D5.1

Case Study Design Methodology – Current Conditions

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1 Introduction

This deliverable defines the characteristics of the Feeder Route and wider Movement Corridor in each of the five case study cities. This includes spatial aspects, multi-modal options, air quality, road users, parking and loading, speed restrictions, street layout, land use patterns, modal share, alternative routes and the interface with the TEN-T Network. It also includes the main stakeholder groups and how they have been engaged.

Each city has set out - in separate chapters - their Design Briefs. These include details on the current day 'sections under stress' along the Feeder Routes which will be the focus of new street designs to improve the conditions and efficiency of movement. The Design Briefs highlight the overall objectives by profiling the performance indicators by which new designs will be evaluated and the timeplans to deliver focus groups and design days for the co-creation of options. Indicators include travel speed, congestion, public transport delay, modal share, persons crossing the road, time spent in area and level of social activities, parking, loading and unloading, accidents and air quality.

The next steps of the project will see sites develop and evaluate these options using the WP4 tools for road space design, stakeholder engagement, simulation (updated VISSIM models) and appraisal.

The learning from this process will help feed into a separate deliverable which will focus on future demand and supply scenarios (looking ahead 10 to 20 years) and how pressures on the feeder route (resulting for instance from denser housing) could be alleviated. This will be tested in the expanded VISSIM modelling.

2 Current conditions along the feeder route and sections under stress to be re-designed

2.1 Budapest

2.1.1 Movement Corridor

BKK Centre for Budapest Transport as the mobility manager of Budapest is responsible for sustainable strategic planning and road allocation in Budapest.

TEN-T road networks approach Budapest's city limit as they intersect with the M0 motorway, which is the bypass of Budapest. The Urban Feeder Route connects with the Mediterranean TEN-T route via M7 motorway (west from Budapest view), M3 motorway (east from Budapest view) which is also part of the Mediterranean corridor. Although the bypass has been built, the road infrastructure from 1970s and 1980s has remained which ensures the shortest pass is still through the city centre between M7 and M3 motorway, and as a result is very well used by motorists. This Urban Feeder Route has been selected for the MORE study along with the surrounding corridor in view of its challenges and also opportunities. It runs from the M0 motorway to the city centre.

Figure 1. Interaction of TEN-T and other key motorways in Budapest.
Green: Mediterranean corridor, brown: Orient / East-Med corridor, blue: Rhine-Danube corridor. On the left: highway, railway, waterway. On the left: motorways, Mediterranean corridor (M7-M0-M3 motorway), Orient / East-Med corridor (M1-M0-M5 motorway), Rhine-Danube corridor (M1-M0-M5 motorway), red: between M7 and M3 motorway shortest path, black: Urban Feeder Route

The map below (Figure 2) shows the entire length of the MORE corridor in Budapest from the M0 motorway to Keleti railway station. The Urban Feeder Route has 4 main sections.

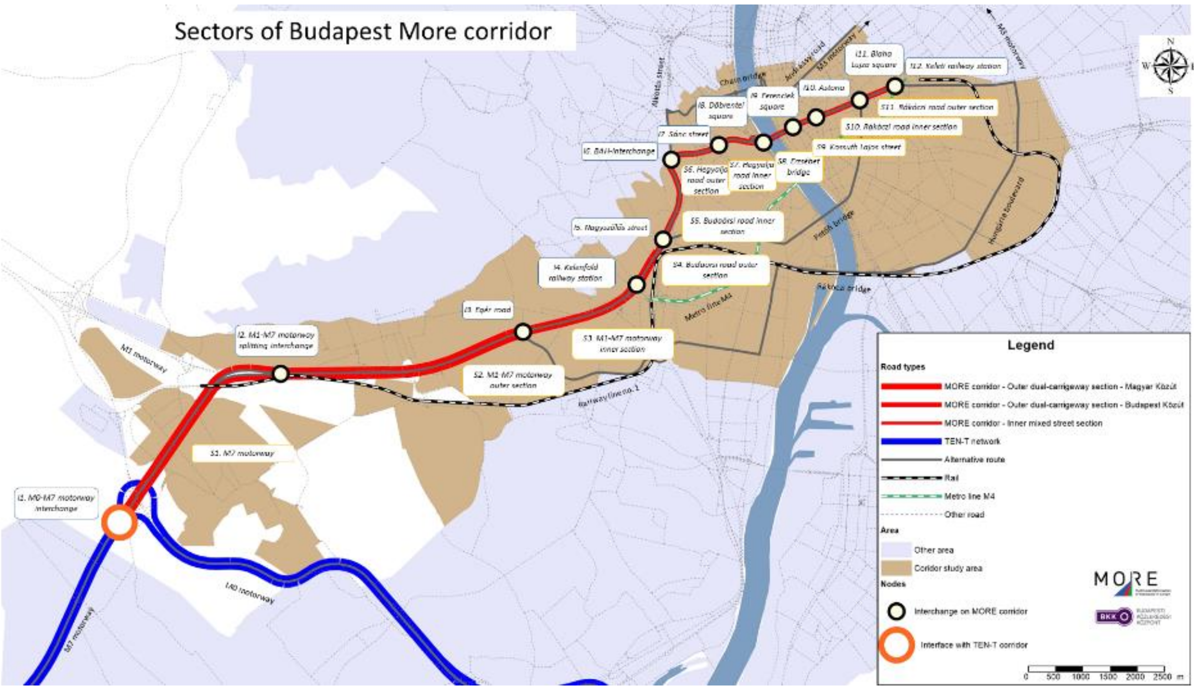


Figure 2. Sections of Budapest Urban Feeder Route

The first part of the route, M1-M7 motorway, is one of the busiest motorways in Hungary, more than 100,000 cars reach the city limit every day. The high number of commuters cause problems in Budapest traffic and beyond (i.e. congestion, parking stress, air quality problems).

The starting point of second part of the corridor, Budaörsi road, is Kelenföld interchange, which is located next to the city limits and is one of the most important intermodal transport hubs in Budapest. National railways, metro line M4, regional and local bus lines, tram lines and P+R facilities are also available. The endpoint of this section is BAH interchange, which is an important junction in Buda where the south-north road and the east-west road intersects.

The third part of the section, Hegyalja road, locates between BAH interchange and Döbrentei square, it goes through the slope of Gellért Hill.

The fourth part of the section is the Rákóczi road axis. This axis is one of the most important boulevards in Budapest not just in the aspect of traffic but also in a historical way. Erzsébet bridge, Kossuth Lajos street, and Rákóczi road is part of the axes and ends at Keleti railway station forming an important interchange.

Budapest road network was redesigned in the 1970s. The city planners' dreams of more space for cars and reduced public transport network became reality. The newly built road infrastructure (i.e. road bridges and tunnels) changed Budapest from a public transport-oriented city to a car-oriented city.

It caused problems mainly in the city centre, because Budapest is the hub of the road network in Hungary, and several main roads were connected via city centre in these years to ensure easy and quick transit for cars. The Rákóczi axis is suffering from these difficulties in particular. In the last years, several parts of the city were redesigned and Budapest is a sustainable mobility city nowadays, but city centre of Budapest is still very attractive not only for local traffic but also transit because of lack of alternative roads and (partly) grade-separated interchanges.

The axis of Kossuth Lajos street and Rákóczi road is the core axis of the Budapest road network and it is a typical example of huge traffic at the city centre. The west-east axis is part of the MORE corridor. This axis provides the connection between the Buda (west) side and the Pest (east) side, of the city across the Danube. The road section between Ferenciek square and Astoria has been analysed in detail at MORE project which is reported in Chapter 3.

Boundary of the MORE corridor range
BKK Centre for Budapest Transport owns and operates a macroscopic transport model of Budapest. It contains major roads, public transportation lines, traffic needs and volumes (public transportation, private vehicle, freight traffic and bike). We have defined a Budapest wider study area boundary and alternative routes of Budapest MORE corridor based on the zones of macroscopic traffic model to ensure traffic model friendly environment to the future simulations.

Identify alternative routes of urban feeder roads
The Urban Feeder Route has three main parallel road routes and several public transport connections. Both of the parallel road routes cross the river Danube on different bridges. The end of alternative routes does not always reach the Urban Feeder Route, because the possible connection with M3 motorway for through traffic was taken into account.

<u>Alternative route I. – Rákóczi bridge</u>
The first alternative route start interchange is Egér road (I3). It bypasses the downtown and ends the outer part of the city centre at Hungaria boulevard.

Table 1. Alternative route I. – Rákóczi bridge

Sections	Road geometry	Traffic condition
Egér road	2 traffic lines in each direction	26000 vehicles/day in two directions
Andor street	2 traffic lines in each direction	
Szerémi road	2 traffic lines in each direction; tram tracks for tram line 1	
Rákóczi bridge	2 traffic lines in each direction; tram tracks for tram line 1	92000 vehicles/day in two directions
Könyves Kálmán boulevard	3 traffic lines in each direction; tram tracks for tram line 1	
Hungária boulvard	3 traffic lines in each direction; tram tracks for tram line 1	73000 vehicles/day in two directions

Alternative route II. – Petőfi bridge

The second alternative route start interchange is Nagyszőlős street (I5), and end junction is Blaha Lujza square (I11). This route bypasses the core of Urban Feeder Route via Grand Boulevard.

Table 2. Alternative route II. – Petőfi bridge

Sections	Road geometry	Traffic condition
Nagyszőlős street	2 traffic lines in each direction	34000 vehicles/day in two directions
Bocskai road	2 traffic lines in each direction	
Október huszonharmadika street	2 traffic lines in each direction; tram tracks for tram line 4	
Irínyi József street	2 traffic lines in each direction; tram tracks for tram line 4,6	80000 vehicles/day in two directions
Petőfi bridge	2 traffic lines in each direction; tram tracks for tram line 4,6	
Ferenc boulevard	2 traffic lines in each direction; tram tracks for tram line 4,6	
József boulevard	2 traffic lines in each direction; tram tracks for tram line 4,6	52000 vehicles/day in two directions

Alternative route III. – Chain bridge

The third alternative route start interchange is BAH-interchange (I5), it goes through the downtown via Chain bridge and Andrássy avenue and it ends at Heroes square as the end of the city centre.

Table 3. Alternative route III. – Chain bridge

Sections	Road geometry	Traffic condition
Alkotás street	2 traffic lines in each direction; tram tracks for tram line 17, 61	44000 vehicles/day in two directions
Mészáros street	1 traffic line in each direction	
Alagút street	1 traffic line in each direction	
Chain bridge	1 traffic lines in each direction	22000 vehicles/day in two directions
József Attila street	1 traffic lines in each direction	
Andrássy avenue	2 traffic lines in each direction; metro line M1 under the Andrássy avenue	36000 vehicles/day in two directions

Public transport

Kelenföld railway station is the western gate of the city. It is an important transportation hub with a direct railway, metro, tram and bus link to the city centre.

Railway

Several national and international trains go through Kelenföld railway station, and the station has a direct connection with two main railway station in Budapest, Déli railway station and

Keleti railway station. The railway service isn't integrated enough to the public transport service in Budapest. Therefore just a few people use the rail for travelling within the city.

Metro

Metro line M4 is the newest metro line in Budapest. It has been opened in 2014, and it makes a connection between Kelenföld railway station and Keleti railway station via the city centre. The usage of the metro line is constantly growing, and it is the most used public transport line to the city centre from the railway station. Two termini of the metro line have relatively similar passenger traffic (750000 passengers a day at Kelenföld railway station, 65000 passengers a day at Keleti railway station) and the downtown section has the greatest passenger traffic (108000 passengers a day between Szent Gellért square and Fővám square).

Tram

Three tramlines approach Kelenföld railway station. Tram line 19 and 49 go directly to the city centre, and tram line 1 is going boundary of the city centre, next to the alternative route I.

Bus

Kelenföld railway station intermodal hub has a local and a regional bus terminus also. They link the outer part of city and its agglomeration area to the city.

Movement/place road category method

Categorizing urban spaces based on Movement/Place matrix is a new method for Budapest. This approach transferred from Transport for London helps to understand the different modal and land use priorities of streets.

Figure 3. Movement/Place matrix

Using this categorisation, the entire length of the Urban Feeder Route is considered "M3", having strategic importance for movement. Outer part of Urban Feeder Route and Gellért hill part of route are "P1", neighbourhood of Ferenciek square and Astoria are "P3", which are important transportation hubs and cafés and shops are available. The rest of the Urban Feeder Route is "P2".

The street type M3P1 is considered to represent arterial roads (“reliable major routes for large volumes of traffic that mitigate the impact on adjacent communities”), while M3P2 represents high roads (“reliable major routes with vibrant, safe, secure and well-maintained urban environments, and making shops and services easily accessible”). Further information can be found in this document: http://content.tfl.gov.uk/londons-street-family-chapters-1-2.pdf

For the MORE project the TfL typology has been developed further to create a distinction between high movement function on the outer “road” section of the corridor (M3A) and on the inner urban “street” section (M3B). We also distinguish between low place function on commercial/non-residential streets (P1A) and on residential streets (P1B). This is primarily to reflect the difference in frontages between these street types, with P1A streets more likely to have active frontages requiring loading/unloading and servicing activity.

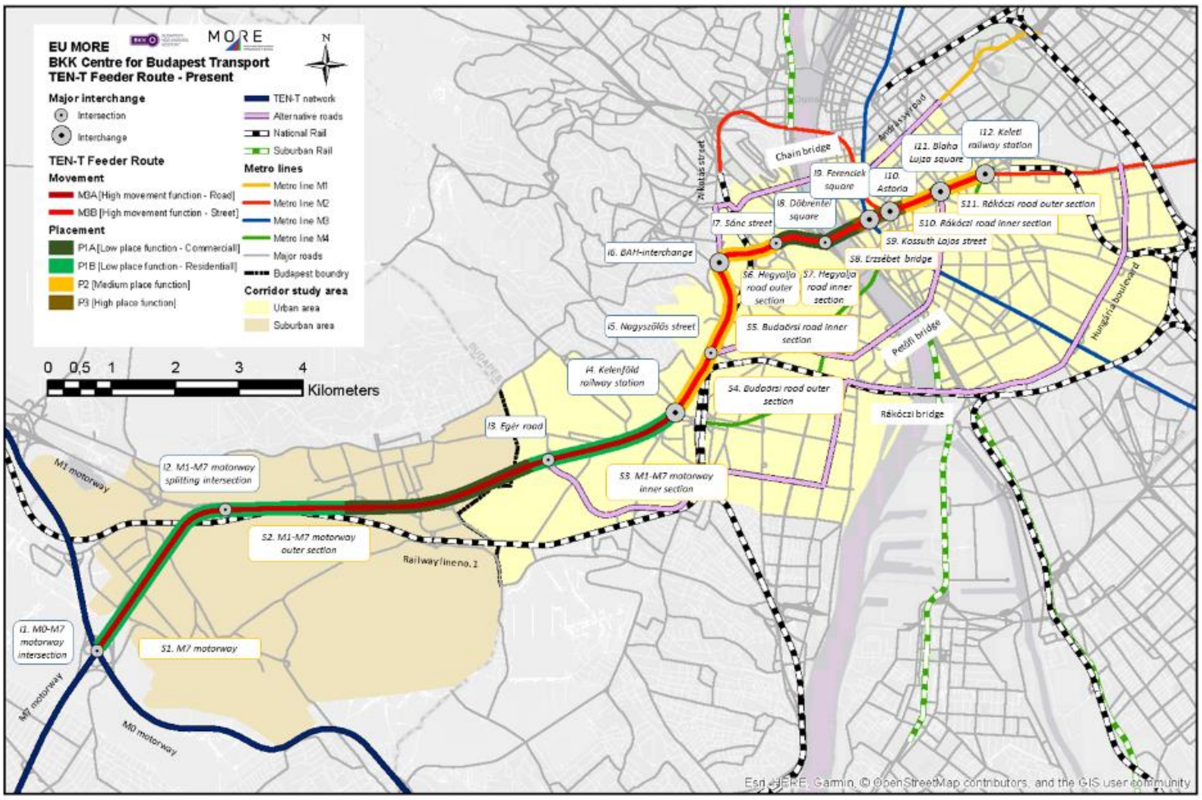


Figure 4. Sections of Budapest Urban Feeder Route in detail, MORE project

2.1.2 Urban Feeder Route

Urban Feeder Route

The Urban Feeder Route contains the following, homogenous sections: M7 motorway, M1-M7 motorway, Budaörsi road, Hegyalja road, Erzsébet bridge, Kossuth Lajos street, Rákóczi road. The length of Urban Feeder Route is 17.55 km.

Table 4. Urban Feeder Route in detail. Red box: Core part of Area under stress

No. of section	Name of section	Type of section i.	Type of section ii.	Length of section [km]	Road operator	Movement and Place classification (Present)	Start interchange / intersection	End interchange / intersection	Design speed [km/h]	No. of lanes for private vehicles*	Road separation [yes/no]	No. of bus lanes*	No. of bus lines	Public transport [passenger / day]‡	Volume of traffic [vehicle/ day]‡	Share of Goods Vehicle under 3,5t‡	Share of Goods Vehicle over 3,5t‡	Share of Cyclist‡	Share of Passenger car ‡	Parking
S1	M7 motorway	Road	Motorway	3.1	Magyar Közút	M3A / P1B	M0-M7 intersection	M1-M7 intersection	130	2+2	yes	0+0	0	-	56400	14%	8%	0%	79%	No
S2	M1-M7 motorway outer	Road	Motorway	5.1	Magyar Közút	M3A / P1B; P1A †	M1-M7 intersection	City limits of Budapest (Egér road)	100	3+3	yes	0+0	3	5400	110300	15%	8%	0%	77%	No
S3	M1-M7 motorway inner	Road	Urban motorway	2.2	Budapest Közút	M3A / P1B	City limits of Budapest (Egér road)	Kelenföld railway station	100	3+3	yes	0+0	3	5400	83700	13%	2%	0%	85%	No
S4	Budaörsi road outer	Road	Urban motorway	1.1	Budapest Közút	M3A / P2	Kelenföld railway station	Nagyszőlős street	70	3+4 4+4	yes	1+0 0+0	8	12300	121200	9%	1%	1%	89%	No
S5	Budaörsi road inner	Street	Urban main road	1.5	Budapest Közút	M3B / P2	Nagyszőlős street	BAH-interchange	50	2+2	yes	0+0	5	9900	69800	5%	1%	2%	93%	Footway
S6	Hegyalja road outer	Street	Urban main road	1	Budapest Közút	M3B / P2	BAH-interchange	Sánc street	50	2+2	yes	surrounds of bus stops	5	22700	48100	2%	0%	2%	95%	Parking spot
S7	Hegyalja road inner	Street	Urban main road	0.75	Budapest Közút	M3B / P1B	Sánc street	Döbrentei square	50	2+2	yes	0+0	5	22700	48100	2%	0%	2%	95%	No
S8	Erzsébet bridge	Street	Urban main road	0.8	Budapest Közút	M3B / P1B	Döbrentei square	Ferenciek square	50	2+2	no	1+1	9	56000	67300	2%	0%	4%	94%	No
S9	Kossuth Lajos street	Street	Urban main road	0.4	Budapest Közút	M3B / P3	Ferenciek square	Astoria	50	2+2	no	1+1	9	39700	53600	3%	0%	7%	90%	No
S10	Rákóczi road inner	Street	Urban main road	0.85	Budapest Közút	M3B / P3	Astoria	Blaha Lujza square	50	2+2	no	1+1	10	52100**	50300	5%	0%	17%	78%	No
S11	Rákóczi road outer	Street	Urban main road	0.75	Budapest Közút	M3B / P2	Blaha Lujza square	Keleti railway station	50	2+2	no	1+1	10	52100**	50300	5%	0%	17%	78%	No

* directions: before plus sign: eastbound direction; after plus sign: westbound direction
** Metro line M2 operates between Astoria and Keleti railway station, passenger flow of metro line was not taken into account.
† shopping malls are in this section
‡ data from Budapest macroscopic traffic model

Road accidents on Urban Feeder Route

BKK as the responsible mobility manager of Budapest collects accident and collision data from several sources. Several types of accidents happened in the past 5 years (between 2013 and 2018) in the TEN-T feeder route. Table 5 below shows the number of accidents in ten different groups in every section of the MORE corridor.

Table 5. Types of road accidents in TEN-T feeder route. Orange background of boxes: the most frequent accident type by road section; red numbers: the most dangerous section by accident type, between 2013 and 2018; red box: Core part of Area under stress

Types of accidents	**M7 motorway** section 1	**M1-M7 motorway outer** section 2	**M1-M7 motorway inner** section 3	**Budaörsi road outer** section 4	**Budaörsi road inner** section 5	**Hegyalja road outer** section 6	**Hegyalja road inner** section 7	**Erzsébet bridge** section 8	**Kossuth Lajos street** section 9	**Rákóczi road inner** section 10	**Rákóczi road outer** section 11	**Summarized result**
Sidewipe collision, straight car	4	26	13	28	36	24	44	14	26	8	41	264
Head on collision, straight car					2		7				1	10
Sidewipe collision, turning car		1	4	5	15	12	7	8	17	3	14	86
Head on collision, turning car			2		6	2	1	1	2	1	2	17
Transverse direction, straight car			1	1	6	1	1	8	9	8	5	40
Transverse direction, turning car			1	4	5			2	5	3	10	30
Parking car accident				1	1			4	3		2	11
Singe car and other accident	5	9	7	11	7	8	9	10	7	4	13	90
Pedestrian accident			2	3	20	10	4	21	29	13	24	126
Summarized result	**9**	**36**	**30**	**53**	**98**	**57**	**73**	**68**	**98**	**40**	**112**	**684**

<u>Interchanges and intersections on Urban Feeder Route</u>

Interchanges and intersections determined based on their functions on the Urban Feeder Route.

Table 6. Interchanges on Urban Feeder Route

No. of interchange / intersection	Type of junctions (interchange / intersection)	Name of interchange / intersection	Short description
I1	intersection	M0-M7 intersection	• Full grade separated intersection
I2	intersection	M1-M7 intersection	• Full grade separated intersection • Only connection from M1-M7 motorway to M1 motorway and M7 motorway
I3	intersection	Egér road (City limits of Budapest)	• Full grade separated intersection • Starting point of alternative route 1
I4	interchange	Kelenföld railway station	• Part grade separated intersection • Transport hub (Kelenföld railway station, 1000 P+R parking spots, metro line M4, bus and tram lines)
I5	intersection	Nagyszőlős street	• Full grade separated intersection • Only connection from Kelenföld railway station to BAH-interchange and Nagyszőlős street • Starting point of alternative route 2
I6	interchange	BAH-interchange	• Part grade separated intersection • Transport hub (bus and tram lines) • Starting point of alternative route 3
I7	intersection	Sánc street	• At-grade junction • Gellért hill
I8	intersection	Döbrentei square	• Part grade separated intersection • Transport hub (bus and tram lines) • End point of alternative route 2
I9	interchange	Ferenciek square	• At-grade junction • Transport hub (metro line M3 and bus lines)
I10	interchange	Astoria	• At-grade junction • Transport hub (metro line M2, bus and tram lines)
I11	interchange	Blaha Lujza square	• At-grade junction • Transport hub (metro line M2, bus and tram lines)
I12	interchange	Keleti railway station	• Part grade separated intersection • Transport hub (Keleti railway station, metro line M2, M4; bus, trolleybus and tram lines)

Urban Feeder Route in detail

Table 7 below illustrates and describes the characteristics of the 12 sections of the urban feeder route. The closer to the centre of the city, the more the different types of road users and demands on street space.

Table 7. Sections of Urban Feeder Route

S1. M7 motorway (eastbound view) • Hungarian Public Road managed • Expressway • Two lanes each direction • Separated directions • No footways • No frontages • Car dominated • High flow • High speed limit (130 km/h)	
S2. M1-M7 motorway outer section (eastbound view) • Hungarian Public Road managed • Expressway • Three to five lanes each direction • Separated directions • No footways • No frontages • Shopping malls • Car dominated • High flow • High speed limit (100-130 km/h)	

S3. M1-M7 motorway inner section
(eastbound view)

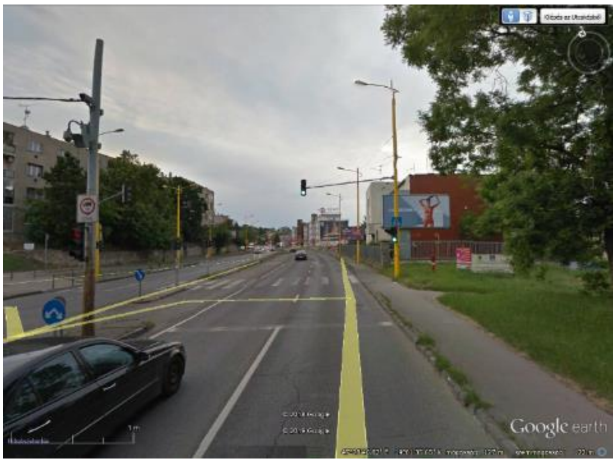
- Budapest Public Road managed
- Expressway
- Three lanes each direction
- Separated directions
- No footways
- No frontages
- Car dominated
- High flow
- High speed limit (80-100 km/h)

S4. Budaörsi road outer section
(northbound view)

- Budapest Public Road managed
- Wide carriageway (Three to four lanes each direction, bus lane at northbound direction)
- Separated directions
- Shops, offices
- Footways
- Car dominated
- High flow
- Speed limit (70 km/h)

S5. Budaörsi road inner section
(northbound view)

- Budapest Public Road managed
- Wide carriageway (2 lanes each direction, parking spots and bus layby)
- Separated directions
- Shops, offices, residential area
- Footways
- Car dominated
- High flow
- Speed limit (50-60 km/h)



S6. Hegyalja road outer section (eastbound view) • Budapest Public Road managed • Wide carriageway (2 lanes for private transport each direction, bus lanes surrounds of bus stops) • Separated directions • Shops, offices, hotels residential area, the slope of Gellért hill • Footways • Important east-west road axis in Buda • Car and Public Transport dominated • High flow	
S7. Hegyalja road inner section (eastbound view) • Budapest Public Road managed • Wide carriageway (2 lanes for private transport each direction) • Separated directions • Parks, green spaces, the slope of Gellért hill • No frontages • Footway • Car and bus dominated • High flow	
S8. Erzsébet bridge (eastbound view) • Budapest Public Road managed • Wide carriageway (2 lanes for private transport, 1 lane for public transport each direction) • Bridge over the Danube • Footway • Tourist • High flow	

S9. Kossuth Lajos street (eastbound view) • Budapest Public Road managed • Wide carriageway (2 lanes for private transport, 1 lane for public transport each direction) • Relatively narrow space for pedestrians, fence between carriageway and footways • There is no parking spots on the corridor • Taxi drop off zone, loading bays parking spots on the side streets • Pedestrian crossing • Residential and commercial land use • Cinema, shops, offices, hotels, pubs, fast food restaurants • Tourists • High flow	
S10. Rákóczi road inner section (eastbound view) • Budapest Public Road managed • Wide carriageway (2 lanes for private transport, 1 lane for public transport each direction) • Relatively narrow space for pedestrians, fence between carriageway and footways • Public transport bus stop, city tour bus stop, taxi drop off zone, loading bays, parking stops • Pedestrian crossings • Residential and commercial land use • Cinema, university, hospital, shops, offices Hotels, pubs, fast food restaurants, church • Tourists • High flow	

S11. Rákóczi road outer section (eastbound view) • Budapest Public Road managed • Wide carriageway (2 lanes for private transport, 1 lane for public transport each direction) • Relatively narrow space for pedestrians, fence between carriageway and footways • Public transport bus stop, city tour bus stop, taxi drop off zone, loading bays, parking stops • Pedestrian crossings • Residential and commercial land use • Cinema, university, hospital, shops, offices Hotels, pubs, fast food restaurants, church	

2.1.3 Land use

Budapest is spread over an area of 525.12km^2, 52% of which is currently occupied by built-up plots, and 48% is undeveloped. The applicable Structural Plan of Budapest (TSZT) would allow that ratio to change to around 59%-41% in the long term. This means that – in accordance with the effective plan – 3,675 hectares of presently undeveloped areas could be newly built-up.

The spatial balance appropriately reflects the purposes for which the area of the capital city is currently being used, and what ratio of built-up / free (undeveloped) area characterizes it. Analysis shows the areas used by Budapest in a breakdown of built-up areas, free urban areas, and special urban operational areas.

Most of the built-up areas (61%) are used for residential purposes, 12% agricultural land, and all other types of area represent a 6% total. Among undeveloped areas agricultural land, forest, and areas used for transport/traffic reflect similar proportions. As areas used by the transport system are classified as technical use, green areas constitute no more than 32% of the city's total area. More information is shown in the map (Figure 5) below.

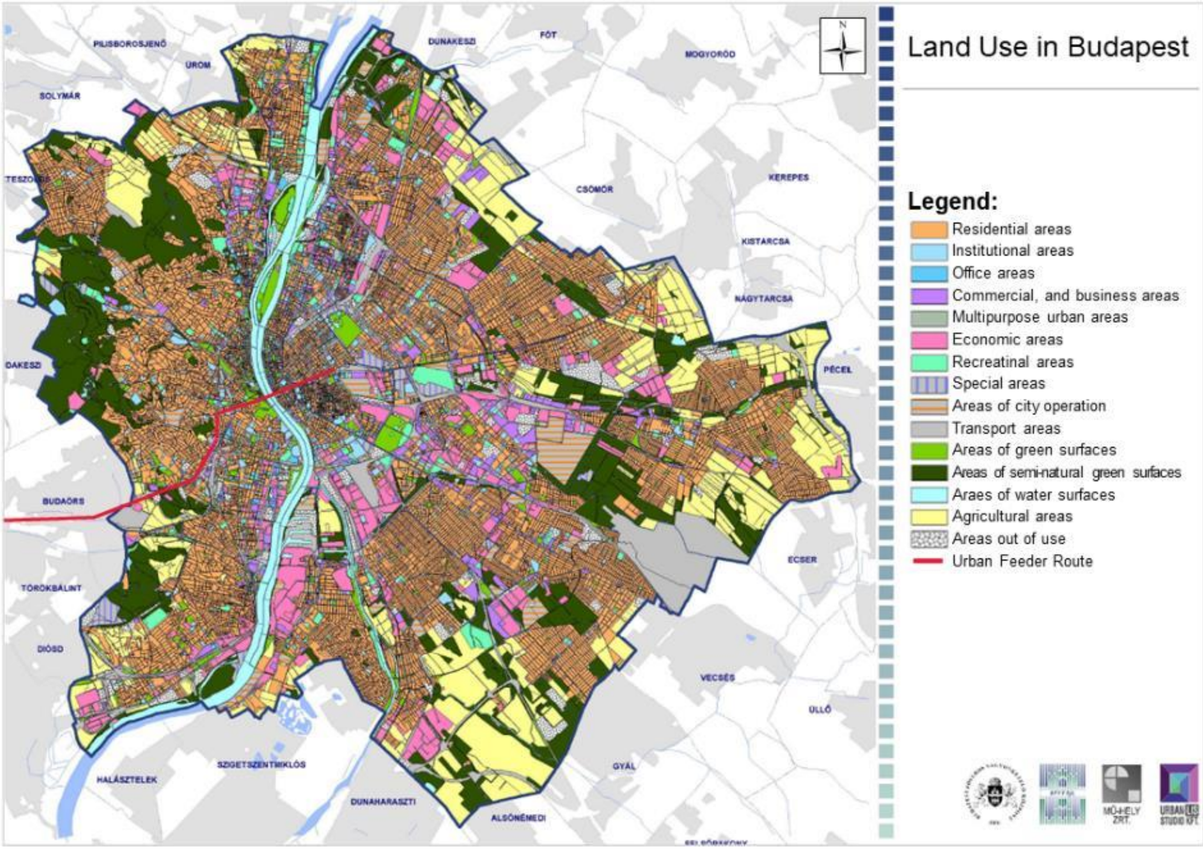


Figure 5. Land Use in Budapest.

Source: https://budapest.hu/Documents/varosfejlesztesi_koncepcio_2011dec/08_Terulethasznalat_Beepites.pdf

2.1.4 Traffic Restriction

The Freight Transport Strategy for Budapest is based on two decrees made by the General Assembly of Budapest. The development of the Freight Transport Strategy for Budapest is well depicted by the map below (Figure 6) regarding the total weight restricted zones and highly protected zones.

The Freight Transport Strategy for Budapest has been a system since 2009 operable for Budapest’s roads on the whole territory of Budapest to mitigate traffic and regulate road transport. It was made by taking primarily environmental protection and city logistics aspects into account.

Access permits have to be applied on the Freight Transport Access Permit Online Administration System (’’TOBI” http://tobi.bkk.hu/?lang=en) for entry into zones designated by the Freight Transport Strategy for Budapest for affected vehicles.

On 1 January 2012 the paper-based access permit was replaced by the electronic-format access permit. Due to changes made in January and February 2012, affected vehicles pay for the access permit into the restricted zones in proportion with their total weight over the maximum permitted weight in accordance with the ton-based system.

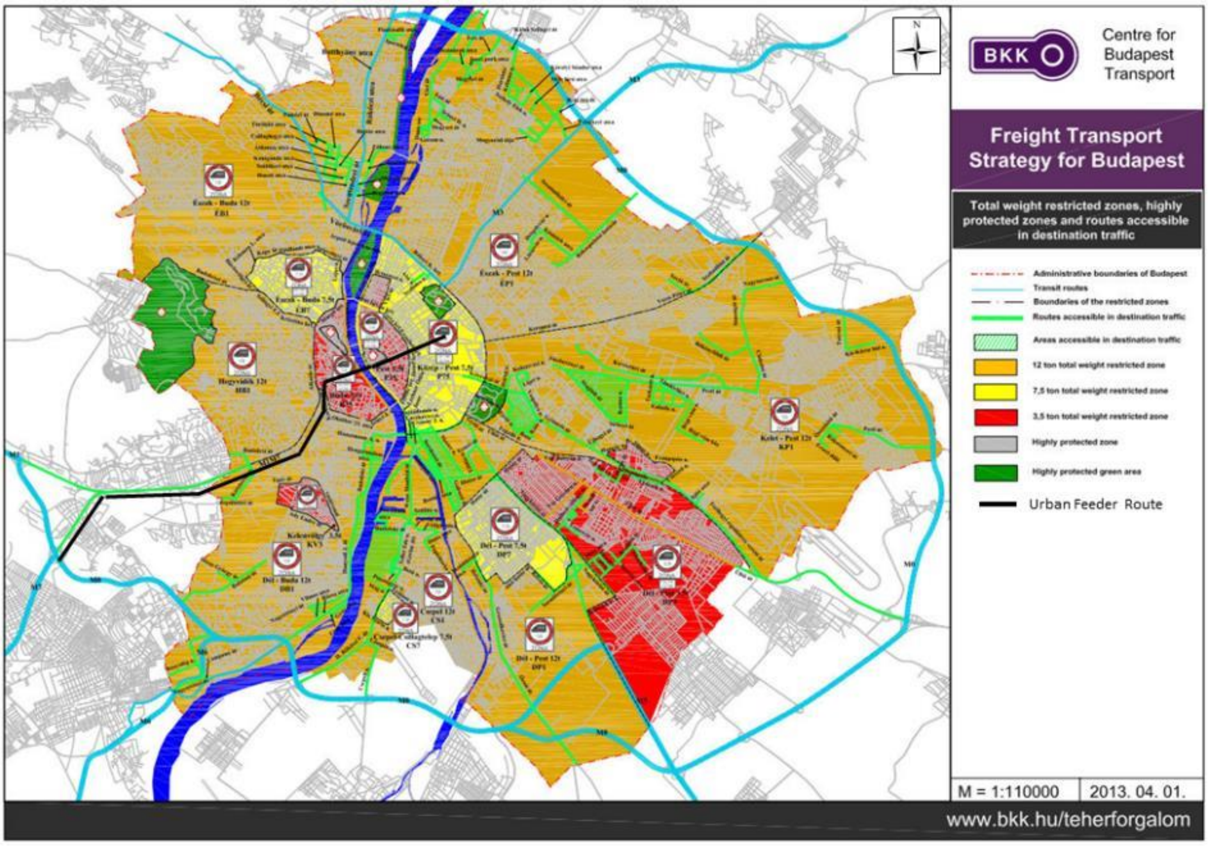


Figure 6. Freight Transport Strategy for Budapest

Source: https://urbanaccessregulations.eu/images/stories/pdf_files/Budapest%20FTSB-information_ENG.pdf

2.1.5 Noise

One of the largest environmental problems in Budapest is constituted by the considerable noise and vibration load levels; typically generated along transport facilities. More than two thirds of the population are affected by considerable noise load. Noise emissions mainly come from public road transport; to be followed by noise loads of railway traffic, near airports, the noise loads of air traffic, besides which industrial emissions cause fewer problems. The map below (Figure 7) shows the varying levels of daytime traffic noise.

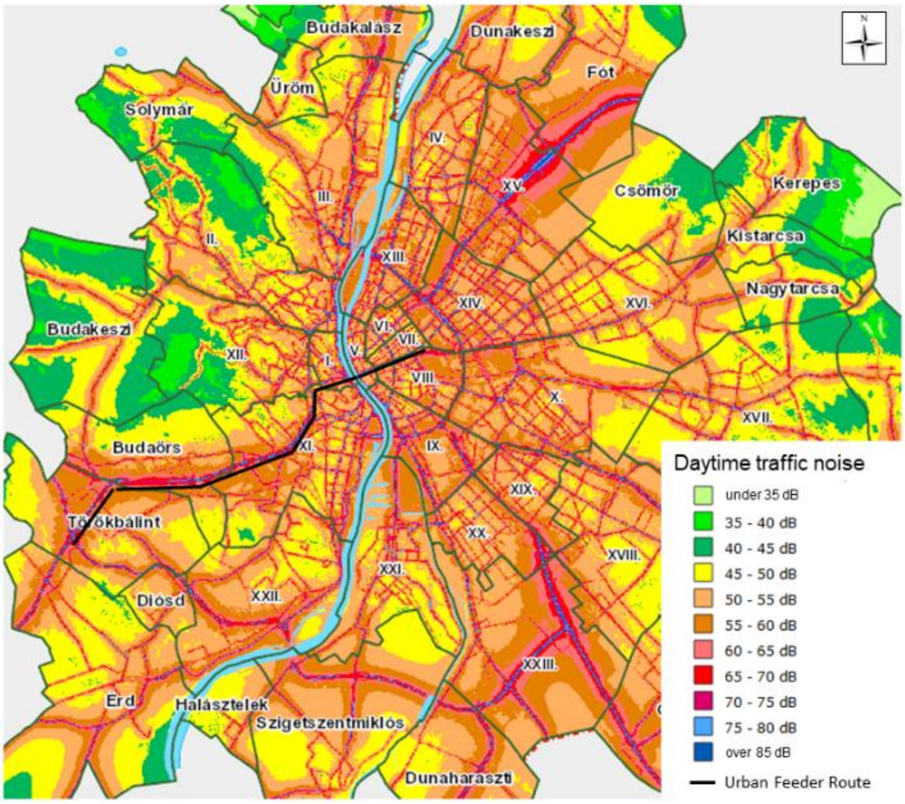


Figure 7. Daytime traffic noise Budapest and agglomeration

Source: https://geoportal.budapest.hu/Kornyezetvedelem/ZAJ/2007/Agglo/

2.1.6 Stakeholders and TEN-T Network.

Hungarian Public Road is the road operator of suburban sector of Urban Feeder Route, and Budapest Public Road is the road operator of urban sector of Urban Feeder Route. The high volume of traffic on the corridor is one of the biggest challenges from the road operator's point of view. The elements of the road network often need renovation and replacement.

The following sections of TEN-T Urban Feeder Route were significant renovation and reallocation:

- M1-M7 motorway needs frequent maintenance;
- Section needs more bicycle friendly environment (moving and locking);
- Installing bus lanes (public transport lanes), where it is missing;
- Kelenföld railway station interchange was reconstructed in 2014. Now it is a partially separated interchange and it has an important task in everyday traffic. Public and private traffic can reach Kelenföld railway station (intermodal hub) via this interchange;
- At the BAH interchange the guard rails of overpass were renovated in 2018;

- Döbrentei square intersection has a lot of small radius curves. Several accidents happened here during the years. Special traffic signs were installed here by the road operator to warn drivers;
- Elisabeth Bridge requires unique maintenance;
- Ferenciek square interchange and its neighbourhood was reconstructed in 2014. Underpass for road traffic was terminated and new pedestrian crossings were opened on the surface;
- Keleti Railway station interchange and its neighbourhood were reconstructed in 2014 in connection with the building of metro line M4.

2.2 Lisbon

2.2.1 Movement Corridor

Lisbon's urban feeder route is included in the Atlantic corridor that connects Europe's South-Western regions towards the centre of the European Continent, linking several ports from the Iberian Peninsula towards central Europe.

Figure 8. TEN-T Network

Figure 9. Connection between Lisbon and the TEN-T Network (Atlantic corridor)

The entrance in Lisbon is done through the E90 highway, which connects the south and the north of Portugal.

Within the urban boundaries, Lisbon's **Urban Feeder Route** starts in the neighbouring municipality of Loures as a motorway (Complementary Network defined in the National Road Plan), gradually reducing the car predominance as we get further from the TEN-T network and closer to Lisbon's centre.

Starting in the north limit of Lisbon, **Infante D. Henrique Avenue** defines almost the whole length of the corridor, along 12 km. The exception is a branch (**Mouzinho de Albuquerque Avenue**/ **Morais Soares street),** perpendicular to this avenue, which leads to a densely residential and commercial area.

The corridor serves as a major access to the Port of Lisbon but also as an important urban commuting road along the eastern waterfront of Lisbon, densely inhabited and with heavy services sector, especially in the north part. It's also an important Public Transport (bus and taxi) route, with little or no parking on the side.

It encloses two main **interfaces**, one multimodal, close to the northern limits of the city, and one for rail (subway and train), at Santa Apolonia station, south of the corridor.

Figure 10. Feeder Route

2.2.2 Wider Feeder Route

The boundaries of the wider corridor are:

- the west axis, defined by the 2nd ring road (2ª circular), airport of Lisbon, Almirante Gago Coutinho and Almirante Reis avenues;
- the north boundary is the city limit; and
- the south axis is the feeder route in itself (with a thin buffer only, since it is adjacent to dense historic urban fabric)

The east limit is the Tagus River. There are 3 major urban areas:

- Parque das Nações (mostly services but with high residential features);
- Olivais and Chelas (almost exclusively residential, with a strong incidence of social housing); and
- Olaias, Picheleira, Areeiro and Penha de França, close to Morais Soares street, already on the fringes of the "old city" and with a high heterogeneity of urban functions, mixing very diverse housing, largely social, with public services and equipment, local shops and services.

This area is intersected by public rail transport, specifically the Metro Red line and Cintura train line, which links the city to the West line and to the Northern line (most significant in the country, as to passenger numbers).

Lisbon Airport is located on the top Northeast limit of the boundary and most of the main road network consists of structuring avenues.

2.2.3 Movement and Place functions

Along the corridor, the axis presents different typology and crosses zones with very diversified functions:

Infante D. Henrique Avenue is categorized as a low place function, although there are "islands" of residential areas along it, as well as in streets parallel to it (most significant in the southern segments). There are many warehouses along it, as seen in the pictures displayed below.

At both south branches of the "Y" shaped corridor, this place function increases, especially at Morais Soares street (where it reaches High place function).

In terms of movement, the feeder route starts as a high movement road and, as it enters the city, changes to a high movement street – although still a high-speed channel (partly through tunnel), it also has pedestrian crossings and sidewalks on the surface.

At about half its length, where it meets the riverfront, the corridor changes to an urban road/street.

In the following pages a detailed analysis is made, splitting the corridor in three sections:

Section 1 - Infante D. Henrique Avenue (North)

Figure 11. Feeder Route division in three zones

The main section of the corridor, just on the border of the city of Lisbon, connects to the Complementary Network defined in the National Road Plan - namely in IC 2 and IC17/CRIL (which are road extensions through highway A1 and through the European roads 1 and 80) and also to the Vasco da Gama bridge (Highway 12), which is part of the trans-European Route E 90.

This important road axis in the city, classified as 2nd and 3rd levels in Lisbon Master Plan's (MP) urban road network hierarchy, is a high capacity road, with the most important junctions unlevelled, very high traffic volume (high percentage of heavy goods and other commercial vehicles), very low active modes usage and quite diverse functions, being a crucial movement road to access the Eastern port of Lisbon, and at the same time being a major urban commuting road along the eastern waterfront of Lisbon, densely inhabited and with heavy services sector, especially in Parque das Nações.

It's also an important Public Transport (bus and taxi) route, with little or no parking on the side.

Section 2 – Infante Dom Henrique Avenue (South)

In this section we have an arterial branch between José Queirós Plaza and the Xabregas viaduct on the Northern line (2nd level in MP) and a secondary branch, between Xabregas viaduct and the Santa Apolónia area (3rd level in MP).

The arterial branch spans heavily industrialized peripheral areas of Lisbon – Cabo Ruivo, Braço de Prata, Matinha, Poço do Bispo, Beato and Xabregas – with several storage facilities (grain silos, for example) being currently under an on-going process of renovation and services' hosting. It remains an important channel for goods transportation, by road and rail from the eastern front of the port of Lisbon, in particular the bulk cargoes (Container Terminal is situated on the Riverfront, West part of the corridor).

Figure 12. Movement and Place analysis in the northern zone

This arterial branch of about seven kilometres, also serves as inter-urban link to the northern suburbs of the city - Sacavém, Bobadela, Santa Iria de Azóia, Vialonga, Alverca, etc. with a strong, light traffic, pendulum movement – and as access to one of the more recent urban expansion areas of Lisbon, Parque das Nações. This is strongly residential, but with a high concentration of large companies headquarters, tertiary higher offices, shops, restaurants and hotels, and major equipment (Lisbon International Fair, Oceanarium, Multipurpose pavillion, ...), as well as important Public Services, namely the justice Campus of Lisbon (Central Courts). It also attracts many people, especially during the weekends, for leisure reasons (theatre, Casino, urban parks, etc.).

Additionally, this artery gives access to major urban areas of East Lisbon, namely the densely inhabited neighbourhoods of Chelas and Olivais, as well as Moscavide and Portela de Sacavém, in the outskirts of the city.

Figure 13. Movement and Place analysis in middle zone

Parque das Nações also hosts the major multi-modal passenger terminal of Lisbon – the Orient Station – where rail - Suburban Line of Azambuja, Cintura line, Northern line and red line Metro station (serving Lisbon Airport) - and road transport (taxis, city and suburban, inter-urban, national and international itinerary buses) interact. Also, this multi-modal interchange offers high parking capacity, encouraging people to park their vehicles and take public transport to the city centre.

This branch was heavily enhanced (Viaducts and Tunnels) in the framework of the EXPO'98. Estimated annual average daily flows are high: around 15.000 cars equivalent on the less constrained section of Braço de Prata, between 20.000 and 30.000 in the central section (between Braço de Prata e Cabo Ruivo), and over 30.000 in top northern section (between Cabo Ruivo, Olivais and Parque das Nações).

The secondary branch (3rd level in the MP) of the feeder route, around 1km long, is located in the historic part of city, parallel to and South of the railway, between Xabregas viaduct and Santa Apolónia, and crosses the Central Railway Station area (with an important, regional, national and international passenger and goods commuter rail service, as well as a taxi service).

This area also harbours the new cruise ship terminal and the end of the subway blue line.

Here, the annual average daily flow values are still relatively high, exceeding 10.000 cars equivalent, but other transport modes are now present, including a cycling lane and a railway for segregated transport of goods, exclusive to the port of Lisbon.

Section 3 - Mouzinho de Albuquerque Avenue/ Morais Soares Street

A second segment of this branch (perpendicular to the road previously mentioned), around 2,5km in length, has quite different functional and physical features from the rest, being predominantly commercial and residential in a clear urban fabric, linking the waterfront to the northern boundary of the City Centre (Almirante Reis Avenue).

This segment, with significantly lower road capacity, has much less heavy traffic but higher pressure of taxis and of regular bus service, and includes residential parallel parking.

The estimated annual average daily flow in this segment, although high, barely reaches the 10.000 cars equivalent. The pedestrian traffic and other active modes are quite significant, unlike the other sections described.

The road hierarchy here is classified partially (around 600m in the south end) as 2nd and, mostly, as 3rd level in the MP.

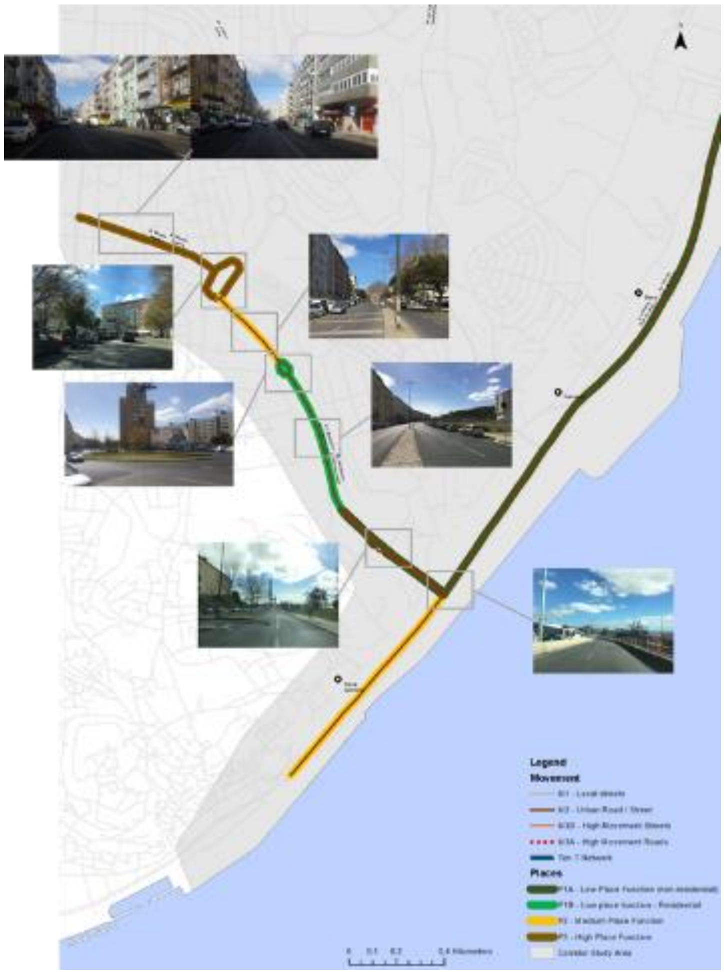


Figure 14. Movement and Place analysis in the southern zone

The final segment, Morais Soares street, is a strong commercial area, with a very high daytime parking demand, mostly for loading and unloading of passengers and goods. This street has also a very high demand of buses, being a significant passenger generator. One of the major characteristics of this street is the high pedestrian flow along the street, between Praça Paiva Couceiro and Praça do Chile, given the very diversified commercial activities in this section.

The Corridor ends over the Arroios subway station, currently closed for expansion and renovation works.

2.2.4 Land Use

The following image (Figure 15) shows the urban classification along the MORE Corridor, as presented in Lisbon's municipal masterplan.

As the image shows, the land use has two main different features: The north side is an **equipment and economic activities** zone, in opposition to the south side which is an area of **central and residential use**.

The corridor crosses several zones under development and transformation as there are few areas, especially by the riverside, that are currently consolidated, both for economic activities and residential areas.

In contrast, the axis formed by Morais Soares Street, Praça Paiva Couceiro and Mouzinho de Albuquerque Avenue, crosses a much more consolidated residential and services area, and a new (huge) residential area on the east side of Mouzinho de Albuquerque Av. is planned to be built.

Additionally to the land use classification, land ownership as well as the foreseen property developments in the corridor area, were analysed.

Figure 15. Land Use along the corridor (Source: Lisbon Masterplan, 2012)

The Port of Lisbon owns most of the land along the riverfront, but there are on-going negotiations with the city council, to allow alternative uses for spaces not essential for port activities.

As shown in the following image, there are several plots of land under development, among which we highlight:

- Jardins Braço de Prata: Construction of a residential area with nearly 500 flats, associated to public space requalification, new green spaces and new public equipment installation.

- Vale de Santo Antonio's Urbanisation Plan: 477.000 m^2 intervention area, to urbanise and construct a new residential (3150 flats) and new shopping areas. Most of these new flats will be integrated in Lisbon municipality' Low Rents program.

- Hub Criativo do Beato: Reconversion of a former army factory complex, with 35.000 m^2, recognized for its industrial and architectural value. There are 20 buildings being renovated to house national and international companies, related to technology, innovation and creative industries, aiming to develop a new business centre.

- Unidade de Execução Olivais Sul – This site has a total intervention area of around 25.000 m2, mostly for commerce and services

All these public space interventions will cause significant changes on the public space, will significantly increase the local traffic and add more pressure on public transport systems. The image shows the location of the referred sites as well as the considered trip generation, which arises from each respective traffic study.

According with the foreseen values, the total implementation of all these plots will be responsible for traffic increase, from 1.800 vehicles to around 3.300 vehicles (afternoon peak hour) which will greatly stress the road network. Figure 16 shows the number of vehicles generated by each one of above referred interventions, according to the respective traffic study.

Figure 16. Traffic volume generated by the new developments to be executed in a short term

Adding to this scenario, it was recently (January 2020) briefed by Lisbon's Mayor that the historic downtown area of Baixa-Chiado will have restricted vehicle access, as one of the most important actions of Lisbon as Green Capital 2020. This will potentially increase stress on surrounding areas, namely on the southern part of the MORE corridor, and it will be considered in this study as soon as there is available data.

2.2.5 Traffic Analysis – Current Situation

Besides current and future land use characterization, a traffic analysis was made according to the traffic model developed by Lisbon Municipality in 2014. Currently, Lisbon municipality is updating the traffic model in the scope of the SUMP (Sustainable Urban Mobility Plan).

However, despite some eventual small changes in the network, our perspective is that there are no significant differences in traffic volume and in capacity ratio from 2014 until the present.

This analysis considers private traffic in the morning and afternoon peak hours, and evaluates the traffic volume along the corridor as well as the capacity ratio, as to identify the places with high congestion probability.

As shown in the following images, the major traffic flow happens along Infante D. Henrique Avenue, starting from the TEN-T[1] corridor to Av. Marechal António de Spínola interchanges. In this section there are several capacity problems, especially in the tunnel and near the intersection with Av. Marechal Gomes da Costa.

Figure 17. Road Network in the TEN-T interface surroundings

From Av. Marechal António de Spínola to the south, the analysed corridor doesn't have major traffic flow problems, except in a small section, on south-north direction, near Braço de Prata, due to a road narrowing.

According to this current analysis, a clear division is noticeable in the corridor. A north side with a high traffic flow volume with several dispersed capacity constraints and a south side, with lower traffic volumes and without capacity problems. However, the forecasted new developments may significantly increase traffic and create some congestion problems, especially in Praça Paiva Couceiro surroundings.

[1] The TEN-T interface is located in the intersection between the Highway A12/E90 and Avenida Infante D. Henrique which is situated in the adjacent municipality of Loures.

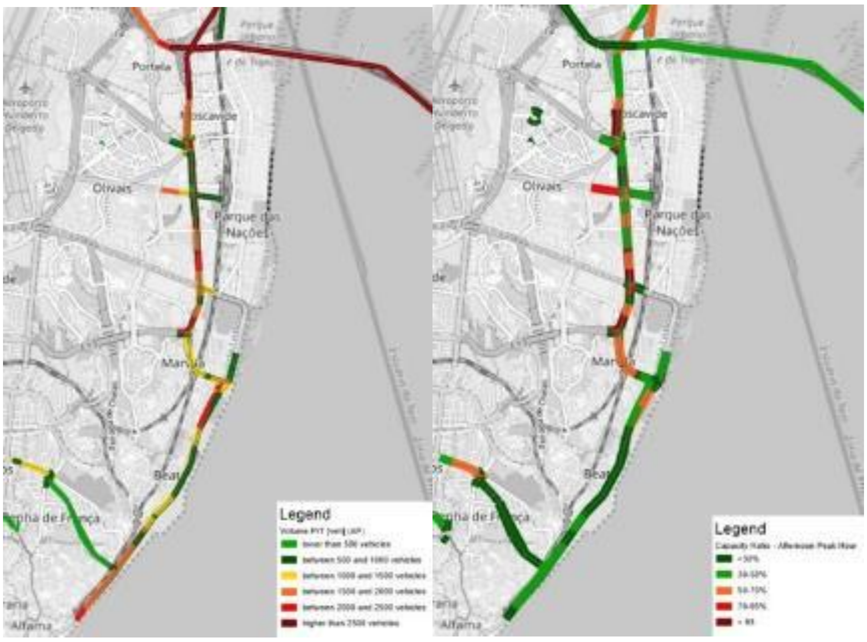


Figure 18. Traffic Volume (left) and Capacity Ratio (right) in the corridor in the morning peak hour (Source: Lisbon Traffic Model, 2014)

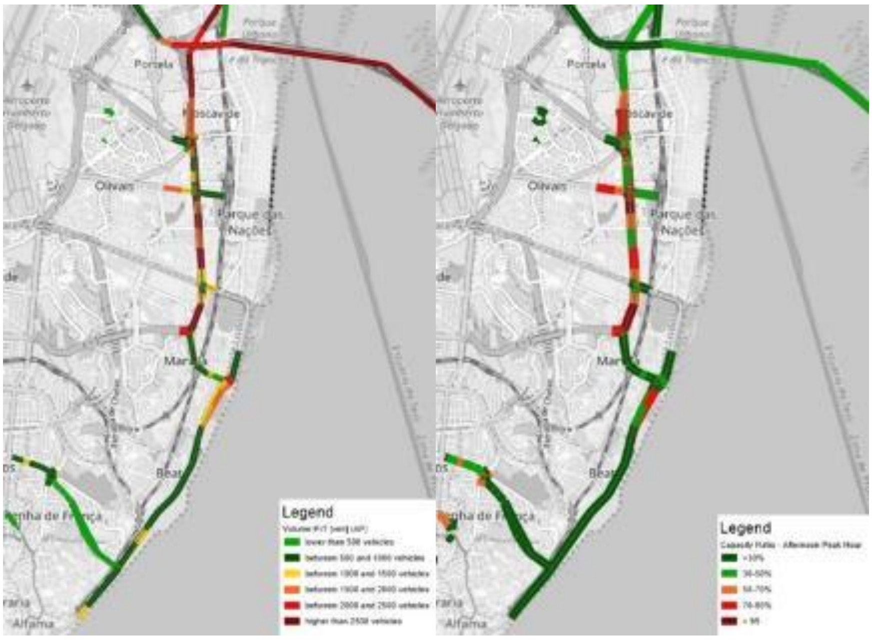


Figure 19. Traffic Volume (left) and Capacity Ratio (right) in the corridor in the afternoon peak hour (Source: Lisbon Traffic Model, 2014)

2.2.6 Accidents

Due to heavy traffic flows and the roads' typology along the corridor, as well as the existence of several intersections with main roads, and the concentration of residential, commercial and service areas, the corridor has some accident black spots that concur with the major intersections identified above which are:

- Intersection 1 – Praça José Queirós
- Intersection 4 – Av. Marechal António de Spínola
- Intersection 7 – Praça Paiva Couceiro / Rua Morais Soares

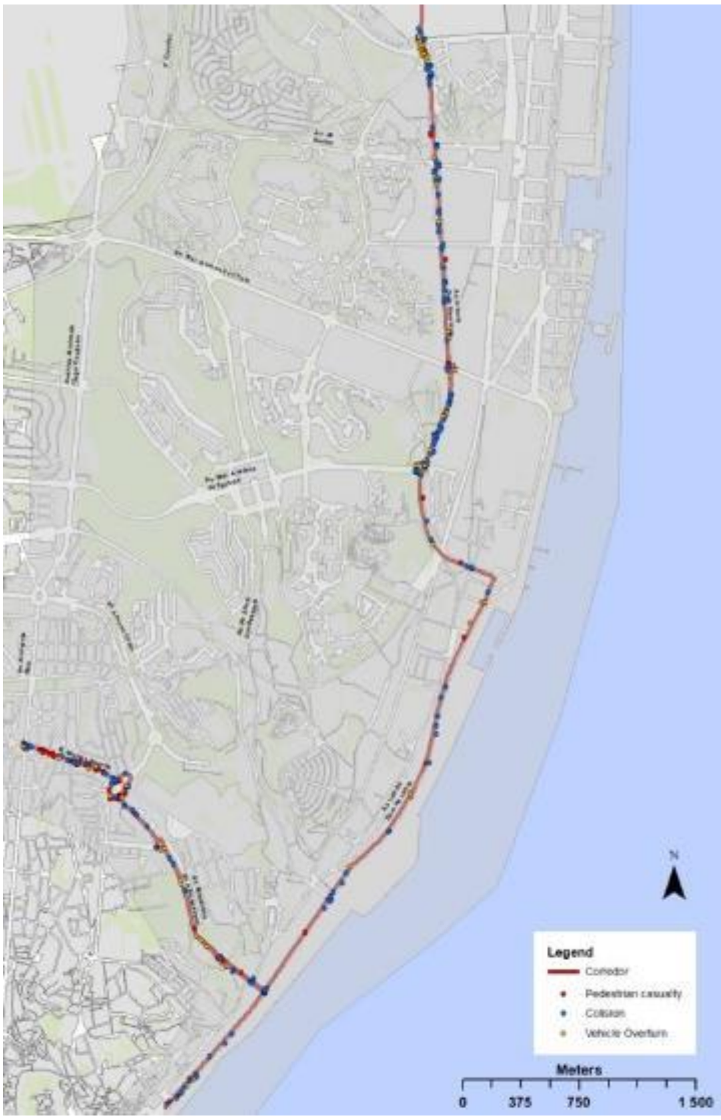


Figure 20. Location of the accidents by type of casualty (Source: ANSR, 2015 - 2018)

The map (Figure 20) shows the number of accidents that occurred between January 2015 and December 2018 in the corridor area, which are also presented in the following tables (Table 8, Table 9).

We must highlight the high percentage of pedestrian casualties and their consequences, which were responsible for 50% of the serious injuries and 75% of the fatal injuries. It should be mentioned that 2 serious injuries and 3 deaths resulted from pedestrian casualties occurred in Praça Paiva Couceiro and Rua Morais Soares.

The following tables show a more detailed analysis of the number of events with casualties along the corridor.

Table 8. Evaluation of the number of casualties, by type of accident between 2015 and 2018

(Source: ANSR – Road Safety National Association)

Type of accident	2015	2016	2017	2018	Total
Pedestrian casualties	19	21	18	19	77
Colision	44	52	57	50	203
Vehicle Overturn	14	21	28	17	80
Total	**77**	**94**	**103**	**86**	**360**

Table 9. Number and type of casualties, by type of injury between 2015 and 2018

(Source: ANSR – Road Safety National Association)

Type of accident	Slight Injuries	Serious Injuries	Fatal Injuries	Total
Pedestrian casualties	74	5	6	85
Colision	249	2	2	253
Vehicle Overturn	88	3	0	91
Total	411	10	8	429

2.2.7 Public Transport

One other important corridor characteristic is the density of public transport, where several transport modes are available, such as bus, subway, rail, a fluvial station in Santa Apolónia and the airport.

Currently, in the studied area, there are three existing interfaces, two of which are located in the direct influence of the road corridor: Parque das Nações and Santa Apolónia.

A new transport interface at the airport is planned and expected to happen in the short term.

This zone is served by:

– the subway red line, which transports 1.3 million passenger km per year and connects the airport to the city centre;

– a very dense bus operation, due to the proximity to Parque das Nações which demands a lot of public transport operation, that connects the eastern side of the city to other town's areas, mostly to the city centre. New bus lanes are planned, between Braço da Prata and Marechal António de Spínola and one in Morais Soares street (west of Praça Paiva Couceiro);

- A large extension of bus lanes is also visible, namely along the road between Santa Apolónia and Braço da Prata, and also on the north, between Av. Marechal Gomes da Costa and Av. de Berlim;
- A railway operation offering urban/suburban systems and connected to national railway operator. Along the corridor, Santa Apolónia and Parque das Nações stations allow connection both to suburban and national rail system, while the stations Marvila, Braço de Prata and Moscavide only allow connection to the suburban lines.

Figure 21. Public Transport Network

2.2.8 Cycle Lanes

The cycle network is under a recent remarkable expansion, relating with a political goal to increase active transport modes as a substitute for car use, having nowadays a total length of 105 km which is aimed to be expanded until around 200 km in 2021.

The following image (Figure 22) shows the existing cycle lane network as well as the planned network, to be executed until 2021.

Figure 22. Cycle Network in the city's eastern side

Along the corridor, there is a cycle lane that connects Santa Apolónia to Parque das Nações (along the river) linking the south and east sides of Lisbon.

Regarding west-east connections most of the network is at a project stage, although there are some existing segments, namely in Parque das Nações' direction.

Until 2021, it is expected to increase significantly the number of connections from the eastern section of the city to the city centre. In the corridor itself, besides the above referred cycle lane connecting Parque das Nações and Santa Apolónia, there is a planned cycle lane in Rua Morais Soares and Praça Paiva Couceiro, until 2021.

2.2.9 Feeder Route

After analysing the corridor's characteristics, it was decided to select the area of Rua Morais Soares and Praça Paiva Couceiro as the section with the highest need of intervention.

Rua Morais Soares is one of the main entrances in the city centre for movements that come from city's east side as well as from the TEN-T network. It provides a connection from Av. Infante D. Henrique to a very dense urban area, with diverse places and functionalities, clearly more stressed than the other analysed sections.

Both Rua Morais Soares and Praça Paiva Couceiro are in the junction of the two most inner ring roads defined in the road network hierarchical scale of Lisbon. This characteristic shows the traffic pressure on this section and enhances the necessity of finding solutions that could accommodate, in a sustainable way, multi-modal systems, reducing the impact of problems like congestion, air pollution and noise, accidents, among others.

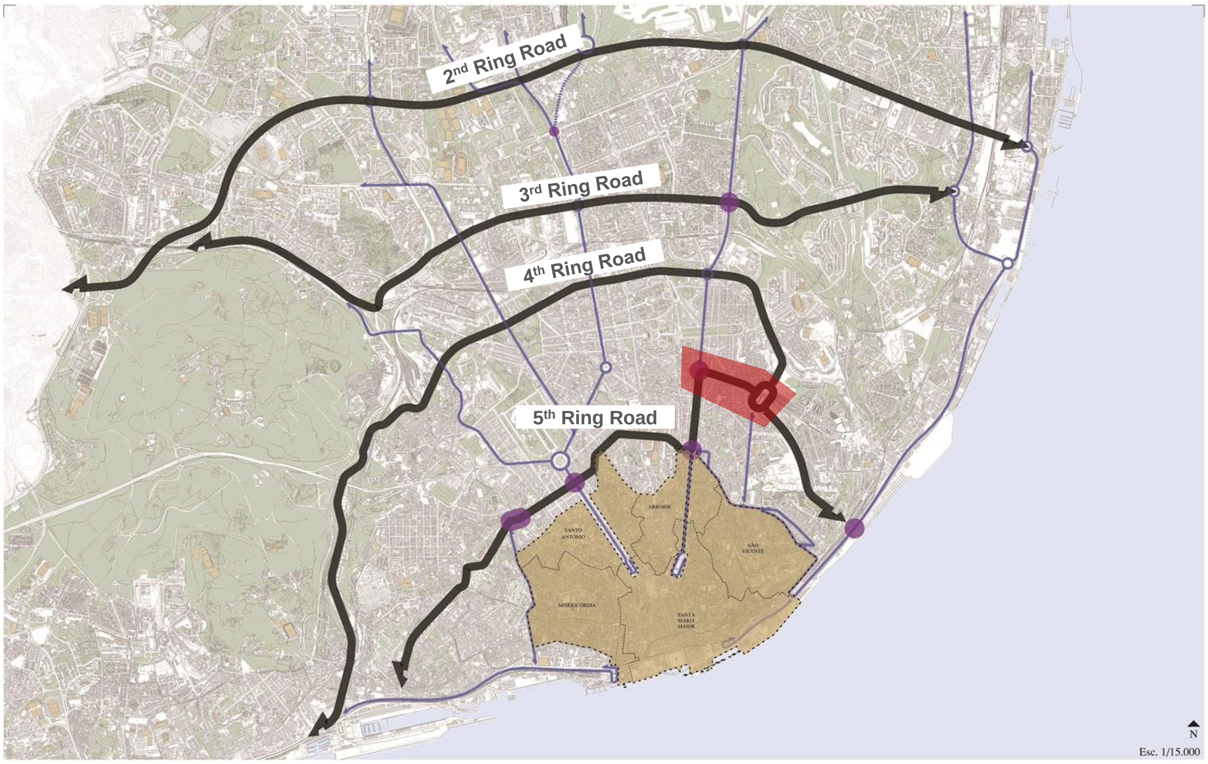


Figure 23. Ring roads considered in Lisbon's road network hierarchical scale

Rua Morais Soares and Praça Paiva Couceiro are strong commercial areas, with a very high daytime parking demand, mostly for loading and unloading of passengers and goods. These areas have also a very high demand of buses, being a significant passenger generator. A major characteristic of these areas is the high pedestrian flow along the street, between Praça Paiva Couceiro and Praça do Chile, given the much diversified commercial activities present.

Besides its socio-economic characteristics, the main reasons why this section was selected were:

- Very important urban street connecting the eastern side of the city to the city centre;
- Very diversified place activity, with a very dense existence of commerce and services;
- High pedestrian activity, despite the lack of good walking conditions available;
- High pressure from private and public transport;
- High pressure for parking, existence of a lot of abusive parking in load/unload bays and a general use of second line parking, having consequences in the traffic flow and boosting the probability of occurring accidents;
- Located in the axis of several public transport lines and planned cycle lanes;
- High ratio of accidents, especially pedestrian casualties, with very serious consequences.

2.2.10 Stakeholders and TEN-T Network

For this specific section, out of an initial extensive list of stakeholders with potential interest in the project, there was a selection of who would most likely engage on the decision making of this section, considering the different competences and responsibilities of each entity.

The objective is to avoid a very extensive list and maintain the focus on the problems, multidisciplinary enough to allow different meetings and focus groups committed to find solutions for the different issues.

The list of stakeholders that is desirable to engage is the following:

National Authority

- IMT - Mobility Transport Institute

Municipal Departments:

- Public Space Municipal Department
- Mobility Management Municipal Department
- Mobility Study and Planning Division
- Mobility Operations Division

- Traffic Management I Division

Local Authority:

- Parish council of Penha de França

Police:

- Municipal Police

Mobility and Parking municipal company:

- EMEL

Transports:

- Carris
- Metro

Citizen Association:

- Vizinhos em Lisboa: Vizinhos da Penha de França
- Mobi.E
- Shopkeepers – with support of Parish council of Penha de França
- Residents – with support of Parish council of Penha de França
- Lisbon Transport User's Commission
- MUBi – Urban cycling mobility association
- ACAM - Association of Self-Mobilized Citizens
- ACAPO - Blind association
- APD - Disability Portuguese Association
- Passeio Livre
- Gebalis

Electric Mobility

TEN-T Network

With regards to the TEN-T Network, the key stakeholders are not officially defined. There is a lack of clarity about who manages the TEN-T road network despite is being commonly agreed that is IMT, as the central government institute that is responsible for planning, regulation, licensing and supervision of land and river infrastructures; commercial ports and maritime transport.

Lisbon municipality has, in fact, limited influence in the TEN-T interface operation, which obliges it to act downstream of the problem, namely, managing traffic flow within the city. From the meetings held so far, it seems that there is some lack of awareness or strategy from IMT for road space reallocation, which will oblige to strengthen the connections between CML and IMT in order to engage both entities to converge possible solutions.

2.3 London

2.3.1 Movement Corridor

The selected corridor in London is situated in the southeast of the city. The map below (Figure 24) shows the entire length of the A2 corridor in from Bricklayers Arms in Southwark (urban centre) to the intersection with the M25 (orbital motorway and TEN-T) boundary in Kent towards the southeast. New Cross (the current section under stress) is indicated on the map for context and which our design brief in Chapter 5 will focus on.

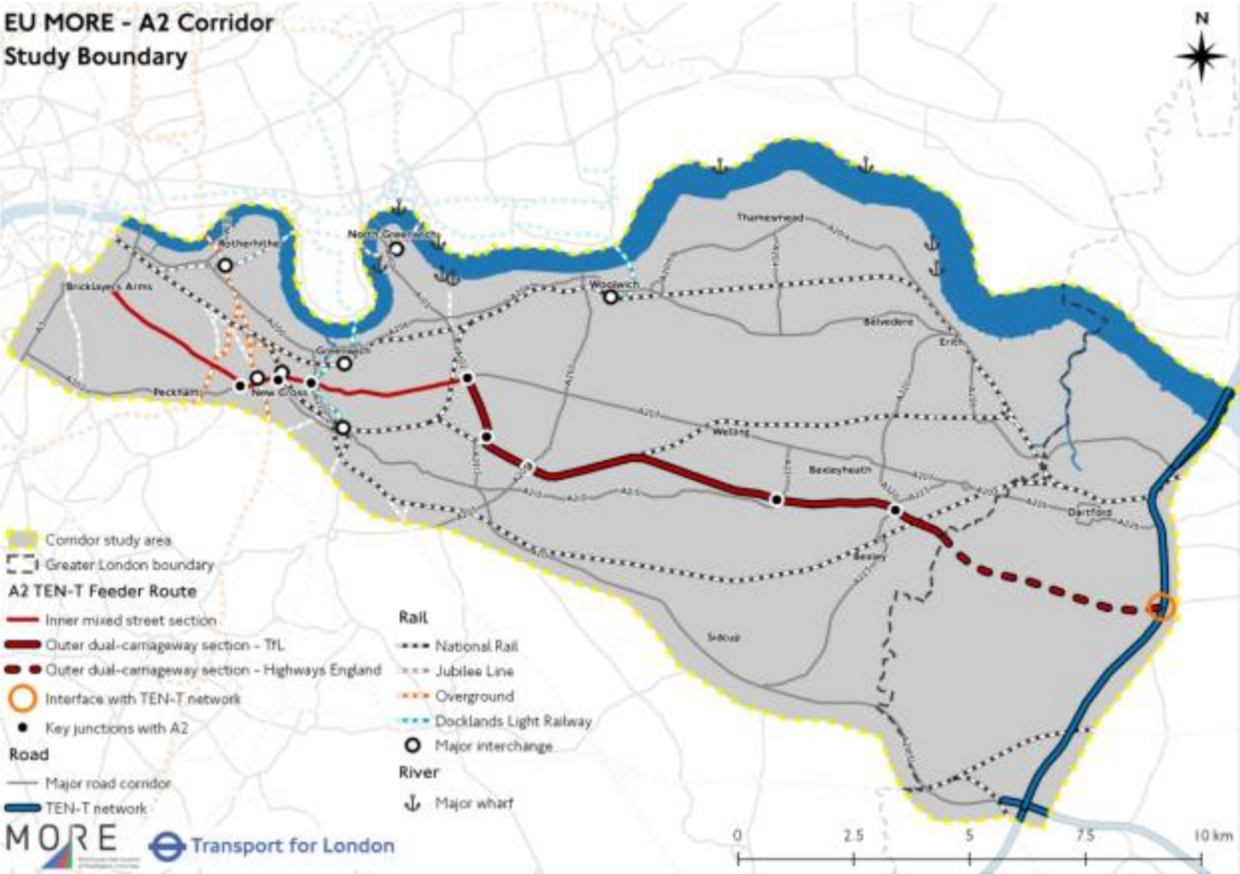


Figure 24. London Movement Corridor and Study Area

We have defined our wider study area boundary, which includes a number of other routes for movement of people and goods along a similar alignment and between different areas along the A2 corridor.

The A2016, A20, A202 and A210 around Lewisham are existing routes that are already capable of serving high volumes of traffic, including freight, some of which might be able to accommodate additional traffic currently using the Urban Feeder Route. We also analysed bus flows on routes in the wider study area which are significant (e.g. the A207 and A210 around Eltham).

A number of railway lines serve the same corridor, running from the southeast of England into and through central London. These could provide alternative public transport options for people currently travelling on the Urban Feeder Route and some of these lines can also be used for freight (we have this information, but it is not indicated on the map).

To the north of the study area, the river Thames carries both passenger services and freight vessels and could therefore serve as an alternative, parallel route for some traffic on the Urban Feeder Route. A number of wharves on both the north and south banks of the river exist in east London. We have mapped the wharves with the greatest capacity for handling goods. The Thames represents the northern boundary of our study area. This provides alternative river, rail and road routes within the study area to the north of the Urban Feeder Route. The A20, along with the Sidcup rail line represent the southern boundary of our study area. This provides alternative rail and road routes within the study area to the south of the Urban Feeder Route.

Movement and Place

In recent years, Transport for London (TfL) worked with local borough councils across London to assign every street to a movement and place category on a scale of one to three (one being local significance and three being strategic significance), resulting in nine movement/ place categories.

Figure 25. TfL's Movement and Place typology

Using this categorisation, the entire length of the Urban Feeder Route is considered "M3", having strategic importance for movement. Nearly all the Urban Feeder Route is "P1" – local significance for place – except for the stress section in New Cross, where there are many shops, cafés and restaurants and where Goldsmiths College is located, making this section "P2".

The street type M3P1 is considered to represent arterial roads ("reliable major routes for large volumes of traffic that mitigate the impact on adjacent communities"), while M3P2 represents high roads ("reliable major routes through London with vibrant, safe, secure and well-maintained urban environments, and making shops and services easily accessible").

Further information can be found in this document: http://content.tfl.gov.uk/londons-street-family-chapters-1-2.pdf

For the purposes of the MORE project, we have created a distinction between high movement function on the outer "road" section of the corridor (M3A) and on the inner urban "street" section (M3B). We also distinguish between low place function on commercial/non-residential streets (P1A) and on residential streets (P1B). This is primarily to reflect the difference in frontages between these street types, with P1A streets more likely to have active frontages requiring loading/unloading and servicing activity. These classifications are shown in the map (Figure 26) below.

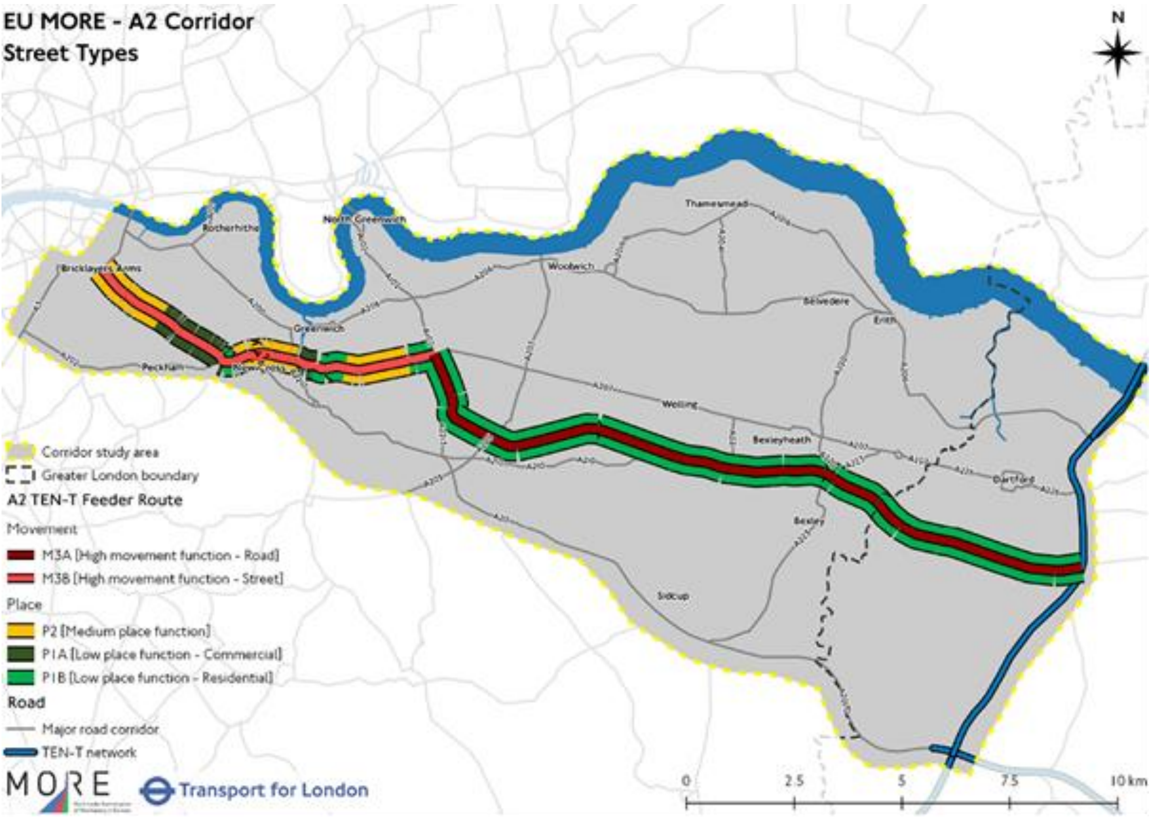


Figure 26. Movement and Place Classifications

2.3.2 Feeder Route

The Urban Feeder Route changes in character, travelling from the edge of central London at the north end of Old Kent Road, through inner London and out to the TEN-T Network. These differences are presented in Table 10 below, with road space limitations evident towards the urban centre.

Table 10. Sections of the Urban Feeder Route

Old Kent Road (southbound view) • Relatively wide carriageway (2 lanes in each direction in places) • Mix of traffic, with pedestrians using footways and crossing • Residential and commercial land use • Large, often warehouse-style shops • Intermittent bus lanes	
New Cross Road, shortly after junction with A202 (eastbound view) • Wide carriageway • Busy location for bus-bus interchange • Residential land use • Bus lane in one direction	
New Cross Road, at New Cross Gate station (eastbound view) • Restricted road space • Higher pedestrian density • Station exit directly onto street • Transitioning to high street environment • Commercial land use with small shops, cafés and restaurants	

New Cross Road, between New Cross Gate and New Cross stations (eastbound view) • Variable carriageway width • Commercial land use • High street/road environment • Pedestrian activity • Bus lane in one direction	
Blackheath (eastbound view) • Restricted road space – one lane in each direction (widening in places) • Recreational land use • Open green space either side • Limited pedestrian crossings	
Approaching Sun in the Sands roundabout (eastbound) • Transition point between street and road • Wide carriageway • Residential land use • Lower pedestrian density	

A2 outer expressway section, after Sun in the Sands roundabout (eastbound view) • Expressway • Three lanes in each direction • No footways • No frontages • Car dominated • Higher flow	
Outer A2, near Bexley (eastbound view) • Expressway • Three lanes in each direction • No footways • No frontages directly onto road (access roads adjacent to A2) • Car dominated • High flow • High speed (50mph)	
A2 beyond the M25 • Highways England managed • Expressway • Three to four lanes • High flow • High speed (70 mph)	

2.3.3 Collisions

The Mayor of London has adopted Vision Zero, aiming to have no one killed or seriously injured (KSI) on London's roads by 2041.

Collisions resulting in injury or fatality in London have decreased over time. However, the largest decrease has been in car occupants, reflecting improvements in vehicle safety technology for people inside the vehicle.

Rates of KSIs in more vulnerable road user groups persist, including people walking and cycling. This is a key challenge not only for achieving Vision Zero, but also in encouraging more people to use these active, sustainable modes.

Pedestrian KSIs along the A2 corridor are concentrated around the areas of higher pedestrian density, namely the north end of Old Kent Road and the section through New Cross and Deptford, as shown in Figure 27 below.

Figure 27. Concentration of pedestrian killed or seriously injured (KSI) casualties for the period 2015-2017 along the A2 corridor

The pattern is similar for cyclist KSIs, although the absolute numbers are smaller. There appears to be a concentration of cyclist KSIs on Blackheath, approaching Sun in the Sands roundabout, as shown in Figure 28 below. However, the link-level data shows that these KSIs occurred on streets adjacent to the A2. There were no collisions resulting in cyclist fatalities on the A2 over the analysed period (2015-2017).

Figure 28. Concentration of cyclist killed or seriously injured (KSI) casualties for the period 2015-2017 along the A2 corridor

The disaggregated data for collisions resulting in injury or death of pedestrians and cyclists is shown in the following two maps (Figure 29, Figure 30).

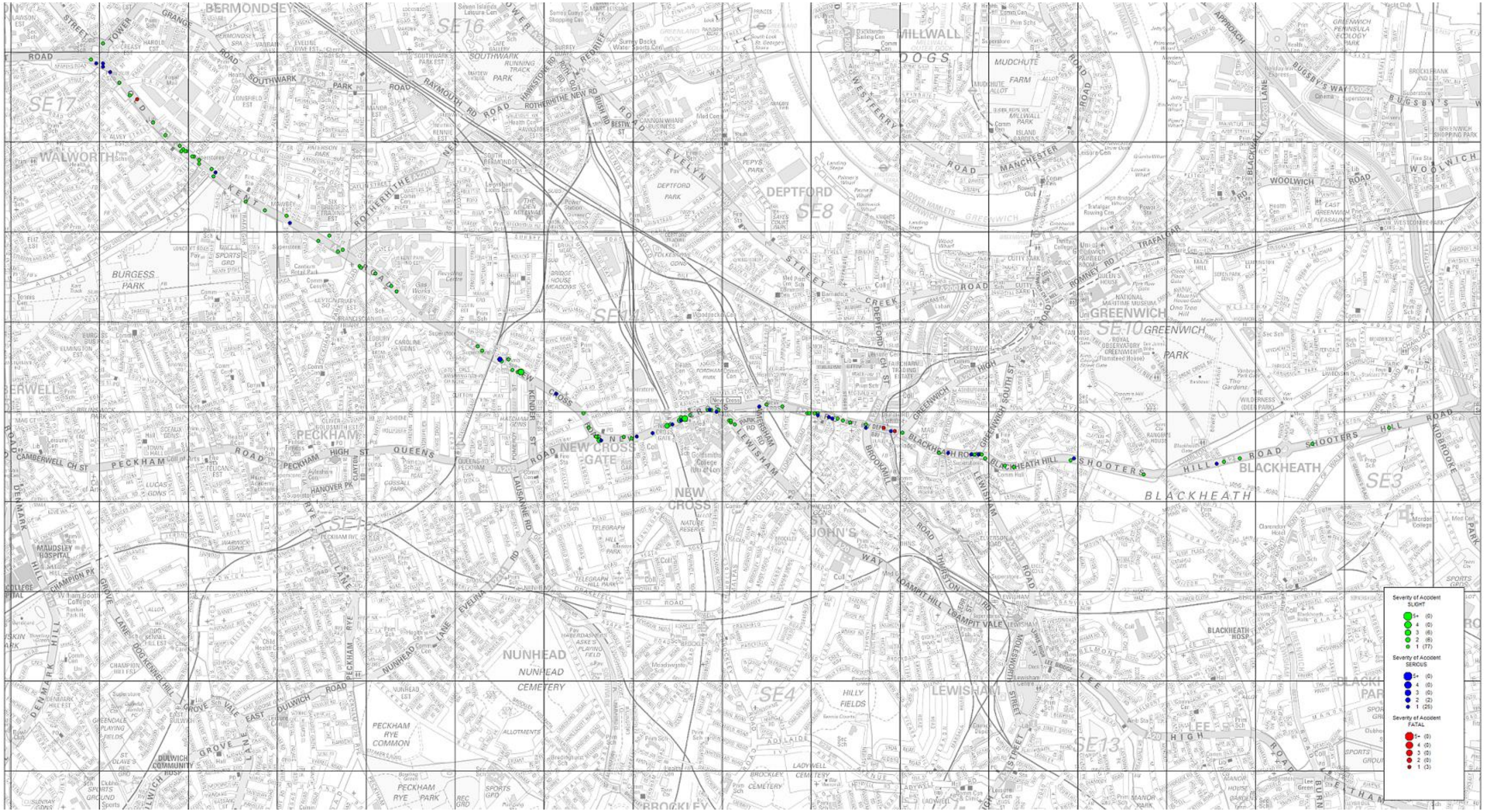


Figure 29. Map of collisions resulting in pedestrian injury (slight or serious) or fatality on the A2 corridor, 2015 – 2017

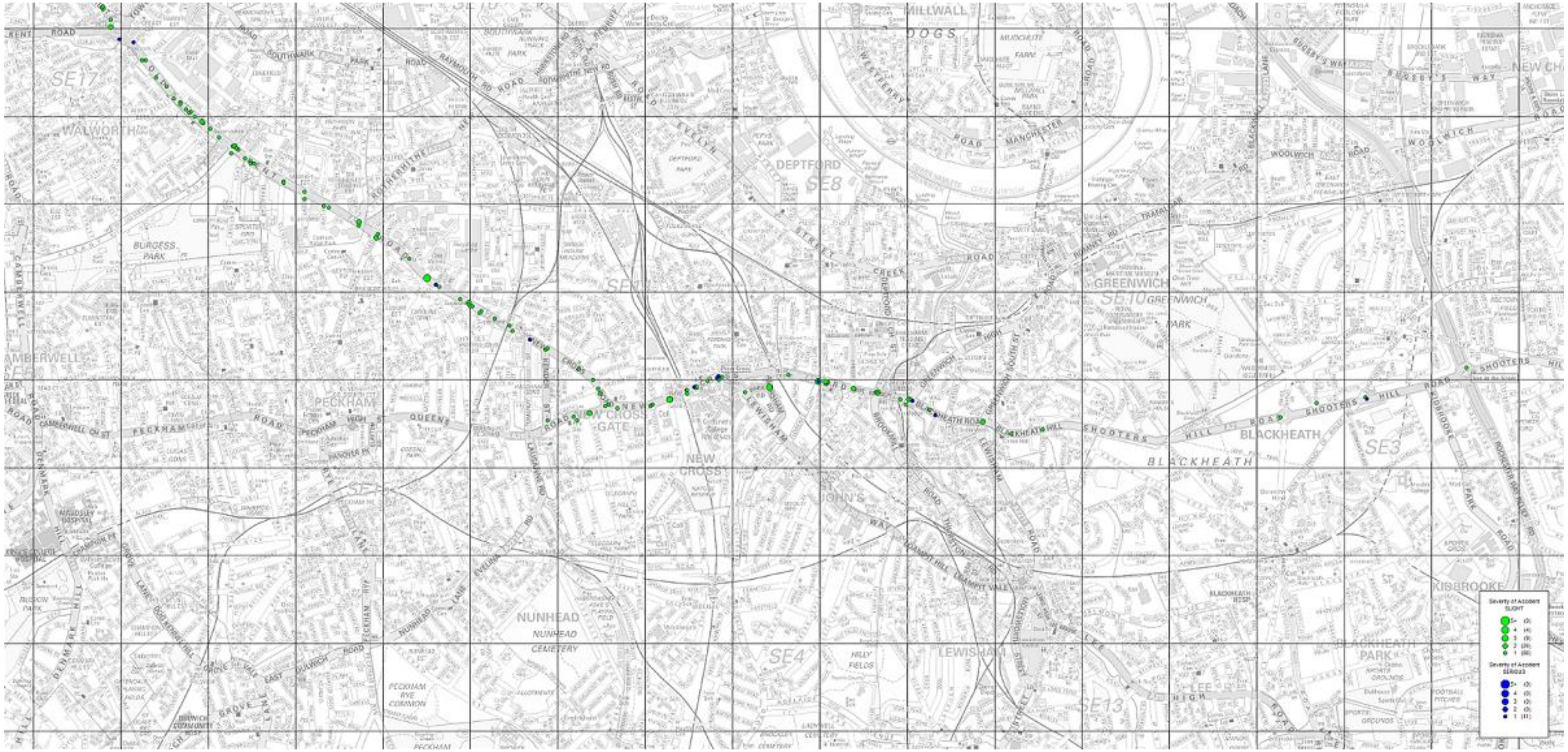


Figure 30. Map of collisions resulting in cyclist injury (slight or serious) on the A2 corridor, 2015 – 2017. There were no collisions resulting in cyclist fatality on the A2 in this period

2.3.4 Crime

TfL has developed an overall measure of street crime, combining multiple datasets to calculate the Street Crime Score (weighted and unweighted by crime severity, based on number of days in prison). Data to calculate Street Crime Scores was obtained from the data.police.uk open data service for 2014-15.

Street crime can also be displayed as Street Crime Rate, which divides by pedestrian density in order to indicate disproportionate levels of street crime.

The individual datasets that contribute to the overall Street Crime Score are:

- Violence and sexual offences;
- Vehicle crime;
- Theft from person;
- Public order offence;
- Bicycle theft;
- Anti-social behaviour.

On the A2 corridor, the locations of the highest Street Crime Scores (shown in Figure 31 below) reflect the location of highest pedestrian density, namely the north end of Old Kent Road and the section through New Cross. This remains the case when looking at the unweighted Street Crime Score (i.e. based only on incidence, not severity), albeit slightly less pronounced.

Figure 31. Street Crime Score (weighted for crime severity), 2014-2015, for hex cells along the A2 corridor, with the top 10 per cent of hexes for the corridor highlighted with black outline

Looking at Street Crime Rate (weighted for crime severity) along the A2 highlights three locations with a disproportionately high rate of crime, given the pedestrian density in these locations. These are the southern end of Old Kent Road on the inner street section of the corridor, and one location near Kidbrooke and another near Bexleyheath on the outer road section of the corridor. This is shown in Figure 32 below.

Figure 32. Street Crime Rate (weighted for crime severity), 2014-2015, for hex cells along the A2 corridor, showing three hex cells on the A2 with disproportionately high rates of street crime given the pedestrian density in those locations

The Street Crime Score for the locations near Kidbrooke and Bexleyheath are among the lowest in the whole GLA area (26 and 10 counts for the period respectively). This reflects the very low pedestrian density at these locations. The score for the location on Old Kent Road is significantly higher (102 counts over the period).

2.3.5 Air quality

Modelled NO_2 and PM_{10} concentrations are available from the London Atmospheric Emissions Inventory (LAEI) April 2017. The LAEI is a database of datasets of modelled pollutant emissions and sources for Greater London (up to the M25) produced in collaboration with the GLA, and King's College London.

Mean NO_2 concentrations are generally higher along the inner street section of the corridor, with the highest concentrations found along the north section of Old Kent Road, the junction with the A202, around New Cross and Deptford, at the Sun in the Sands roundabout and near junctions with the A2213 and A205 on the outer section. This is illustrated in Figure 33 below.

Figure 33. Modelled mean NO2 concentrations (µg/m3) along the A2 for the year 2013. Darker hex cell indicates higher concentrations

Figure 34 below shows the mean PM_{10} concentrations along the corridor which are more uniform, but peak in similar locations along the inner section of the corridor, namely the north end of Old Kent Road, the junction with the A202 and at New Cross.

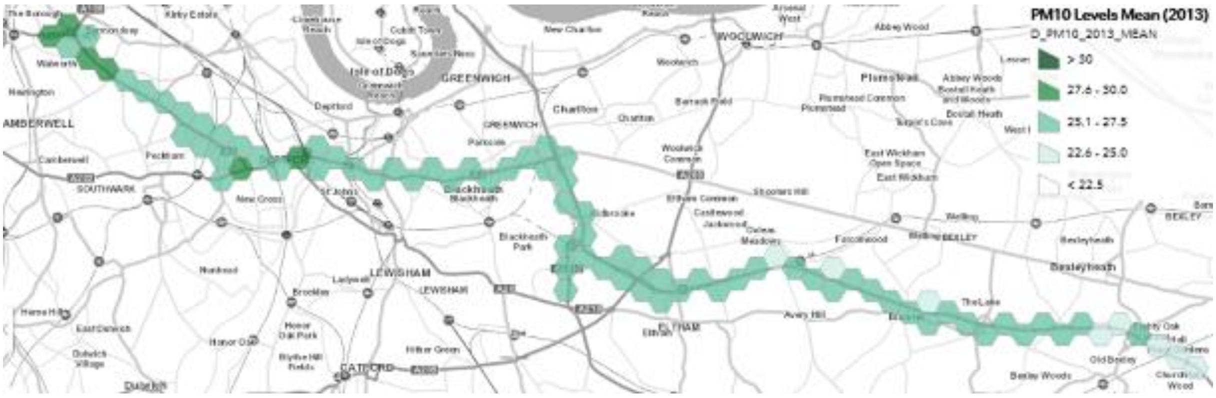


Figure 34. Modelled PM10 concentrations (μg/m3) along the A2 for the year 2013. Darker hex cell indicates higher concentrations

Combining the NO_2 and PM_{10} datasets with data on pedestrian density for the A2 corridor, we can highlight locations likely to have a particularly large impact on people's health due to poor air quality. Taking the top 10 per cent of hex cells for each dataset, these are shown to overlap at the north end of Old Kent Road, the junction with the A202 and New Cross, as illustrated in Figure 35.

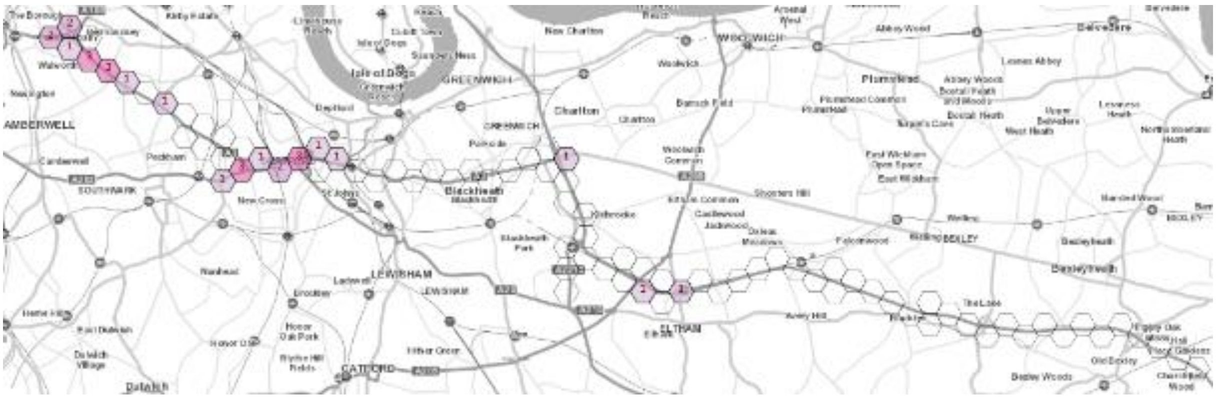


Figure 35. Highlighted hex cells are the top 10 per cent for either modelled NO2 or PM10 concentrations (μg/m3) (2013) or pedestrian density (2012-2017) along the A2. Dark pink hex cells are where the top 10 per cent for all three of these measures overlap

Perhaps more pertinent, if we conduct the same analysis using data for the whole Greater London Authority (GLA) area, we find - in the map below (Figure 36) - that significant stretches of the A2 corridor fall into the top 10 per cent of NO_2, PM_{10} and pedestrian density.

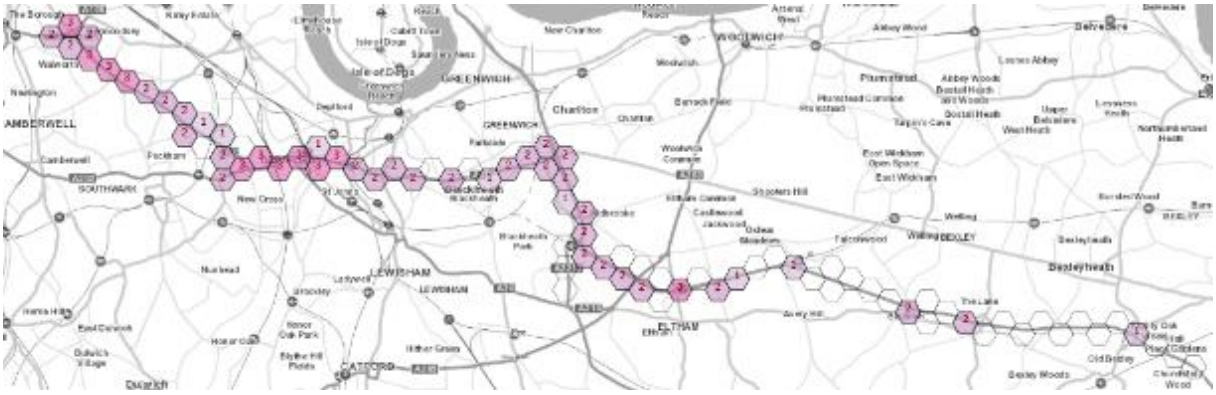


Figure 36. Highlighted hex cells are in the top 10 per cent for either modelled NO2 or PM10 concentrations (µg/m3) (2013) or pedestrian density (2012-2017) for the whole Greater London Authority. Dark pink hex cells are where the top 10 per cent for all three of these measures overlap. for the year 2013

2.3.6 Congestion

General traffic speeds on the inner street section are mostly between 5-10mph going westbound in the morning peak. Eastbound, speed mostly ranges between around 10mph (sometimes lower) and 25mph.

On the outer section, speeds between the Sun in the Sands roundabout and Kidbrooke interchange junction are around 30mph in both directions during the morning peak.

East of the Kidbrooke interchange, westbound speeds remain below 30mph but eastbound speeds increase to above 30mph during the morning peak.

East of Eltham, eastbound speeds reach the 50mph limit, but westbound speeds remain at around 35mph during the morning peak. This is all shown in Figure 37 below.

Figure 37. Traffic speeds in the morning peak for year 2015/16

Vehicle delay at nodes along the A2 – modelled in TfL's Highway Assignment Models and using demand data from 2012 – shows a number of locations that experience particularly severe delays during the AM peak. These tend to occur at major intersections.

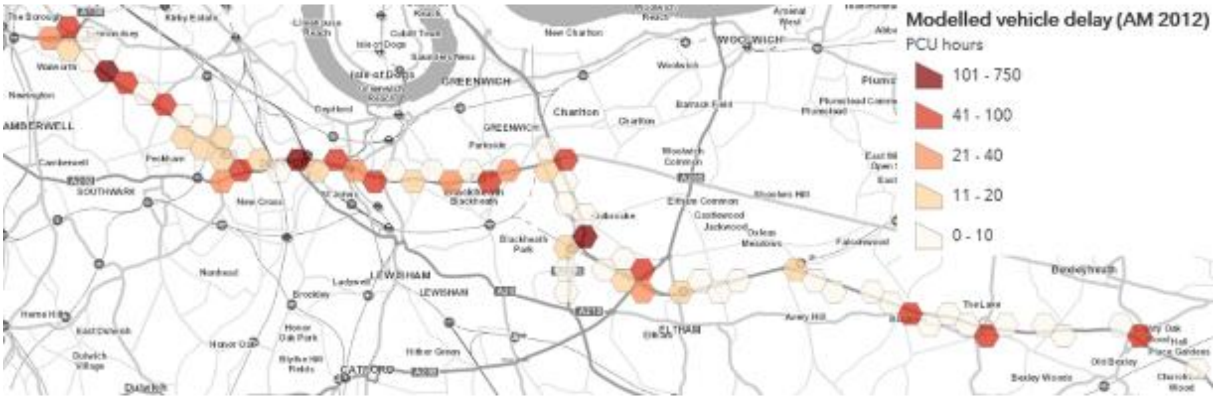


Figure 38. Modelled motorised vehicle delay during the morning peak at nodes along the A2 corridor, aggregated to 350m hex cell level. Darker hex cells represent a higher level of delay

2.3.7 Bus speeds

Buses do not currently run on the outer section of the corridor. Along most of the inner section going westbound into central London, bus speeds are <10mph during the morning peak as shown below. Bus priority on sections of the Old Kent Road seems to have a perceptible impact on bus speeds.

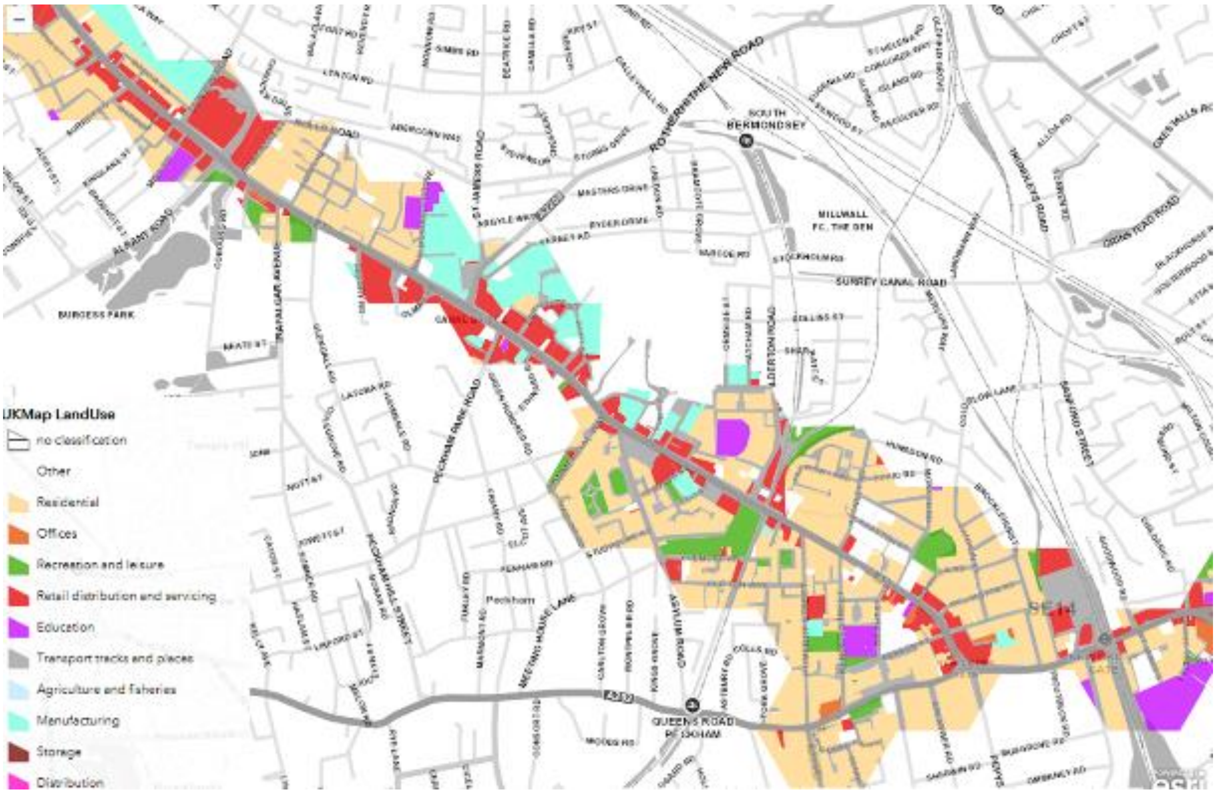
Figure 39. Bus speeds in the morning peak for the year 2016/17, showing westbound speeds mostly below 10mph

2.3.8 Land use

Figure 40 below presents three maps showing the mix of land uses along the inner and outer sections of the corridor. Industrial land at north end of Old Kent Road attracts freight trips all the way into inner London. Sections of retail land use along Old Kent Road attract trips to the area. Much of this land accommodates large, warehouse-style shops with substantial car parking provision.

Through New Cross, the retail land use represents a mix of smaller shops and restaurants, more similar to a high street environment than much of Old Kent Road. This changes east of Deptford, with mainly residential land use directly before the recreational land use of Blackheath.

Land use along the outer road section is mostly residential, with some pockets of recreational and education land use. The corridor here is segregated from the surrounding area, with no frontages directly onto the road.



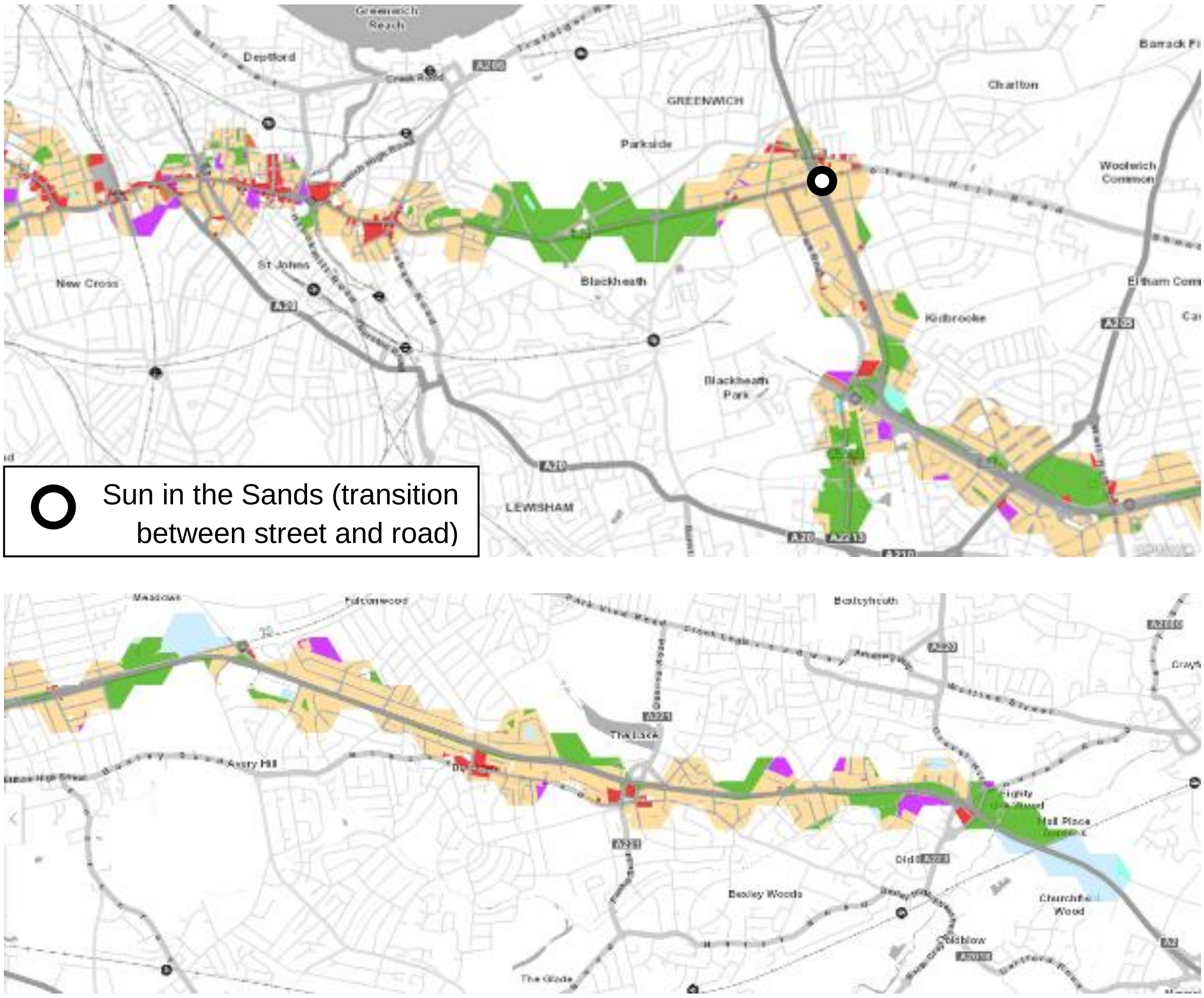


Figure 40. Land use along the Urban Feeder Route

2.3.9 Place User Activity

The spatial composition of the corridor, with a mix of residential, commercial, retail and transport purposes, creates a wide range of activities taking place along its length. To underline the variety of uses and the differences at varying points of the day, a snapshot of activity was analysed for a cross-section that represents a variety of uses on weekdays and on a Saturday. Figure 41 below illustrates the areas (red boxes) in New Cross that have been examined.

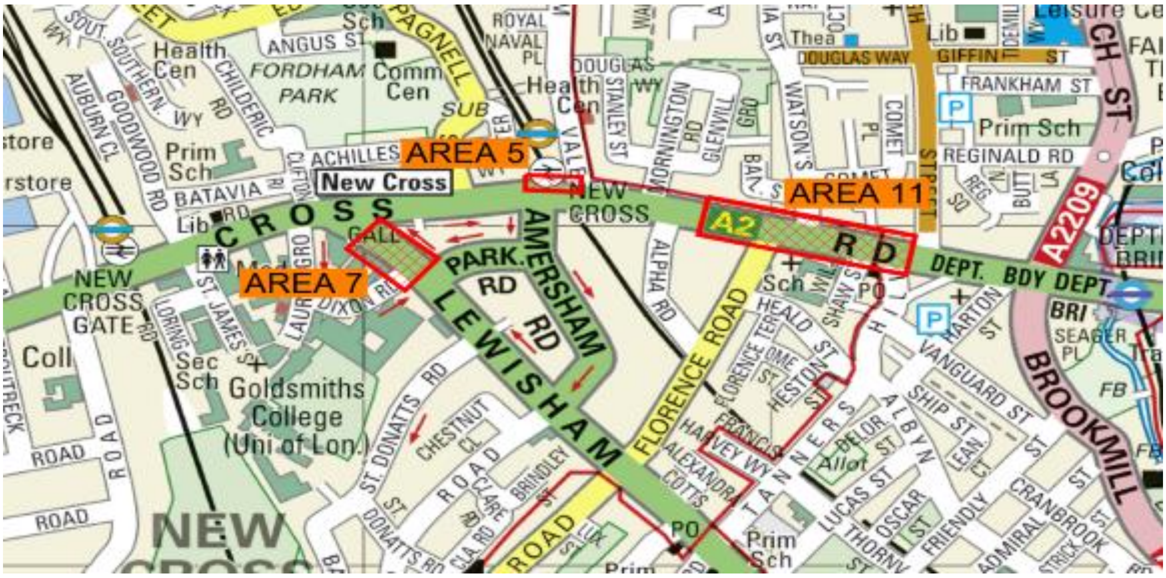


Figure 41. Snapshot of activity and areas analysed

Area 5 –Immediately outside New Cross Gate station

While the station sees an almost constant procession of people going in and out throughout the day, the draw for people to travel into this zone also sees a number of other activities taking place. While use of the station with no other activity was by far the most common, activities of people chatting and standing around in this zone were also recorded. Both of these can be linked to use of the station, with meeting outside the entrance being a focal point, alongside the volume of people passing resulting in people who know each other, potentially from using the station everyday, passing and talking. The volume of the people using the station is also likely to have resulted in some of the other uses that were seen, including someone handing out flyers through the morning peak and begging throughout the day. While similar behaviour is observed over the weekend, the drop in the number of people using the station is also represented through no one being seen begging or flyers being handed out.

Area 7 – Lewisham Way, between New Cross Road and Parkfield Road

Due to the larger size of this area it has been broken down into three different areas focussed around the bus stop closest to the A2 eastbound turn and Marquis of Granby pub and the commercial premises beside it (7A); around the bus stop further to the south and the commercial premises opposite (7B); and, outside the retail and commercial properties by the corner with Parkfield Drive (7C).

Area 7A, focussing around the furthest north bus stop sees by far the greatest number of people waiting for a bus throughout, both in total and at the specific focus points throughout the day, both in the week and over the weekend, as shown in Figure 42 below. The lack of others uses could be a result of the time of the analysis (0700-1835 through the week and 1000 – 1605 over the weekend), or that Areas B or C present a better environment.

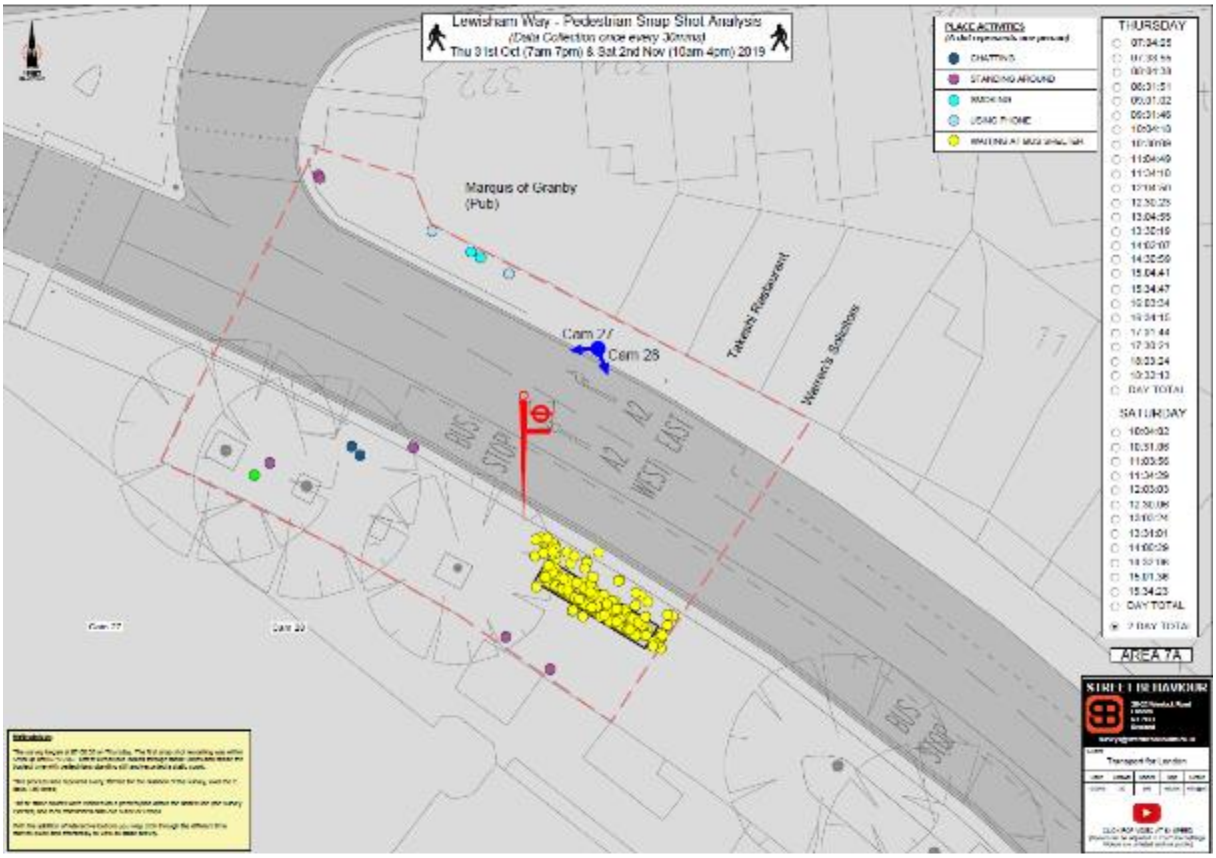


Figure 42. Zone 7A – showing total mix of use over two days

While Area 7B follows a similar pattern with the level people waiting for a bus exceeding that of any other purpose, the variety in this cross section also results in other behaviours taking place, namely people chatting outside of the commercial/retail/food premises. This is also heavily temporally influenced, with this being observed approximately between 1-2pm, likely reflecting the lunch related element of purchasing food. As with Zone 7A, this is only seen throughout the week, with waiting for the bus principally being the only activity taking place over the weekend.

Zone 7C is different to the previous two areas as it does not contain a bus stop, with the dominant features being the Sainsbury's Local and Costa Coffee. While eating and drinking at the café is the most dominant activity throughout both the week and weekend, the nature of the area also lends itself more to people standing around or chatting. These activities are also seen throughout the observation period, and while at a lower level is seen over the weekend at a relatively similar pattern.

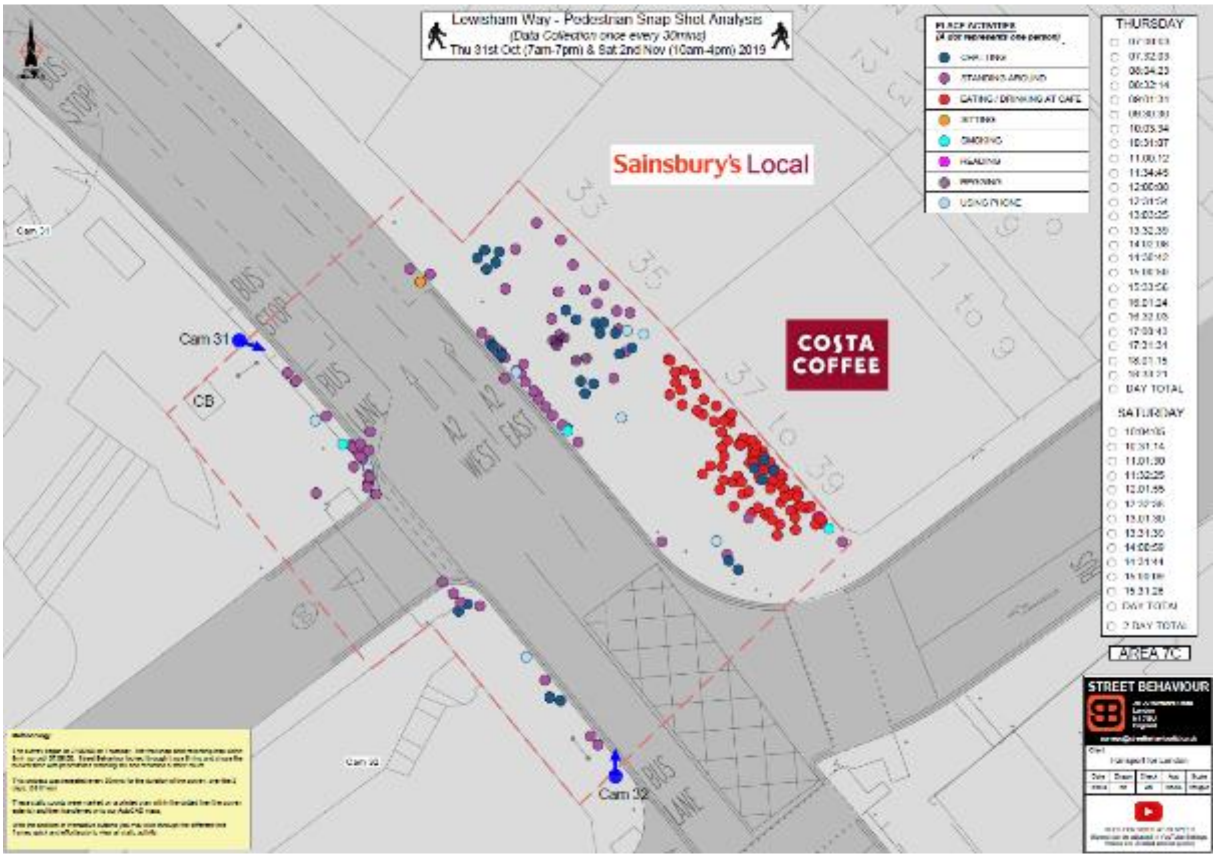


Figure 43. Zone 7C - all activities weekday and weekend

Area 11 – New Cross Road, from Florence Road to Deptford High Street

This area has also been broken down into sub-sections labelled 11A, 11B and 11C. 11A focusses on the area around the westbound bus stop to the east of Florence Road; 11B focusses on the controlled pedestrian crossing by Watson's Street and east bound bus stop opposite Willshaw Street; and, 11C on the pedestrian crossing between Tanner's Hill and Deptford High Street.

Area 11A is dominated by people waiting to catch a bus throughout the observation period, both through the week and over the weekend, with eating and drinking/sitting outside the café being the next most notable activity taking place but to a significantly smaller level.

Areas 11B and 11C are both similar with the dominant activity being people waiting to cross the road in both areas at the controlled crossings, while 11B also has a secondary primary activity where people are waiting to catch an eastbound bus.

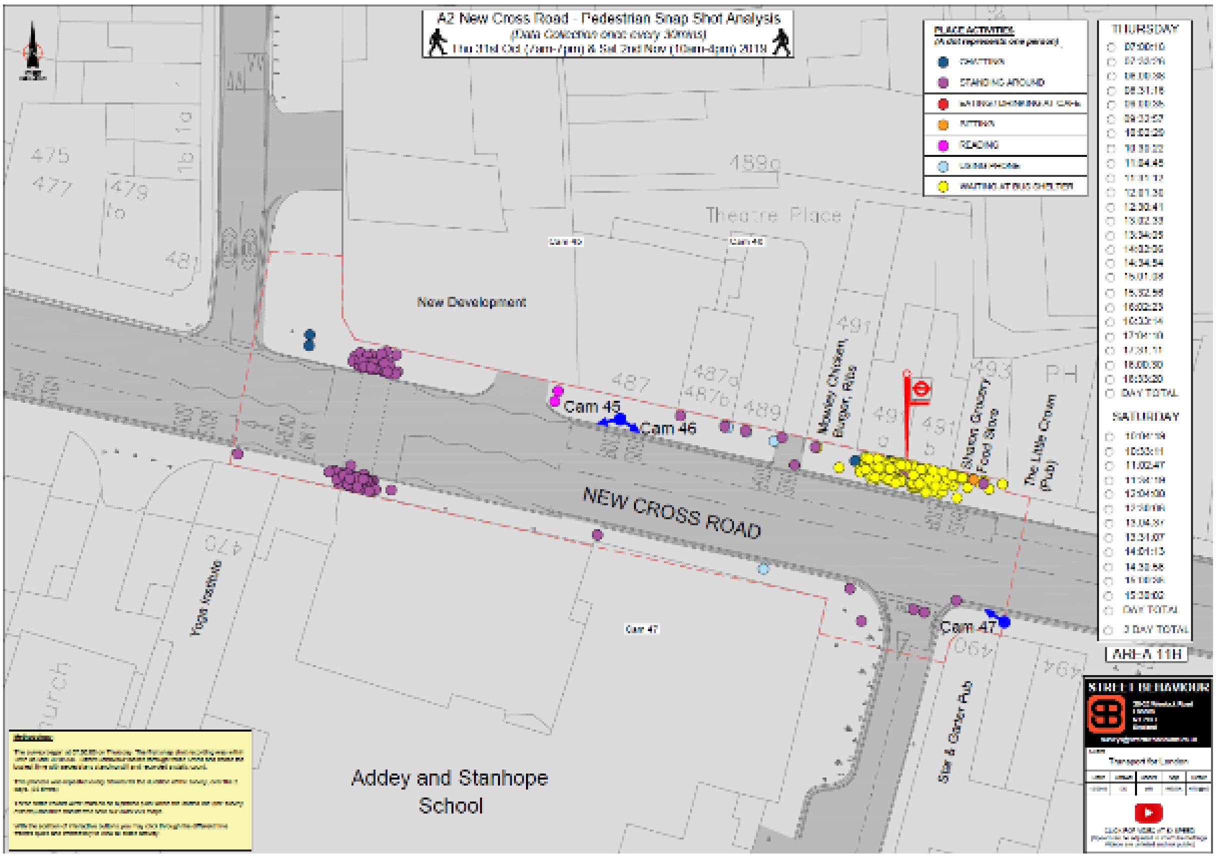


Figure 44. Area 11B - all activity weekday and weekend

Figure 45 below shows Area 11C containing a small public space outside a promenade of shops in which people were also observed standing and chatting to an extent not seen outside other shops that are closer to the highway, while the area also has some trees.

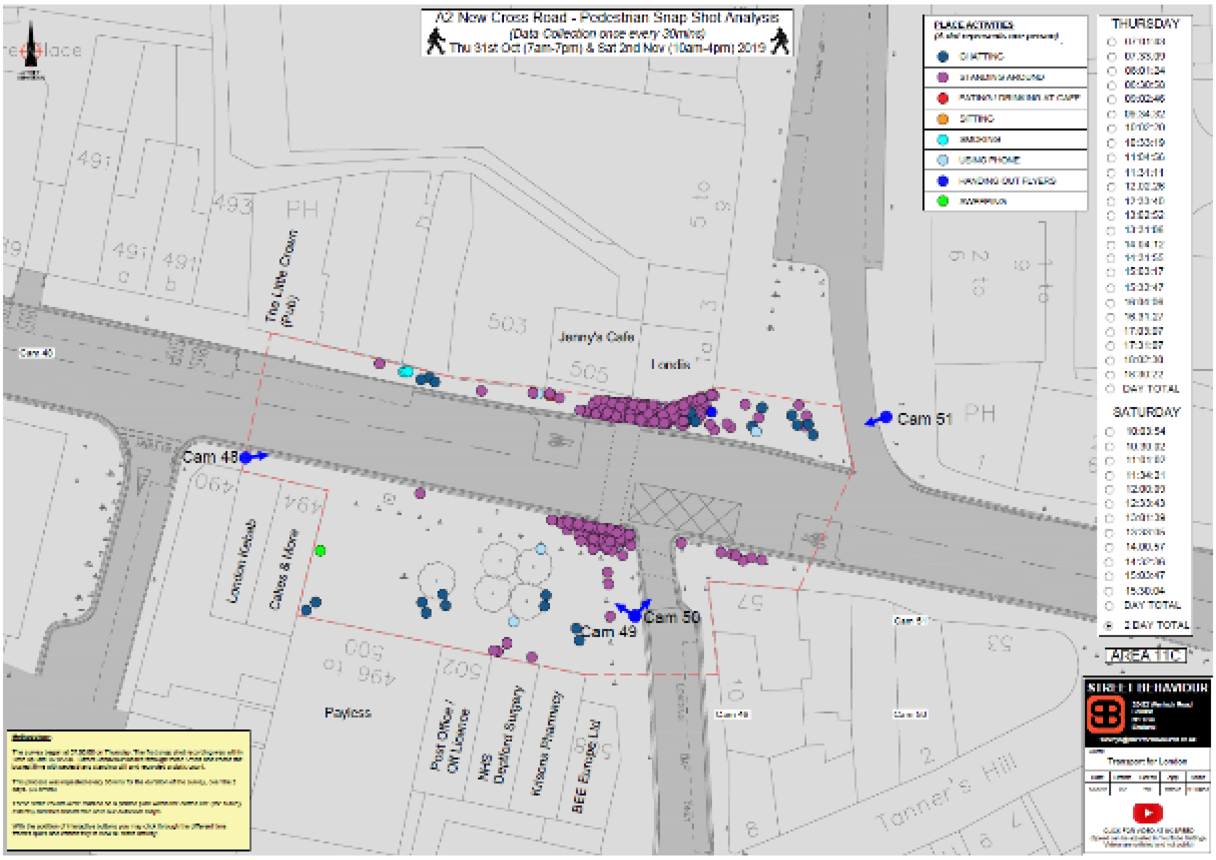


Figure 45. Area 11C weekday and weekend activity

2.3.10 Pedestrian severance

TfL has developed an experimental indicator of levels of pedestrian severance providing a score (0 to 4) of barriers to pedestrian movement. The score is a combination of aggregated traffic speed from TrafficMaster (2014/15 AM), motor vehicle flow from the Highway Assignment Model (HAM), HGV flow (HAM), and road width (derived).

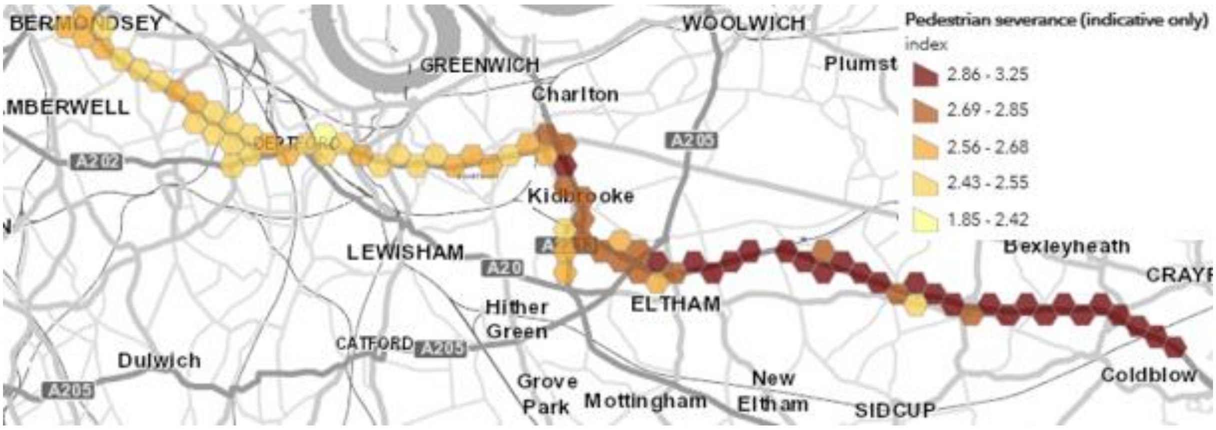


Figure 46. Indicative dataset showing levels of pedestrian severance along the A2 corridor as a function of traffic speed, motor vehicle flow, HGV flow and road width. Darker hex cells show higher levels of pedestrian severance

N.B. This remains an experimental dataset within TfL; caution should be taken when drawing conclusions from this visualisation

This experimental indicator shows high levels of severance on the outer section of the corridor and lower severance on the inner section. This is to be expected, given the expressway function of the outer section. However, there are some higher levels of severance within the inner section.

Approximately mid-way along Old Kent Road, at New Cross Gate station, Deptford Bridge station and over Blackheath, pedestrian severance is higher than elsewhere along the inner section of the corridor. Looking into the data that combine to create this indicator, it appears that HGV flows and traffic speeds are the main factors contributing to high pedestrian severance in these locations, though this would need to be confirmed through more detailed analysis of each location.

Data on potential walking trips is derived from the London Travel Demand Survey (LTDS). The data represents trips made by London residents which could reasonably be walked all the way but are not walked at present. The LTDS collects travel pattern data from approx. 17,000 persons a year including details of all trips undertaken the day before the interview. Trips and stages made by car, public transport and other modes from 2014/15 to 2016/17 are included in the dataset. The data is aggregated by plotting how these trips and stages would travel along the walk network if they were walked, summing the length of these trips in each hex cell and weighting to represent all Londoners.

Figure 47. Density of potential walking trips, based on analysis of trips currently made using any other mode, using data from the London Travel Demand Survey (LTDS). Darker hex cells represent a greater density of trips being made in that location, which could potentially be walked

<u>‘Walkability’</u>

An additional measure to existing pedestrian density and the density of potential walking trips is an indicative measure of ‘walkability’. This dataset has been produced by Ashley Dhanani, Bartlett School of Architecture and combines spatially detailed variables and space syntax methods to construct a model to predict the likely intensity and location of pedestrian activity.

The dataset has significant positive correlation and predictive abilities with pedestrian density. Built environment data sets integrated include land use, residential population, public transport accessibility and street network structure. TfL colleagues have aggregated the data to hex cells from the original 25m^2 raster cells and presented as a percentile (high to low walkability) as shown in Figure 48 below.

Figure 48. Indicative measure of ‘walkability’ along the A2 corridor, combining multiple variables to predict the likely intensity and location of pedestrian activity, with darker hex cells representing more ‘walkable’ locations

This measure of 'walkability' provides additional information on the potential to increase walking trips along the corridor by drawing on built environment data.

2.3.11 Stakeholders and TEN-T Network

In spring 2019, workshops were hosted with local government and a number of socio-economic actors and interest groups for the MORE project with the aim of understanding challenges resulting from the development of new, alternative road and street uses on existing forms of allocating road/street space. Attendees included:

Freight Transportation Association	Licensed Taxi Drivers Association
London Borough of Southwark	Sustrans
London Cycling Campaign	Living Streets
Addison Lee	London Councils
Greater London Authority	London Borough of Lewisham
Chartered Institution of Highways and Transportation	

Further local engagement was carried out in the summer of 2019 collecting responses from local residents and businesses on the current issues experienced on New Cross Road of the A2 using the online stakeholder engagement tool developed in WP4 of the MORE project. 40 stakeholders were met or spoken to via informal interviews.

Relationship with TEN-T and related stakeholders.

Transport for London is responsible for managing the main through-routes in London, a total network of 580 kilometres (360 miles) of roads and 5% of the total road network in London, by distance. These routes are called the Transport for London Road Network (TLRN) and are also known as "red routes", as they can be identified by their red road markings and signage.

The remainder of the city's street network is the responsibility of the individual London boroughs, except for the 0.4% of trunk roads in London managed by Highways England (HE). The North-Sea Mediterranean TEN-T is operated and maintained by HE through the motorway network to the port of Dover in the South East.

HE is the government company charged with operating, maintaining and improving England's motorways and major A roads. HE's road network totals around 4,300 miles. While this represents only 2 per cent of all roads in England by length, these roads carry a third of all traffic by mileage and two thirds of all heavy goods traffic.

Traffic composition

The M25 is the major HE road network, on the TEN-T, which acts a major boundary encircling Greater London and which tails into the greater London boundary via the urban feeder routes.

The London Orbital Multi-Modal Study (ORBIT) that took place in 2002 looked to identify and understand the cause of problems, namely severe congestion and unpredictability of journeys on the M25 network (Thompson & Coombe, 2003). Whilst now outdated, the study found about 50% of traffic was making a journey to work; Over 40% of trips using the M25 were more than 60 miles (100km) in length; The average length of M25 used was relatively short (40% of vehicles travel 1 or 2 junctions only); Average rates of car occupancy were low (1.15 people per car); and Origins and destinations were widely dispersed – 40% had both trip ends outside the M25 Greater London Boundary and 20% had both trip ends inside the M25.

Traffic Management

While the A2 feeder route is listed as a diversion route for Highways England, in agreement with TfL, this is understood to be used when diverting traffic during planned disruption, rather than a route to actively divert traffic onto during unplanned incidents.

Incidents on the M25 can impact the operation of the A2 feeder route, although these are usually major or closure events. On a fairly regular basis, traffic heading north to the Dartford crossings on the M25 can usually expect to queue (at peak periods) between junctions 2 (A2) and 3 (A20) and this is the new 'normal'. Therefore, even this level of disruption would not see a major re-routing via the A2 into London.

In this way, the TLRN and A2 in particular, given its proximity to the Thames crossing at Dartford and the Blackwall tunnel provide some resilience for Highways England's Strategic Road Network around London.

Strategy

HE work in a 5 year planning period, producing a Delivery Plan that outlines what Highways England will do over the next five years to deliver against the commitments in its Strategic Business Plan[2] and in the government's Road Investment Strategy[3]. The current Strategy Business Plan and Delivery Plan cover the period 2015-2020 with a new Road Investment Strategy due to be published in 2020 with a new HE delivery plan to follow.

The current Strategic Business Plan contains the following key outputs, and which the delivery plan details:

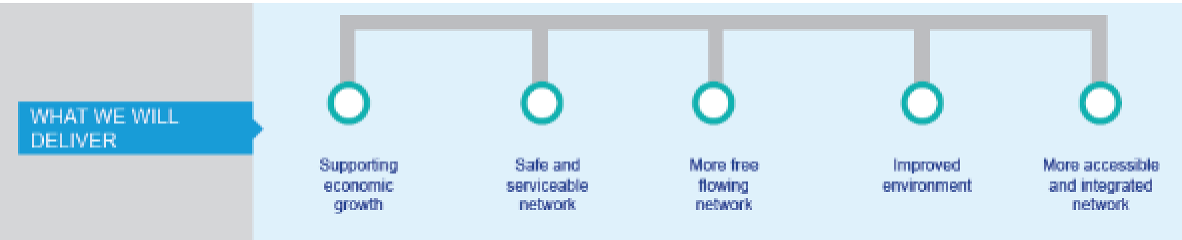


Figure 49. Strategic Business Plan Outputs

[2] https://www.gov.uk/government/publications/highways-england-strategic-business-plan-2015-to-2020
[3] https://www.gov.uk/government/collections/road-investment-strategy

A number of the priorities align closely with TfL's in the way of the key priorities of the Mayor's Transport Strategy (SUMP for London). Air quality, safety and multi-modal integration feature heavily in the delivery plan with the 2019 update reporting that 10 air quality studies have been completed, one of which included how to improve air quality by influencing driver behaviours.

During 2019-20, HE planned to deliver 109 schemes from the Cycling, Safety and Integration Designated Fund totalling 57 new or improved pedestrian crossings and 50 cycle schemes.

However, whilst the main outcome of the Mayor's Transport Strategy is to achieve an 80% sustainable mode share mix in London, HE report that 60% of congestion is caused by a lack of road capacity and therefore are investing in developing a national spine of Smart Motorways and adding new capacity at key points on the network. During 2018-19, seven major schemes were completed that have added around 60 lane miles of additional capacity to the network, some of which feed the arterial routes into Greater London where efforts remain to increase priority for sustainable modes and reduce private car mode share.

Engagement

TfL and HE have regular contact at an operational level, albeit on an ad-hoc basis when disruption occurs. As previously indicated, drivers are not given advice on routes to take should a major incident happen. No data sharing or strategic operational meetings are known to take place.

Up to 2017, a high-level strategy meeting used to take place between the organisations however financial pressures and subsequent organisational restructures on TfL's side meant it became increasingly difficult to connect the right people and the meetings discontinued.

In November 2019, a meeting took place between a number of senior officers from both TfL and HE where it was agreed to establish regular engagement on strategic planning and operations following the publication of the 2020 Road Investment Strategy by the UK Government.

2.4 Constanta

2.4.1 Movement Corridor

Constanta City is located in the South-East of Romania being connected to the TEN-T Rhine Danube Corridor by road, rail and water (inland waterway through the Danube – Black Sea Channel and maritime through Constanta Port).

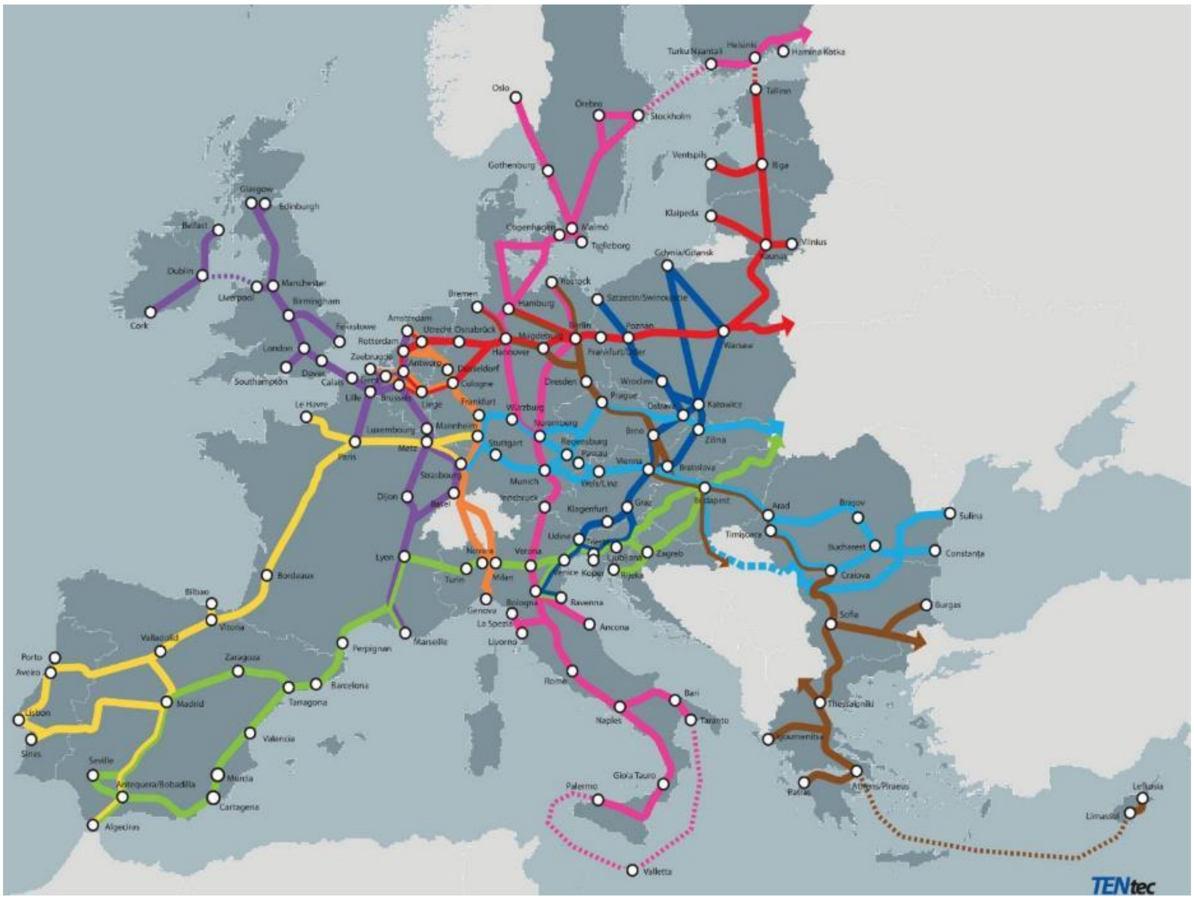
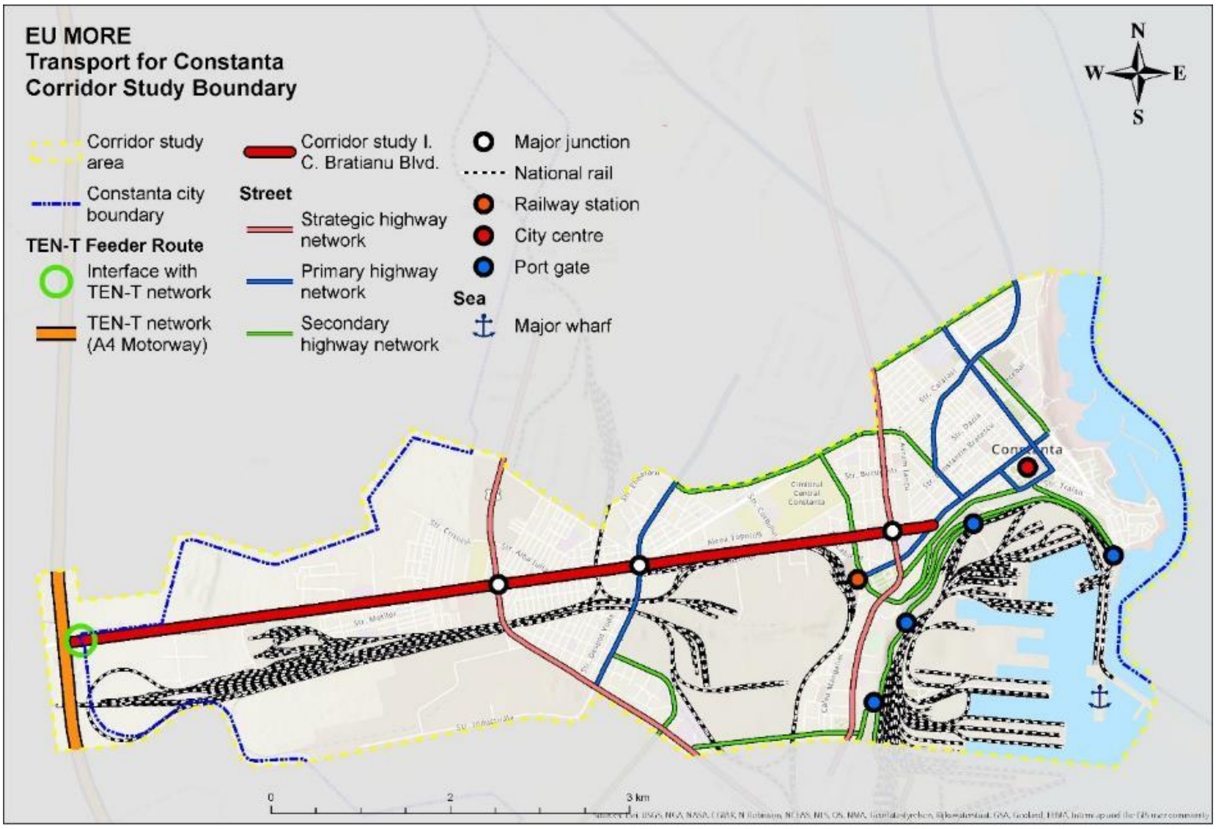


Figure 50. The Core Network Corridors map

Source: ***https://ec.europa.eu/transport/themes/infrastructure/ten-t_en***

National Road (DN) no. 3/ I.C. Brătianu Boulevard connects Constanta to the Rhine – Danube TEN-T Corridor and is the main entrance to the City on a West – East direction. The boulevard is part of the strategic street network of the City connecting it with other neighbouring localities from the South East Development Region and with Bucharest – the capital City of Romania through A4 / A2 motorway.

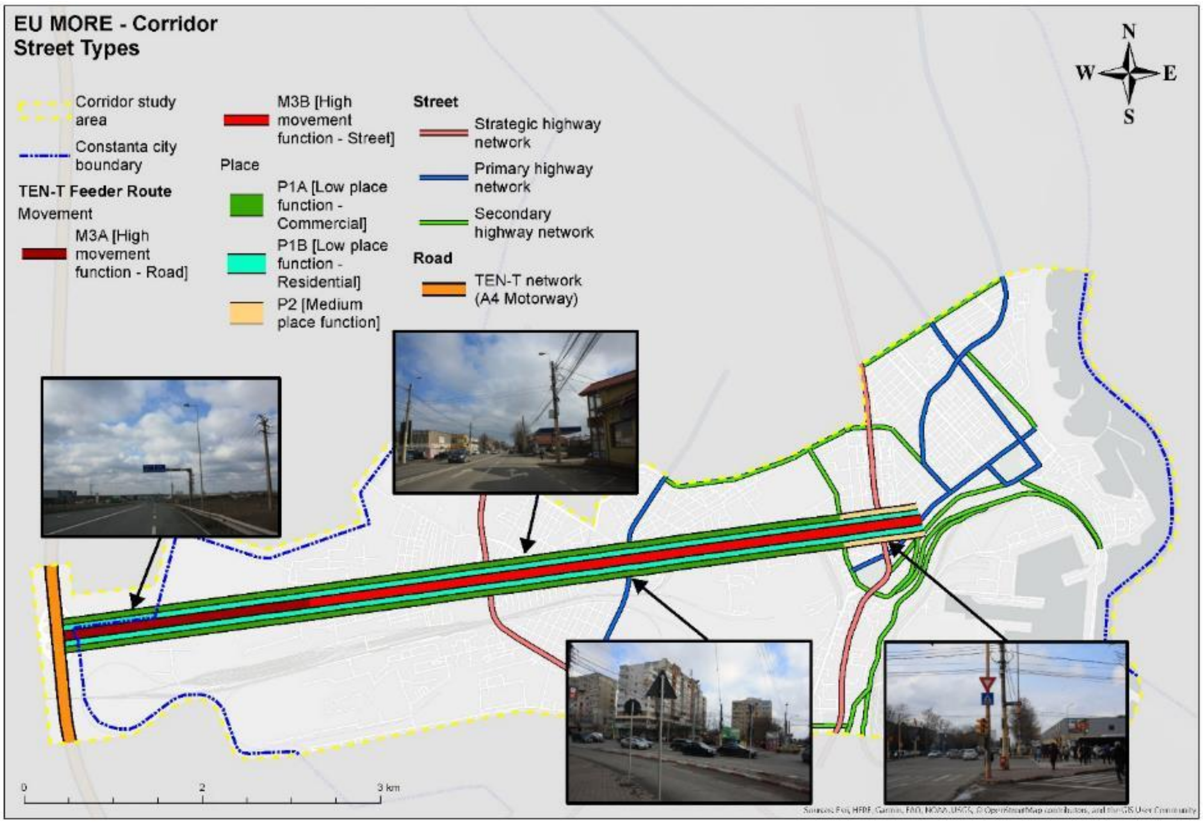
As shown in the map below (Figure 51), the boulevard connects some important areas of the City like the Central Railway station, the Port of Constanta, Mamaia resort, the industrial areas of Constanta and the City Centre.



The map was created with the ESRI ArcGIS Pro Standard 2.2.0 application, EFL850542887 license

Figure 51. Movement Corridor Area

2.4.2 Feeder Route



The map was created with the ESRI ArcGIS Pro Standard 2.4.1 application, EFL850542887 license

Figure 52. Corridor street types

As presented in Figure 52 above, the corridor tackled in the MORE project has a length of 7,5 km and is composed of two main segments: a) the first segment is represented by the DN 3 (National Road no. 3), represented with dark green on the map; and b) I.C. Bratianu Boulevard segment, represented with light and dark green on the map.

a) Segment 1 - National Road no. 3 description of current conditions

The first segment is represented by the DN 3 (National Road no. 3) linking A4 Ring Road (the TEN-T interface) with Constanta City. The road has a length of about 1,7 km with two lanes per direction separated by a concrete Jersey wall. There are no junctions on this segment of the road, except a roundabout that allows for turning and which ensures access to the businesses located near to the road.

There are no sidewalks along this segment of the road, the maximum speed limit is 90km/h and stopping and parking is not allowed.

The road is used both by private and public transport vehicles (inter-county bus services). Since the construction of A4 ring road an important part of the heavy traffic was taken over by the A4, especially the one related to the Port activities but the road is still used by heavy trucks/vehicles that access the Industrial area of Constanta and the companies alongside Aurel Vlaicu Boulevard (the former ring road of the city, now an important and congested urban street).

From the ‘**Movement and Place**’ Classification point of view the road can be classified as M3A (High-movement Roads) and P1A (Places of more local importance with non-residential uses).

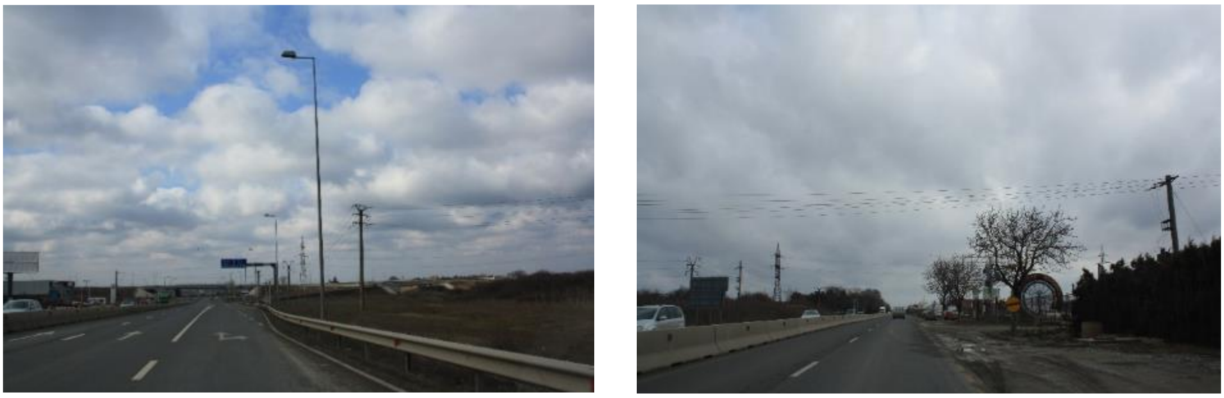


Figure 53. National road no. 3

This segment of the road is owned by the Romanian State and is managed by CNAIR S.A. – the National Company for Road Infrastructure Administration. CNAIR S.A. is a company of national strategic interest working under the authority of the Romanian Ministry of Transport with the aim of managing, developing and exploiting the elements of the national road and motorway infrastructure on the basis of commercial principles for ensuring that the road traffic is performing in safe, fluent and continuous conditions.

b) Segment 2 - I.C. Bratianu Boulevard description of current conditions

The second segment is represented by I.C. Bratianu Boulevard a category I type of street (def. Category I streets – thoroughfare, which assures the takeover of the major traffic flow of the city on the direction of the national roads crossing the city or in the main direction of connection with these roads) and part of the strategic road network of the city, as described in the City SUMP (see Figure 54 below).

Figure 54. Constanta street network (source: Constanta SUMP)

From the '**Movement and Place'** Classification point of view the road can be classified as M3B (High-movement Streets) and P1 (Places of more local importance: P1A - with residential and P1B - with non-residential uses) and when approaching the City centre P2 (Medium Place function), see Figure 52.

This segment of the street is owned by the municipality and is managed by S.C. Confort Urban S.R.L. Company. S.C. Confort Urban S.R.L. Company works under the Municipality`s authority and is responsible for public streets and parking places management.

I.C. Bratianu Boulevard is parallel to the railway network connecting Constanta to Bucharest but there is no train station alongside it except the CFR Railway station, that is connected through Ferdinand Boulevard, Theodor Burada Street and also through Labirint Street.

We can also identify some parallel routes to the boulevard that connects to different area of interest around the city, as shown in Figure 51.

The street has a length of approximately 5,8 Km (5.816 m), the width of the carriageway varies between 16m and 12m and has an approximate total surface of 93.056 m^2, the width of the sidewalks varies between 6 m and 2 m and has an approximately total surface of 34.896 m^2. The maximum speed limit on this street is 50 km/h and according to the law, parking is allowed in special designated spaces.

There are 12 junctions along the road length, from which 3 roundabouts and 3 traffic light signalized junctions when approaching the City centre, the rest being signalized through traffic signs and road markings.

The street is used by all type of road users, both private and public transport vehicles, freight transport vehicles, pedestrians, cyclists etc.

The local public transport service provider in the City is CT BUS company, that is owned by the municipality. I.C. Bratianu Boulevard area is served by the local bus route no. 48, which is operated by a fleet of 10 buses (ISUZU Euro Diesel VI with a length of 12 m and MAZ Euro Diesel IV with a length of 15 m). The bus route has a length of 13,2 km/trip and a trip duration of approx. 55min. The service is provided from 5:15 o'clock to 23:00 o'clock on all working days and from 5:45 o'clock to 23:00 o'clock during weekends with a frequency of 10 minutes. The CT BUS route map is shown in Figure 56 below.

There are a number of eleven bus stops on each side of the street, some are illustrated below. Most of the bus stops alongside the Feeder Route are Bus Bay type and are used both by CT BUS vehicles and those of the private county/national transport operators, especially those from Murfatlar, Valu lui Traian, Cobadin, Medgidia and Cernavoda localities.

Figure 55. Constanta bus stops

The CT BUS route map is shown below.

Figure 56. CT BUS route maps (source: https://www.ctbus.ro/)

For a better description and for better identifying the Movement and Place functions of I.C. Bratianu Boulevard, it can be divided in different street section taking into consideration the numbers of lanes of the carriageway and also the urban functions that the street is serving, as follows:

Street section no. 1 – From the City entrance to the junction with Aurel Vlaicu Boulevard

The section starting from the City entrances to the junction with Aurel Vlaicu Boulevard (street section no. 1), where the traffic is carried out on two lanes per direction and where alternatives routes to the street cannot be identified. This street section is characterised by the existence of individual housing, different public institution buildings (the Road Police and the Constabulary), education facilities (Pontica High school) and some local commercial activities.

On this segment the traffic is mainly fluent except the peak hours when the street suffers from congestion and all related consequences (air and noise pollution, safety etc.).

On-street parking is not allowed and there are few parking places near the street, even though most people park on the sidewalks, creating a bad environment for pedestrians.

The corridor is used both by private vehicles and public transport, there are no dedicated bus lanes. On this section of the street, there are no bicycles routes and the footways are not in a proper state and adapted to the needs of people with reduced mobility.

Figure 57. I.C. Bratianu Boulevard – street section 1 – city entrance

On this section of the street there is also a place where most traffic accidents occur. This place is located near Pontica and CFR High schools and the Road police Head offices, a very busy place for activities.

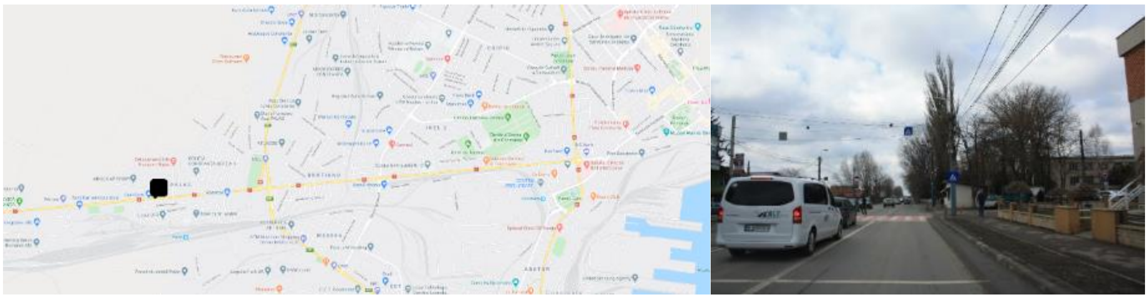


Figure 58. black/grey spot on the street section

Aurel Vlaicu Boulevard is an important street in the city (the former ring road of Constanta) it connects important business, housing, touristic and other sites in Constanta and has direct link with Mamaia resort and other neighbouring localities.

Aurel Vlaicu Boulevard can be considered as a parallel route to I.C. Bratianu Boulevard due to the fact that it connects the industrial areas of the city, especially for heavy duty vehicles. It also it connects to Mamaia resort and the housing neighbourhoods around the area and the city centre. I.C. Bratianu Boulevard connects with Aurel Vlaicu Boulevard through a roundabout junction, this junction is a place where most traffic jams are created.

Figure 59. IC. Bratianu Boulevard – street section 1 – connection with Aurel Vlaicu Boulevard

Street section no. 2 - From the Aurel Vlaicu boulevard junction and to the junction with Dezrobiri/Cumpenei street junction/ Cora roundabout

This section shares most of the characteristics of section 1, except the fact that on this section there are more collective housing and there are also some bigger retail business that attract more people. Parking is a big problem on this section of the street due to the limited number of parking spaces compared with the car ownership and also the enforcement of parking rules.

Figure 60. IC. Bratianu Boulevard – street section no. 2

Street section no. 3 - From Cora roundabout to the junction with Ferdinand boulevard

This section has three lanes per direction, except the small portion approximately 300m from the 1st December 1918 Boulevard to the junction with Ferdinand where there are 2 lanes per direction. Here we can identify some alternative routes but with a limited capacity compared to I.C. Bratianu Boulevard which make them less desirable.

This section is characterised by the existence of all the urban functions alongside the street (hospitals, individual and collective housing buildings, schools and high schools, important/big commercial centres, small economical agents, the ambulance service, restaurants etc.). On this section of the street the traffic is fluent, the biggest issue regarding the traffic flow on this section is the junction with Cumpenei/Dezrobirii Street/Cora roundabout, especially in peak hours when congestion occurs. The corridor is used both by private vehicles and public transport, but there are no dedicated bus lanes. On this section of the street there are no bicycles routes and the footways are not in a proper state and not adapted to the needs of people with reduced mobility.

On-street parking is not allowed on this section but there are some parking lots (parallel to the street and 45 degree angled) arranged on this section serving the collective housing buildings and the economical agents located on/near the street.

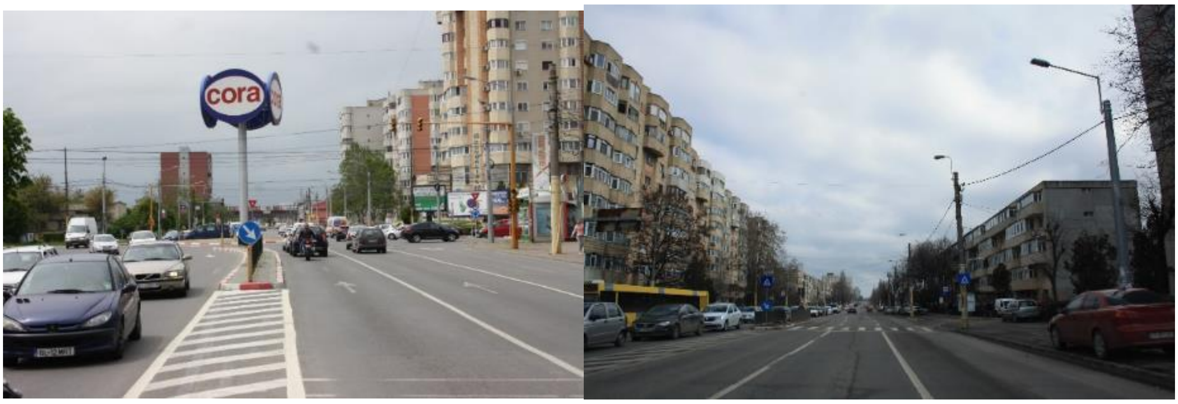


Figure 61. I.C. Bratianu Boulevard – street section 3 – Cora roundabout

Some alternatives route on the Feeder route can be identified on this section of the street, as follows:

- Ion Luca Caragiale street which leads to the city centre, important housing neighbourhoods, Mamia resort and different business activities;

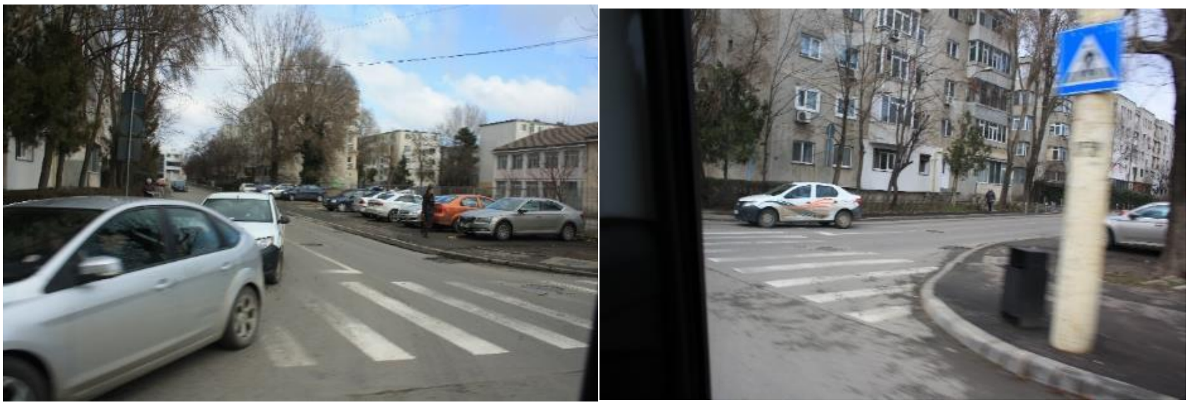


Figure 62. I.C. Bratianu Boulevard – street section 3 – junction with Ion Luca Caragiale street

- Theodor Burada street leading to the CFR Railway Station;

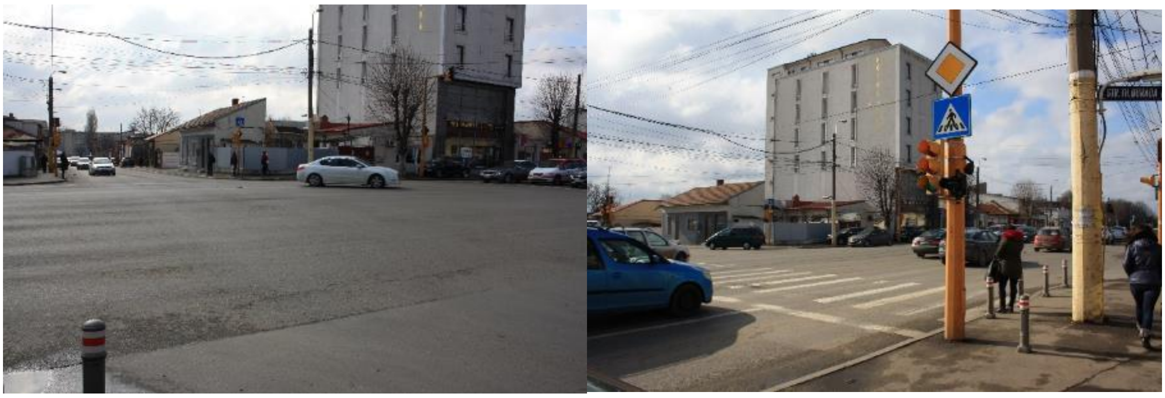


Figure 63. I.C. Bratianu Boulevard – street section 3 – junction with Theodor Burada street

- 1 Decembrie 1918 Boulevard (strategic street) connecting the CFR Railway Station with Mamaia resort. This street will enter in an ample refurbishment process in the framework of a project financed through the Regional Operational Program. The aim of the project is to improve the traffic conditions for buses, bicycles and pedestrians by reallocating the road space in a more sustainable and equitable way for all road users.

Figure 64. I.C. Bratianu Boulevard – street section 3 – junction with 1 Decembrie 1918 Boulevard

2.4.3 Road Safety

I.C. Bratianu Boulevard is one of the most congested boulevards in Constanta, especially in the morning and the afternoon peak hours. An important aspect that need to be considered is that in the summer period the traffic volumes are much more increased due the city being a major touristic destination, attracting more than 500.000 tourists each year.

Regarding the traffic safety on I.C. Bratianu Boulevard, we can see from Table 11 below that since 2014 the number of accidents occurred on the street decreased each year, halving in 2018, even though the number of accidents is slightly high and still represents an issue. The two main causes for producing traffic accidents are, as provided by the Road Police statistics, not granting priority to pedestrians, and illegal crossing by pedestrians.

Table 11. Road safety statistics on I.C. Bratianu Boulevard (source: Constanta County Police Inspectorate)

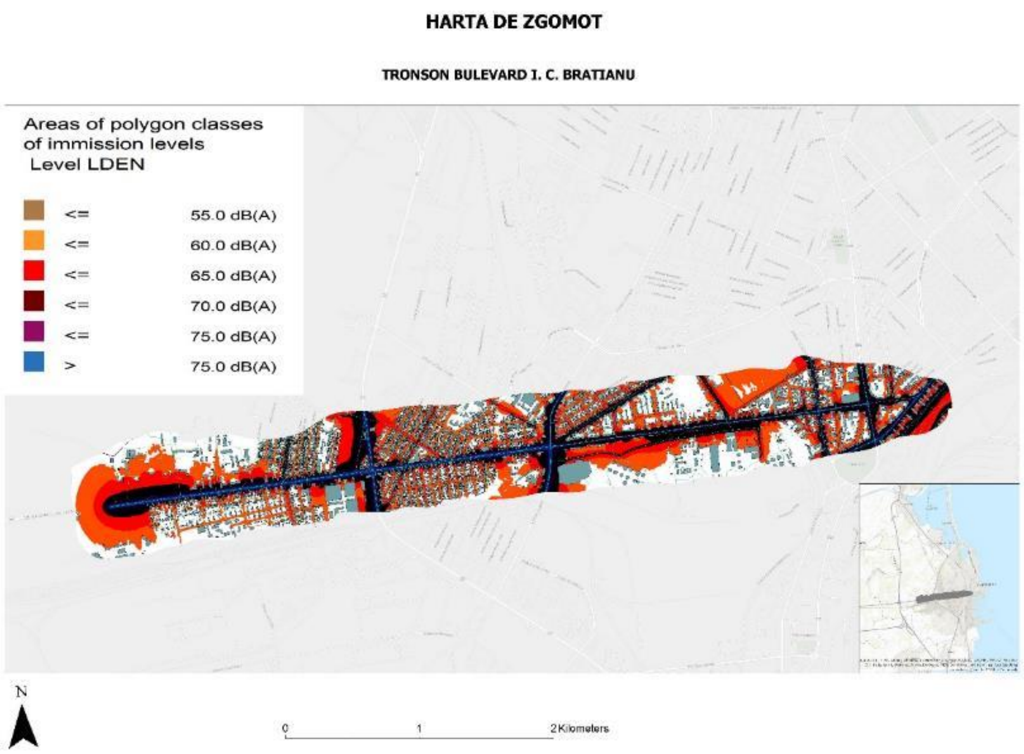
	Year	No. of accidents	No. of deceased people	No. of people severely injured	No of people easily injured	No. damaged cars
1	2018	21	0	1	26	31
2	2017	26	0	1	27	36
3	2016	25	1	5	28	37
4	2015	31	2	3	38	49
5	2014	45	0	6	51	63

2.4.4 Air Quality

In the summer of 2018, in the framework of PORTIS project, there was an air quality assessment on I.C. Bratianu Boulevard. The assessment was made with an air monitoring equipment which was placed on 5 locations alongside the street for around 1 week in each location. The equipment monitored the CO, CO2, NOx, SO2, PM2,5, PM10 and NO2 emissions produced by car traffic. After the assessment we observed that, especially in the peak hours, some locations surpassed the minimal the PM emission limits. In Appendix 8.4 of this document is found an abstract providing the main findings of this assessment.

2.4.5 Noise pollution

Regarding the noise level around the Boulevard, in 2018 the municipality realized the noise map of the City, including the area approached in the MORE project. In the maps below (Figure 65), we can see the noise level around the Feeder Route. As it can be seen the level of noise is much greater near the street compared with the area protected by building/construction, due to the noise produced by car traffic, leading to an unpleasant urban environment.



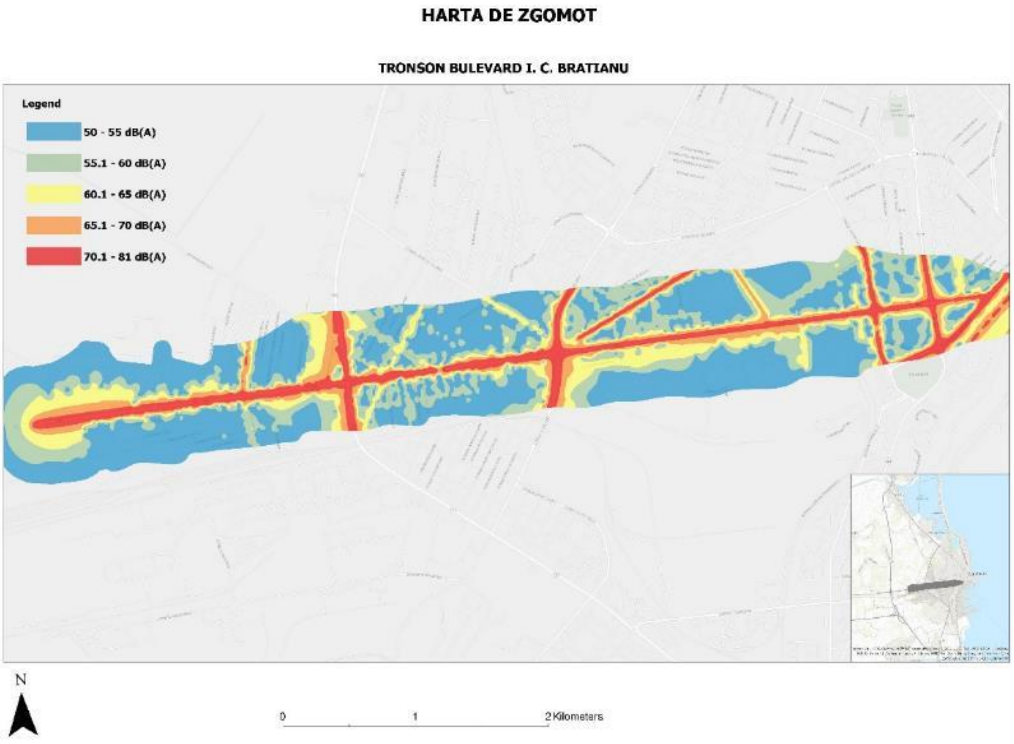


Figure 65. Feeder Route noise map

2.4.6 Stakeholders

The MORE stakeholders were identified after some brainstorming exercises followed by analysis with the local project implementation team. This resulted in an extensive list of stakeholders with their respective competencies, responsibilities and interests regarding the Stress Section Area, and future design activities. They are shown in the table below.

Table 12. Stress Section Area Stakeholders

Stress Section Area Stakeholders	
National Authority	National Company for Road Infrastructure Administration (CNAIR – responsible for managing the national road network)
	National Road Police
Municipality Departments	Public Services management Department (roads, taxi, public transport, green spaces, public lightning)
	Development and European Funding Department (responsible for the SUMP implementation and obtaining funding for the SUMP projects implementation)
	Urban Planning and Land Use Division
	House Owners Association Department
	Local Police Department
Municipality Company	Confort Urban Company (responsible for road works and parking management)

	CT BUS Company (local public transport)
Metropolitan Area	Constanta Metropolitan Area Intercommunity Development Association
Education	Universities – Ovidius University
	School no. 8 representatives
NGOs/Associations	Residents Association (House owners association)
	Students Associations
	Taxi Association
	Private transport Association
	People with disabilities Associations
Private sector	Car sharing companies
	Shopkeepers

2.4.7 TEN-T Network Stakeholders

National Road no. 3 (DN3) is the direct link to the TEN-T network. This segment of the road is owned by the Romanian State and is managed by CNAIR S.A. – the National Company for Road Infrastructure Administration. CNAIR S.A. is a company of national strategic interest working under the authority of the Romanian Ministry of Transport with the aim of managing, developing and exploiting the elements of the national road and motorway infrastructure on the basis of commercial principles for ensuring that the road traffic is performing in safe, fluent and continuous conditions.

When entering the City, DN3 transforms into I.C. Bratianu Boulevard. This segment of the street is owned by the municipality and is managed by S.C. Confort Urban S.R.L. Company. The Company works under the Municipality`s authority and is responsible for public streets and parking places management.

The cooperation between these entities is a good one, and they cooperate whenever the situation requires it, most often they are cooperating when developing plans, strategies or policies in the field of transport and mobility, even though there is no formalised way of cooperation between these entities.

During the MORE project, Constanta municipality has had a formal meeting with the representatives of CNAIR to present them the project objectives and make them aware that we will need them to be involved in the project activities. Therefore, by the mid/end of March we intend to organize a joint meeting with the main stakeholders (public authorities/institutions) of the Feeder Route, namely: CNAIR, Road Police, County Council road management department and all interested Municipality departments and companies. This meeting will have as main objective the identification of the priorities regarding the Feeder Route and hopefully to establish a modus operandi between these actors by the end of MORE.

2.5 Malmo

The *Scandinavian – Mediterranean* TEN-T network corridor stretches from Malta and Sicily of the south of Italy, cross Europe in a direct north-south line and connect the Scandinavian capitals of Copenhagen, Oslo, Stockholm and Helsinki. The corridor intersects with other strategic transport nodes such as the ports of Malmö and Gothenburg and the Rail-Road terminal in Hallsberg.

Ongoing strategic investment in the corridor includes the Fehmarn Belt link between Puttgarden and Rødby as well as the Brenner Base Tunnel in the Alps connecting Austria and Italy.

The corridor in the case study stretches from the inner city of Malmö, adjacent to Malmö central station and the University in north-easterly direction towards the highway and functional TEN-T link of E6/E20, see Figure 66. The railway stretching along the corridor is included in the TEN-T as well.

In Malmö, the TEN-T corridor stretches along the outer ring of the city. There are nine intersections in total where the TEN-T corridor connects with city streets network of Malmö.

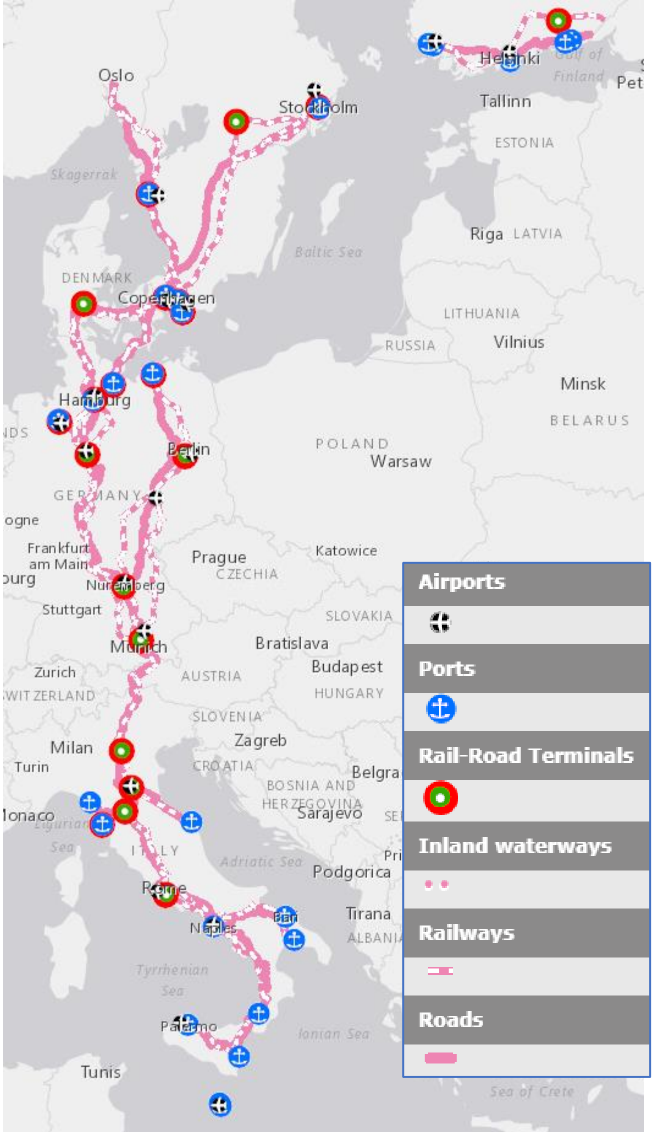


Figure 66. Scandinavian - Mediterranean TEN-T corridor

Figure 67. Study area (green) and its relation to the main TEN-T network corridors in Malmö (pink)

The study area is defined by the feeder route of Västkustvägen together with adjacent roads and streets, connecting the northern parts of the inner city, with the TEN-T corridor, see Figure 68 below. The feeder route is one of three major feeder routes from the north connecting the city of Malmö. All feeder routes are dual carriage ways, developed in the 1950-70s.

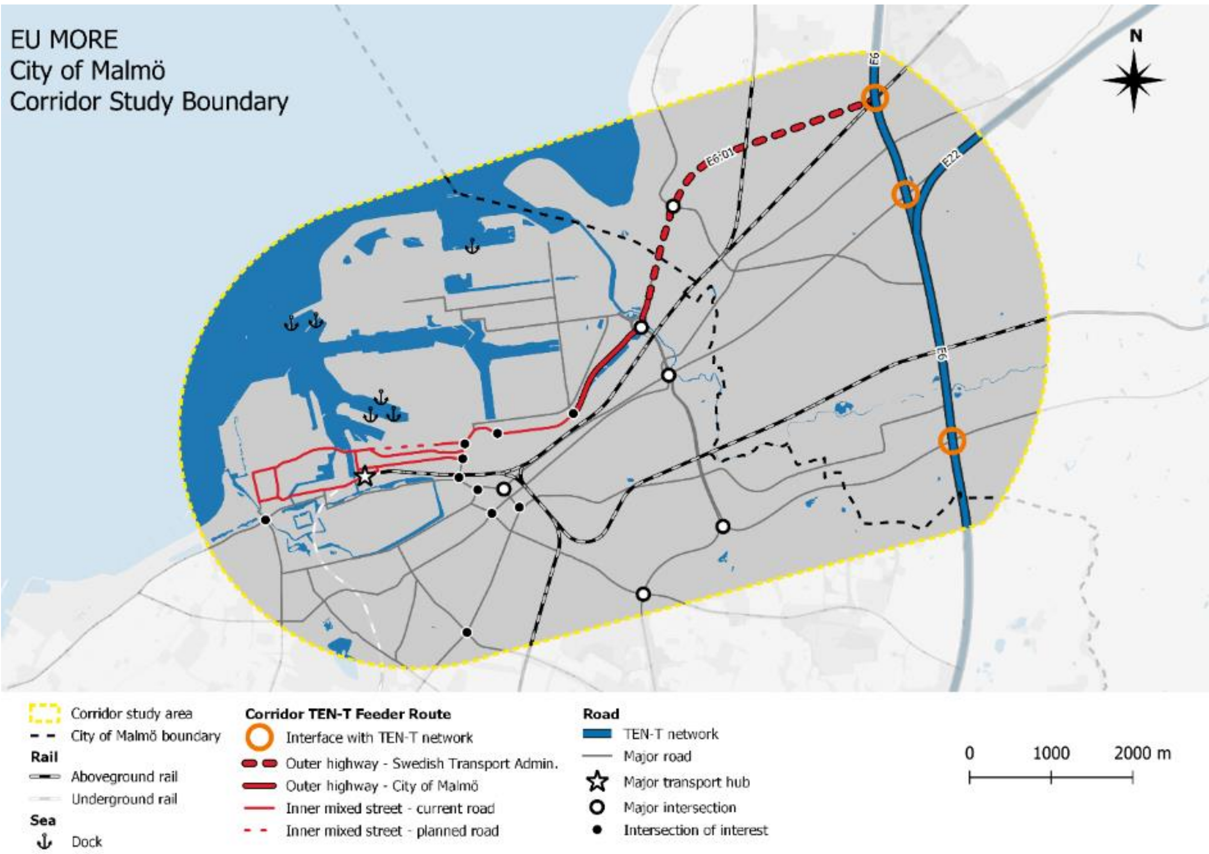


Figure 68. Detailed map of corridor and study area

2.5.1 Historic Planning and land use

Like many other important harbour cities, the harbour of Malmö has slowly been constructed and formed where the city meets the ocean. In the 19th Century the ocean line separating the city from the sea was located roughly where the central station of Malmö is located today, several kilometres from the open ocean. Ever since the industrialization of Malmö, the port has bit by bit traversed into what was once ocean.

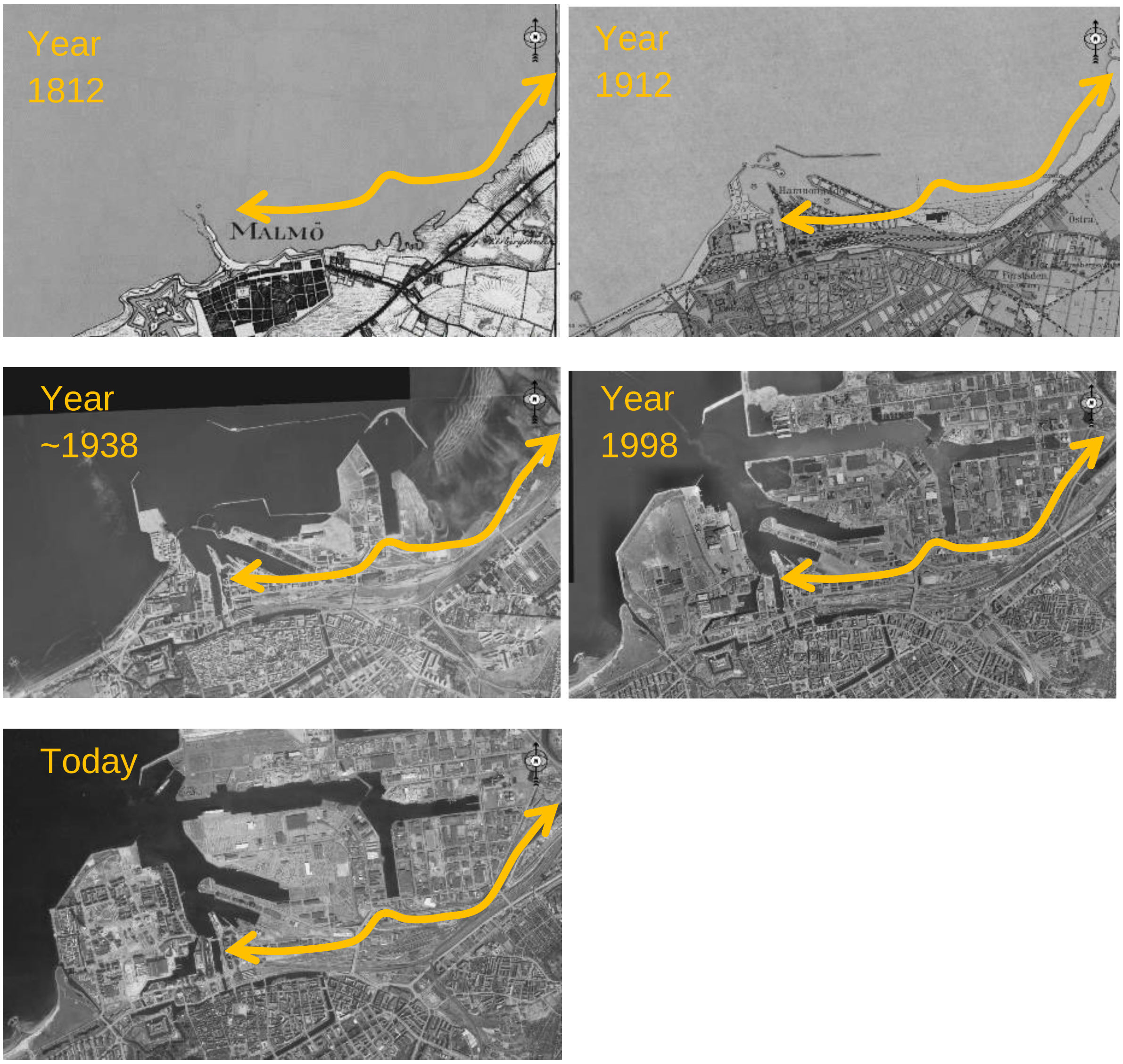


Figure 69. The transition from ocean to harbour to mixed city. Source: Malmö stad

2.5.2 Current planning

Physical planning

Today, the area of Nyhamnen is a diversified area with mixed land use. Along the corridor from Skeppsbron until the major intersection between *Västkustvägen* and E6/E20 outside the town of Åkarp the cityscape changes from a dense urban built up area with mostly commercial and office building, to low-medium dense industrial areas and agricultural landscape. The corridor follows the southern edge of the major industrial area of Malmö, *Hamnen* – or the harbour. The area is divided between *Nyhamnen*, the area to be converted into a mixed dense urban area in the future, *Mellersta hamnen*, with industrial buildings and storing of imported cars from container ships and *Norra hamnen*, with mostly advanced industrial development and offices. *Norra hamnen* is currently also being extended with use of land reclamation. Further out, past the city limits of Malmö the corridor follows the town of Arlöv with industrial and residential areas in the south, and agricultural land in the north to intersect with the main TEN-T network corridor of E6/E20 the Alnarp.

Infrastructure

The viaduct of *Spillepengen* is the latest attribute increasing mobility of the feeder route, opening for traffic in 2015. The intersection is part of the corridor and feeder route. The viaduct makes a fly-over over the existing roundabout between the connecting feeder routes and the harbour area.

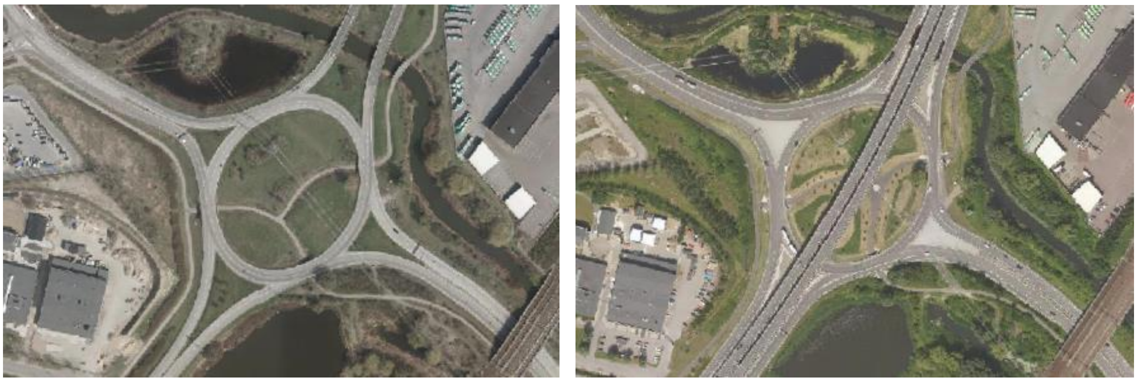


Figure 70. The fly-over intersection of Spillepengen, before and after construction

Presently, the railway between Malmö and Lund is being upgraded from double track to four-track railway, increasing the capacity for both passenger traffic and freight in one of Sweden's most important commuter links. The four-track is planned to open in December 2023, and from the years 2020 to 2022, a temporary double track railway will be in use during the building process, and this will decrease the capacity slightly.

In the year 2020 the railway towards Lomma will be opened for passenger traffic, a new passenger link that will heavily reduce travel times between Lomma and Malmö. Initially the trains will operate one per hour and holds capacity of up to 600 persons. After 2024 the route will operate twice hourly and increase capacity for train travel further.

2.5.3 Future planning

The detailed masterplan *Nyhamnen* is under development in the municipality of Malmö. The new urban district will in the future support up to 9 000 dwellings, 21 000 workplaces, three new schools and a new green link with parks and recreation. The area is set out to overbridge the gap between the central city and the ocean.

Figure 71. The area of Nyhamnen, today and future conditions, looking towards southwest. Area of study represented by the yellow arrow. Image: FÖP Nyhamnen

Figure 72. The area of Nyhamnen with future development. Area of study represented by the yellow arrow. Image: FÖP Nyhamnen

The future Nyhamnen will be dense, and mobility planning is one of the greatest challenges for the area in general. The future main street will be a continuation of Hans Michelsensgatan that will be designed as a city street with high mobility. Both pedestrians, bicycles, cars and a possible future tramline will have dedicated space. The street of Jörgen Kocksgatan, that today serves as the main traffic link between Västra hamnen and the TEN-T corridor will be transformed to a green park corridor for only bicycles and pedestrians. The southmost street of Carlsgatan will be tighter, though traversing the most densely built-up area in Nyhamnen.

The exact layout and street functions for the future Nyhamnen is not politically adopted as of 2019.

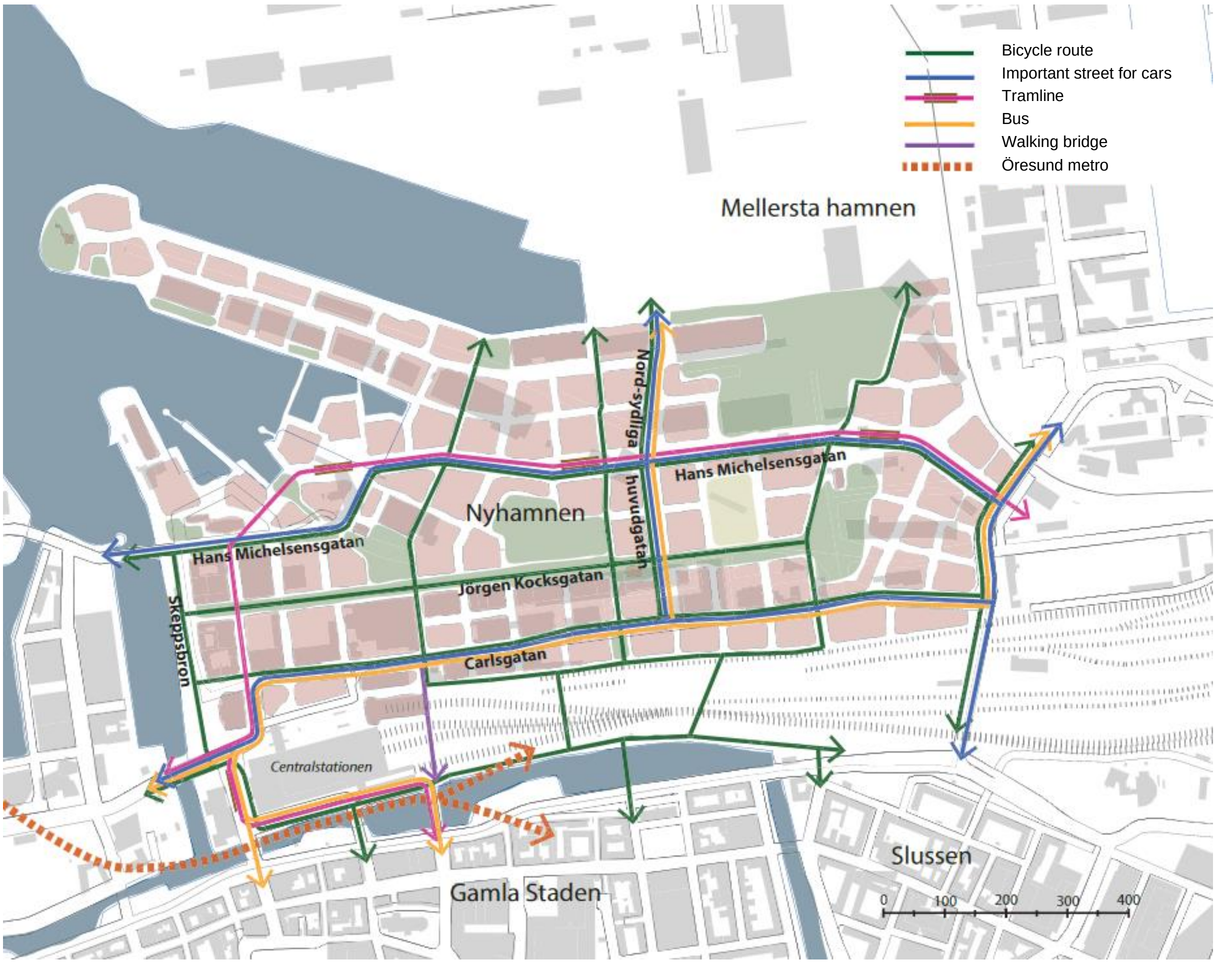


Figure 73. Future traffic mix in the area of Nyhamnen

2.5.4 Sustainable urban mobility plan

The city council of Malmö has adopted a Sustainable Urban Mobility Plan (SUMP) in order to describe the holistic planning approach towards promoting a sustainable and climate neutral transportation system in the city. The plan sets out for example a target-based planning approach towards the future modal split of the transportation system in the city and how future commuting can be done in a sustainable way.

2.5.5 Corridor definition and characteristics

The corridor has been defined and classified into segments using Transport for London's Movement and Place typology - adapted for MORE - for defining the urban feeder route. The method involves the analysis of the route according to mobility and place functions, see Figure 74.

The segments have been divided up into nine parts, each representing different mobility and place functions.

Figure 74. Movement and Place, street classification using the MORE typology

2.5.6 Outer sections

The major part of the defined feeder route, from the intersection with the TEN-T core network and E6/E20 is defined as M3A and P1A. Since the route mainly is characterized as a controlled-access highway, with few signalled intersections and high speed, the route is defined as M3 / P1. According to the standardized MORE typology, the feeder route is defined as a "road", and not as a street, where the main character is defined by the mobility of motorised vehicles and no other functions. A separate bicycle lane is adjacent to parts of the segment but is not in all given the same priority as the motorised vehicles along the corridor. For the places typology, the corridor stretches along industry areas which are classified as commercial according to the MORE typology, and will hence be given the classification A.

The outer part (Arlöv ring) is a high-speed controlled-access highway with speed limit of 110 km/h. At the intersection with Lommavägen/Malmövägen, the road speed limit is decreased to 70 km/h, continuing all way into the central parts of the harbour. The segment Arlöv-Spillepengen is still a significantly a controlled-access with only one level intersection with traffic signal. The intersection of Spillepengen is characterized by the motorway fly-over. The intersection is one of the most important intersections for freight and goods traffic in the city, connecting the TEN-T corridor with the major parts of the freight harbour. South of Spillepengen lies the rail/road terminal with important goods transfers between rail and road transport. The intersection at Sjölundaviadukten also acts as a major connector between the city feeder routes and the harbour area.

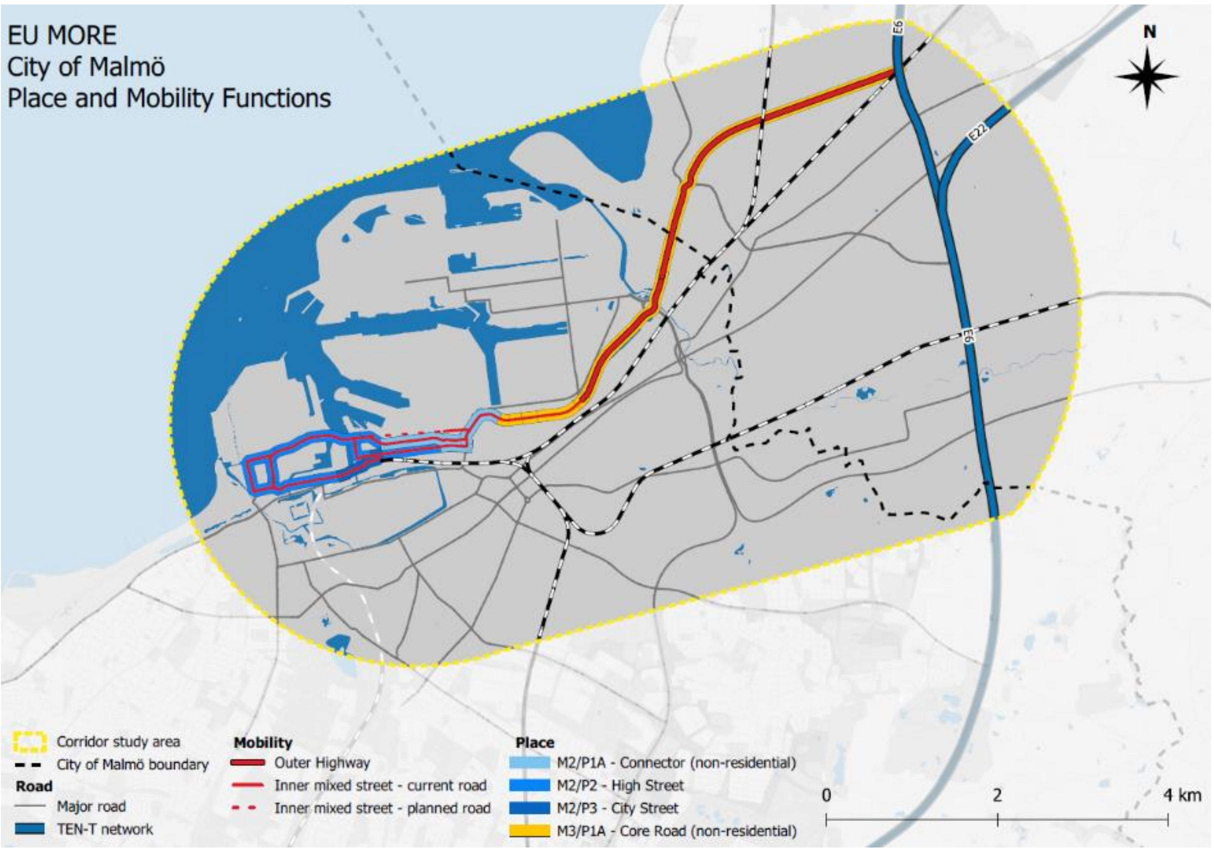


Figure 75. Corridor definitions

2.5.7 Inner sections

Continuing west at Västkustvägen, the road changes character when meeting the area called Mellersta hamnen and Frihamnsviadukten. This section is characterized by closely knitted intersections, traffic signals, crossings for bicycles and pedestrians, surrounding office buildings and a reduced speed limit. It is defined as a M2/P1A section where mobility for motorized vehicles still is dominant but other city functions are injected into the streetscape. On the viaduct, Frihamnsviadukten, the route connects over the large railway area towards the inner city of Malmö. Therefore, the section has both a feeding function as well as a connecting function for traffic between the city and different parts of the port of Malmö.

The M2/P1A section continues across the viaduct, and connects with the street of Jörgen Kocksgatan, where the section divides into split sections. The northern part following the street of Jörgen Kocksgatan continues as a M2/P1A segment with low diversity and mixed city functions.

The southern segment, Carlsgatan is characterized differently as it continues further and further towards the city, becoming more built up and with additional destinations along the street section. Office buildings, different associations and workplaces with entrances from street level define the streetscape. The street has walking and biking areas on both sides of the street.

At the intersection of Navigationsgatan, both the northern and the southern segments change character when entering the developed cityscape. The northern part follows the street of Hans Michelsensgatan towards the island of Universitetsholmen and is at this section surrounded by office buildings, sidewalks and a diverse mix of land uses including parking, which classify the segment as a M2/P2. The southern segment turns south towards Malmö central station and the old city and here the street changes and adds to become a diverse set of mixed uses.

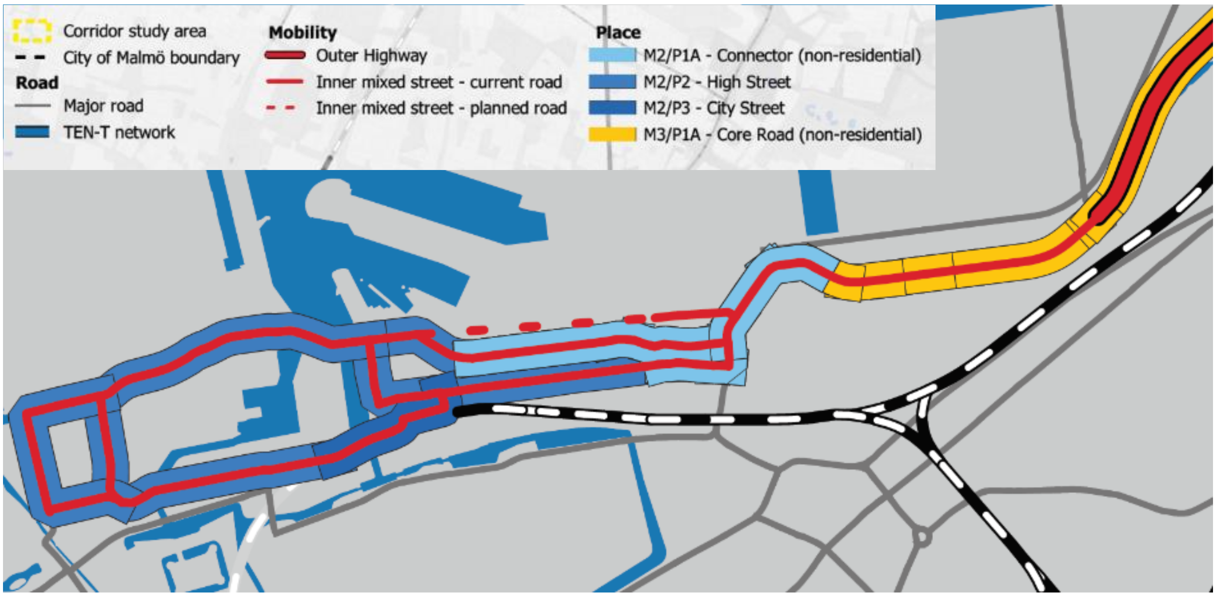


Figure 76. Corridor definitions, detailed

Table 13. Corridor definition table

Segment number	Segment name	Segment type	Characteristics	Intersections
1	**Arlöv ring**	M3A / P1A	Controlled-access highway, 110 km/h,	No street level intersections
2	**Arlöv - Spillepengen**	M3A / P1A	Mainly controlled-access highway, 70 km/h	One signalled intersection
3	**Spillepengen - Sjölundaviadukten**	M3A / P1A	Mainly controlled-access highway, 70 km/h, bicycle lane	One intersection without signalling
4	**Sjölundaviadukten - Frihamnsviadukten**	M3A / P1A	Mainly controlled-access highway, 70 km/h, bicycle lane	One intersection without signalling
5	**Frihamnsviadukten**	M2 / P1A	Major road, connector, 50 km/h	Multiple signalled
6	**Jörgen Kocksgatan**	M2 / P1A	Major road, connector, 40 km/h	Multiple, no signals
7	**Hans Michelsensgatan**	M2 / P2	Major road, connector, 40 km/h, moderate place character	Multiple, no signals
8	**Carlsgatan**	M2 / P2	Major road, connector, 40 km/h, moderate place character	Multiple, no signals

9	**Malmö C**	M3B / P3	Major street, 40 km/h, high mobility, central station	Multiple, signalled

2.5.8 Segment dividing characteristics

This chapter contains detailed street images and descriptions of each segment divider in the corridor. The segments are divided between major intersections and where the route characteristics change along the corridor. There are a total of 9 segments along the route and they are described below according to their respective numbers shown in Table 13 above.

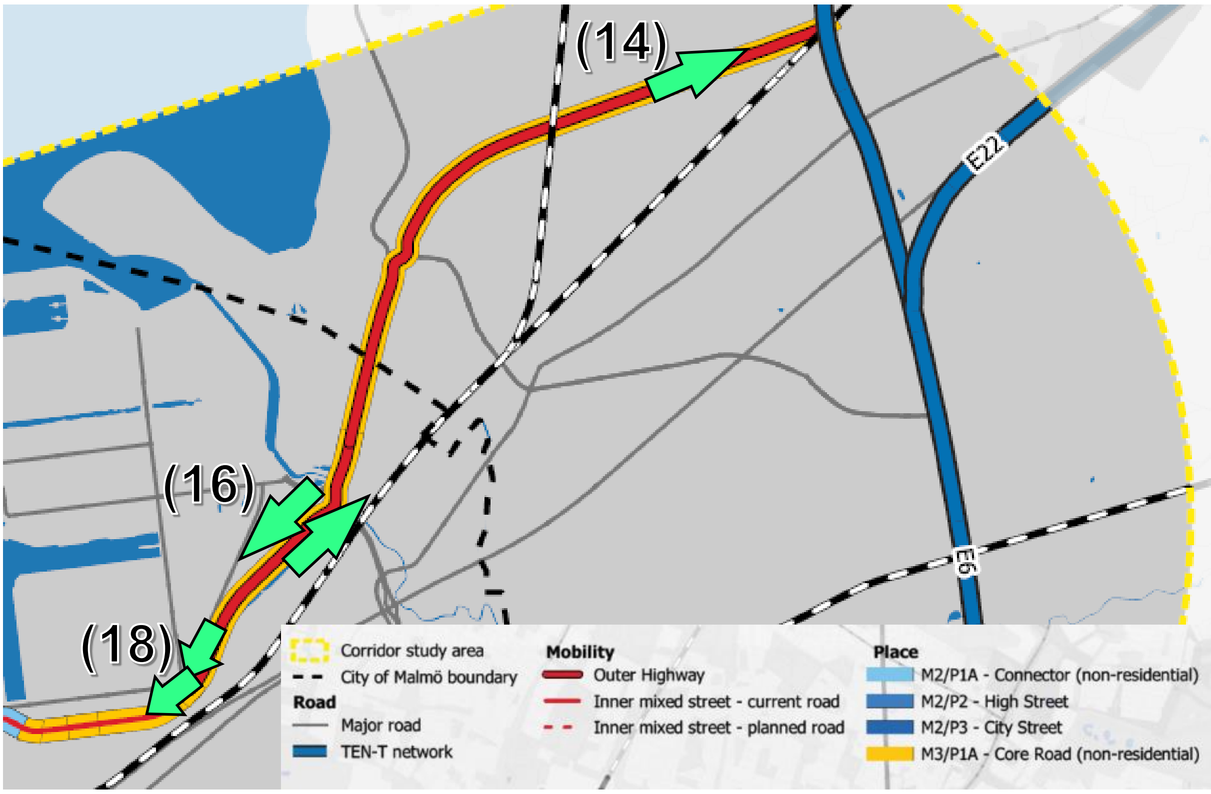


Figure 77. Street images and segment descriptions, outer sections. Number in brackets represent figure numbers below

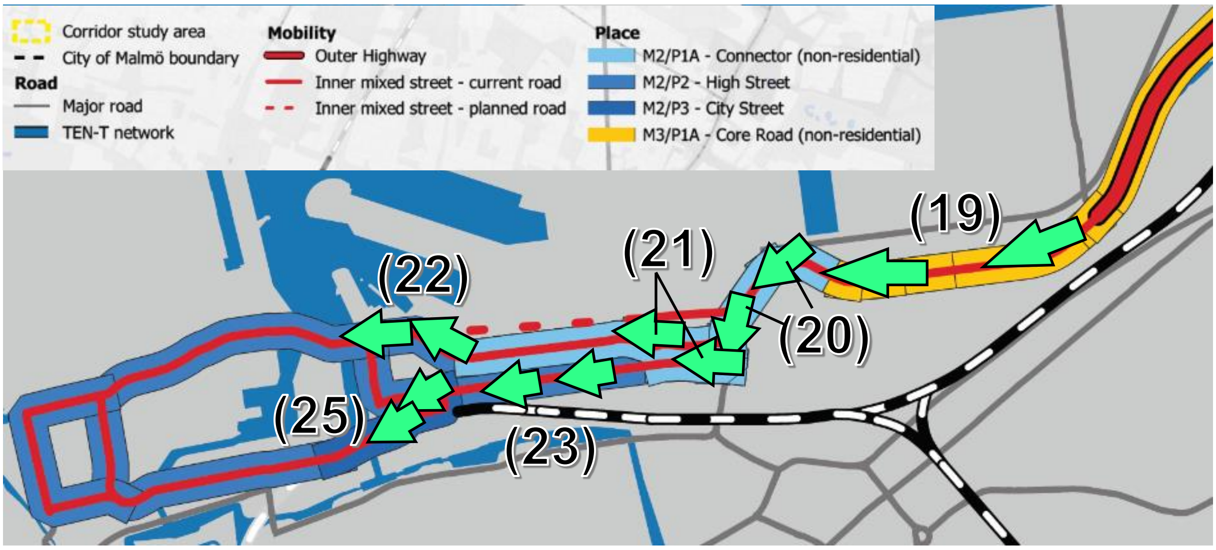


Figure 78. Detailed map. Number in brackets represent figure numbers below

Arlöv ring (1 & 2)

The outer parts of the corridor are characterized as a controlled-access highway with high speeds. The total number of vehicles per average weekday is approximately 12 500, with 18% of the total traffic considered as heavy vehicles. The section connects with the TEN-T network and European route of E6 / E20.

Figure 79. The outer parts of the corridor, outside the municipal border of Malmö, looking north-east

Spillepengen (2 & 3)

The intersection of Spillepengen was renovated in 2015 and opened with a high-speed flyover to reduce traveling time and increasing capacity for heavy vehicles to and from the harbour area. The intersection serves as one of Malmö's major connections between the intercity road network and connects the study corridor with the inner ring road and the major road between Malmö and Lund. The traffic flow is 20,700 vehicles per average weekday. Bicycle tracks run through the roundabout and connects the harbour area with the existing network of bicycle track in the city.

Figure 80. Spillepengen overview, looking south-west

Figure 81. Spillepengen, from south to north and from north to south

2 – 3 Sjölundaviadukten (3 & 4)

The intersection of Sjölundaviadukten is an important node connecting the inner parts of the harbour area and the eastern parts of Malmö. The intersection also functions as a crossing for bicycles and pedestrians with bicycle tracks and curbs on multiple sides on of the roads.

Figure 82. Sjölundaviadukten overview, looking south-west

Figure 83. Sjölundaviadukten, from north to south and south to north

Västkustvägen (4)

The road of Västkustvägen changes character along different parts of the route. Separate curb sides for pedestrians and bicycles follow the road on both sides and further towards the inner city the more built-up the surrounding areas become, see Figure 84 below.

Figure 84. Västkustvägen (segment 4), to the south

Frihamnsviadukten (4 & 5)

Frihamnsviadukten is a large multi-intersection segment of the corridor, connecting several important roads in the city and the harbour area. Curbs for pedestrians and bicycles follow the road on both sides. The road connects through a viaduct over the railroad to the inner city.

Figure 85. Frihamnsviadukten (segment 5), to the south

Jörgen Kocksgatan (6)

The street of Jörgen Kocksgatan is an industrial two-lane street, following the old industrial buildings of Nyhamnen towards Västra hamnen. Newly added bicycle tracks follow the street to connect further in with the existing bicycle network. The street will change character hugely in the coming decades as the area of Nyhamnen is developed.

Figure 86. Jörgen Kocksgatan (segment 6), looking west

Hans Michelsensgatan (7)

The western-most part of the corridor, Hans Michelsensgatan is sided by a mix of street level parking lots and high-rise office and commercial buildings. Separate curbs for pedestrians are found on both sides of the road, however there is no infrastructure for bicycles. The street will change character hugely in the coming decades as the area of Nyhamnen is developed. The current traffic flow is approximately 11,300 vehicles per average weekday.

Figure 87. Hans Michelsensgatan (segment 7), looking west

Carlsgatan (8)

Carlsgatan is the southern segment of the corridor after the split on Frihamnsviadukten. The road is characterized by mixed-use buildings on the north side and empty lots to be developed in the coming years of the south side. Separate facilities for pedestrians and bicycles follow the street towards the city. The street section will change with the coming development in Nyhamnen. The traffic flow is approximately 16,500 vehicles per average weekday.

Figure 88. Carlsgatan (segment 8), looking west

Malmö C (8)

The segment where the corridor meets Malmö Central Station is the most diverse part of the corridor. Mixed-use high-rise buildings and old historic buildings along the street make for a more complex street section. There are large curbsides for pedestrians and the flow of people is great compared other parts of the corridor.

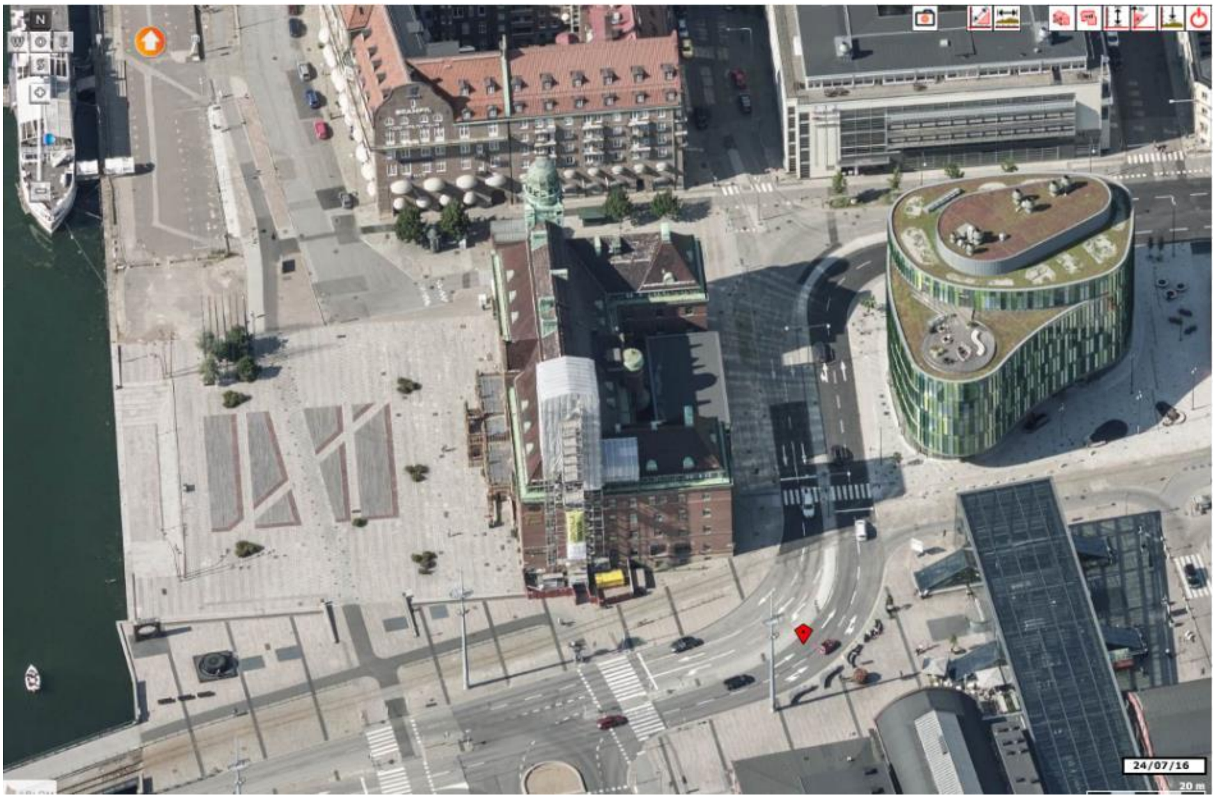


Figure 89. Malmö C, overview, looking north

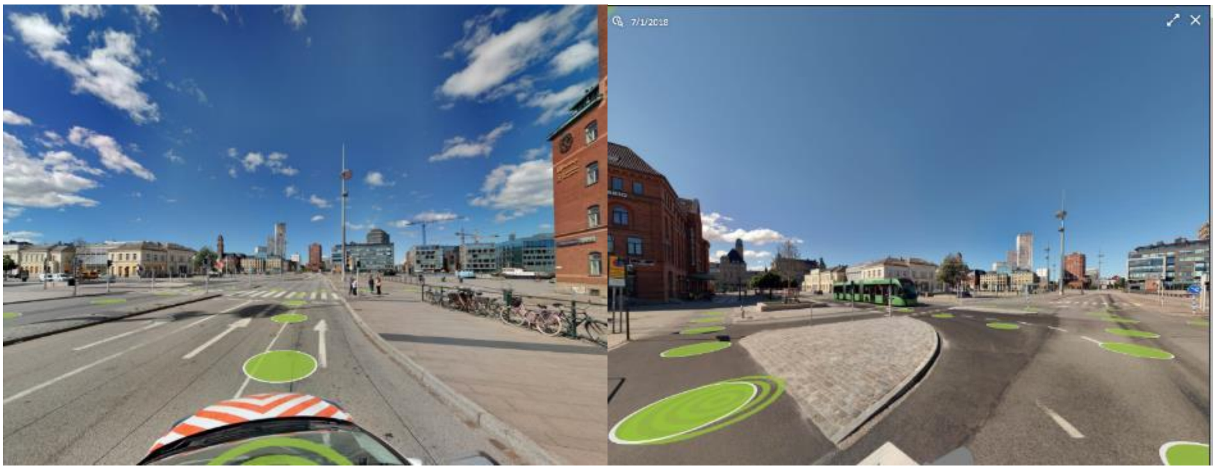


Figure 90. Malmö C (segment 8), looking west

2.5.9 Traffic and mobility

The corridor, stretching from Universitetsbron in the central city, towards the European route 6, carries different amount of traffic. The main traffic mode along the corridor is private motorized vehicles and the traffic intensity varies along the route. In the central city, the traffic flow Hans Michelsensgatan and Carlsgatan are approximately 11,300 and 16,500 vehicles per day. By *Spillepengen*, by the municipal border, the traffic flow for the feeder route is approximately 20,700 vehicles.

Table 14. Traffic flow (motor-vehicles per average weekday) in different corridor sections

Corridor section	Traffic flow (year)	Rush hour
Hans Michelsensgatan by Universitetsbron	11 300 (2016)	1 170 (pm)
Carlsgatan	16 500 (2017)	1 750 max (pm)
Västkustvägen by Frihamnsviadukten	N / a	N / a
Västkustvägen by Spillepengen	20 700 (2017)	2 400 (pm)
Västkustägen by Hakegatan	18 500 (2016)	2 070 (pm)
Västkustvägen north of Malmövägen	12 600 (2016)	N / a

The corridor, stretching from the intersection at *Alnarp*, all the way to Nyhamnen and *Universitetsholmen*, has different uses and functions for traffic and mobility. Primarily, the corridor functions as one of Malmö's most important feeder routes for cars and goods connecting the main road of E6/E20 with the northern central parts of Malmö.

Many of the vehicles using the corridor has northern and western parts of the central Malmö as starting position or destination. The majority of the private vehicles traversing the corridor in rush hour are commuters with workplaces in central Malmö and Västra hamnen. The majority of the heavy vehicles has starting point or destination in the harbour area and the rail-road good hub.

Cyclists

There are cycle lanes along major parts of the streets incorporated in the corridor. However, the quality and continuality of the cycle infrastructure differs between sections and parts of the street network.

During 2019 a testbed of new cycle tracks has been added to the streets of *Carlsgatan*, *Jörgen Kocksgatan* and *Grimsbygatan* in Nyhamnen. The aim is to promote the effectiveness of the cycling network infrastructure in the area.

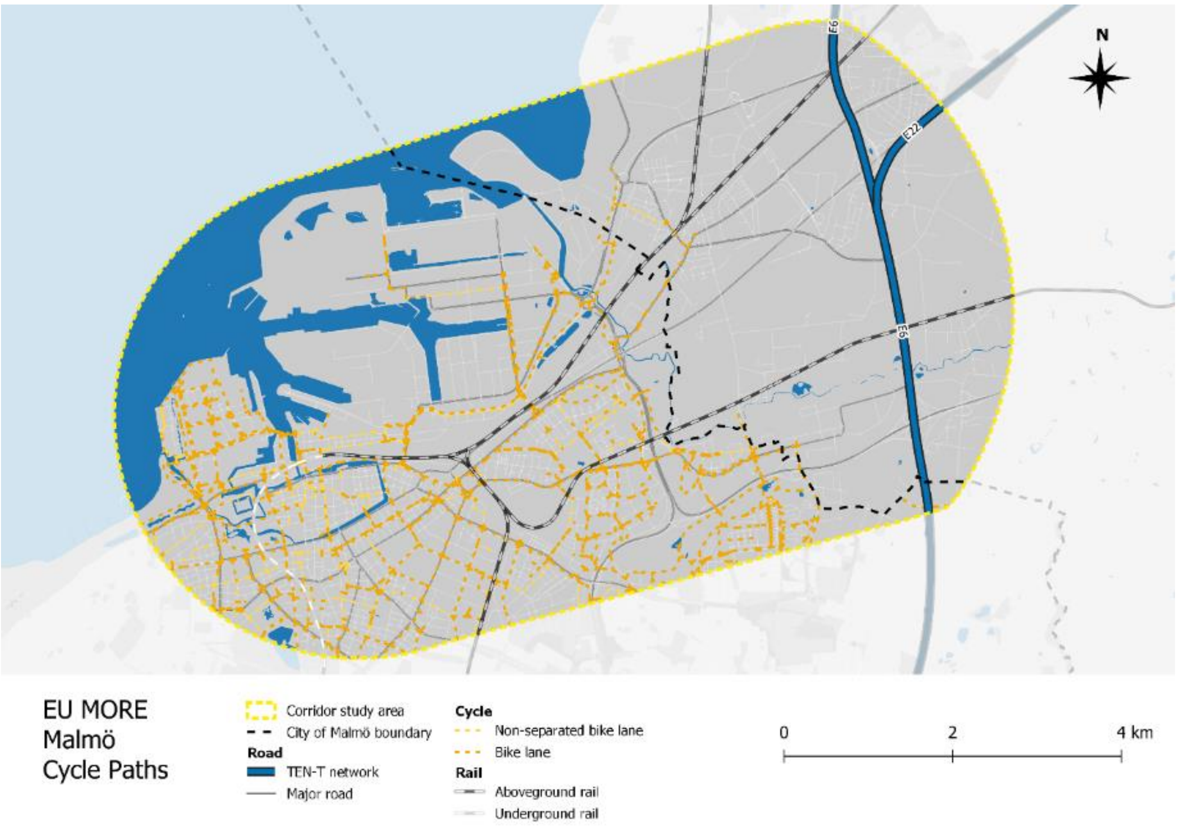


Figure 91. Overview of the bicycle infrastructure in the area. (Filled line is separated cycle track, dotted line is cycle lane on grade with other vehicle traffic)

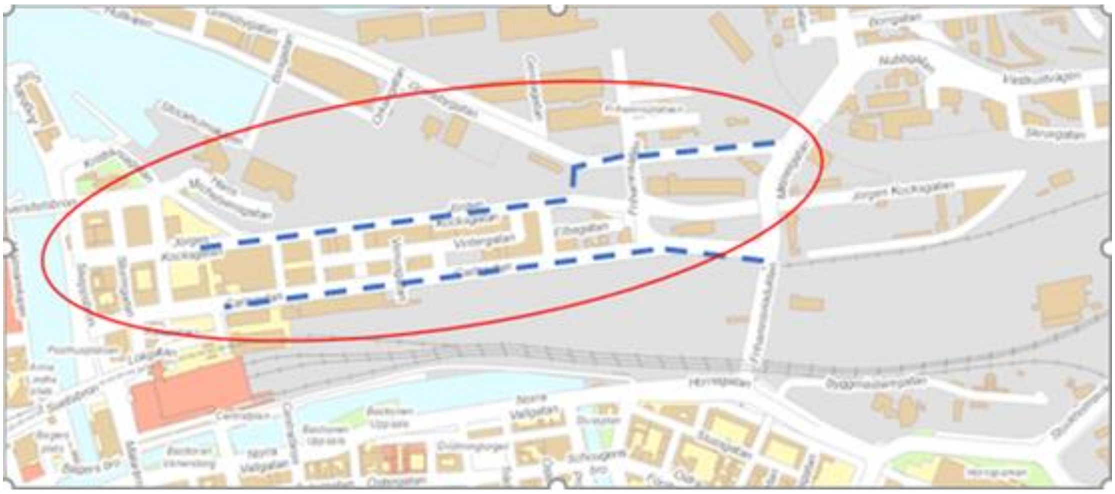


Figure 92. Testbed bicycle infrastructure in Nyhamnen. Image: Malmö stad

Pedestrians

Based on manual analysis and observations, the net flow of pedestrians in the area is relatively low. The main area where pedestrians accumulate is the western parts of Nyhamnen, where there are several large-scale office buildings and other commercial activities. North of Jörgen Kocksgatan and east of Västkustvägen the flow of pedestrians is marginal in relation to other transport modes.

The number of pedestrian crossings is very few. They are both controlled with traffic signals and uncontrolled. Further out where the corridor turns to feeder route, the number of pedestrian crossings is zero.

Figure 93. Pedestrian crossings: green dots are unsignalized crossings, red dots are signalized

Public transport

There are currently two city bus lines and two regional bus lines that use the corridor in daily operation. City bus lines 31 and 32 traverse the street of *Jörgen Kocksgatan* to reach *Mellersta hamnen* and *Norra hamnen*. The regional bus line 133 use *Västkustvägen* to reach Lomma north of Malmö.

In the near future, combined with the development of Nyhamnen, high capacity city bus lines are planned to make use of streets in the corridor, mainly the future street *Hans Michelsensgatan*. The rapid bus concept, *Malmöexpressen* is planned to be introduced in Nyhamnen in the near future, as an alternative to tram traffic as described earlier.

The railway between Malmö and Lund is one of the most heavily utilized railway sections in Sweden. The railway line carries both a high number of regional trains (Pågatågen and Öresundstågen) as well as intercity and high-speed trains towards Göteborg, Stockholm and further north. The railway also carries significant amounts of freight traffic, connecting both the harbour of Trelleborg and the Öresund link with the rest of Sweden and Scandinavia.

Figure 94. Bus traffic in the corridor. Different colours represent different bus routes

Heavy vehicles

The corridor serves as a central function to move goods and freight from three major areas: the inner city (city logistics), the harbour (industry and shipping goods) and the rail-road terminal (freight to and from railroad). This means the amount of heavy traffic along the corridor is significant, although the ratio of heavy vehicles and cars is decreasing further in the city. One traffic measurement made in 2016 shows the total number of heavy vehicles at the intersection of Västkustvägen / Hakegatan, just north of Spillepengen. The total number of heavy vehicles is over 20% of the total traffic.

Table 15. Total heavy traffic by the intersection per average day at Hakegatan (north of Spillepengen)

Total number of two axle vehicles	7610
Total number of three axle vehicles	4133
Total number of heavy vehicles without trailer	1684
Total number of heavy vehicles with trailer	1538
Mean number axle of heavy vehicles	3,6

In the central parts of Malmö, restrictions for heavy traffic applies (see Figure 95 below). At present, there are no applied restrictions for the corridor or the study area, however when the development for the area of *Nyhamnen* is being transformed, restrictions will apply for this area as well. The restrictions regulate lengths, weight and environmental classification (Euro standards) for HGVs.

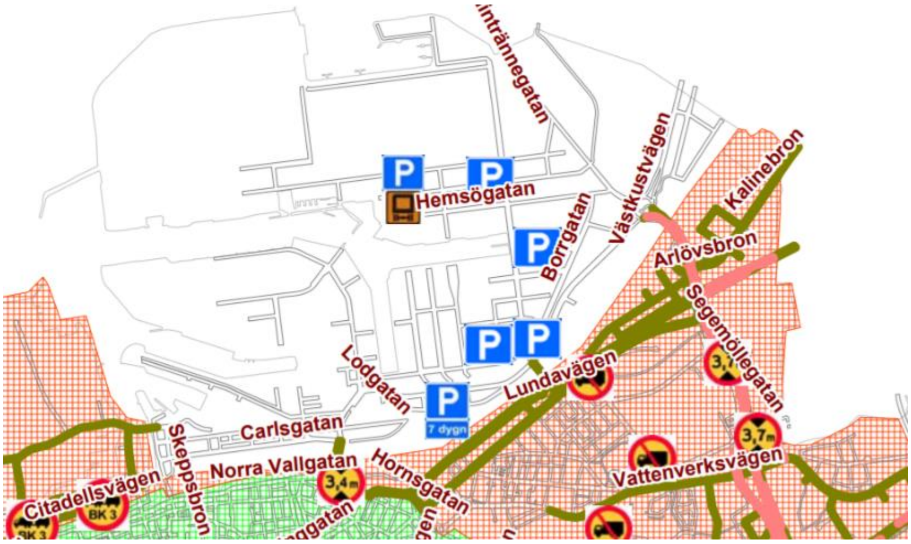


Figure 95. Local traffic regulations for heavy vehicles

Modal shares

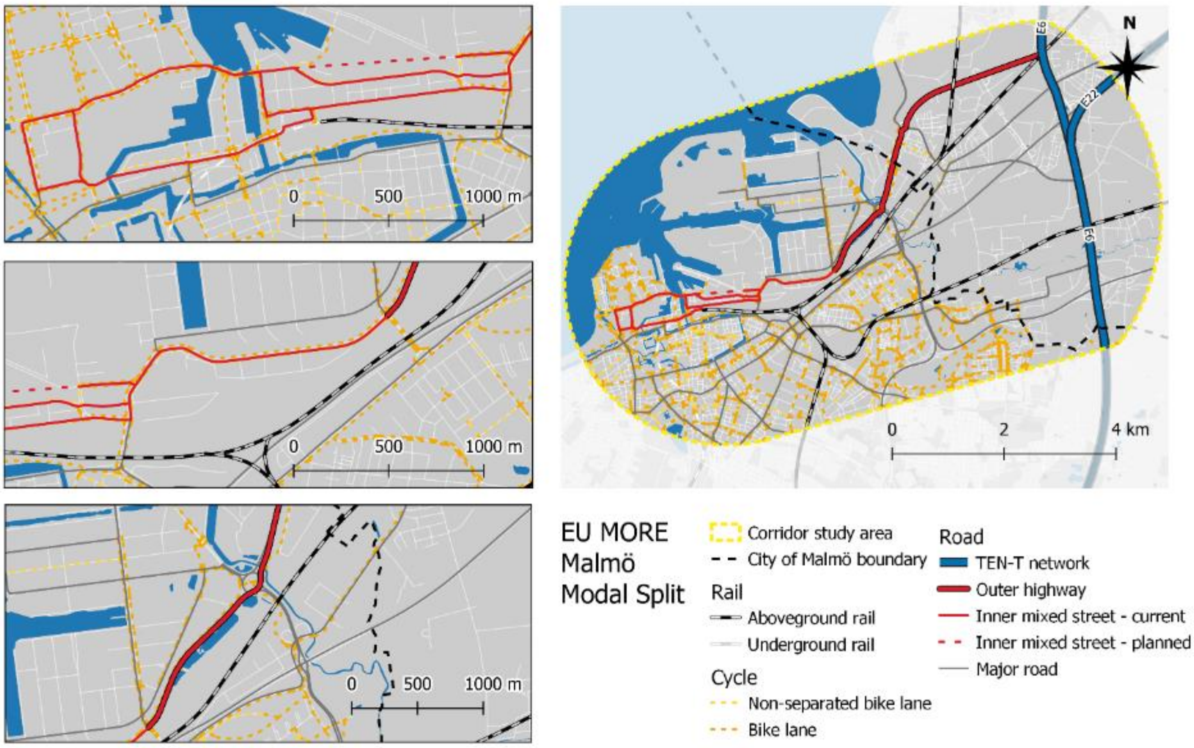


Figure 96. Different transport modes along the feeder route corridor

The modal split for the city of Malmö is shown in Figure 97. However, the commuting volumes to Västra hamnen - that partly use the main feeder route - have higher rates of car use than the city overall.

The exact modal share for the feeder route corridor is dependent on the corridor definitions. Västkustvägen carries mainly cars. Buses and bicycles incorporate only a fraction of the total travel (<5%). However, by including the main railway, the modal shares changes to the benefit of rail travel, see Table 16.

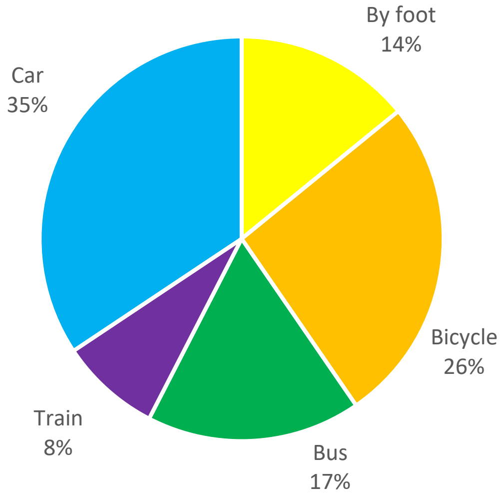


Figure 97. Modal split for transport in Malmö, whole municipality

Table 16. Modal split for feeder route including railway

Car	Bicycle	Train	Bus
22,000	400	56,100	5,000
27 %	< 1 %	68 %	5 %

2.5.10 Safety, security and environment

Accidents

Between the year 2010 and 2019, a total of 257 accidents in which people were injured occurred along the corridor selected for this project. The study area stretches from the inner city of Malmö and Universitetsbron, alongside Malmö central station, and towards the highway and TEN-T link of E6/E20. Of the total amount of reported accidents during the time period, 8 were considered serious accidents and 43 were considered moderate.

The majority of accidents occurred between two passenger cars (31%) or a passenger car and truck (15% in which 1 person was seriously injured).

Noteworthy is also the number of single accidents with passenger cars (11% of which 1 person was seriously injured), also the number of single accidents with cyclists is high along the corridor (11%, of which 2 were seriously injured).

11% of the total amount of accident involved pedestrians, however most of them only involved one person. 5 of the reported accidents occurred between pedestrians and passenger cars.

The statistics also show that the majority of bicycle accidents occur closer to the city centre, often involving a crossing nearby an intersection. Accidents involving a passenger cars or trucks are more spread out alongside the corridor and often occur in a roundabout or intersection.

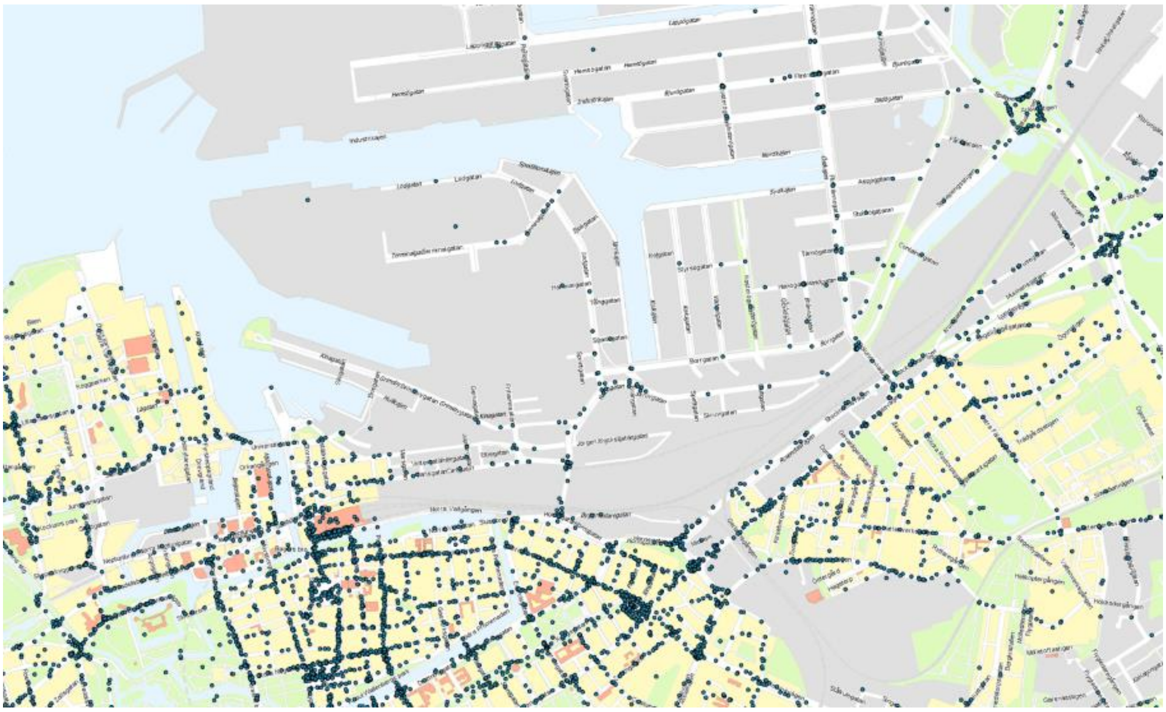


Figure 98. Overview of accidents

Air pollution

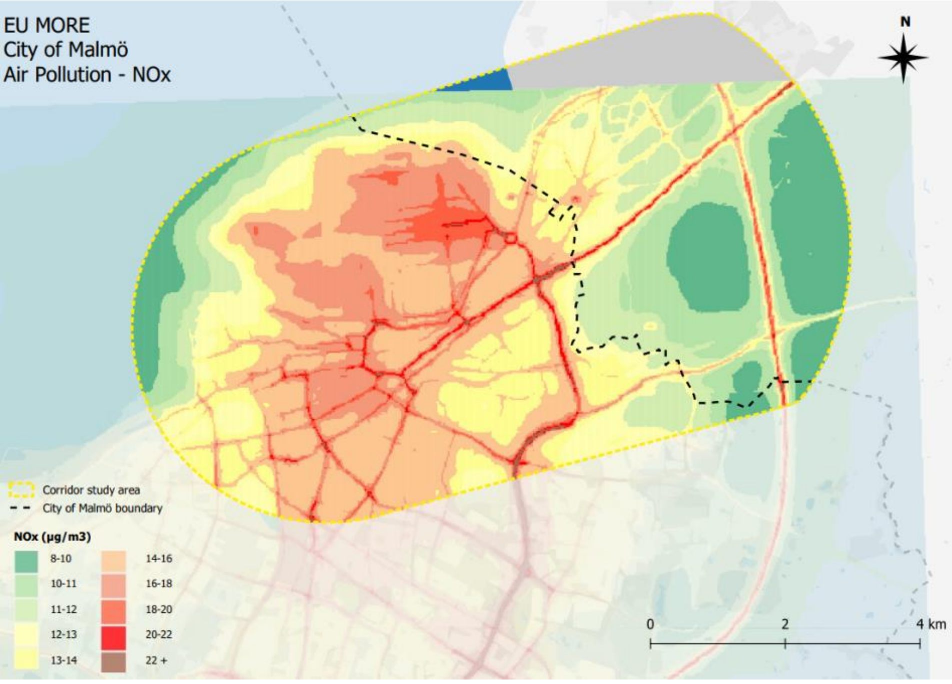


Figure 99. Air pollution NOx. Source: Miljöförvaltningen, Malmö stad, March 2017

The map shows air pollution levels (micrograms of nitrogen dioxide / m3) in Malmö. Different types of emission sources such as road traffic, local geography and meteorological variations were used to calculate the level of air pollution.

Malmö has problems with meeting the environmental quality standard for nitrogen dioxide in places where the proportion of heavy traffic is high and where traffic is intensive on both sides of the street. The problems with poor air quality are concentrated in Malmö's central area.

The data show that the air has high levels of pollution (24-26), starting at the roundabout in the beginning of Västkustvägen reaching down to the roundabout where Carlsgatan turns into two streets; Jörgen Kocksgatan and Carlsgatan. The air quality is slightly better along Carlsgatan (20-21), and better at Jörgen Kocksgatan (18-19).

The map below (Figure 100) also shows particulate matter emissions in the area ($PM_{12.5}$).

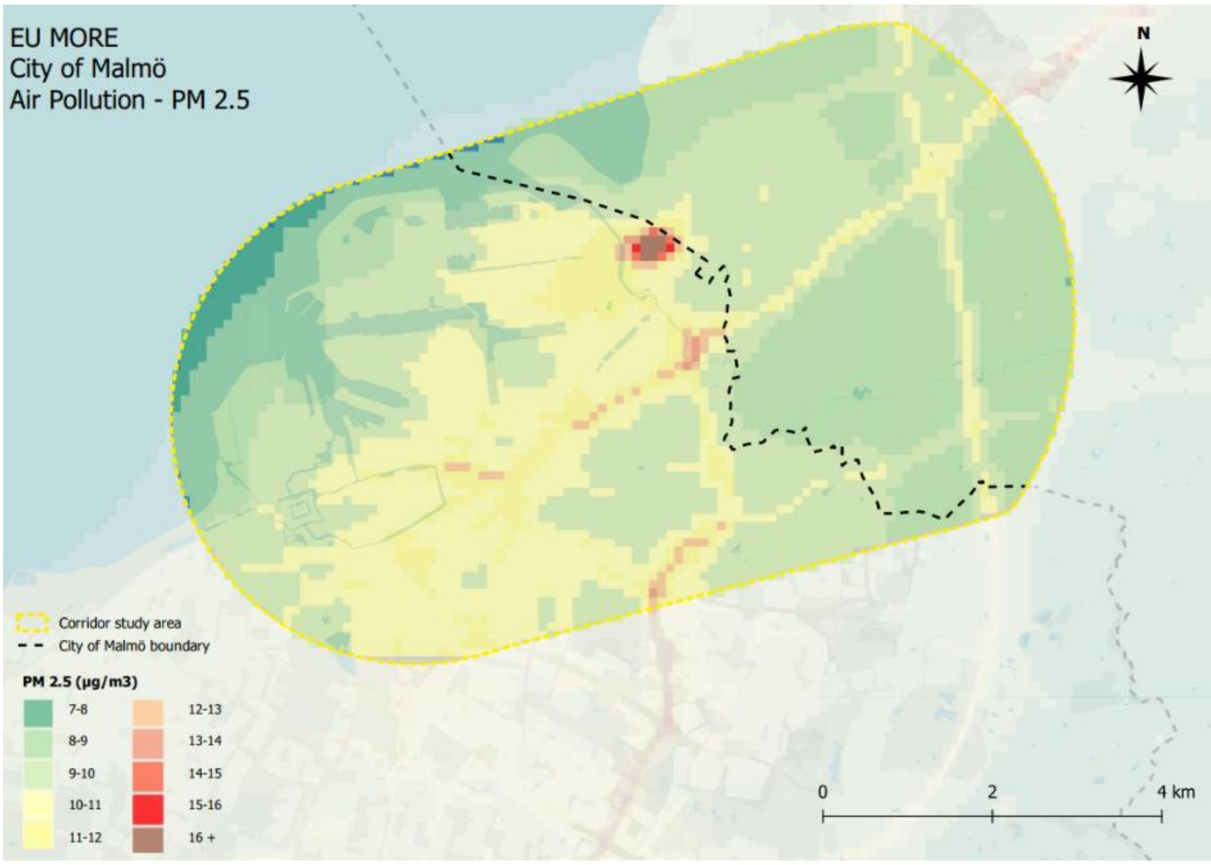


Figure 100. Air pollution PM2.5. Source: Miljöförvaltningen, Malmö stad, March 2017

Noise disturbances from train traffic

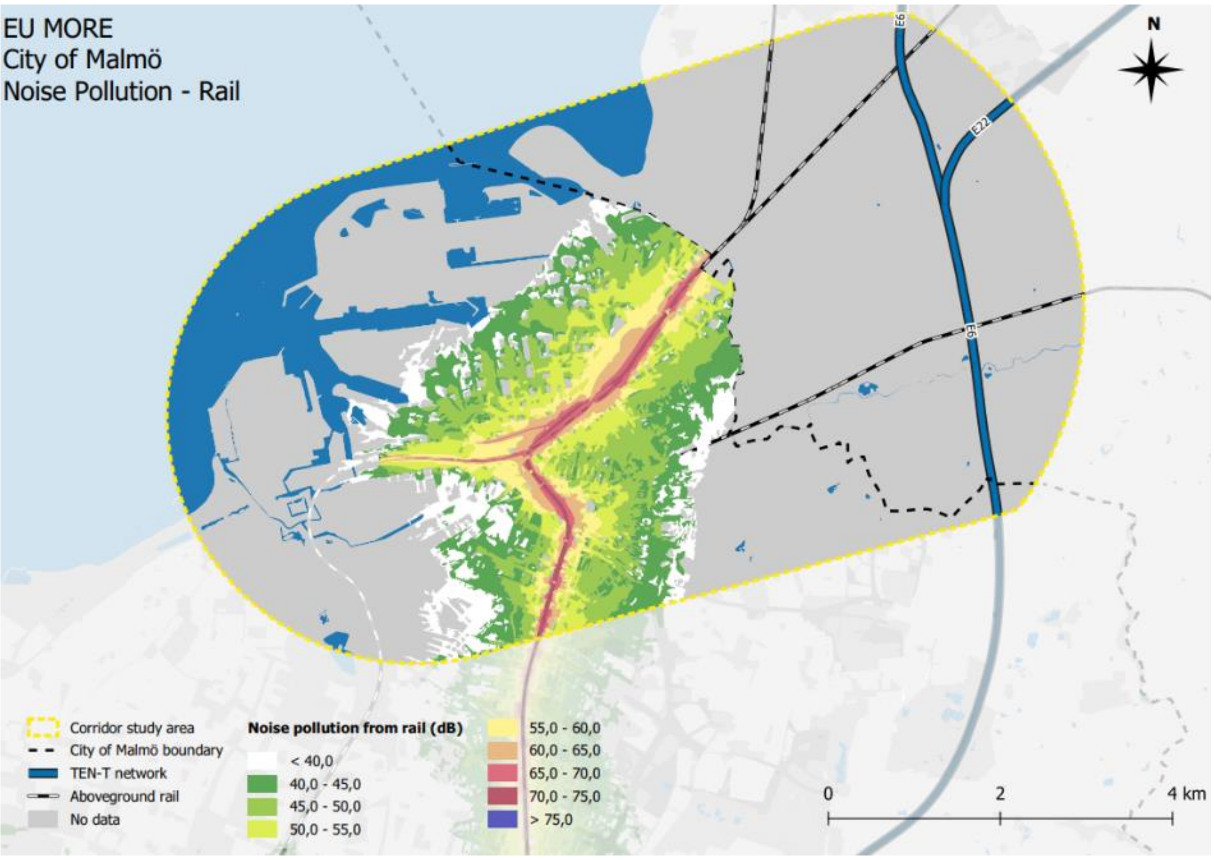


Figure 101. Source: Miljöförvaltningen, Malmö stad, September 2017

Figure 101 above shows estimated noise values two meters above ground from train traffic. The noise levels are based on calculated traffic volumes on behalf of the Environmental Administration.

Noise from car traffic

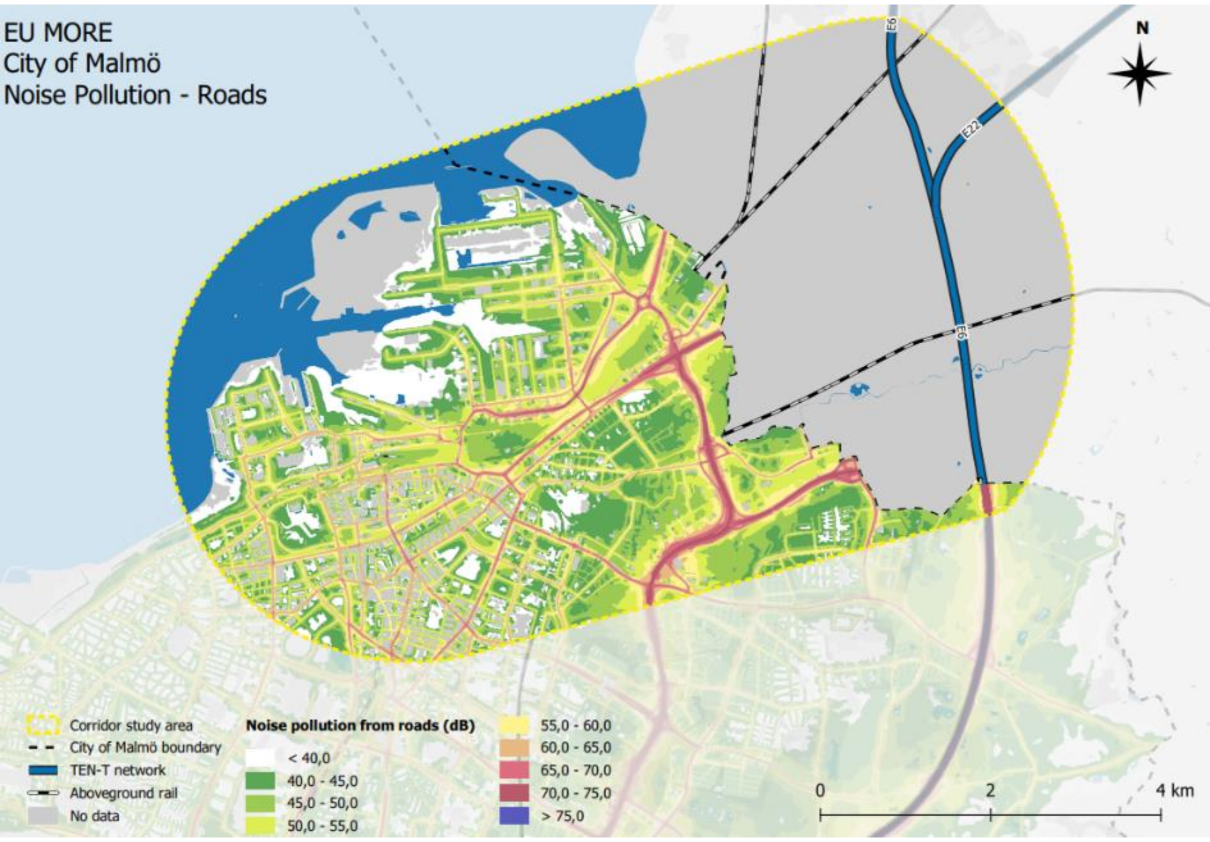


Figure 102. Source: Miljöförvaltningen, Malmö stad, September 2017

Figure 102 above shows estimated noise values 2m above ground, from road traffic. The noise levels are based on calculated traffic volumes and carried out on behalf of the Environmental Administration.

2.5.11 Street social factors

The current streets of Nyhamnen along with the feeder route *Västkustvägen* has a general low rating of accessibility and social factors. The width of the streets together with the ratio between space for pedestrians or cyclists with the space designated for motorized vehicles makes the streets less inhabitable for people.

Since the area within the corridor, feeder route and the greater part of Nyhamnen today is underdeveloped, the experienced street valued might be much lower compared to the rest of the city. However, as the city is expanding outwards, the street social factors are planned to increase as well.

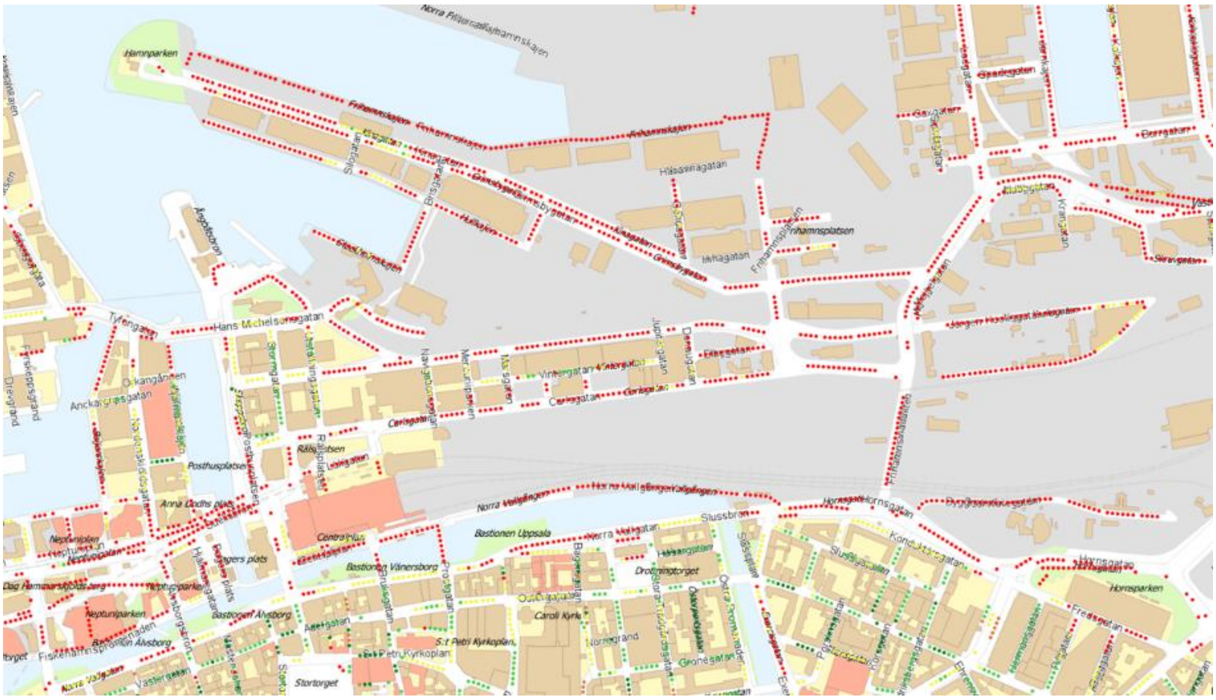


Figure 103. Scale of buildings in ratio with street width, green means higher value, red means lesser value

Figure 104. Ratio of street space designed for pedestrians

2.5.12 Traffic analysis

Traffic volume

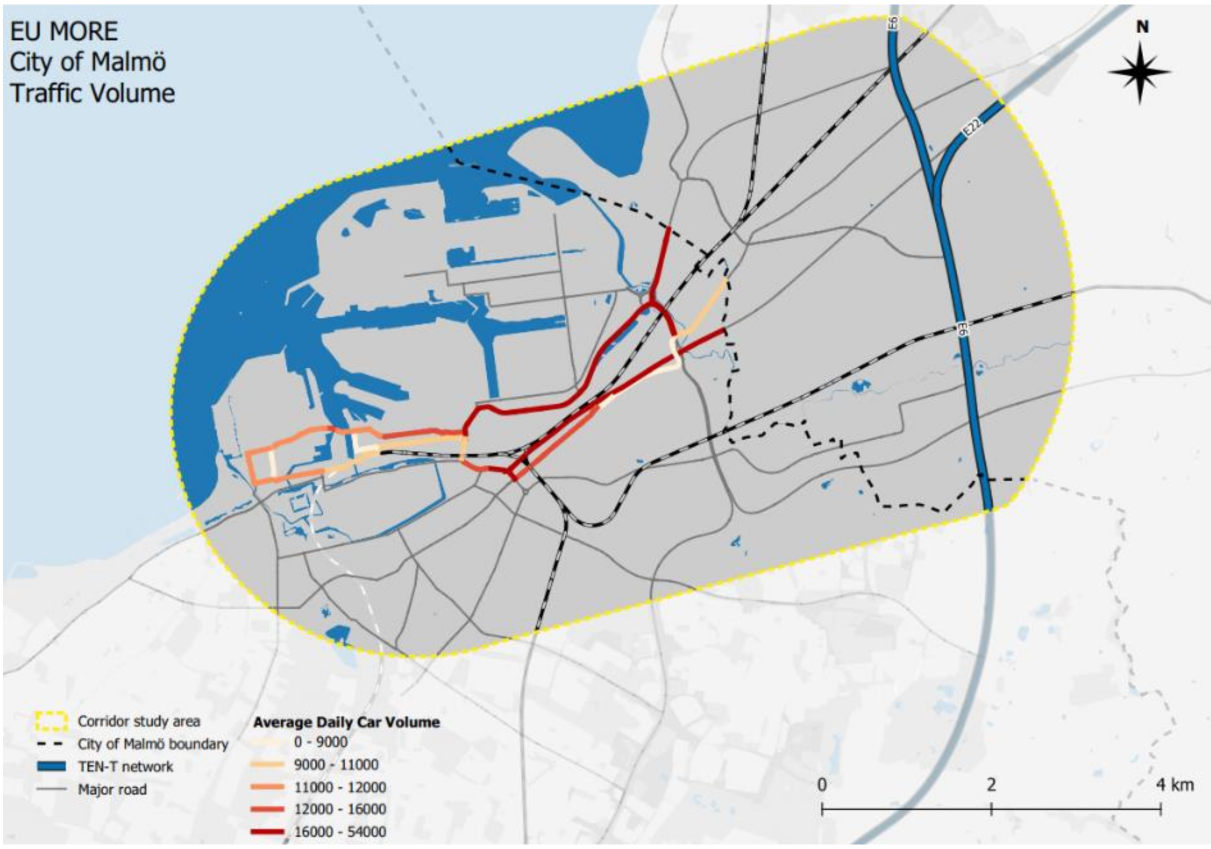


Figure 105. Traffic volumes on streets and roads within the study area

Capacity

Figure 106 below is an extract from the Vissim model and is not yet fully calibrated and validated. The expectations are that the model underestimates the traffic congestion around and on the bridges to/from Västra Hamnen. It shows the flows and the colours indicates the average speed during the morning peak hour. The blue circle shows the area with the two bridges. The most congested areas are the corridor of Hans Michelsensgatan part of the network.

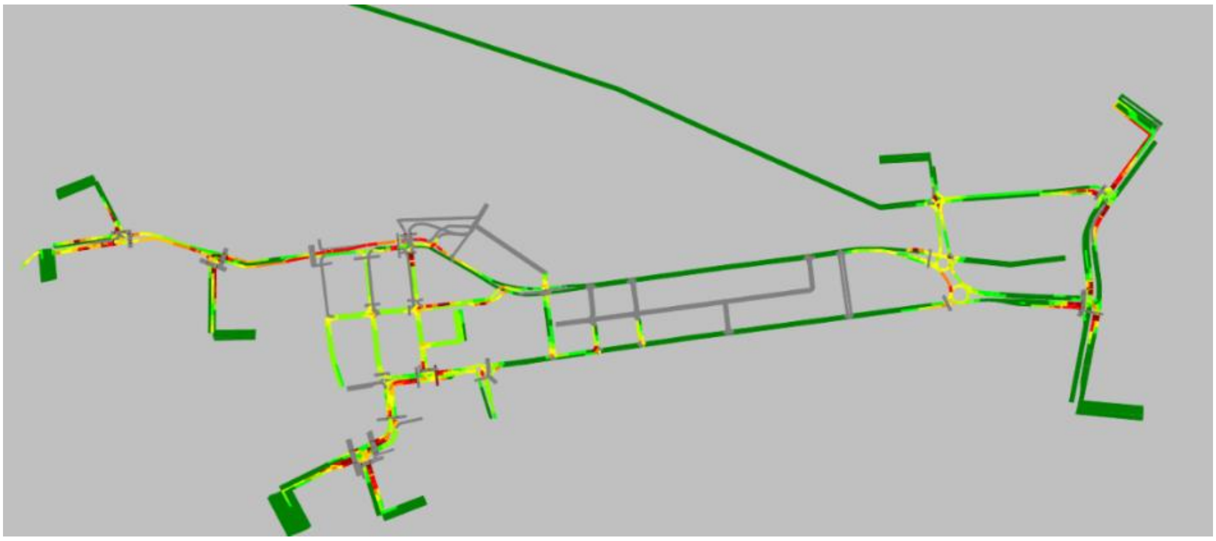


Figure 106. Capacity of street network in Nyhamnen

Speed

The regulated speed of the corridor stretches from 110 km/h to 40 km/h (with 70 km/h and 50 km/h on some parts of the route). Figure 107 shows the speed limits along the feeder route corridor.

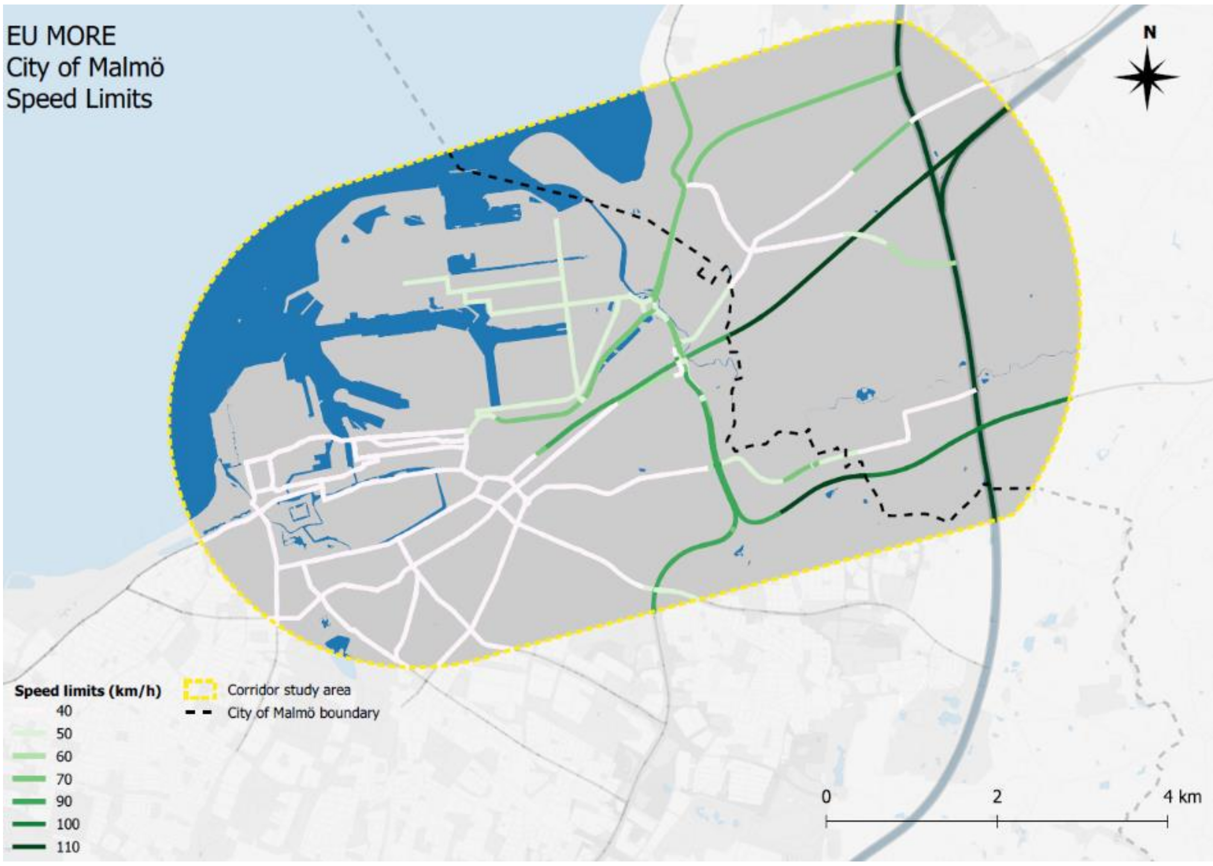


Figure 107. Speed limits along the feeder route corridor

Figure 108 and Figure 109 below show the actual average speeds along the feeder route corridor, during morning and afternoon rush hours.

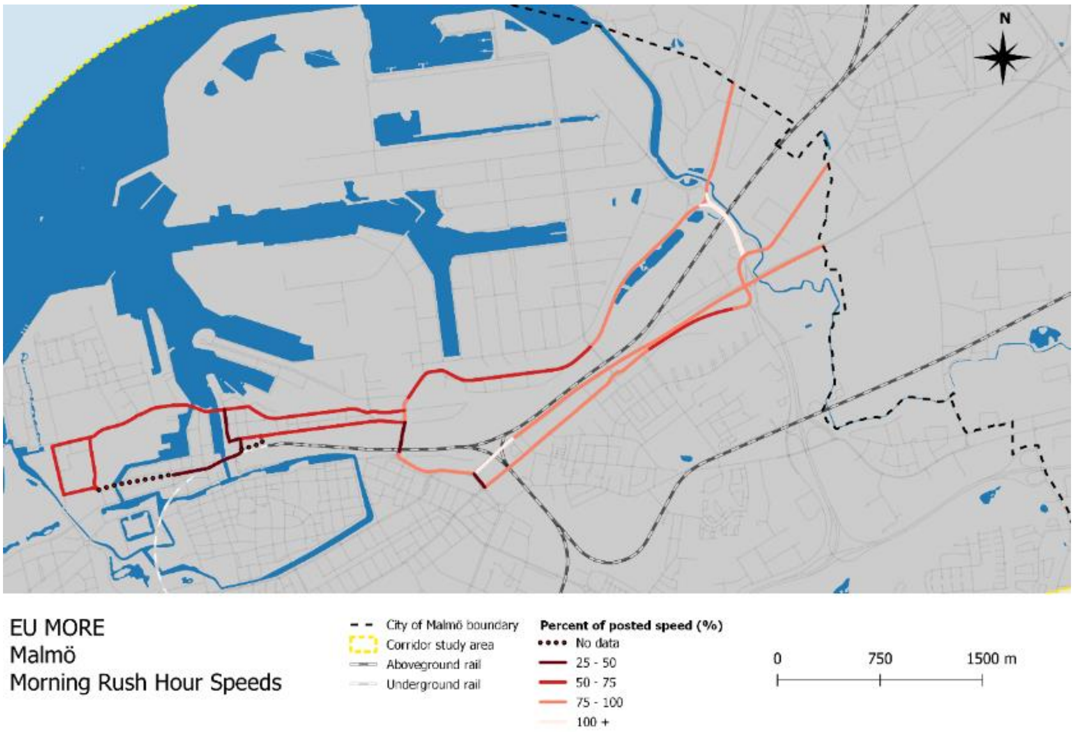


Figure 108. Morning rush hour speeds, percent of speed limit

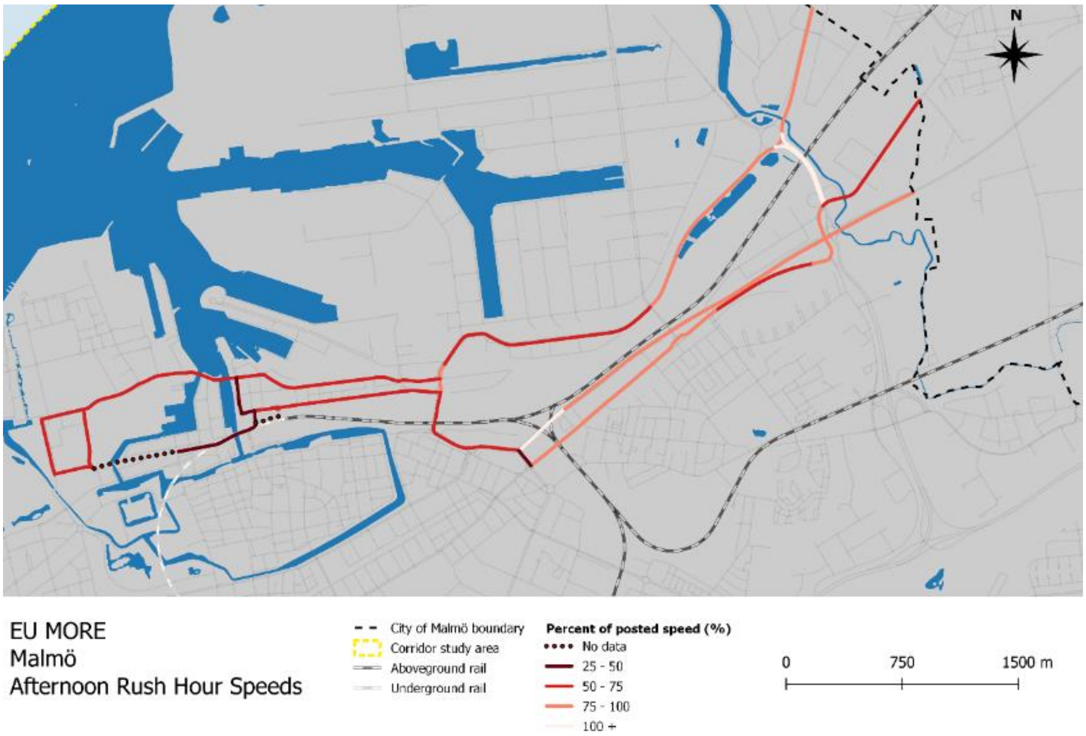


Figure 109. Afternoon rush hour speeds, percent of speed limit

Signalling

There are in total 8 signalled intersections along the corridor. The majority of the signalled intersections are in the area of Frihamnsviadukten and the western parts of Nyhamnen where the concentration of vehicles is high and speed limit is low.

Figure 110. Traffic signals (blue dots)

Parking

There are an estimated 1,500 – 2,000 street level parking places in in the western parts of the area of Nyhamnen, excluding the multi-storey car parks in the area. Of the 1,500 parking spots, about 300-350 are along streets and regulated by the municipality.

Figure 111. Municipal parking in the area of Nyhamnen. Different colours represent different regulatory price settings

2.5.13 Summary and key challenges

Globally speaking, Malmö is not a very large city. In Scandinavian terms, however, and as an integrated part of the Greater Copenhagen region, Malmö is of great economic and cultural significance. Being one of the fastest growing cities and regions in Scandinavia, Malmö faces great challenges in the shift towards sustainable transportation.

The city develops with great ambitions: Malmö was the first city in Sweden to adopt the UN Development Goals. One of the strategies is to expand the city inwards, through smart densification, minimizing effects on important natural and agricultural landscapes surrounding the city. Densification also requires smarter and more efficient mobility and transportation solutions, which in turn opens for a more diverse usage of streets and public spaces. How can the issues of increasing traffic in a fast-growing region be managed in order to produce a livable city and not only a transportation link?

As a hub for both passenger as well as freight transport, Malmö is a node in the Scandinavian-Mediterranean TEN-T corridor. Being also a regional center for both visitors and commuters, the added transport requirements for freight and goods poses complex and diverse challenges for the transportation systems.

Today the area of Nyhamnen, where the main feeder route traverse, is largely a low density industrial area with diverse functions. The feeder route suffers from traffic delays for motorized vehicles in vital links and intersections. The traffic queues form a negative impact on properties, businesses and commuters; not only in Nyhamnen but also in adjacent neighbourhood western harbour.

Increasing capacity for cars and motorized vehicles will directly oppose the main goals to reduce car traffic, while the future development of Nyhamnen increases the need for mobility greatly. This calls for new thinking, innovation, and a shift in mobility to accommodate future transportation needs in both Nyhamnen and Västra hamnen. The upcoming case study of the current conditions will address the following key topics:

- How dense traffic flows can be portioned along the main feeder route corridor and minimize traffic queues in the central city through gating;
- The use of future mobility hubs to promote the last portion of the commute trip to be undertaken by bike or public transport;
- The possibilities of increased dialogue with commuters, inhabitants and key stakeholders in reference areas to stimulate behavioral changes and thoughts on personal mobility.

To deal with conflicting needs, goals and impacts on the city, the MORE project can indeed utilize new and innovative tools to extract the essence of the issues at hand. As the area of Nyhamnen today not is developed as a dense diverse city landscape, reference areas in the city has been selected to collect and analyze data. They will provide important and useful data in the coming processes of the project.

3 Design Brief of City Feeder Route – BUDAPEST

3.1 Introduction

This section covers the physical layout, key features and existing patterns of use of the selected section under stress.

3.1.1 Overview

The Budapest section under stress is located between Váci street and Síp street on Kossuth Lajos street and Rákóczi road in Budapest and its length is 800m. This east-west boulevard is called the Rákóczi axis, and it is one of the most important and busiest roads in Budapest, which goes through the city centre. Traffic and air pollution are high, and the street is not able to play its natural role, where people can feel confident in the city centre. The road axis splits the city centre into two parts, and only a few connections are available to cross a road. Ferenciek square and Astoria are important mobility hubs and place for living in the city centre. There are situated in the Area Under Stress and split into two parts. The following Figure 112 and Figure 113 show the Area Under Stress on satellite map (north-west orientation) and traffic map (north orientation).

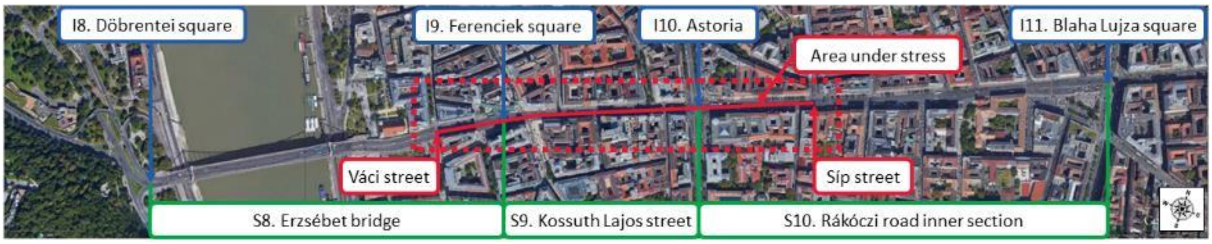


Figure 112. Area Under Stress, satellite map, north-west orientation

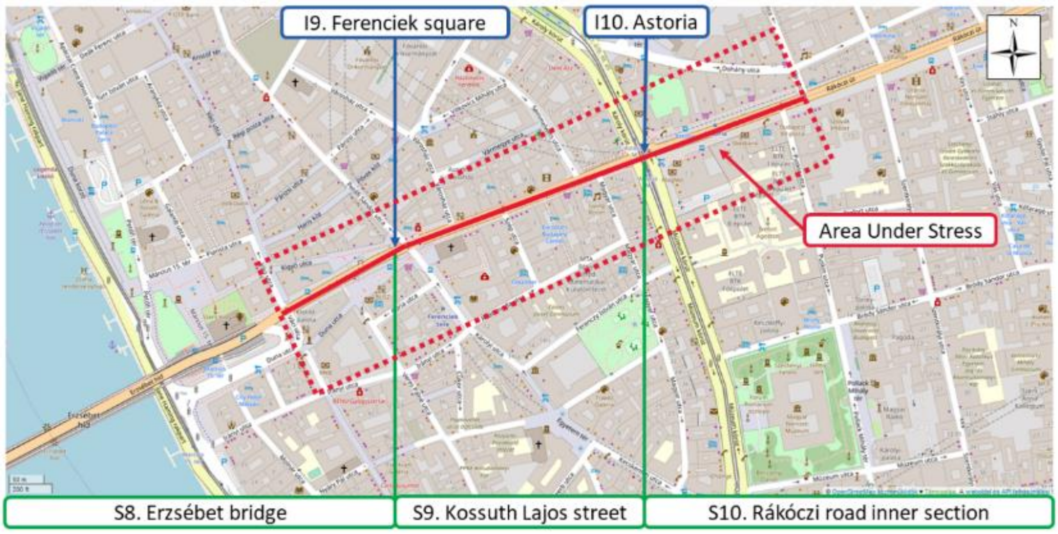


Figure 113. Area Under Stress, traffic map, north orientation

Table 17 below provides details of the characteristics of the area under stress.

Table 17. Area Under Stress, General description

S8. Erzsébet bridge (eastbound view) The section before Ferenciek square. Next to Erzsébet bridge, Szabad Sajtó street is also part of this section between the Pest side bridgehead of Erzsébet bridge and Ferenciek square. • Budapest Public Road managed • Wide carriageway (2 lanes for private transport, 1 lane for public transport each direction) • Bridge over the Danube • Footway • Tourists • High flow	

I9. Ferenciek square
(eastbound view)

- Budapest Public Road managed
- At-grade junction
- Wide carriageway (2 lanes for private transport, 1 lane for public transport + 1 lane for public transport around stops for overtake each direction)
- Public transport bus stop, city tour bus stop, taxi drop off zone, loading bays
- There is no parking spots on the corridor, parking spots on the side streets
- Transport hub
  - Metro line M3
  - 8 daily bus lines (56 buses in each direction between 7-8 AM) and 4 night bus lines are available on the corridor
  - 2 daily bus lines (6 buses between 7-8 AM) are crossing the corridor
  - High volume of transfer passenger
- Relatively wide space for pedestrians
- Pedestrian crossing and underpasses
- Residential and commercial land use
- Shops, offices, hotels, pubs, restaurants, fast food restaurants, church
- Tourists
- High flow

S9. Kossuth Lajos street (eastbound view) The section between Ferenciek square and Astoria • Budapest Public Road managed • Wide carriageway (2 lanes for private transport, 1 lane for public transport each direction) • Relatively narrow space for pedestrians, fence between carriageway and footways • There are no parking bays on the corridor • Taxi drop off zone, loading bays parking spots on the side streets • Pedestrian crossing • Residential and commercial land use • Cinema, shops, offices, hotels, pubs, fast food restaurants • Tourists • High flow	

I10. Astoria
(eastbound view)
 	
• At-grade junction
• Wide carriageway (2 lanes for private transport, 1 lane for public transport each direction)
• Public transport bus stop, city tour bus stop, taxi drop off zone, loading bays
• There is no space for parking
• Transport hub
  o Metro line M2
  o 8 daily bus lines (56 buses in each direction between 7-8 AM) and 7-night bus lines are available on the corridor on working days
  o 2 daily tram lines (18 trams in each direction between 7-8 AM) and 1 daily bus line (10 buses in each direction between 7-8 PM) and 7 night bus lines are crossing the corridor
• Relatively narrow space for pedestrians
• Pedestrian crossing and underpasses
• Residential and commercial land use
• Shops, offices, university, hotels, pubs, restaurants, fast food restaurants
• Tourists
• High flow
	

S10. Rákóczi road inner section
(eastbound view)
The section after Astoria

- Wide carriageway (2 lanes for private transport, 1 lane for public transport each direction)
- Relatively narrow space for pedestrians, fence between carriageway and footways
- Public transport bus stop, city tour bus stop, taxi drop off zone, loading bays, parking stops
- Pedestrian crossings
- Residential and commercial land use
- Cinema, university, hospital, shops, offices Hotels, pubs, fast food restaurants, church
- Tourists
- High flow

3.1.2 Road Users and Patterns of Use

Traffic and pedestrian data collection were held at Area Under Stress between 6AM and 10PM on workdays. The following data was collected at Ferenciek square in each direction.

Table 18. Results of traffic collection, Ferenciek square, 19 Nov 2019

Vehicle types	**Ferenciek square**	
	Kossuth Lajos street eastbound view	**Kossuth Lajos street westbound view**
Private car	18737	19242
Taxi	2028	2837
Bicycle	119	425
e-Scooter	25	140
Segway	4	83
Motorcyclists	568	460
Bus (Public and Private)	1231	1010
HGV/LGV with 2 axles, < 3.5t	1727	651
HGV/LGV with 2 axles, 3.5t-7.5t	612	666
HGV/LGV with 2 axles, 7.5t <	22	867
HGV/LGV with 3 axles	0	0

HGV/LGV with 4 axles	0	0

3.1.3 Existing road layout

There is a wide carriageway for private and public traffic along the Street Under Stress. Two lanes for private transport, one lane for public transport, and some additional lines at the neighbourhood of junctions each direction are available for road traffic. The traffic lanes are 3m width. The following map (Figure 114) shows the existing road layout and varying number of lanes in different sections.

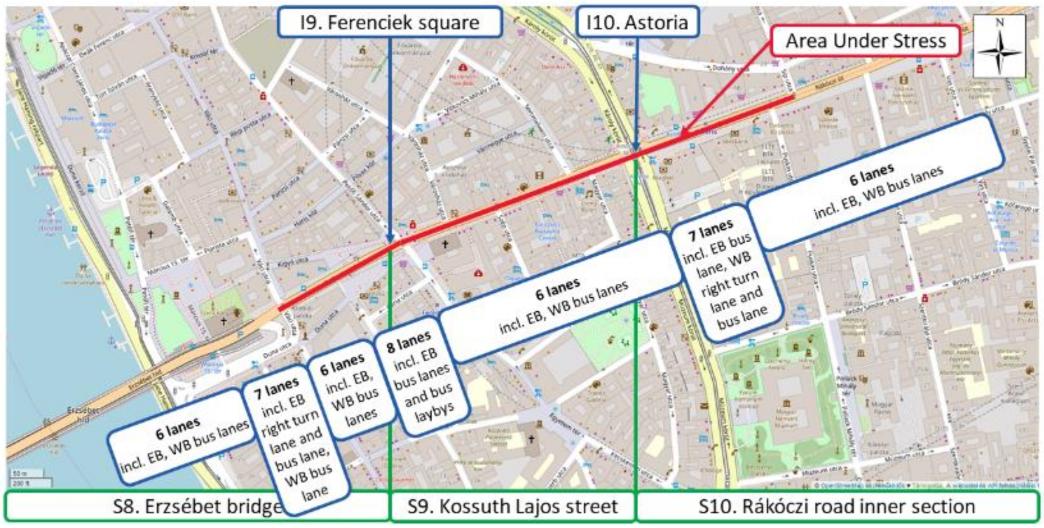


Figure 114. Overview of existing the road layout, the number of lanes in different sections and their purpose

Budapest Public Road as the operator and maintainer of Budapest's road network has a detailed GIS based road database, which represents the current road status in Budapest. This database contains not just traffic signs, signals and pavement marks, but also public transport, bicycle parking and packing & loading facilities.

The following five figures contain detailed traffic plans (pavement marks, signs and signals) of the Area Under Stress. They are separated into five parts based on the sections of Urban Feeder Route and included locals and tourists as users.

Figure 115 shows the end of Erzsébet bridge (section S8), the Pest side bridgehead of Erzsébet bridge. The starting point of Area Under Stress is Váci street, and this is the first intersection with traffic lights. Váci street is the main pedestrian path at the city centre, and it crosses the Urban Feeder Route at this intersection, where north-south pedestrian traffic is very significant.

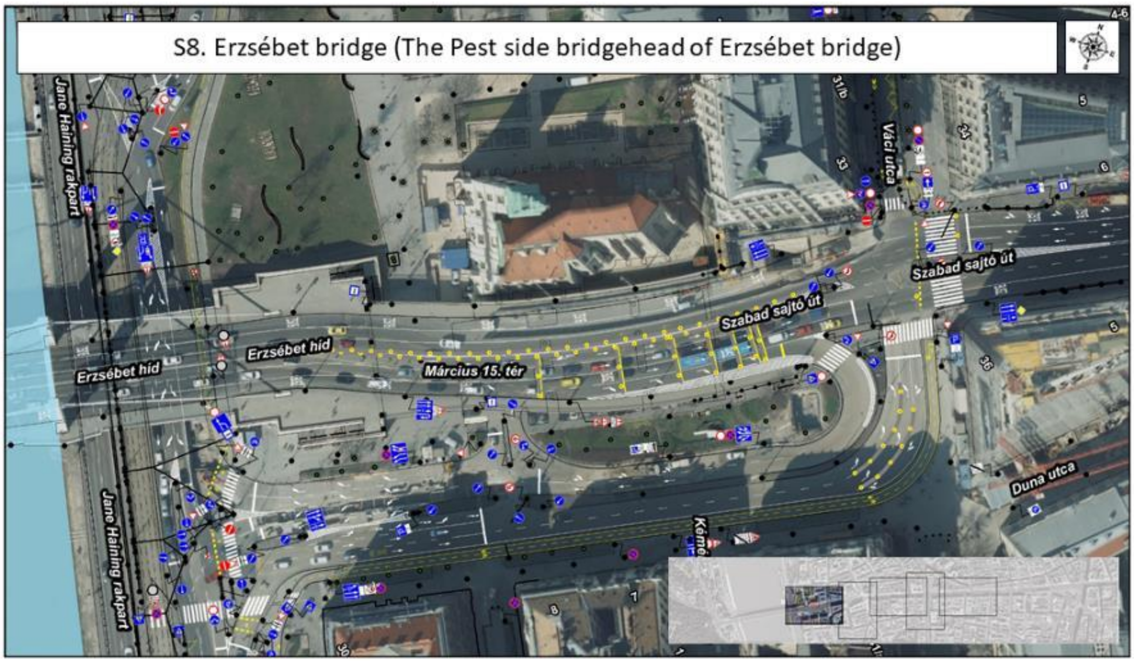


Figure 115. The traffic plan of neighbourhood of Pest side bridgehead of Erzsébet bridge, Váci street cross-section

Figure 116 shows the neighbourhood of Ferenciek square (intersection I9). Ferenciek square is the old part of historical Pest. The Church is the oldest building at the Area Under Stress, most of the building was built with at the same time with Erzsébet bridge, Kossuth Lajos street. It is a very busy place, public transport users transfer between buses of Rákóczi road and metro line M3. Ferenciek square was reallocated in 2014 at the part of Budapest Heart. Traffic was calmed around the church, and the south-west traffic underpass was closed. Space was given to the pedestrians and local dwellers. A new pedestrian crossing was opened at Kossuth Lajos street and the underpass was renovated. Several local bars, restaurants, shops and small and high-level accommodation are also available around the square.

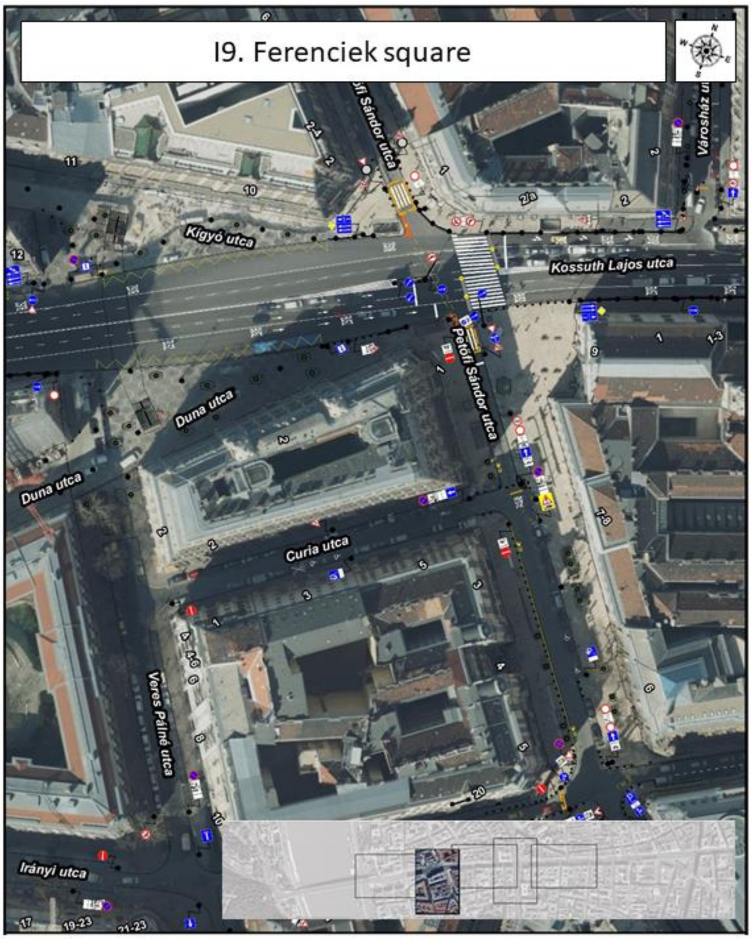


Figure 116. The traffic plan of Ferenciek square

The third section is Kossuth Lajos street (section S9). It links Ferenciek square and Astoria. This street was constructed at the end of XIX century, beginning of XX century, when it was taken to the existing street network of Pest. Almost every building was demolished and new ones were built. City leaders wanted to have a representative and busy avenue through the city centre. There is a wide carriageway 2 lanes for private transport, 1 lane for public transport each direction, and a fence between carriageway and footways to protect illegal pedestrian crossings because only one pedestrian crossing with traffic lights is available for pedestrians. A cinema, shops, offices, hotels, pubs, fast food restaurants are located at this section.

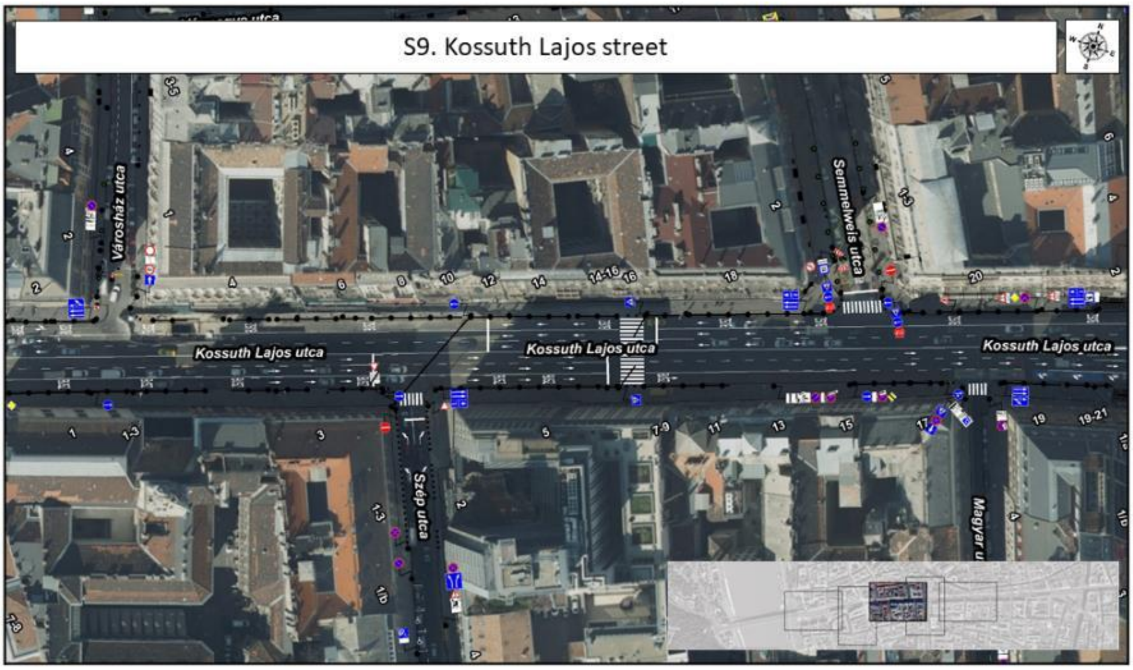


Figure 117. The traffic plan of Kossuth Lajos street

The fourth section is Astoria intersection (intersection I10). The name of the square comes after famous Astoria hotel. The intersection is located at the crossing of Small Boulevard (Károly boulevard and Múzeum boulvard) and Kossuth Lajos street-Rákóczi road avenue (Street Under Stress). It is a very busy road junction taking into account road traffic, public transport and pedestrian traffic also. There are two lanes for private traffic and one lane for public transport each direction. There are bus lanes at Street Under Stress and tramways at Small Boulevard, which can also use by PT buses. An underpass links the metro station with bus and tram stations, and it ensures connection among footways because the pedestrian crossing is only available through small boulevards. ELTE University and several local bars, restaurants, shops and accommodations are available around the square.

Figure 118. The traffic plan of Astoria

The last part of Area Under Stress is the first part of Rákóczi road inner section (section S10) between Astoria and Síp street. A pedestrian crossing is next to the Síp street through Rákóczi road. Rákóczi road's cross section is similar to Kossuth Lajos one's, but there is more space for pedestrians because the footways are wider. Rákóczi road inner section links Astoria (Small Boulevard) and Blaha Lujza square (Grand Boulevard). A cinema, a university, a hospital, a chapel, shops, offices, accommodations, pubs, fast food restaurants, are available on the road and its neighbourhood.

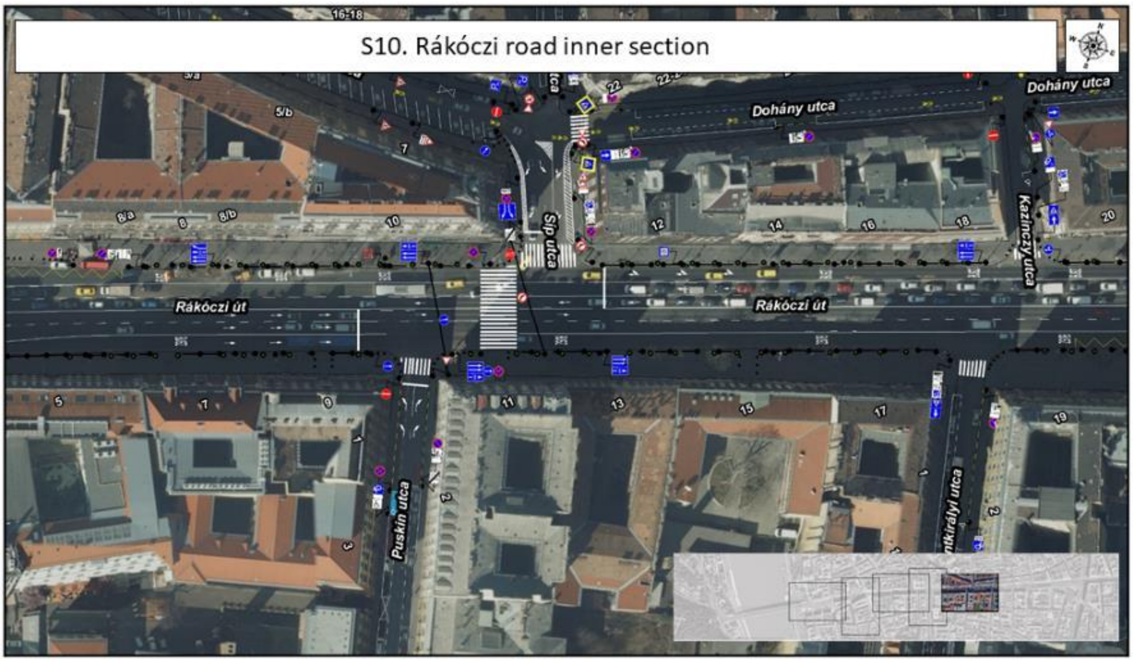


Figure 119. The traffic plan of Rákóczi road inner section

3.1.4 Traffic lights and speed restrictions

The following figures (Figure 120 and Figure 121) show traffic lights and speed restrictions at the Area Under Stress. Traffic lights are installed at the main intersections. The Street Under Stress is a very busy road, more than 20,000 vehicles go through Rákóczi road each direction every day. Traffic lights help to manage traffic among busy roads and local streets. Speed restriction measures are present.

Figure 120. Traffic lights and speed restrictions around Ferenciek square (S8 Erzsébet bridge, I9 Ferenciek square, S9 Kossuth Lajos street)

Figure 121. Traffic lights and speed restrictions around Astoria (S9 Kossuth Lajos street, I10 Astoria, S10 Rákóczi road inner section)

3.1.5 Parking and Loading

Parking is a complex system in Budapest. There is a protected zone in Budapest downtown, where vehicles with permission may be used, which is most of the local residents. The other inner part of the city centre is at Zone 1, rest of the city centre is at Zone 2. Parking is prohibited at the full length of Kossuth Lajos street and Rákóczi road.

City logistic vehicles could use parking and loading points to serve hotels, shops, restaurants and administrative offices. Several loading points are available downtown. Taxi drop off points are located at the main part cultural, administrative and transportation hubs, and centres of the city, for instance the surrounds of Ferenciek square and Astoria. This is shown in Figure 122 and Figure 123 below.

Figure 122. Parking, loading and taxi facilities around Ferenciek square (S8 Erzsébet bridge, I9 Ferenciek square, S9 Kossuth Lajos street)

Figure 123. Parking, loading and taxi facilities around Astoria (S9 Kossuth Lajos street, I10 Astoria, S10 Rákóczi road inner section)

3.1.6 Public Transport

Figure 124 shows public transport lines in the city centre. As the figure represents, Ferenciek square and Astoria are important transportation hubs in Budapest. They lay at Rákóczi axis bus corridor and many passengers travel through these hubs. Metro line M3 approaches Area Under Stress at Ferenciek square and metro line M2 approaches Area Under Stress at Astoria.

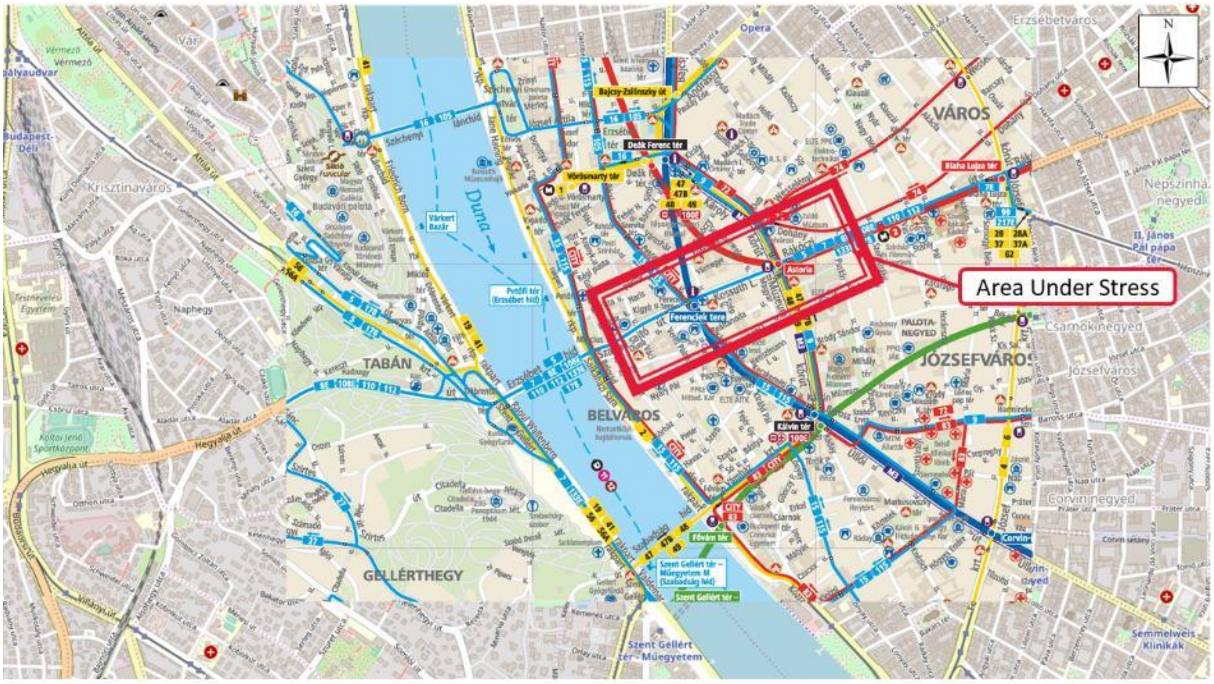


Figure 124. Public transport network at the city centre

The following tables contains the frequency of public transport lines which are located at the Area Under Stress. They are grouped by directions and common stops. Tables show the rush hours frequency between 7 AM to 9 AM, 4 PM to 7 PM on weekdays and average hour frequency at the morning and afternoon rush hours on weekdays. As the tables show, Ferenciek square and Astoria are two of the most important and busy transport hubs in Budapest. The following tables represent public transport lines and service frequency.

Table 19. Public transport lines and service frequency

Ferenciek square – eastbound direction, on the ground						
Public transport line	Type	Vehicle type	Frequency between 7 AM to 9 AM on weekdays	Frequency between 4 PM to 7 PM on weekdays	Average hour frequency between 7 AM to 9 AM on weekdays	Average hour frequency between 4 PM to 7 PM on weekdays
5	Bus	Articulated bus	17	23	8.50	7.67
7	Bus	Articulated bus	16	29	8.00	9.67
8E	Bus	Articulated bus	16	24	8.00	8.00
108E	Bus	Articulated bus	6	9	3.00	3.00
110	Bus	Solo bus	8	12	4.00	4.00
112	Bus	Solo bus	11	13	5.50	4.33
133E	Bus	Articulated bus	22	24	11.00	8.00

178	Bus	Solo bus	12	16	6.00	5.33
Total			**108**	**150**	**54.00**	**50.00**

Ferenciek square – westbound direction, on the ground						
Public transport line	Type	Vehicle type	Frequency between 7 AM to 9 AM on weekdays	Frequency between 4 PM to 7 PM on weekdays	Average hour frequency between 7 AM to 9 AM on weekdays	Average hour frequency between 4 PM to 7 PM on weekdays
5	Bus	Articulated bus	17	23	8.50	7.67
7	Bus	Articulated bus	16	29	8.00	9.67
8E	Bus	Articulated bus	16	24	8.00	8.00
108E	Bus	Articulated bus	6	9	3.00	3.00
110	Bus	Solo bus	8	12	4.00	4.00
112	Bus	Solo bus	11	13	5.50	4.33
133E	Bus	Articulated bus	22	24	11.00	8.00
178	Bus	Solo bus	12	16	6.00	5.33
Total			**108**	**150**	**54.00**	**50.00**

Ferenciek square – northbound direction, on the ground						
Public transport line	Type	Vehicle type	Frequency between 7 AM to 9 AM on weekdays	Frequency between 4 PM to 7 PM on weekdays	Average hour frequency between 7 AM to 9 AM on weekdays	Average hour frequency between 4 PM to 7 PM on weekdays
15	Bus	Solo bus	6	9	3.00	3.00
115	Bus	Solo bus	5	9	2.50	3.00
Total			**11**	**18**	**5.50**	**6.00**

Ferenciek square – underground						
Public transport line	Type	Vehicle type	Frequency between 7 AM to 9 AM on weekdays	Frequency between 4 PM to 7 PM on weekdays	Average hour frequency between 7 AM to 9 AM on weekdays	Average hour frequency between 4 PM to 7 PM on weekdays
M3 – northbound direction	Metro	6 carrigies train	45	64	22.50	21.33
M3 - southbound direction	Metro	6 carrigies train	45	64	22.50	21.33

Astoria – eastbound direction, on the ground						
Public transport line	Type	Vehicle type	Frequency between 7 AM to 9 AM on weekdays	Frequency between 4 PM to 7 PM on weekdays	Average hour frequency between 7 AM to 9 AM on weekdays	Average hour frequency between 4 PM to 7 PM on weekdays
5	Bus	Articulated bus	17	23	8.50	7.67
7	Bus	Articulated bus	16	29	8.00	9.67
8E	Bus	Articulated bus	16	24	8.00	8.00
108E	Bus	Articulated bus	6	9	3.00	3.00
110	Bus	Solo bus	8	12	4.00	4.00
112	Bus	Solo bus	11	13	5.50	4.33
133E	Bus	Articulated bus	22	24	11.00	8.00
178	Bus	Solo bus	12	16	6.00	5.33
Total			**108**	**150**	**54.00**	**50.00**

Astoria – westbound direction, on the ground						
Public transport line	Type	Vehicle type	Frequency between 7 AM to 9 AM on weekdays	Frequency between 4 PM to 7 PM on weekdays	Average hour frequency between 7 AM to 9 AM on weekdays	Average hour frequency between 4 PM to 7 PM on weekdays
5	Bus	Articulated bus	17	23	8.50	7.67
7	Bus	Articulated bus	16	29	8.00	9.67
8E	Bus	Articulated bus	16	24	8.00	8.00
108E	Bus	Articulated bus	6	9	3.00	3.00
110	Bus	Solo bus	8	12	4.00	4.00
112	Bus	Solo bus	11	13	5.50	4.33
133E	Bus	Articulated bus	22	24	11.00	8.00
178	Bus	Solo bus	12	16	6.00	5.33
Total			**108**	**150**	**54.00**	**50.00**

Astoria – northbound direction, on the ground						
Public transport line	Type	Vehicle type	Frequency between 7 AM to	Frequency between 4 PM	Average hour frequency between 7 AM	Average hour frequency between 4 PM

			9 AM on weekdays	to 7 PM on weekdays	to 9 AM on weekdays	to 7 PM on weekdays
9	Bus	Articulated bus	18	24	9.00	8.00
47	Tram	27m long tram	18	24	9.00	8.00
49	Tram	27m long tram	18	24	9.00	8.00
Total			**53**	**73**	**26.50**	**24.33**

Astoria – southbound direction, on the ground						
Public transport line	Type	Vehicle type	Frequency between 7 AM to 9 AM on weekdays	Frequency between 4 PM to 7 PM on weekdays	Average hour frequency between 7 AM to 9 AM on weekdays	Average hour frequency between 4 PM to 7 PM on weekdays
9	Bus	Articulated bus	18	24	9.00	8.00
47	Tram	27m long tram	18	24	9.00	8.00
49	Tram	27m long tram	18	24	9.00	8.00
Total			**53**	**73**	**26.50**	**24.33**

Ferenciek square – underground						
Public transport line	Type	Vehicle type	Frequency between 7 AM to 9 AM on weekdays	Frequency between 4 PM to 7 PM on weekdays	Average hour frequency between 7 AM to 9 AM on weekdays	Average hour frequency between 4 PM to 7 PM on weekdays
M2 – eastbound direction	Metro	5 carrigies train	40	60	20.00	20.00
M2 - westbound direction	Metro	5 carrigies train	40	60	20.00	20.00

Figure 125 below shows public transport stops, pedestrian crossings and underpasses at the neighbourhood of Ferenciek square.

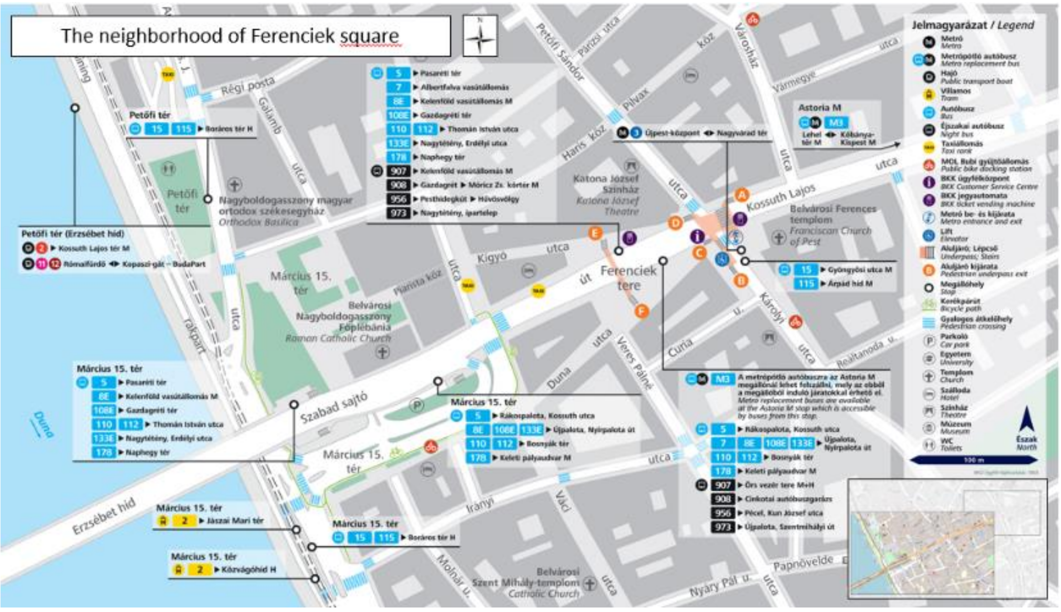


Figure 125. Public transport stops around Ferenciek square

Figure 126 below shows public transport stops, pedestrian crossings and underpasses at the neighbourhood of Astoria.

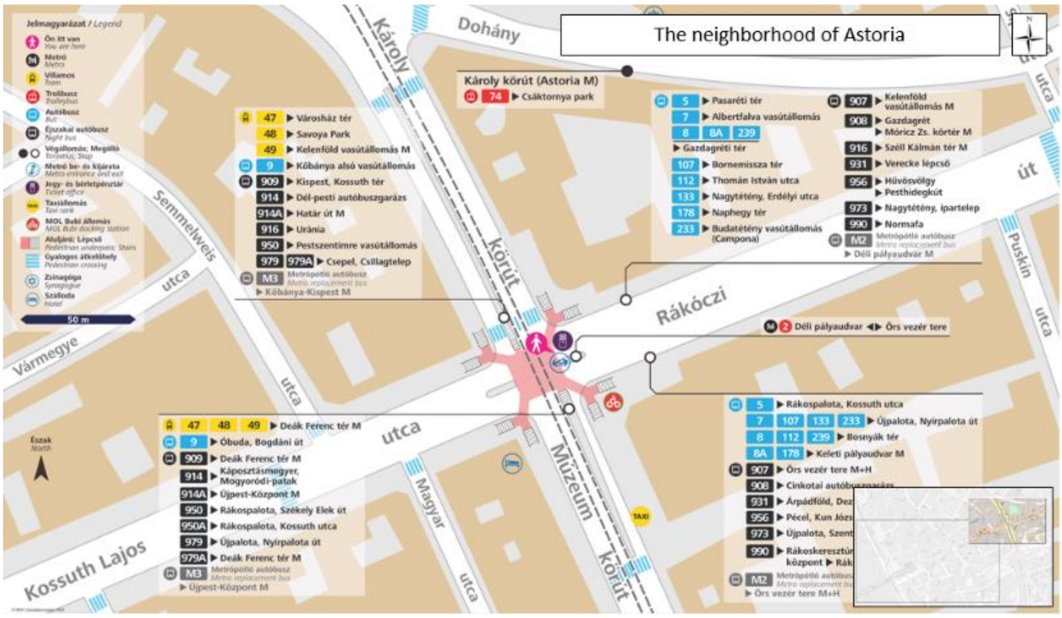


Figure 126. Public transport lines around Astoria

Figure 127 and Figure 128 below show PT lines and their stops, shelters and FUTÁR (Budapest journey planner application) street displays.

Figure 127. Public transport facilities around Ferenciek square (S8 Erzsébet bridge, I9 Ferenciek square, S9 Kossuth Lajos street)

Figure 128. Public transport facilities around Astoria (S9 Kossuth Lajos street, I10 Astoria, S10 Rákóczi road inner section)

3.2 Key Problems and Issues to be addressed in the Design Exercise

3.2.1 Pedestrian Severance

Pedestrian movements are limited within the Area Under Stress, with only four pedestrian crossings (at Váczi street, Ferenciek Square, middle of Kossuth Lajos street and Síp street) and two underpasses at Ferenciek square and Astoria. A fence is sited between the carriageway and footpath along Kossuth Lajos street and Rákóczi road except around public transport stops to prevent illegal pedestrian crossing between two sides of the road. Underpasses provide not only pedestrian crossing between two sides of the road, but also metro entrances. The following figures represent daily pedestrian traffic at important pedestrian crossings and underpasses.

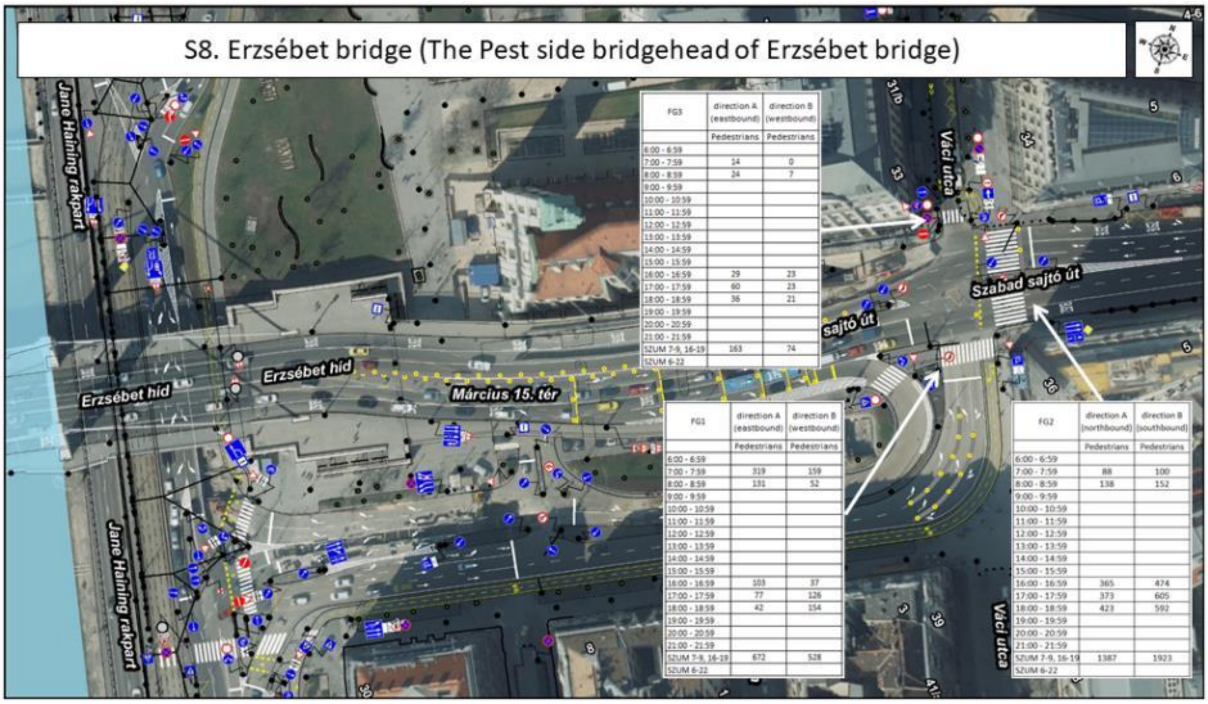


Figure 129. Daily pedestrian traffic at pedestrian crossings in pest side bridgehead of Erzsébet bridge

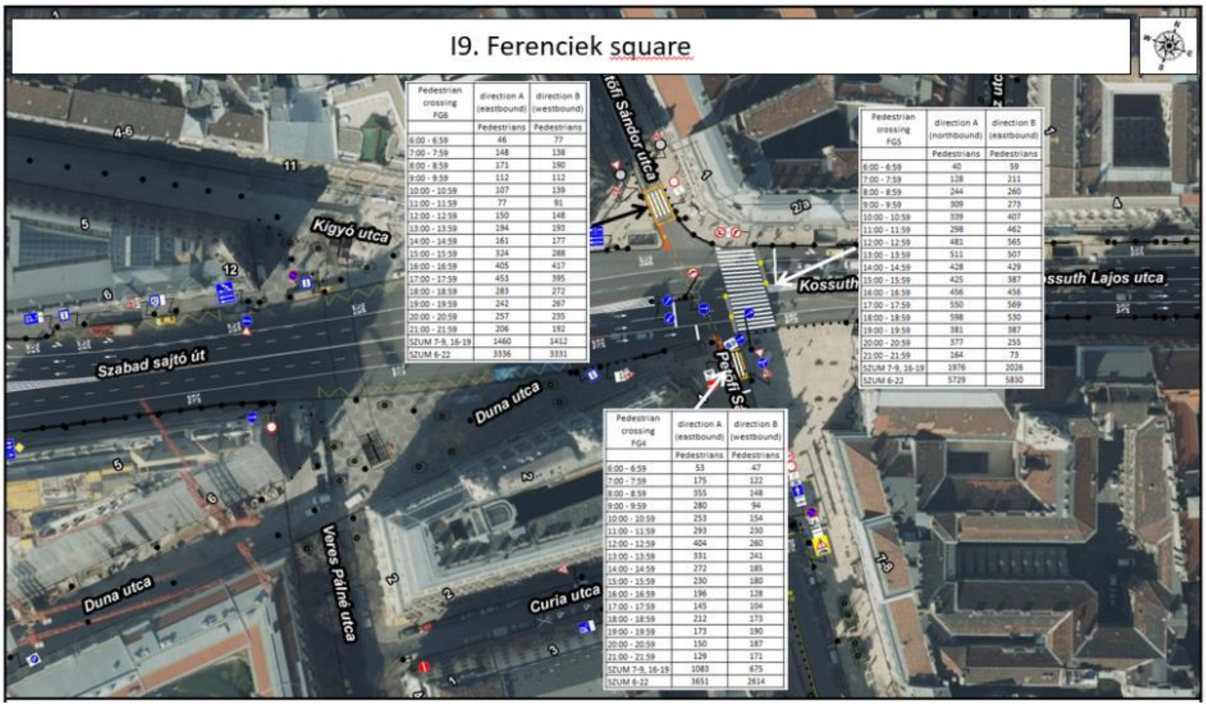


Figure 130. Daily pedestrian traffic at pedestrian crossings in Ferenciek square

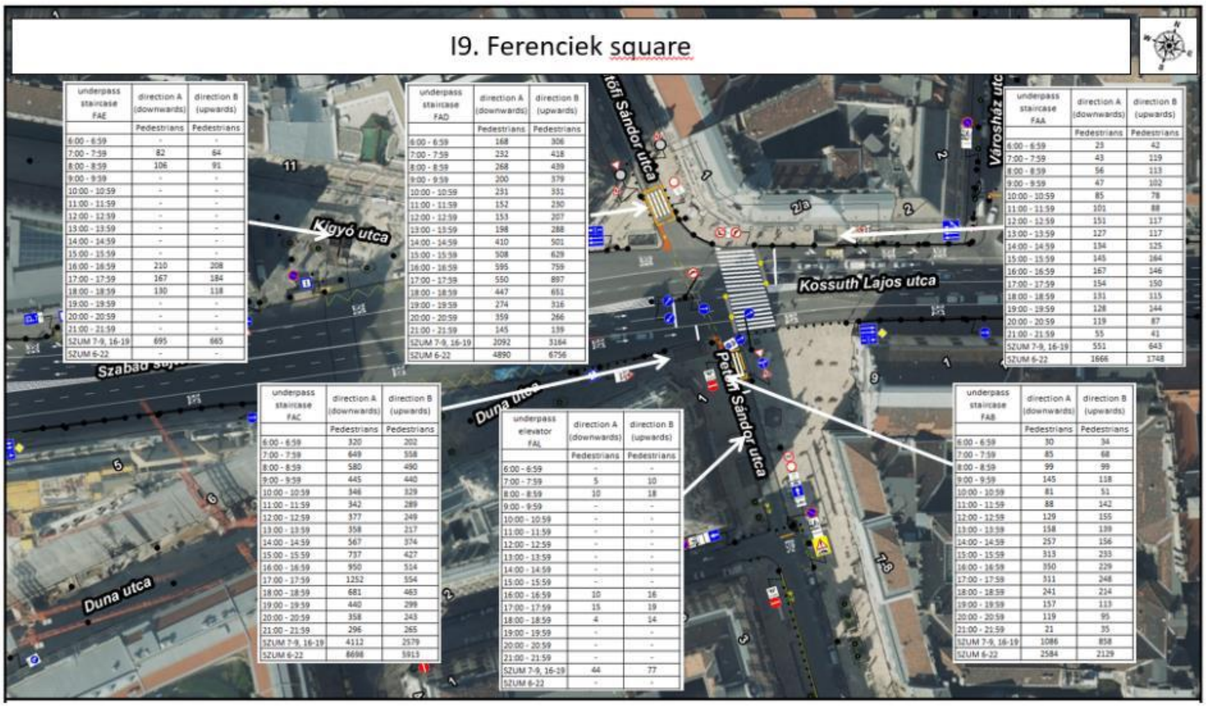


Figure 131. Daily pedestrian traffic at underpasses in Ferenciek square

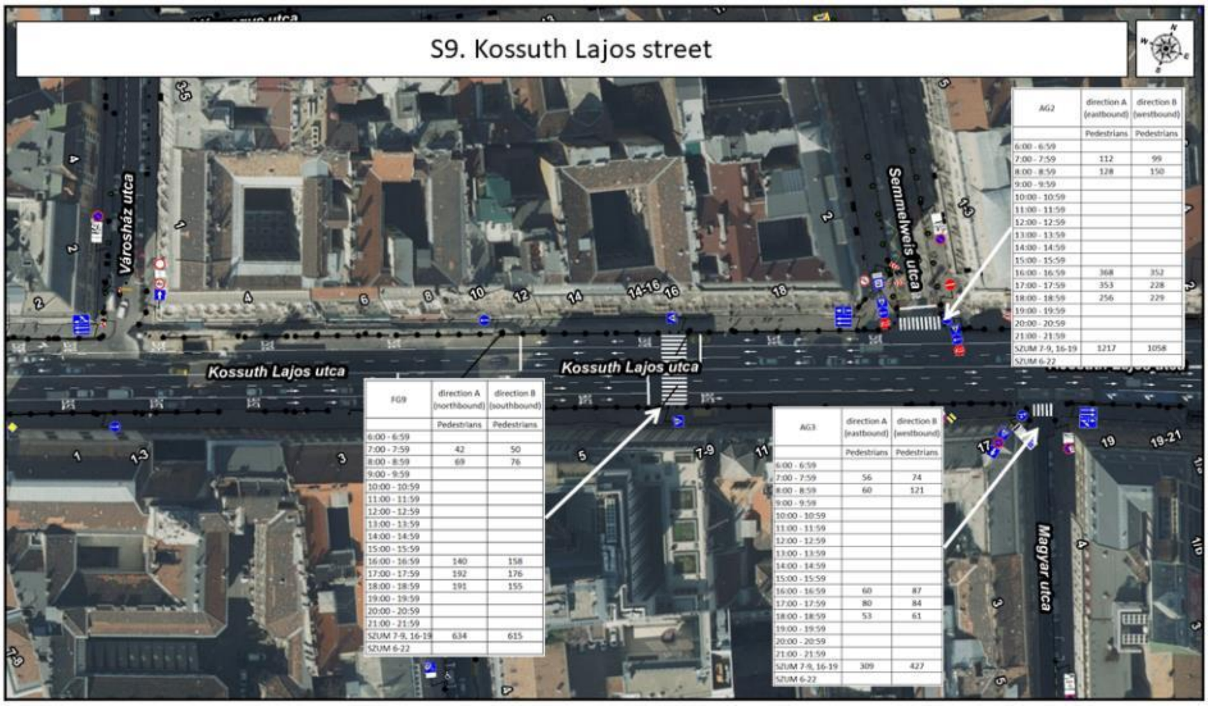


Figure 132. Daily pedestrian traffic at pedestrian crossings in Kossuth Lajos street

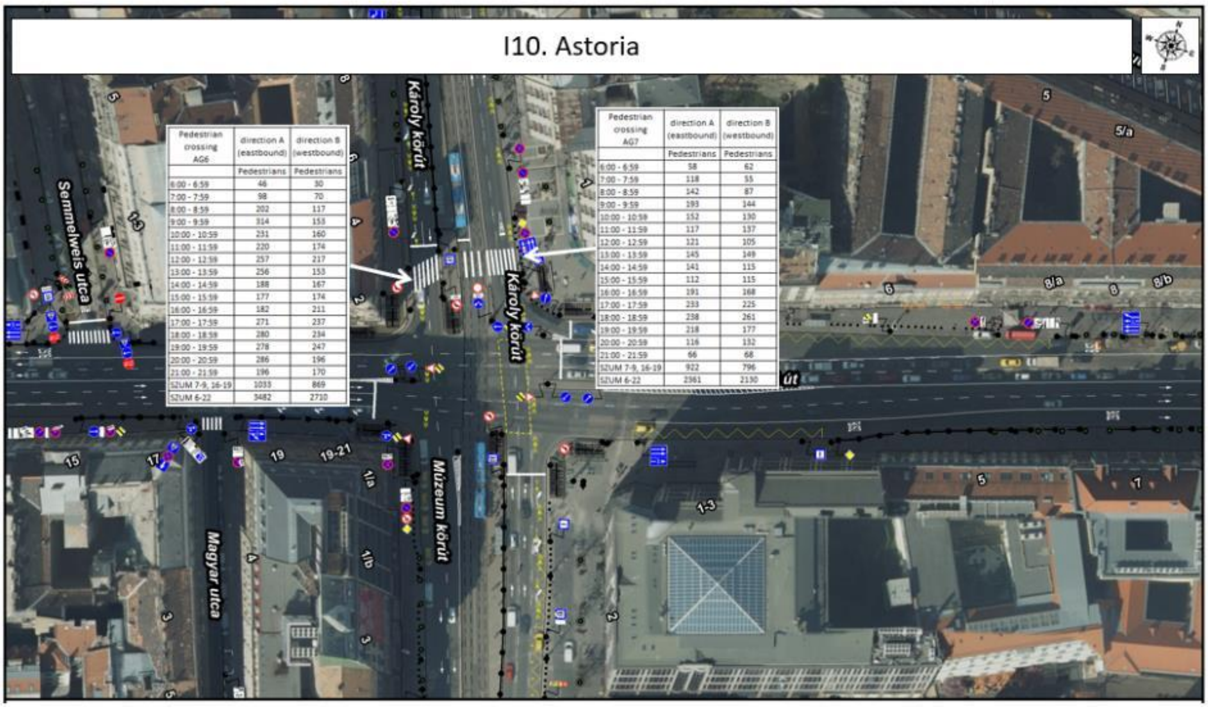


Figure 133. Daily pedestrian traffic at pedestrian crossings in Astoria

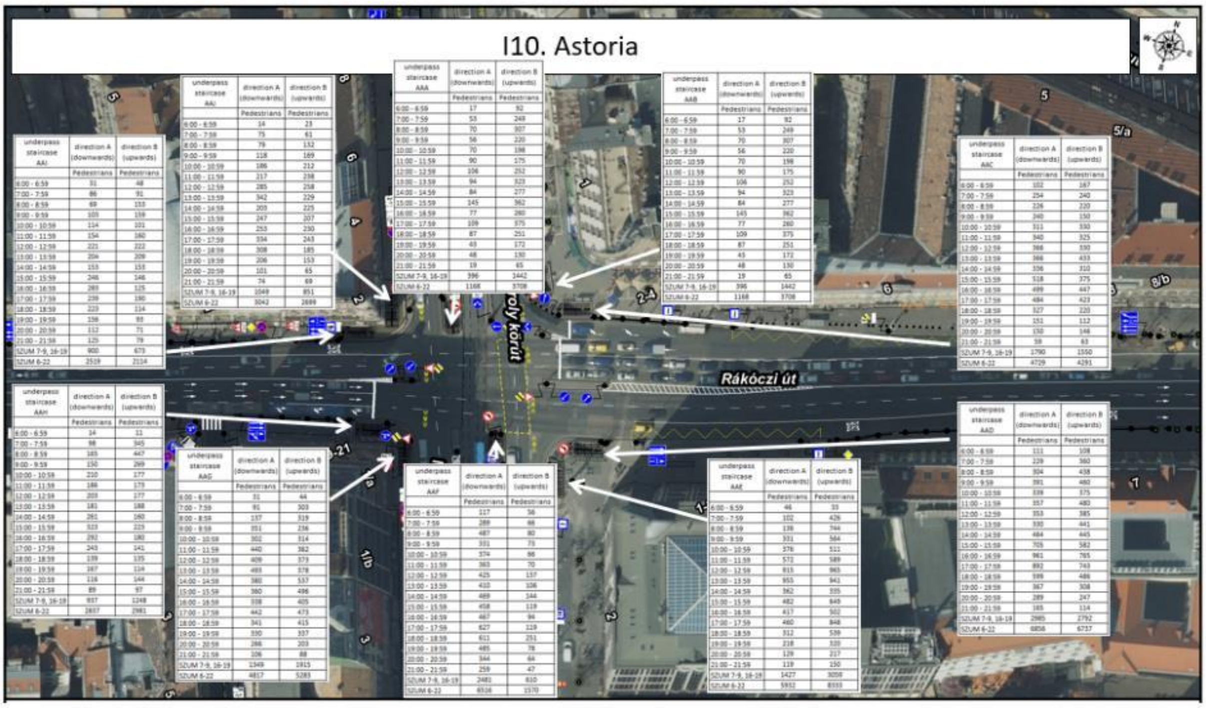
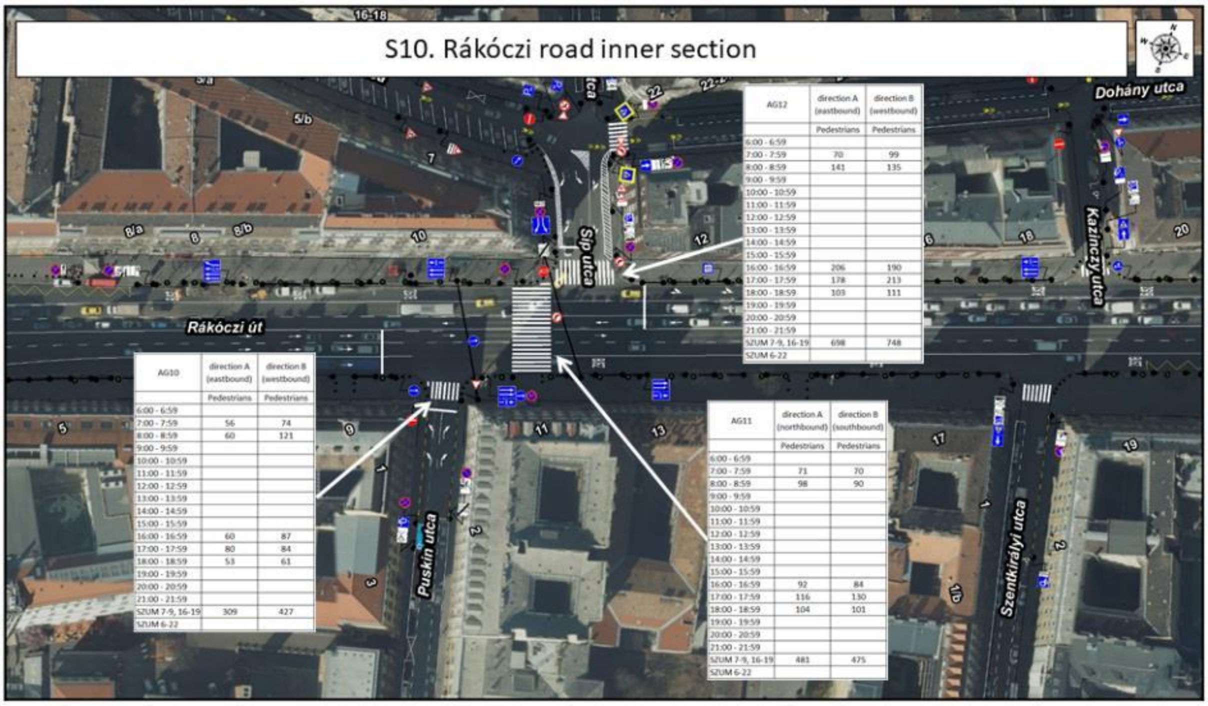


Figure 134. Daily pedestrian traffic at underpass in Ferenciek square



AG12	direction A (eastbound)	direction B (westbound)
	Pedestrians	Pedestrians
6:00 - 6:59		
7:00 - 7:59	70	99
8:00 - 8:59	141	135
9:00 - 9:59		
10:00 - 10:59		
11:00 - 11:59		
12:00 - 12:59		
13:00 - 13:59		
14:00 - 14:59		
15:00 - 15:59		
16:00 - 16:59	206	190
17:00 - 17:59	178	213
18:00 - 18:59	103	111
19:00 - 19:59		
20:00 - 20:59		
21:00 - 21:59		
SZUM 7-9, 16-19	698	748
SZUM 6-22		

AG10	direction A (eastbound)	direction B (westbound)
	Pedestrians	Pedestrians
6:00 - 6:59		
7:00 - 7:59	56	74
8:00 - 8:59	60	121
9:00 - 9:59		
10:00 - 10:59		
11:00 - 11:59		
12:00 - 12:59		
13:00 - 13:59		
14:00 - 14:59		
15:00 - 15:59		
16:00 - 16:59	60	87
17:00 - 17:59	80	84
18:00 - 18:59	53	61
19:00 - 19:59		
20:00 - 20:59		
21:00 - 21:59		
SZUM 7-9, 16-19	309	427
SZUM 6-22		

AG11	direction A (northbound)	direction B (southbound)
	Pedestrians	Pedestrians
6:00 - 6:59		
7:00 - 7:59	71	70
8:00 - 8:59	98	90
9:00 - 9:59		
10:00 - 10:59		
11:00 - 11:59		
12:00 - 12:59		
13:00 - 13:59		
14:00 - 14:59		
15:00 - 15:59		
16:00 - 16:59	92	84
17:00 - 17:59	116	130
18:00 - 18:59	104	101
19:00 - 19:59		
20:00 - 20:59		
21:00 - 21:59		
SZUM 7-9, 16-19	481	475
SZUM 6-22		

Figure 135. Daily pedestrian traffic at pedestrian crossings in Rákóczi road

3.2.2 Cycling facilities

The cycling network is fragmented within the Area Under Stress, as the following Figure 136 and Figure 137 show. The environment of Kossuth Lajos street and Rákóczi street is not bicycle friendly. There isn't any designed bike infrastructure elements on the corridor. Only the brave cyclist could use carriageway, the rest of them are using narrow footways or parallel streets as alternative routes. Some bike stands are available for bike parking.

MOL Bubi is a station-based public bike sharing system in Budapest, and BKK operates it. MOL Bubi system has 156 docking stations and 2071 available bikes for users all over the city. There are two MOL Bubi stations at Area Under Stress at Ferenciek square with 15 racks and Astoria with 22 racks.

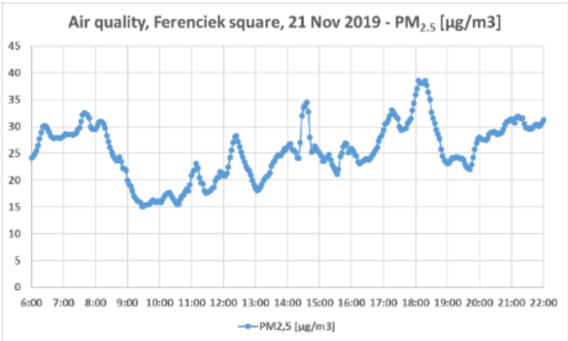
Figure 136. Cycling facilities around Ferenciek square (S8 Erzsébet bridge, I9 Ferenciek square, S9 Kossuth Lajos street)

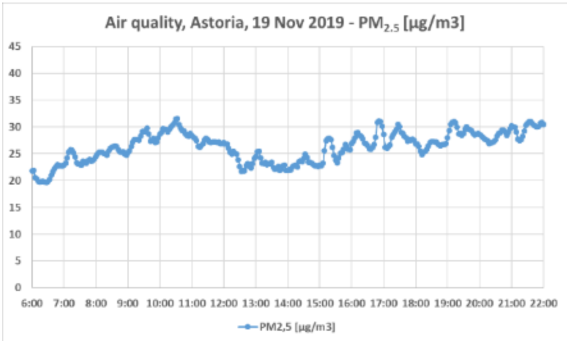
Figure 137. Cycling facilities around Astoria (S9 Kossuth Lajos street, I10 Astoria, S10 Rákóczi road inner section)

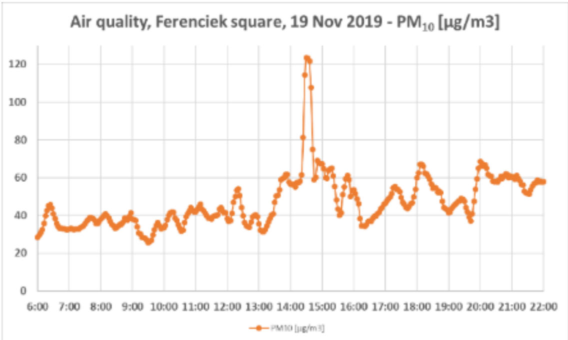
3.2.3 Air quality

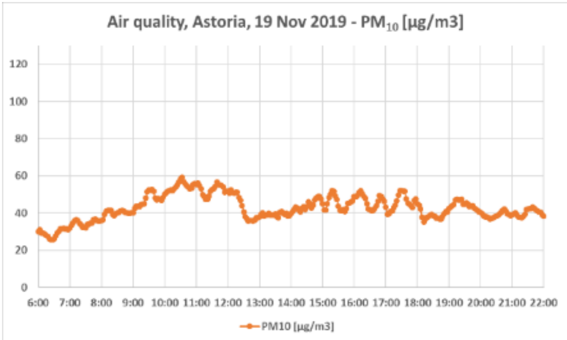
Air quality was measured at Ferenciek square on 19 Nov 2019 and Astoria on 21 Nov 2019. The weather condition was cloudy and dry, the temperature was 12°C at noon. Table 20 below contains details of the emissions recorded ($PM_{2.5}$, PM_{10}, NO_2, O_3, SO_2) and their locations. The following graphs represent the outputs.

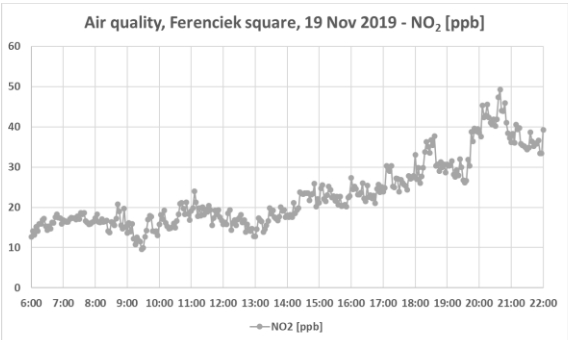
Table 20. Recorded emissions and their recording locations

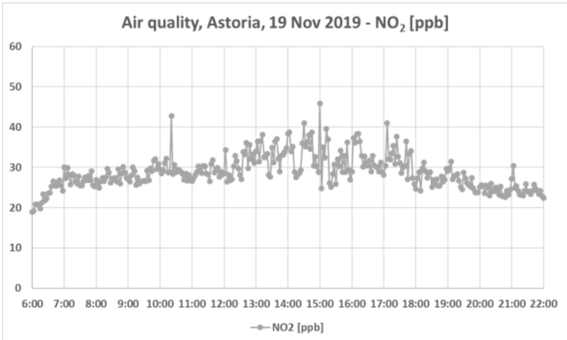


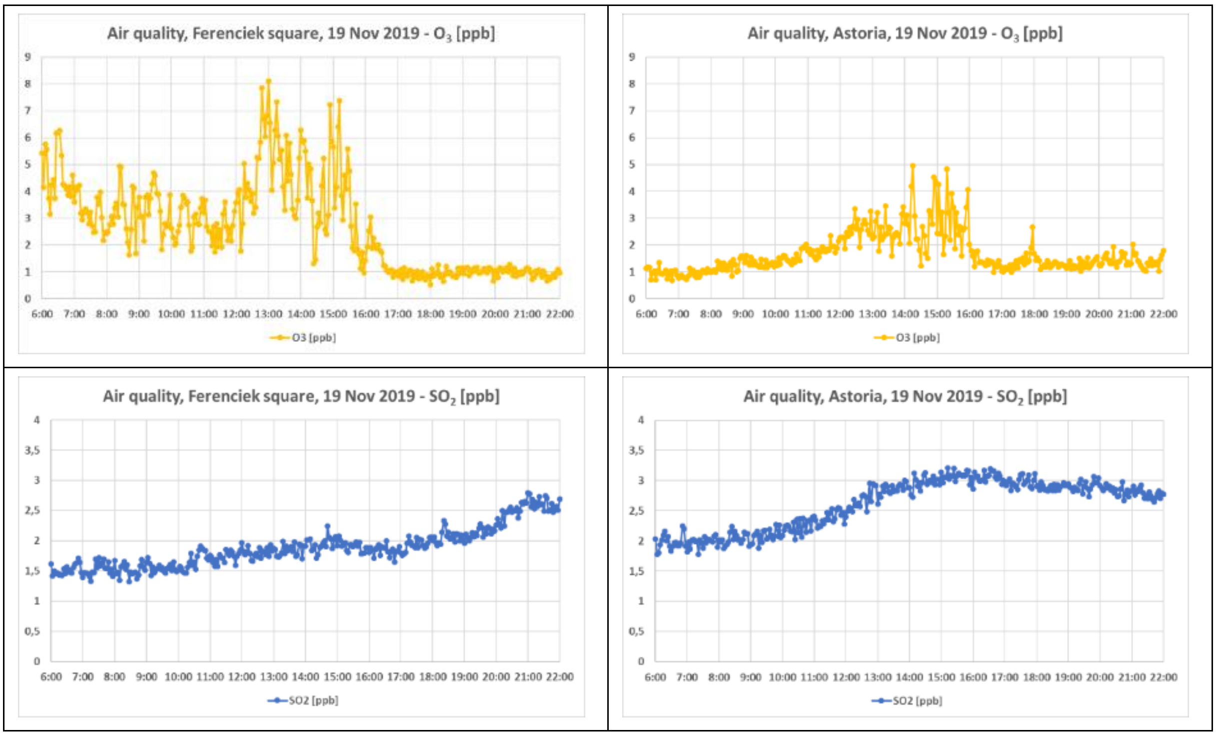












3.2.4 Noise

One of the largest environmental problems in Budapest is constituted by the considerable noise and vibration load levels; typically generated along transport facilities. More than two thirds of the population are affected by considerable noise load. Noise emissions mainly come from private and public road transport at Area Under Stress.

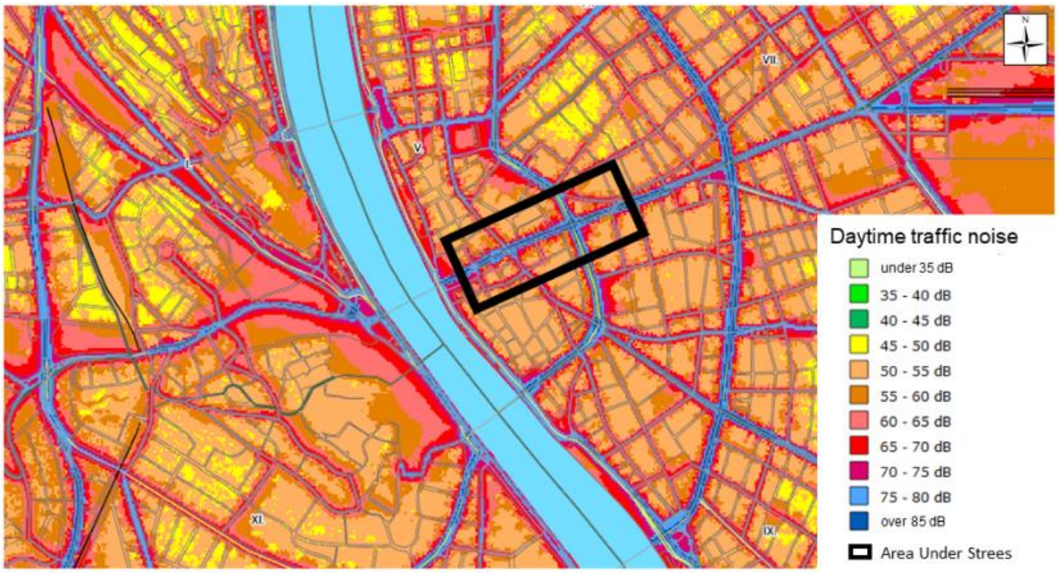


Figure 138. Daytime traffic noise at Area Under Stress

Source: ***https://geoportal.budapest.hu/Kornyezetvedelem/ZAJ/2007/Agglo/***

3.2.5 Local Stakeholders

Kossuth Lajos street and Rákóczi road were built as the main boulevard in Budapest at the end of the 1800s, the first part of the 1900s. Budapest's population, economy, transportation role of Hungary boosted between 1867 and 1914. The city developed to one of the most important cities in the Austro-Hungarian Empire next to Vienna during these years until the First World War.

Kossuth Lajos street and Rákóczi road were built as the main boulevard in Budapest at the end of the 1800s, first part of the 1900s with representative reason, for instance, street network of old Pest was redesigned to ensure place for Kossuth Lajos street and originally built Erzsébet bridge was the longest suspension bridge when it was opened in 1903.

Several representative and middle-high-end shops were available at the famous Rákóczi axis (Area Under stress) and it was the heart of Budapest until the 1980s. In the last 30 years, the road has deteriorated. Road traffic, air pollution and noise have increased, old shops have closed and several low range shops, hostels, and fast-food restaurants appeared. Ferenciek square and its neighbourhood were renovated in 2012. This renovation provides more space for pedestrians and dwellers, but most part of the corridor is still in bad shape.

The following local shops, accommodations are available nowadays at Street Under Stress:

- 41 flats flor rents;
- 34 clothes shops;
- 31 restaurants;
- 25 hotels and hostels;
- 10 pubs;
- 10 travel agencies;
- 10 exchanges.

3.2.6 Collisions and Vulnerable Road Users

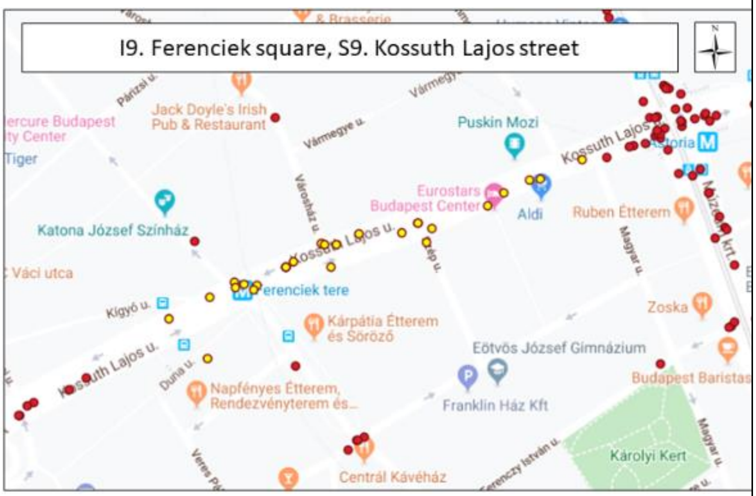
The following tables show different types of collisions between 2013 and 2018. One-third of the collisions are pedestrian accidents which come from mostly illegal carriageway crossings. The following tables represent the accidents.

Table 21. Types of collisions between 2013 and 2018

Types of accidents	Numbers of accidents	Map (S8 Erzsébet bridge)
Sideswipe collision, straight car	13	
Head on collision, straight car	-	
Sideswipe collision, turning car	2	

Head on collision, turning car	-	
Transverse direction, straight car	1	
Transverse direction, turning car	-	
Parking car accident	-	
Singe car and other accident	2	
Pedestrian accident	6	
TOTAL	**24**	

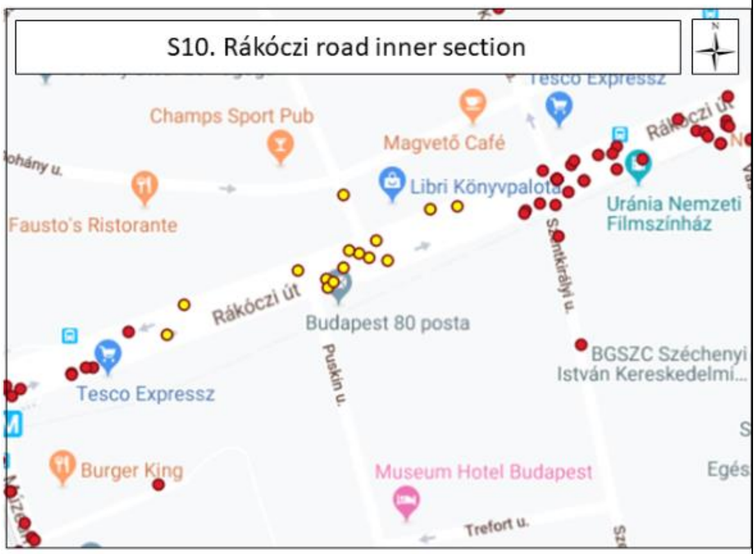
Types of accidents	Numbers of accidents	Map (I9 Ferenciek square and S9 Kossuth Lajos street)
Sideswipe collision, straight car	4	
Head on collision, straight car	-	
Sideswipe collision, turning car	5	
Head on collision, turning car	-	
Transverse direction, straight car	1	
Transverse direction, turning car	1	
Parking car accident	1	
Singe car and other accident	5	
Pedestrian accident	8	
TOTAL	**25**	



Types of accidents	Numbers of accidents	Map (I10 Astoria)
Sideswipe collision, straight car	8	

Head on collision, straight car	-	
Sideswipe collision, turning car	4	
Head on collision, turning car	1	
Transverse direction, straight car	7	
Transverse direction, turning car	-	
Parking car accident	5	
Singe car and other accident	4	
Pedestrian accident	12	
TOTAL	**41**	

Types of accidents	Numbers of accidents	Map (S10 Rákóczi road inner section)
Sideswipe collision, straight car	3	
Head on collision, straight car	-	
Sideswipe collision, turning car	1	
Head on collision, turning car	1	
Transverse direction, straight car	-	
Transverse direction, turning car	-	
Parking car accident	1	
Singe car and other accident	1	
Pedestrian accident	8	
Summarized result	**15**	



3.3 Outline of Policy context

3.3.1 Budapest Mobility Plan

The main challenge for urban transport in Budapest was to overcome the deterioration of transport conditions (in terms of both infrastructure and of assets), network inadequacies, fragmented developments that have not been integrated into a system, an obsolete sector-based approach, as well as outdated regulations. In an effort to tackle precisely these transport problems, the Municipality of Budapest established the BKK Centre for Budapest Transport in 2011.

In parallel to work on other mobility services, BKK started to work on the first SUMP-based transport development strategy of Budapest in 2012. The first part of the Budapest Mobility Plan (BMT), formally named the Balázs Mór Plan, was published for public discussion in 2014 and this version subsequently approved by the General Assembly of the Municipality of the City of Budapest the very same year.

Extensive institutional and public consultation followed and encouraged different actors to provide feedback on the various aspects of the plan. The comments and suggestions were integrated into the final version of the BMT objectives and measures, which was then formally approved in 2015.

It is important to keep in mind that the mobility planning process does not end with the approval of the first part of the work, however. With a clear vision already having been set, the next step in the strategic planning process was to work out the second part of the BMT.

The plan is further supplemented with a Program of Transport Development and Investments that is developed on the basis of the evaluation of the projects. Based on the clear strategic framework, the land use plans and urban development plans, during the last three years the long list of transport projects were analysed by the planning team. More than 170 different transport projects were collected on the long list and had detailed appraisals according to the SUMP methodology. The projects were ranked by Cost-Benefit Analysis, Multi-Criteria Appraisal, Strategic Environmental Appraisal, Feasibility Assessment, Synergy Appraisal and the results were used for sifting the long list of projects to produce different packages. After the assessing process three project packages were performed as three scenarios of implementation of the SUMP depending on the budget available. The second part of Budapest Mobility Plan named Program of Transport Development and Investments contains the methodology, the results of the different analysis and the proposed project package as well as suggestions of new project ideas to effectively cover the whole spectrum of decided goals.

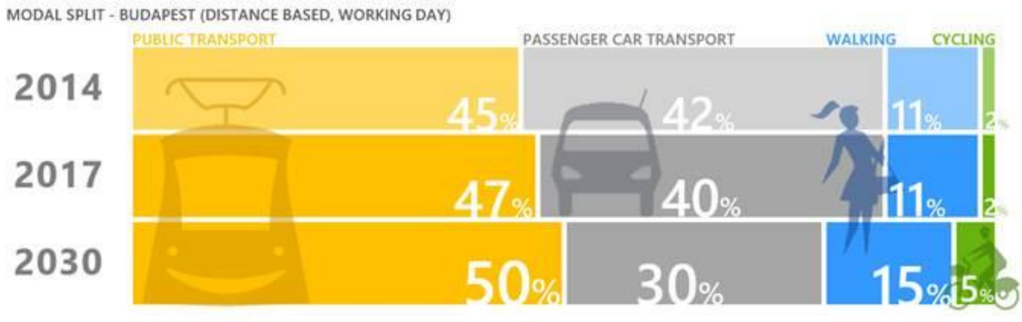


Figure 139. Distance based Budapest modal split, working day

With the completion of the second part, the development of the city's first SUMP was also achieved. The completed SUMP, with the Program of Transport Development and Investments, was ultimately approved by the General Assembly in 29 May 2019.

The BMT state-of-the-art approach puts city-dwellers and their urban environment in the focus of planning. The new strategy is furthermore in line with the guidelines laid down in the White Paper, "Roadmap to a single European transport area – towards a competitive and resource-efficient transport system", that was issued by the European Commission in March 2011. The BMT analysed the current state of mobility in Budapest and put in place a monitoring system, consisting of appropriate indicators, to ensure that the defined objectives are reached and the approved measures going according to plan. For the reasons mentioned above, the essence of Budapest's SUMP may be summarised by the following three terms: integration, efficiency, and quality. Based on these principles outlined above, Budapest's SUMP aims to help the city achieve a more lively and liveable future.

There is a related transport project which is important for the MORE project (P067: Kossuth Lajos strret-Rákóczi road public space reallocation). The goal of that project is the reconstruction of the inner section of the MORE corridor. The goal of the reconstruction would be, to make the corridor much more liveable, with green areas, pedestrian crossings on the surface, and to prepare the area for the tram or BUS lines in the middle. The public transport corridor on the middle of the route would be an another, different project.

3.4 Design objectives

3.4.1 Outcomes

Taking into consideration the objectives presented in the Budapest Mobility Plan context and the Key Problems to be addressed, this section will outline the road uses and users considered as priority for Kossuth Lajos street and Rákóczi road and the priorities for the design exercise.

Key Priorities	
Provide safe and consistent cycle provision	Introduce road danger reduction measures

Improve walking conditions	Improve air quality
Improve walking conditions	Reduce private car trips

In creating road space designs that deliver the above key priorities, road user requirements have been considered in the table below alongside measures that will be used to evaluate success in achieving these outcomes.

Table 22. Street users and measures implemented

Road/street User	Provision	Measure
Pedestrians	• Provide safe & Direct pedestrian crossings • Increase footway provision • Provide consistent pedestrian wayfinding • Reduce vehicle speeds	• Crossing facilities • Width of footway • Opportunities to sit • Further street furniture • Trees & greenery • Speed limit • Improved urban realm
Cyclists	• Provide safe & consistent cycle provision • Reduce vehicle speeds • Provide secure cycle parking	• Increased cycling flows • Reduced casualty rates • Special characteristics for cycling provision (bike lane, advanced stop lines, bike boxes, bending in, bending out, two-stage left turn) • Type, width and buffer of cycling provision • Speed limit
Micromobility Users (e-scooter Users)	• Provide safe & consistent micromobility provision • Reduce vehicle speeds • Provide secure micromobility parking	• Increased micromobility flows • Reduced casualty rates • Special characteristics for cycling provision • Type, width and buffer of micromobility provision • Speed limit
Bus Passengers	• Safe & Accessible bus stop provision • Provide seating at bus stops and interchanges • Improve bus priority to reduce bus journey times	• Width of footway • Provision of priority lanes for buses • Surveillance & Street lighting • Bus stop equipment • Crossing facilities • Improved urban realm

Tram Passengers	• Safe & Accessible tram stop provision • Provide seating at tram stops and interchanges • Improve tram priority to reduce tram journey times	• Width of footway • Provision of priority lanes for trams • Surveillance & Street lighting • Tram stop equipment • Crossing facilities • Improved urban realm
Metro Passengers	• Provide consistent wayfinding to improve interchange facilities	• Accessible metro station • Improved urban realm
Car Drivers/ Passengers	• Cleaner & Greener vehicles • Sustainable Mode shift	• Reduced traffic volumes • Improved air quality • Speed limit • Number of lanes for general traffic • Reduced collisions
Motorcyclists	• Visibility improvements of infrastructure • Signing/ road marking improvements to reduce conflicts	• Reduced collisions • Allowed user groups in each lane
Car sharing Users	• Cleaner & Greener vehicles • Sustainable Mode shift • Dedicated drop off/ pick up points at interchange locations	• Improved air quality • Speed limit • Parking/ loading facilities-type & restrictions
Taxi Drivers	• Cleaner & Greener vehicles • Dedicated drop off/ pick up points at interchange locations	• Improved air quality • Speed limit • Parking/ loading facilities-type & restrictions
Taxi Passengers	• Accessible taxi ranks • Dedicated drop off/ pick up points at interchange locations	• Parking/ loading facilities-type & restrictions
HGV, LGV Drivers	• Clear & Concise restrictions for Parking & Loading • Convenient locations for Parking & Loading • Consolidate & Re-time deliveries • Rear access • Out of area waiting facilities	• Improved air quality • Parking & Loading facilities-type & restrictions • Reduced traffic volumes

3.4.2 Times of Day

The design exercise will develop and test road space designs for five temporal periods of:

Period	Time
Morning	6:00-7:00
AM Peak	7:00- 9:00
Inter-peak	9:00-16:00
PM Peak	16:00-19:00
Evening	19:00-22:00
Weekends	10:00- 16:00

3.4.3 Impacts for Feeder Route

Designs developed for each time period should have regard to the movement and place functions along the entire Feeder Route to the Trans-European Network (TEN-T) Interface and beyond.

Most trips on the European road transport network begin or end in urban areas. While some parts of the inter-urban road network suffer from delays and unreliability, most problems occur in larger urban areas. Here the delays and variability in travel times can undermine the efficiency of road transport across Europe – resulting in delays to road passengers and missed slots for freight vehicles.

At the same time, the major corridor feeder roads are called upon to meet a variety of urban economic and social needs. The focus of MORE is on these Urban Nodes and on improving the efficiency and effectiveness of the main roads that feed traffic to/from the interurban road links of the TEN-T, also taking into account the scope for modal transfers.

3.5 Tasks to be carried out in the street design exercise. Using the MORE tools

The BKK action plan for Jan 2020 to Oct 2020 can be found below setting out how each of the tools developed in MORE (design blocks and acetates, Linemap, Traffweb, VISSIM, Appraisal framework tool) will be applied, followed by further details of each of the tasks.

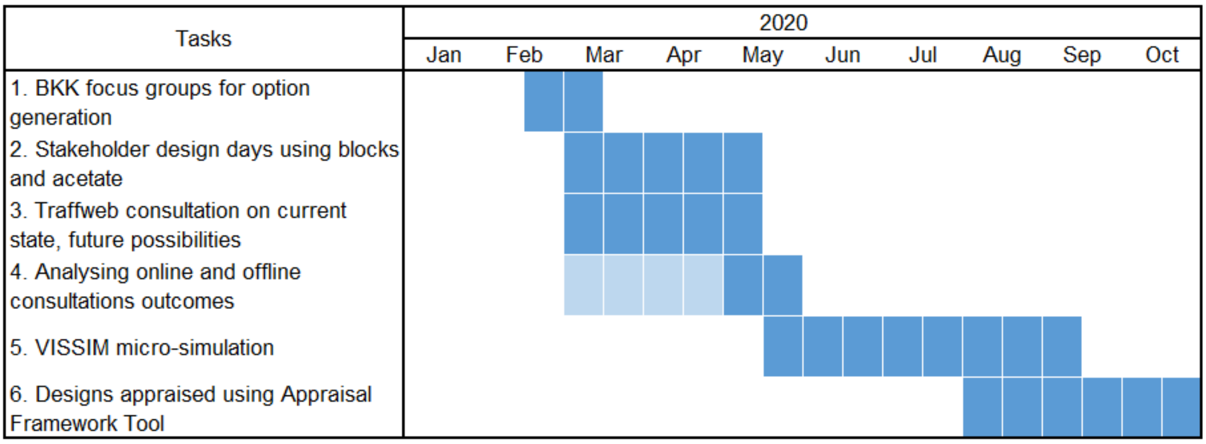


Figure 140. MORE action plan

- Task 1: BKK experts will analyse Area Under Stress to determine scenarios based on own experiences and former plans.
- Task 2: Stakeholder design days will hold using physical toolkit (blocks and acetate) for relevant stakeholders (locals, road and urban planners, municipalities and authorities).
- Task 3: Online consultation will be held for the public using Traffweb consultation about current state, problems and ideas
- Task 4: BKK experts will analyse the outcomes of online and offline consultations outcomes, for pick up ideas and determine best future scenarios.
- Task 5: VISSIM micro-simulation will use to simulate and analyse in detail the best scenarios of consultations.
- Task 6: Results will analyse by Appraisal Framework Tool for detailed evaluation.

4 Design Brief of City Feeder Route – LISBON

4.1 Introduction

The analysed section is located in a consolidated urban area, with several multi-modal conflicts, caused by the concentration of individual and public transport, but mainly by large influxes of people moving to these streets for commercial and leisure reasons, with a very high daytime parking demand, mostly for loading and unloading of passengers and goods.

This section is located at south of the TEN-T network and is one of the main ways to access city's historic and business centre, being also an important communication axis to spread traffic flows for other main communication routes to other parts of the town. The map shows the location of the section under analysis, under the context of the Feeder Route.

In terms of the Place and Movement definition, the section can be defined as P3 (High Place Function) given to the intense and diverse use of places and M2 (Urban Road/Street), due to the road characteristics and traffic volume.

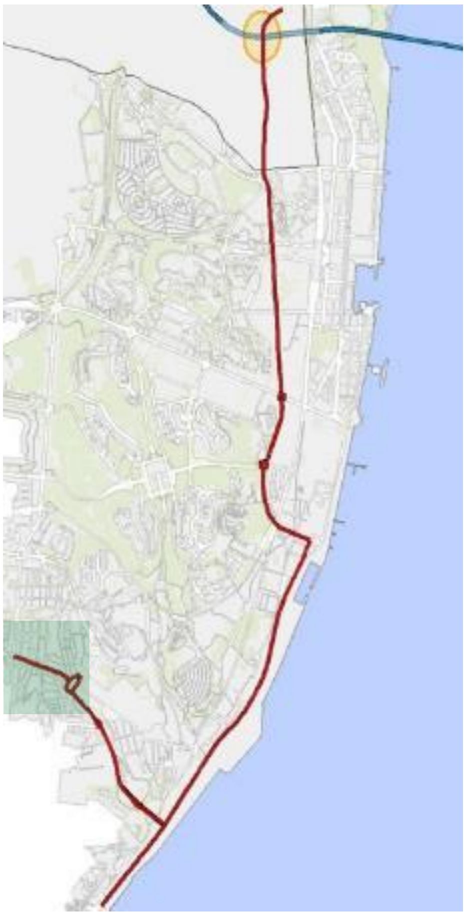


Figure 141. Location of the section under analysis in the TEN-T context

The stress section includes the Morais Soares street, that connects Praça (Square) Paiva Couceiro to Praça do Chile. Praça Paiva Couceiro, given its relevance in the community as well as its place´s diversity is also included in the analysis.

Figure 142. Stress Section

The length of this section is around 1125m (Rua Morais Soares' section - 685 meters, plus a perimeter of 440 meters around Praça Paiva Couceiro).

The map here shows the section under analysis, some points of interest around its influence area as well as where the movements that use Rua Morais Soares can be distributed, assuming the importance of this street to spread many movement flows.

Rua Morais Soares is one of the most important roads that connect the east part of the city, and the movements that come from the TEN-T network to the city centre, namely the business and historic centre. Besides its importance in the road network, it is also a very dense commercial and service zone. It generates high levels of demand, attracting large flows of people throughout the day on different transport modes, causing several second line parking problems, and with a high pedestrian flow pressure, despite the lack of comfortable and appealing conditions to walk.

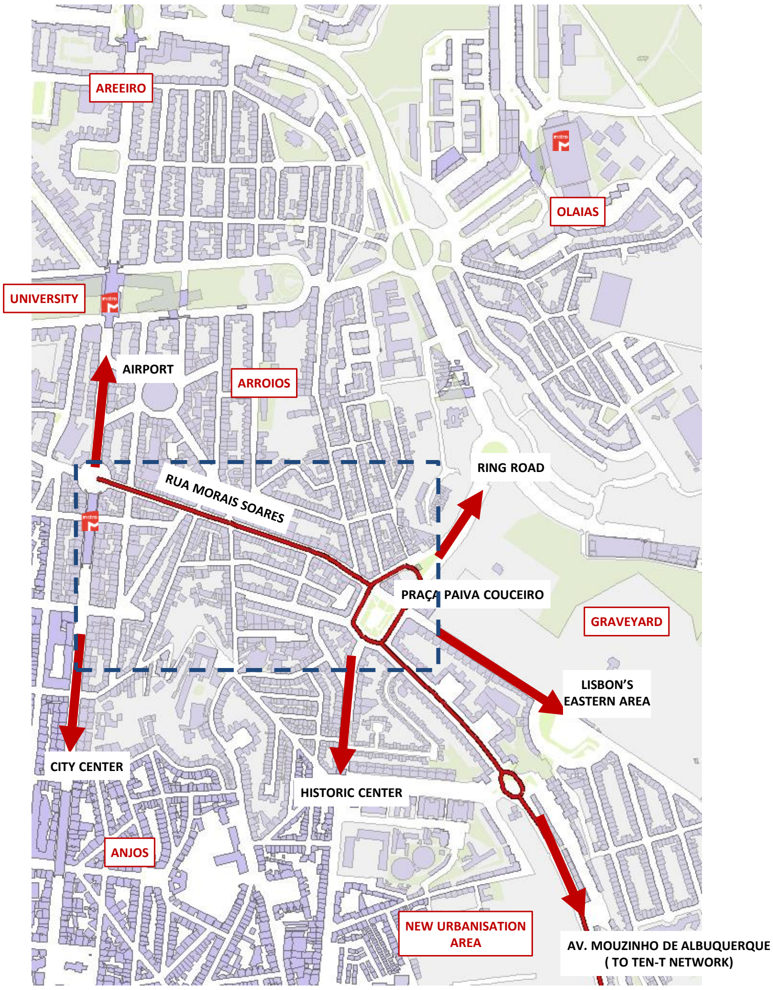


Figure 143. Location of the stress section under study and its surroundings

Given the importance of Rua Morais Soares and Praça Paiva Couceiro in a local and urban context, and its connection to the TEN-T network, it is important to decrease the unpredictability in the traffic flows. At the same time, to provide better conditions for people, in order to take advantage of the intense diversity of places and activities that exists in this area, which is decreasingly common in the cities all across Europe.

In the following, several aspects of the section under stress will be analysed, which will help to identify and characterize the most relevant constraints and what can be improved to accomplish the project's objectives. The data was gathered from several entities and municipal departments and complemented by a data survey done to street users and shopkeepers and, also, through pedestrian and vehicles counting surveys in two weekdays during the peak hours. Both complementary works were done in December 2019.

The collected data are the following:

- Demographic and economic activities;
- Street cross-sections;
- Infrastructure characterization: number of lanes, parking areas, pedestrian walking crosses, severance;
- Public transport characterization: public transport lanes, public transport stops;
- Cycle lane network;
- Traffic Volume: Speed, congestion, modal share;
- Accidents;
- Parking/loading/servicing problems;
- Pedestrian volume, flows, mobility patterns; and
- Air and noise pollution;

4.1.1 Demographic and economic activities

As already mentioned, this section is a very dense and diversified area, densely populated and concentrating a large number of activities.

According to the last census in 2011, around 4900 people lived within a buffer of 100 meters around the section, with a homogeneous distribution along the street and square. This is illustrated below and is well spread around the blocks.

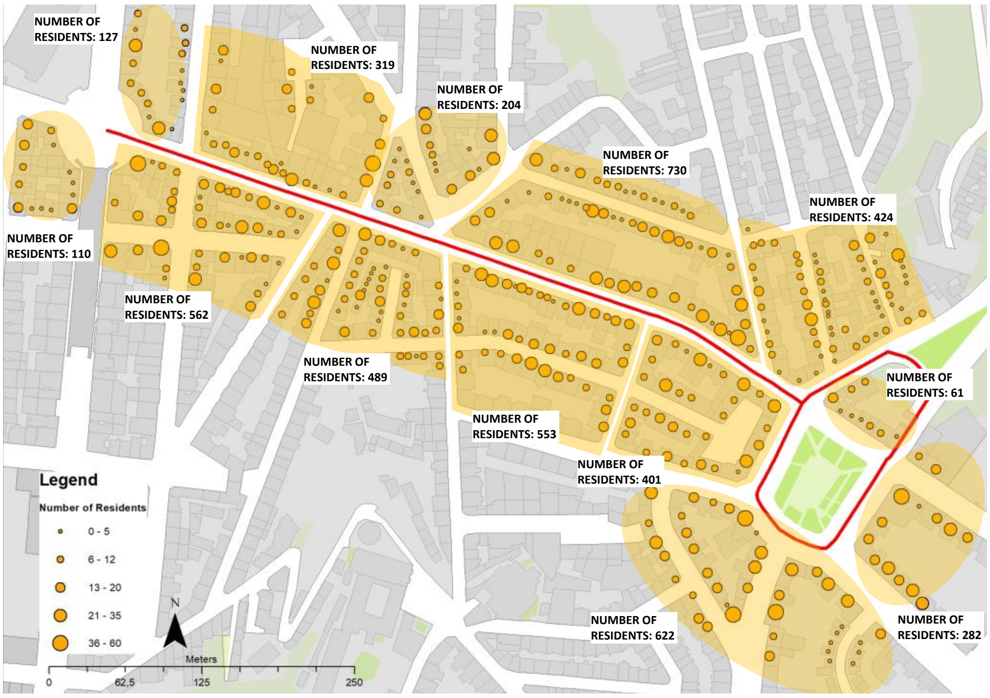


Figure 144. Population distribution around the section (Source: Census 2011)

In terms of economic activities, an identification and characterization work was done over the type of activities that currently exist in the analysed section. As it was already mentioned this area has a strong component of commerce and daily services, having a total number of 169 commercial and service establishments, the largest part (56%) of which is dedicated to commerce, like groceries, specialized food stores and common daily products.

Other important activities here are restaurants, pastries shop and bakeries, which total 22% of all the activities. The large number of these activities causes a high demand during lunch hours and a lot of abusive uses of load/unload parking bays from the customers.

Services like banks, post offices, exchange stores and hairdressers are also very relevant for the activities in these zones. The banks and their ATM machines as well as the post office are mainly responsible for the second line parking and severance, so they should be carefully observed along this work.

Four pharmacies and one health clinic were also identified, which is a considerable number for the street's length. Pharmacies are also responsible for severance and second lane parking and have a lot of constraints in the load/unload operations.

Only one hotel was identified, but it is known that are many dispersed unregistered accommodations here, so it wasn't considered in this survey.

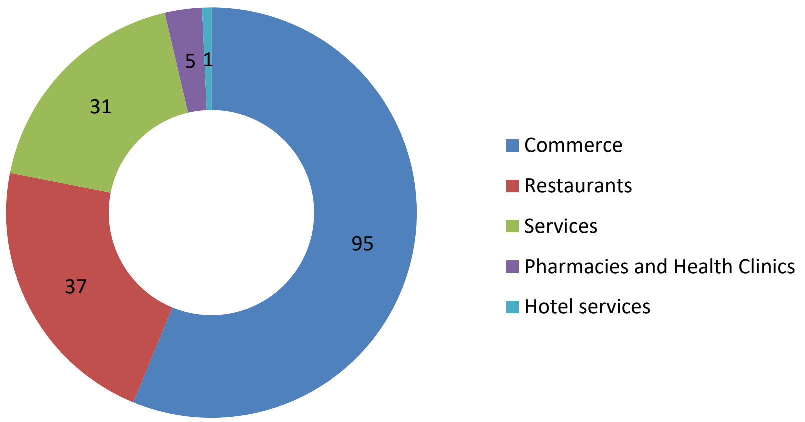


Figure 145. Number and type of stores in the analysed section

One of the most relevant and appreciable characteristics of this zone is the low rate of buildings that are vacant and in bad conditions. 94% of the buildings are inhabited and with activity which clearly demonstrates the attractiveness of this zone, with an interesting balance between commerce, services and housing.

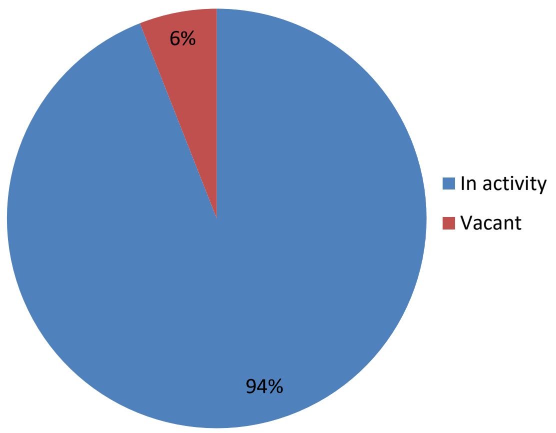


Figure 146. Percentage of buildings in activity and vacant

4.1.2 Street cross sections

The following exercise intends to characterize several cross sections along the section under study, which will allow acquiring a perception about the typical street design and how can it be modified to improve the street's features.

As showed in the following figures, in Rua Morais Soares most of the street's profile is dedicated to traffic flow and parking bays. The sidewalks are usually very narrow, frequently with less than 1,80 meters, which is clearly insufficient for the large amount of pedestrians that use the street. Often, the sidewalks are occupied by several objects, like traffic signs, garbage bins and, frequently, shops' furniture shortens the sidewalk width and creates obstacles for people walking.

Other problem in this section, which relates to the limited area provided for the people, is the lack of spaces available for people to rest and meet and the absence of shadows, which is not adequate for the high flow and demand generated by the street's diversity. Besides this, many street users are elder or have mobility problems, and require more comfortable walkways and places to stay.

The following three figures are illustrative of the usual street profile along the corridor.

Figure 147. Cross-section of Rua Morais Soares between Rua Francisco Sanches and Rua Cavaleiro de Oliveira

Figure 148. Cross-section of Rua Morais Soares between Calçada Poço dos Mouros and Rua Carrilho Videira

Figure 149. Cross-section of Rua Morais Soares between Rua Carrilho Videira and Rua Barão de Sabrosa

In Praça Paiva Couceiro, the characteristics are very different, especially because the available space is much larger, despite vehicles (flow and parking) being massively present, all around the square. The road contours a garden in the middle of the square that has a lot of places for people to stay, with shadows, whereas the other side of the road has large sidewalks that are used to install esplanade and other stores' furniture.

However, Praça Paiva Couceiro is the crossing point of two important city's ring roads which causes heavy traffic flows. This, combined with a wide street profile around the garden, invites to higher speed driving, enhances conflicts between vehicles and pedestrians and increases, for instance, pedestrian crossing insecurity and noise problems.

It may be said that despite the large sidewalks that exist here, complemented by places to stay and sit, with plenty of trees to provide shadow in both sides of the square, the width of the street causes a great barrier for people, especially considering the age and mobility conditions of most of the people who use this place.

The following four figures show cross-sections of four different areas around the square that demonstrate the considerations above referred.

Figure 150. Cross-section of Praça Paiva Couceiro between Rua Morais Soares and Rua Jacinto Nunes

Figure 151. Cross-section of Praça Paiva Couceiro between Rua Jacinto Nunes and Avenida General Roçadas

Figure 152. Cross-section of Praça Paiva Couceiro between Avenida Mouzinho da Silveira and Rua Morais Soares

Figure 153. Cross-section of Praça Paiva Couceiro between Avenida Mouzinho da Silveira and Rua Morais Soares

4.1.3 Infrastructure characterization: number of lanes, parking areas, pedestrian walking crosses, severance

<u>Number of lanes</u>

This section has a very homogeneous number of lanes along Rua Morais Soares in contrast with Praça Paiva Couceiro, that has different number of lanes in different sections.

The following figures show the number of lanes and respective directions in Rua Morais Soares, Praça Paiva Couceiro and in the cross-cutting streets that access to them.

There is only one bus lane in operation, although there is an intention of implementing two bus lanes in Rua Morais Soares in each direction.

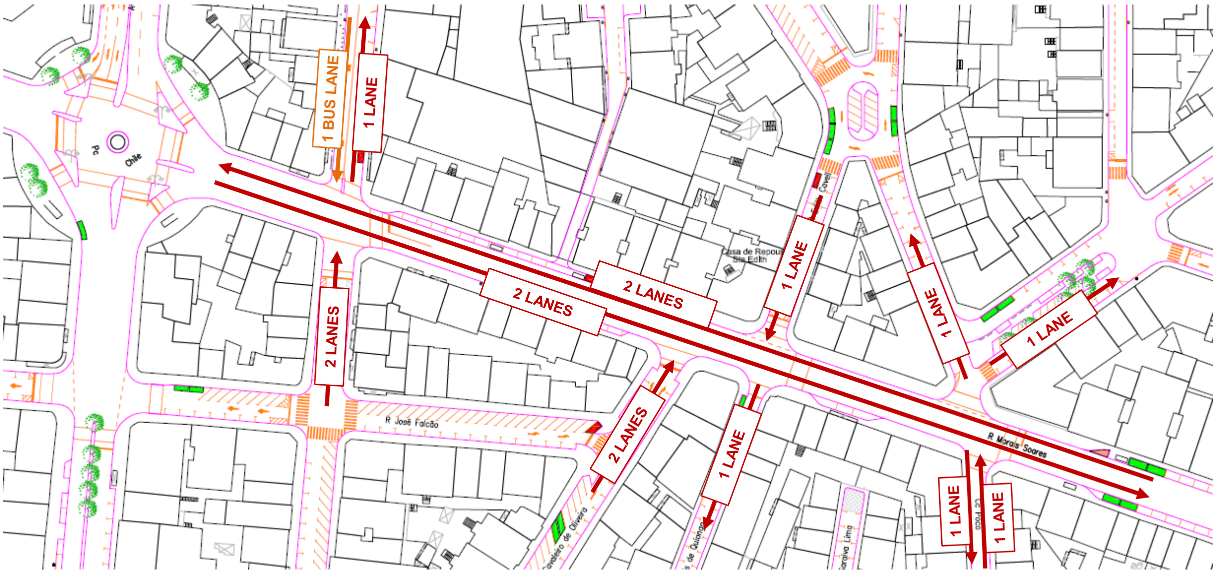


Figure 154. Number of lanes in Rua Morais Soares and in the transversing streets (Section between Praça do Chile and Calçada Poço dos Mouros)

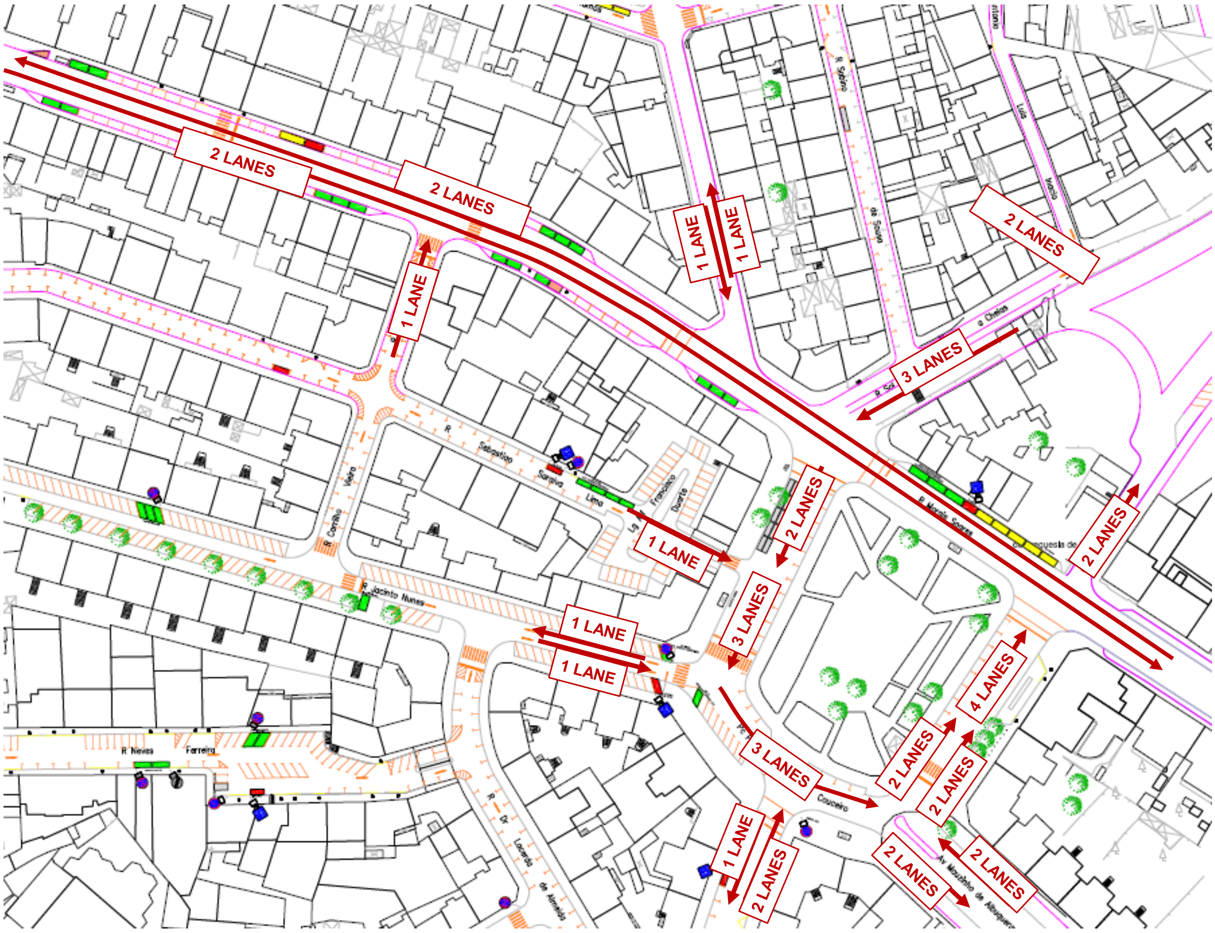


Figure 155. Number of lanes in Rua Morais Soares and Praça Paiva Couceiro and in the transversing streets

Parking Areas

The number of existing parking bays along Rua Morais Soares and Praça Paiva Couceiro was identified and segregated in different types of parking:

- Normal;
- Limited mobility;
- Load/unload parking;
- Motorcycles;
- Taxi bays.

The report makes a distinction between the type and number of parking bays in both directions, between Praça do Chile and Praça Paiva Couceiro, and in this last square.

Table 23. Number and type of parking bays along Rua Morais Soares and Praça Paiva Couceiro

Direction	Type of parking bay				
	Normal	Disabled	Load/unload	Motorcycles	Taxi bays
Praça do Chile → Praça Paiva Couceiro	28	3	14	1	
Praça Paiva Couceiro → Praça do Chile	27	-	9	1	
Praça Paiva Couceiro	36	1	4		10
TOTAL	91	4	27	2	10

Pedestrian crossings

In the western section of Rua Morais Soares, due to the existence of several intersections, all the pedestrian crossings are signalised with traffic lights, as shown in Figure 156 below.

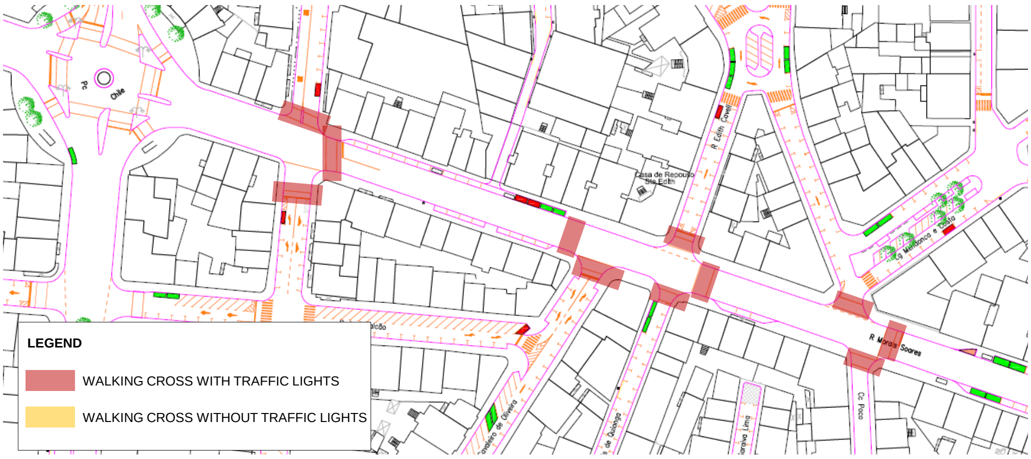


Figure 156. Location of the walking crossings in the western section of Rua Morais Soares

The situation in the eastern section of the street as well as in Praça Paiva Couceiro, is quite different, as shown in Figure 157 below. In this section, there is a combination of pedestrian crossing with and without traffic lights in both street and square. In fact, due to low visibility (in Rua Morais Soares) and excessive speed (in Praça Paiva Couceiro), two of the pedestrian crossings without traffic lights are mainly responsible for pedestrian accidents, as analysed ahead.

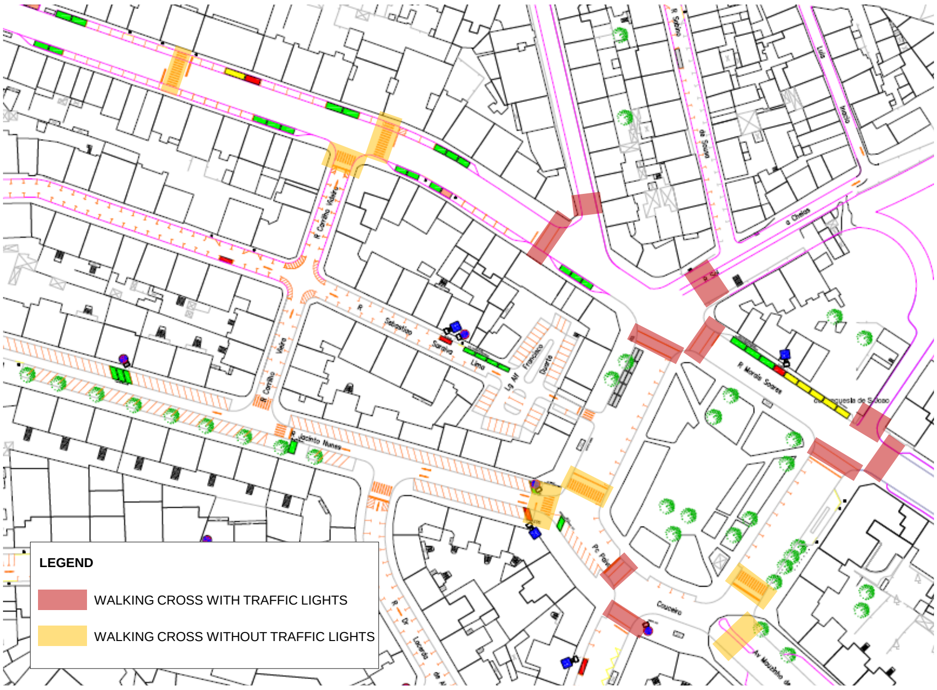


Figure 157. Location of the walking crosses in the eastern section of Rua Morais Soares and Praça Paiva Couceiro

<u>Severance</u>

Due to the existence of several pedestrian crossings along the analysed section, the situation of severance is not that frequent. However, there are some punctual locations where this occurs more often, connected to places that, usually, require only a short stop, and where people double park and cross the road to access them. According with local observation, this situation happens in ATM machines, pharmacies and, less frequently, in the post office.

The following figure identifies the location of these establishments / equipment, where severance has a higher probability to occur. In fact, there is a concentration of the referred activities in a located area in the eastern section of Rua Morais Soares, where some offer of parking bays exists, most is used for long parking periods and only a few to load/unload actions (and most of them are often illegally occupied).

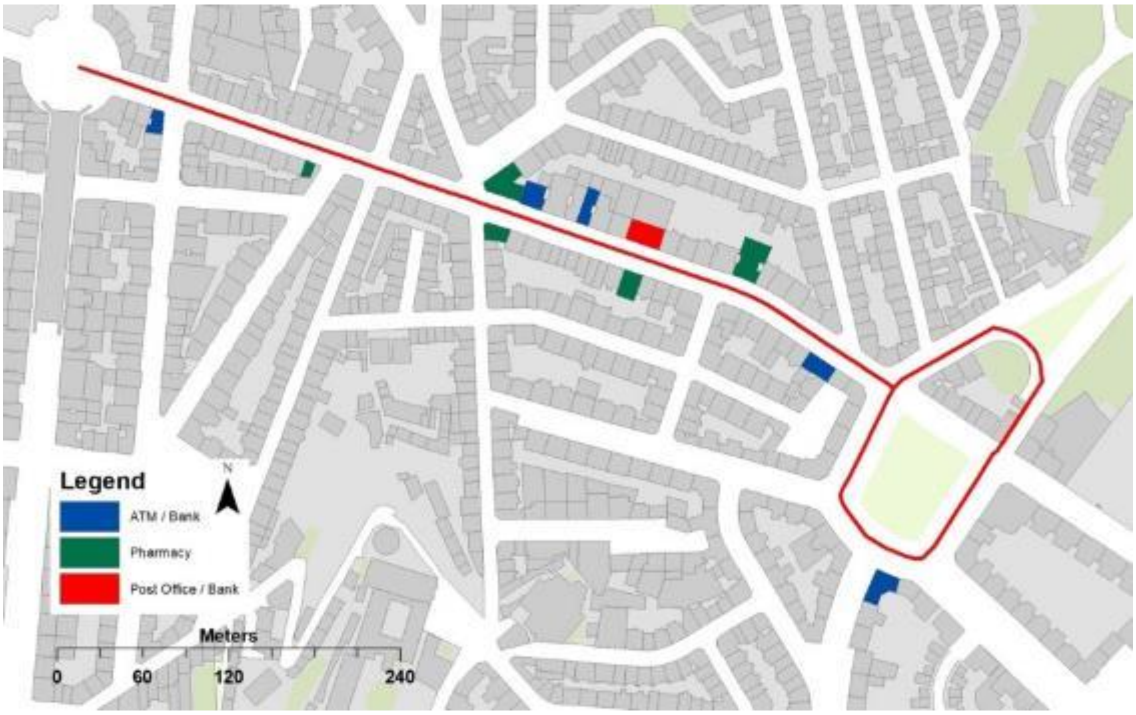


Figure 158. Location of the establishments with higher probability of occurring severance

4.1.4 Public transport characterization: public transport lanes, public transport stops

Besides the characteristics already referred, it is relevant to mention the importance of this street in the bus network, due to its location between the east and west sides of the city, serving as a confluence point of five bus lines that spread all over town, connecting Lisbon's east, centre, southwest and north areas. In terms of subway offer, the section under analysis is served directly by the green line through Arroios station. However, this subway station is currently closed for works (estimated to reopen in the beginning of 2021) and the nearby station of Alameda, served by green and red lines, works as an alternative.

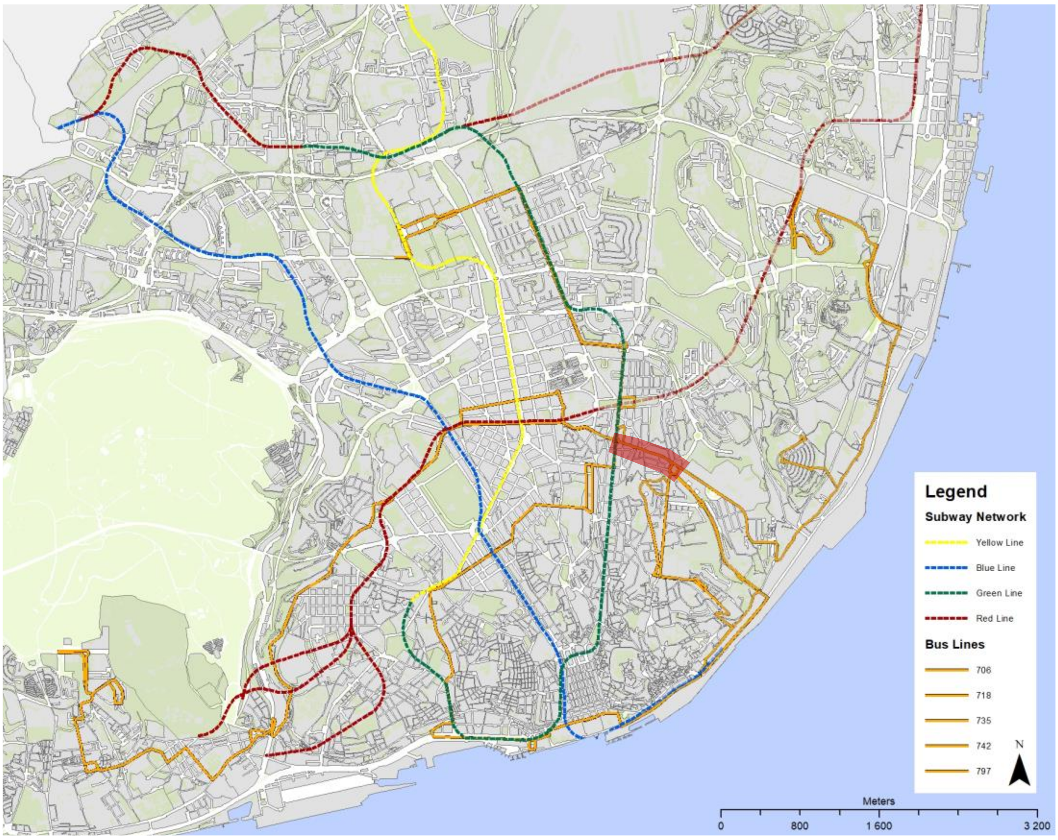


Figure 159. Public transport network that serves directly the section under stress (Carris and Metro)

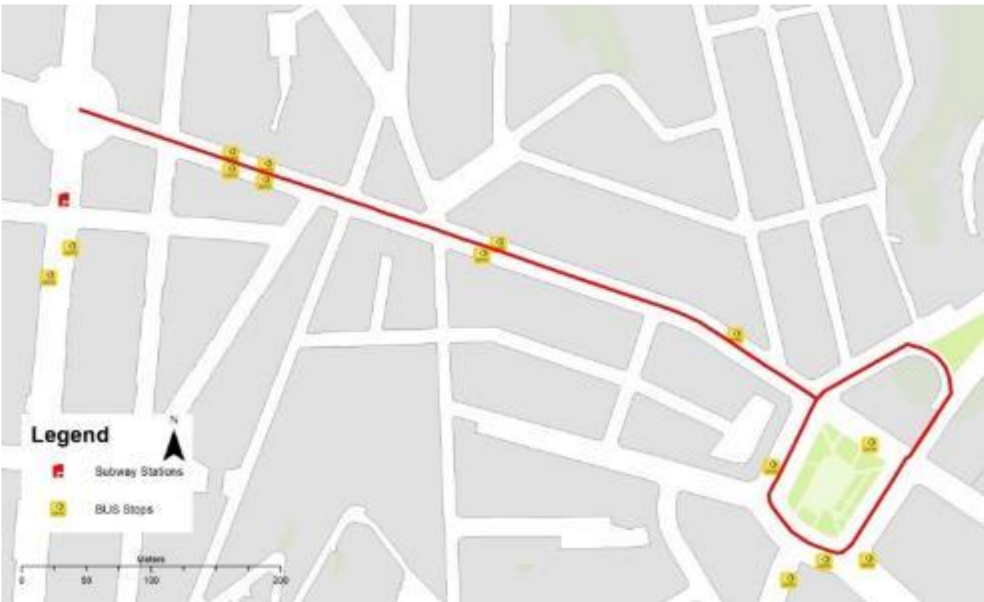


Figure 160. Location of the Bus stops and Subway stations around Rua Morais Soares and Praça Paiva Couceiro

To underline the pressure of the bus service in this street, the following table shows the scheduled number of trips per day and subsequent average number of trips per hour that cross Rua Morais Soares. According to data provided by Carris, an average of one bus every three minutes, per direction on a working day, every 4,2 minutes on Saturdays and every 5 minutes on Sundays is expected

Table 24. Number of bus scheduled trips in Rua Morais Soares (Source: Carris - Bus transport operator)

BUS Line	Number of scheduled trips per day			Average number of trips per hour (both directions)		
	Working days	Saturday	Sunday	Working days	Saturday	Sunday
706	137	116	96	7,6	6,4	5,3
718	118	72	68	6,6	4,0	3,8
735	194	128	100	10,8	7,1	5,6
742	198	146	106	11,0	8,1	5,9
797	98	56	56	5,4	3,1	3,1
Total	**745**	**518**	**426**	**41,4**	**28,8**	**23,7**
Average bus frequency per direction				**2,9**	**4,2**	**5,1**

Table 25 below shows the number of validations per day along the route of the five bus lines that serve the section under analysis. Although the number of validations at the bus stops located in Rua Morais Soares and Praça Paiva Couceiro weren't provided, it is notorious for the high number of passengers in almost all the lines, especially in the lines 735 and 742. This demonstrates the importance of these lines in the bus network and predictably in people's movement to and from this area.

Table 25. Average number of validations per day in the bus lines that serve Rua Morais Soares and Praça Paiva Couceiro[4]

BUS Line	Average number of validations per day		
	Working day	Saturday	Sunday
706	7 039	2 838	1 921
718	5 122	2 290	1 930
735	13 600	7 840	5 113
742	19 141	11 081	7 480
797	1 745	819	671
TOTAL	**46 647**	**24 868**	**17 115**

[4] Carris was asked to provide the number of specific validations at the bus stops of Rua Morais Soares and Praça Paiva Couceiro, instead of in the entire route. The request was reinforced.

4.1.5 Cycle lane network

Lisbon has made, since 2017, a huge effort to expand its cycle network, aiming to reach 200 km of cycle lanes until 2021. Currently there are 105 km in operation. Regarding Morais Soares, there is an intention to implement a cycle lane along the street and square until 2021, which will connect this section to the city and business centre.

Until now, there aren't any existing projects to implement a cycle lane here, which gives room for manoeuvre for the proposed solutions.

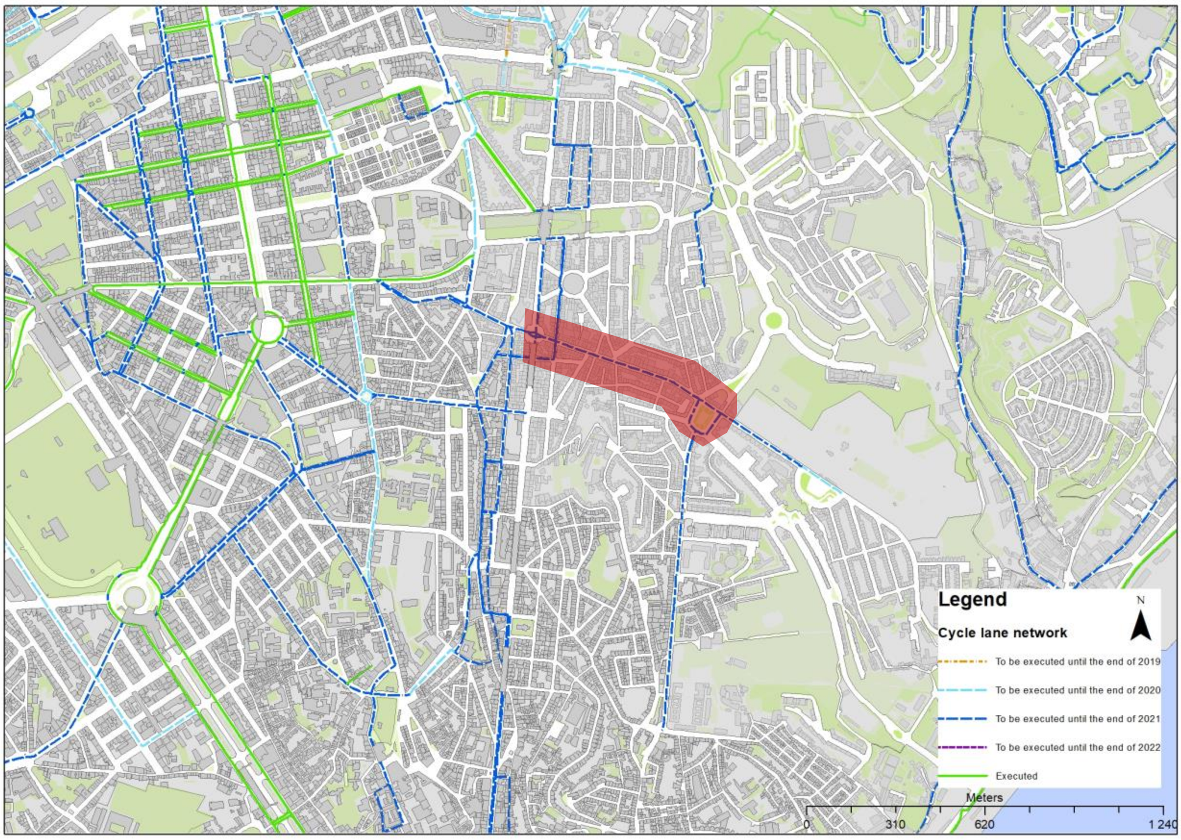


Figure 161. Existing and foreseen cycle network in and around Rua Morais Soares and Praça Paiva Couceiro

4.2 Key issues to address

4.2.1 Traffic Volume: Speed, modal share

On the 11th (Wednesday) and 12th (Thursday) December a survey was made to measure traffic volume and average speed along the section under study.

The purpose of this survey is to identify the section's current traffic conditions, in order to know its volume, main flows and modal share which will allow to evaluate its volume-to-capacity ratio and level of service, helping to identify alternative solutions to increase the street's use efficiency.

In the following, the main conclusions of the realized survey are presented.

Traffic Volume

The counting survey was made in the above referred two days, in the peak periods, i.e., morning period (7:30 – 10:00), lunch period (12:00 – 13:30) and afternoon period (16:30 – 18:00). The counting survey segregated the traffic in the following different modes:

- Light Vehicles;
- Light duty vehicles;
- Heavy duty vehicles;
- Bus;
- Motorcycles;
- Bicycles.

This task was made through the use of video cameras positioned at carefully chosen locations, that allowed to record all the movements in the section's intersections, in 15 minutes periods, which were counted manually after the video recording.

Figure 162 below shows the location of the intersections where the counting survey was made.

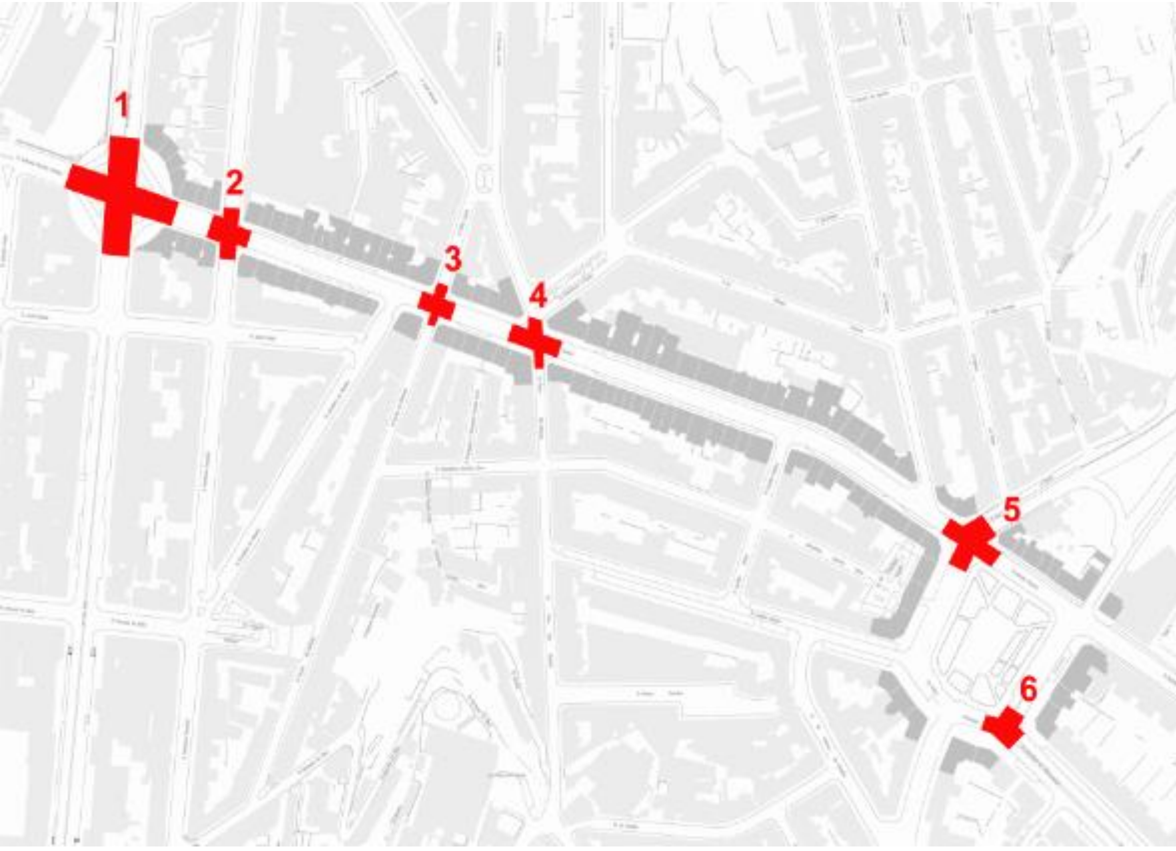


Figure 162. Location of the counting stations

In the following two tables, the total number of traffic during one-hour period, by station, in both survey days, is shown. As it may be observed, Thursday is the most intensive day with higher traffic volumes.

Table 26. Traffic volume during one-hour period, Wednesday 11th December

Counting Period		Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	TOTAL[5]
7:30	8:30	5 888	1 653	2 006	2 038	3 024	2 772	11 493
7:45	8:45	6 522	1 859	2 248	2 252	3 200	2 978	12 537
8:00	9:00	6 960	2 025	2 438	2 456	3 292	3 084	13 295
8:15	9:15	7 138	2 064	2 526	2 550	3 356	2 984	13 480
8:30	9:30	7 272	2 031	2 546	2 516	3 414	2 958	13 465
8:45	9:45	7 180	1 983	2 478	2 450	3 442	2 834	13 187
9:00	10:00	7 022	1 859	2 394	2 352	3 362	2 730	12 697
TOTAL		**47 982**	**13 474**	**16 636**	**16 614**	**23 090**	**20 340**	**90 154**

Counting Period		Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	TOTAL
12:00	13:00	3 897	1 990	2 330	2 312	3 270	2 670	12 572
12:15	13:15	4 384	1 940	2 274	2 198	3 232	2 608	12 252
12:30	13:30	4 632	1 842	2 160	2 080	3 126	2 574	11 782
TOTAL		**12 913**	**5 772**	**6 764**	**6 590**	**9 628**	**7 852**	**36 606**

Counting Period		Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	TOTAL
16:30	17:30	4 515	1 796	2 658	1 972	3 126	2 874	12 426
16:45	17:45	4 491	1 932	2 712	1 362	3 214	2 898	12 118
17:00	18:00	4 651	1 962	2 728	722	3 218	2 926	11 556
TOTAL		**13 657**	**5 690**	**8 098**	**4 056**	**9 558**	**8 698**	**36 100**

Table 27. Traffic volume during one-hour period, Thursday 12th December

Counting Period		Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	TOTAL
7:30	**8:30**	5 824	1 802	2 098	1 958	3 286	2 826	**11 970**
7:45	**8:45**	6 744	2 012	2 296	2 160	3 744	3 010	**13 222**
8:00	**9:00**	7 170	2 104	2 476	2 354	4 378	3 002	**14 314**
8:15	**9:15**	7 318	1 998	2 498	2 376	4 436	2 972	**14 280**
8:30	**9:30**	7 410	2 002	2 458	2 346	4 254	3 050	**14 110**
8:45	**9:45**	7 134	1 998	2 468	2 394	4 060	2 970	**13 890**
9:00	**10:00**	6 882	1 954	2 382	2 336	3 548	2 920	**13 140**
TOTAL		**48 482**	**13 870**	**16 676**	**15 924**	**27 706**	**20 750**	**94 926**

Counting Period		Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	TOTAL
12:00	**13:00**	7 206	1 874	2 286	2 196	3 254	2 630	**12 240**
12:15	**13:15**	7 112	1 914	2 266	2 188	3 304	2 686	**12 358**
12:30	**13:30**	7 098	1 854	2 140	2 110	3 328	2 596	**12 028**
TOTAL		**21 416**	**5 642**	**6 692**	**6 494**	**9 886**	**7 912**	**36 626**

Counting Period		Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	TOTAL
16:30	**17:30**	7 766	2 026	2 374	2 396	3 396	3 178	**13 370**
16:45	**17:45**	8 138	2 110	2 532	2 484	3 560	3 124	**13 810**
17:00	**18:00**	8 406	2 182	2 488	2 484	3 696	3 008	**13 858**
TOTAL		**24 310**	**6 318**	**7 394**	**7 364**	**10 652**	**9 310**	**41 038**

[5] Since the station 1 is situated outside of the section under study, and has clearly higher traffic volumes than the other stations due to the movements of Av. Almirante Reis, for this analysis' purpose it was only considered the station from 2 to 6.

During Thursday, the peak periods, according with the counted traffic volumes are the following:

- Morning peak: 8:00 – 9:00
- Lunch peak: 12:15 – 13:15
- Afternoon peak: 17:00 – 18:00

Regarding modal share, the patterns are very similar in both days. Clearly, the car is the most used vehicle in the section, with around 80% of the total transport modes.

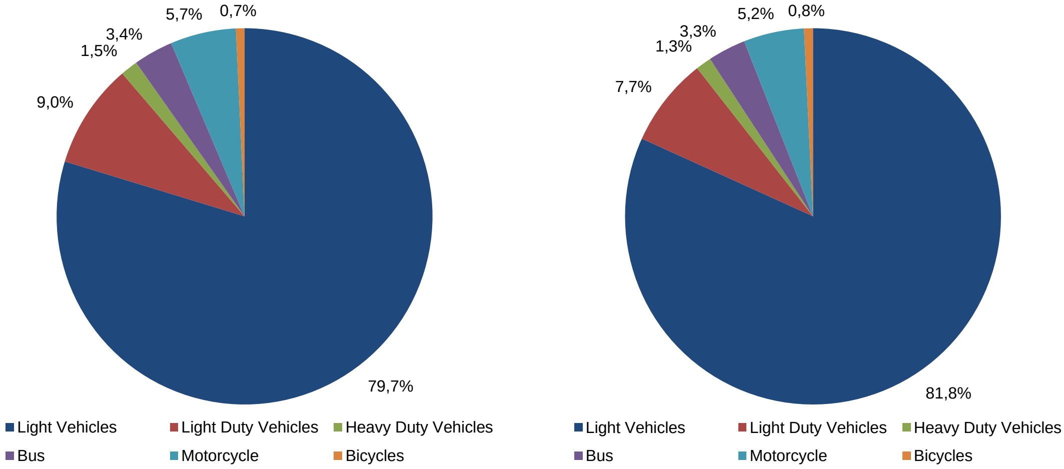


Figure 163. Modal share in the section under study. Wednesday 11th December on the left, Thursday 12th December on the right

The following figures show the traffic volumes, by sections, segregated by transport mode, which were calculated from the intersections counting data. In Appendix 8.2.3 it may be seen the counting data gathered for each intersection.

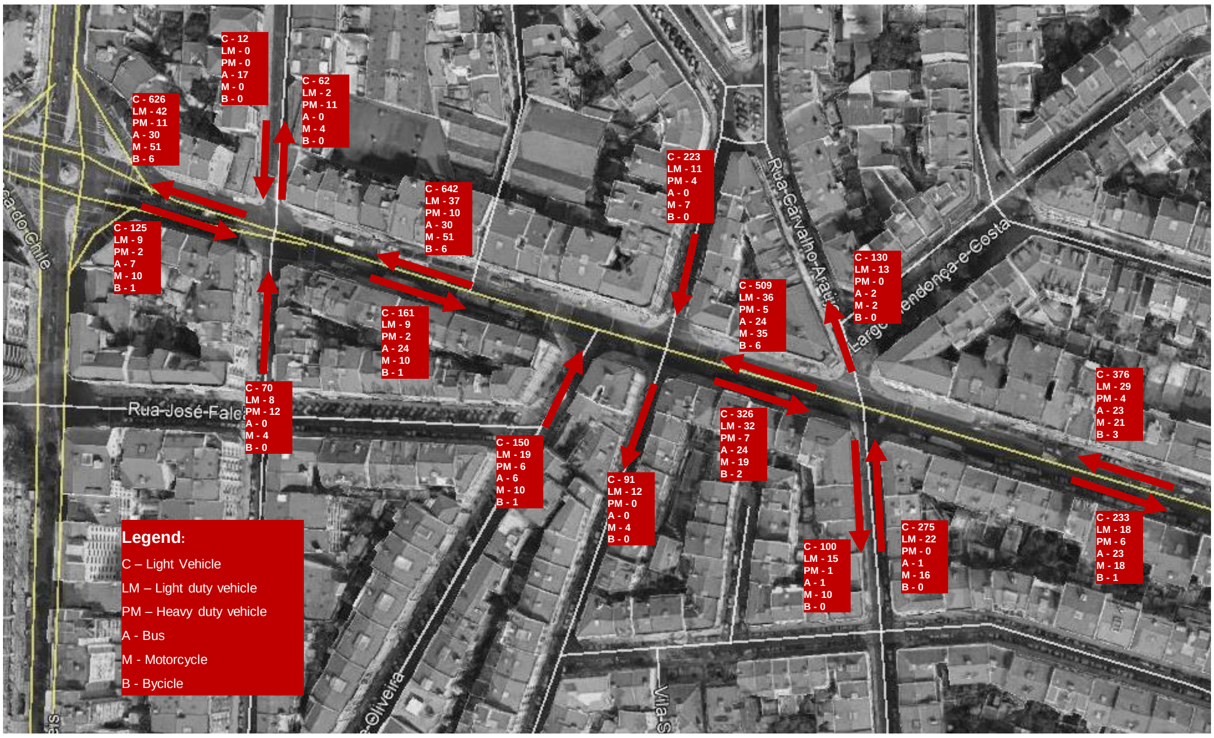


Figure 164. Traffic volumes, by transport mode, in the morning peak hour (8:00-9:00) – West Section of the section under study

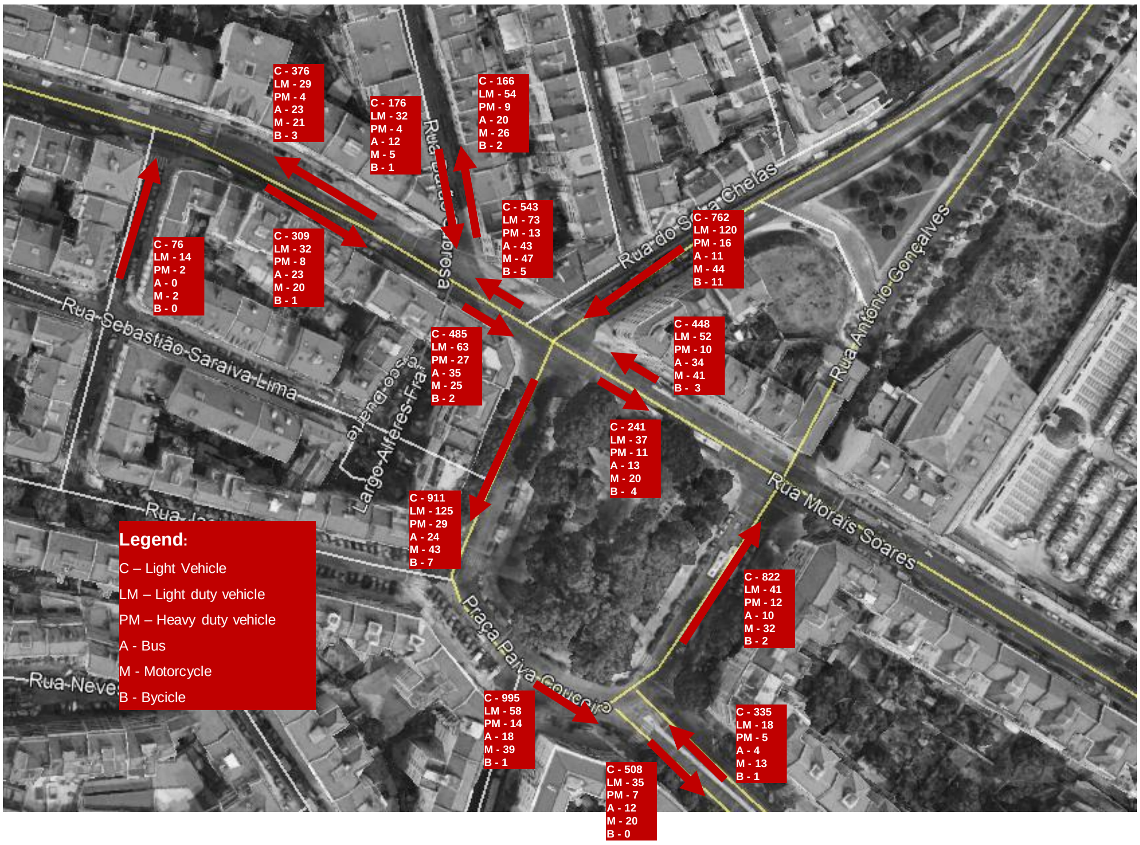


Figure 165. Traffic volumes, by transport mode, in the morning peak hour (8:00-9:00) – East Section of the section under study

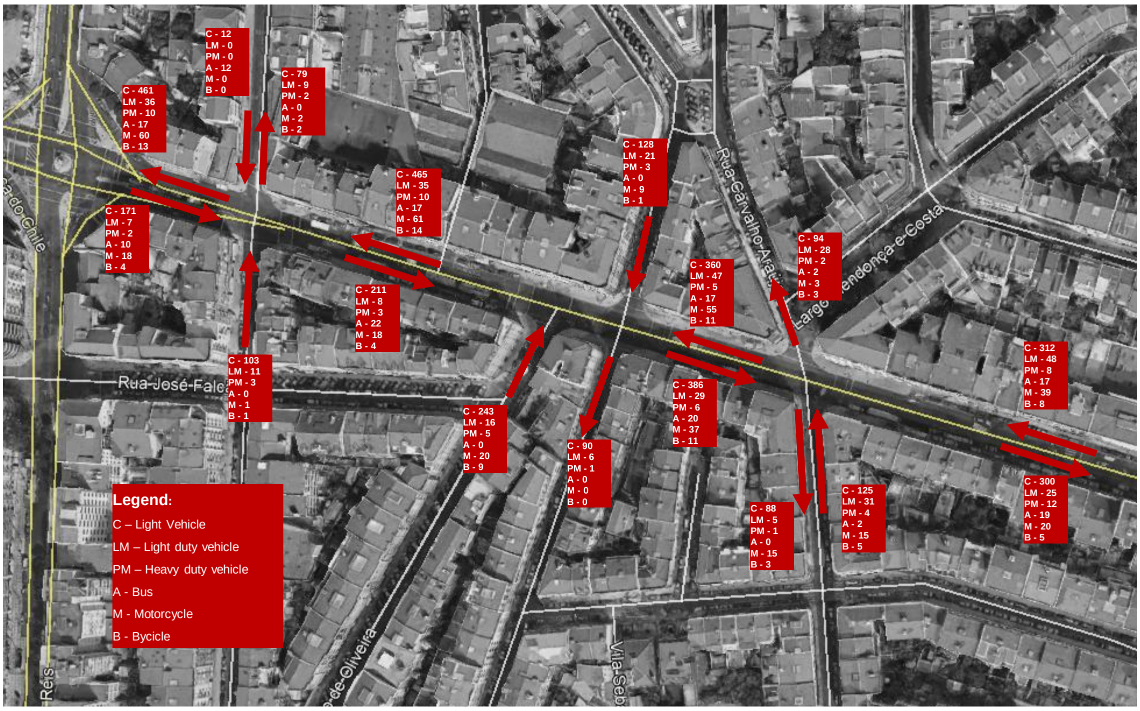


Figure 166. Traffic volumes, by transport mode, in the lunch peak hour (12:15-13:15) – West Section of the section under study

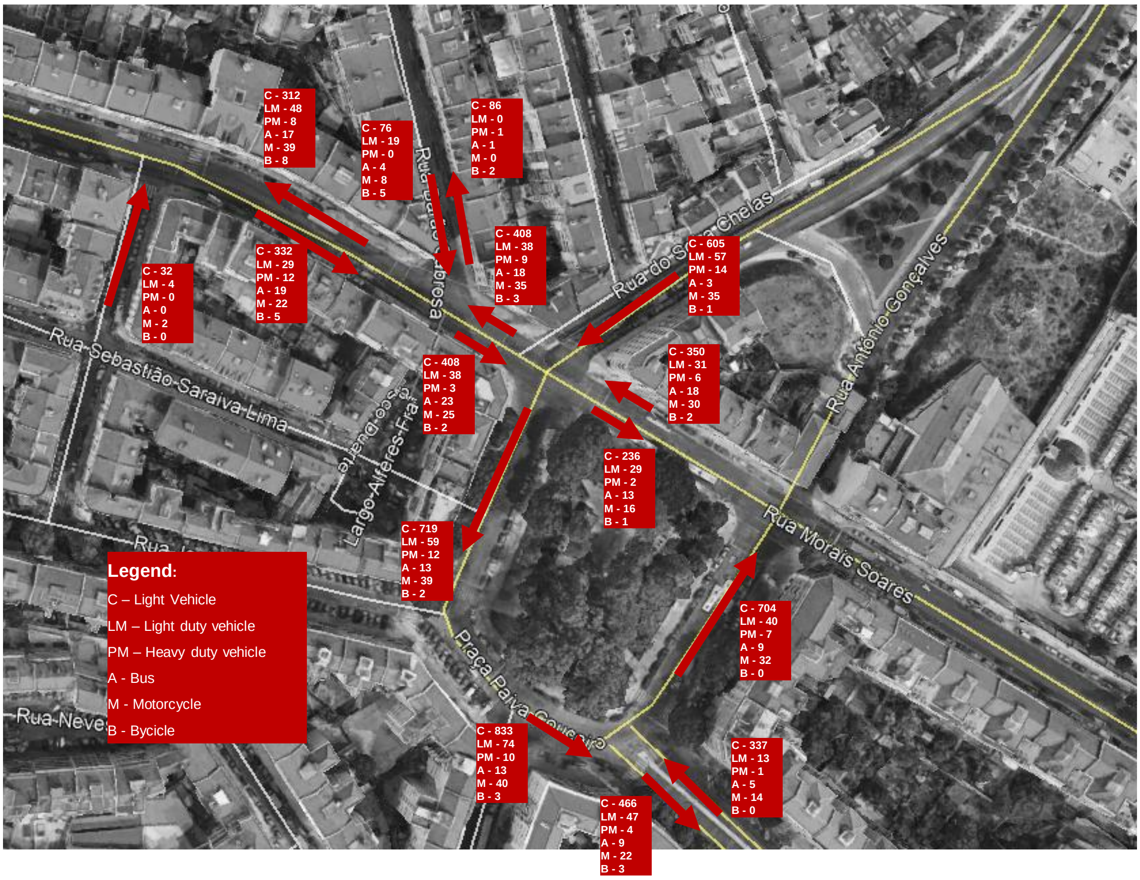


Figure 167. Traffic volumes, by transport mode, in the lunch peak hour (12:15-13:15) – East Section of the section under study

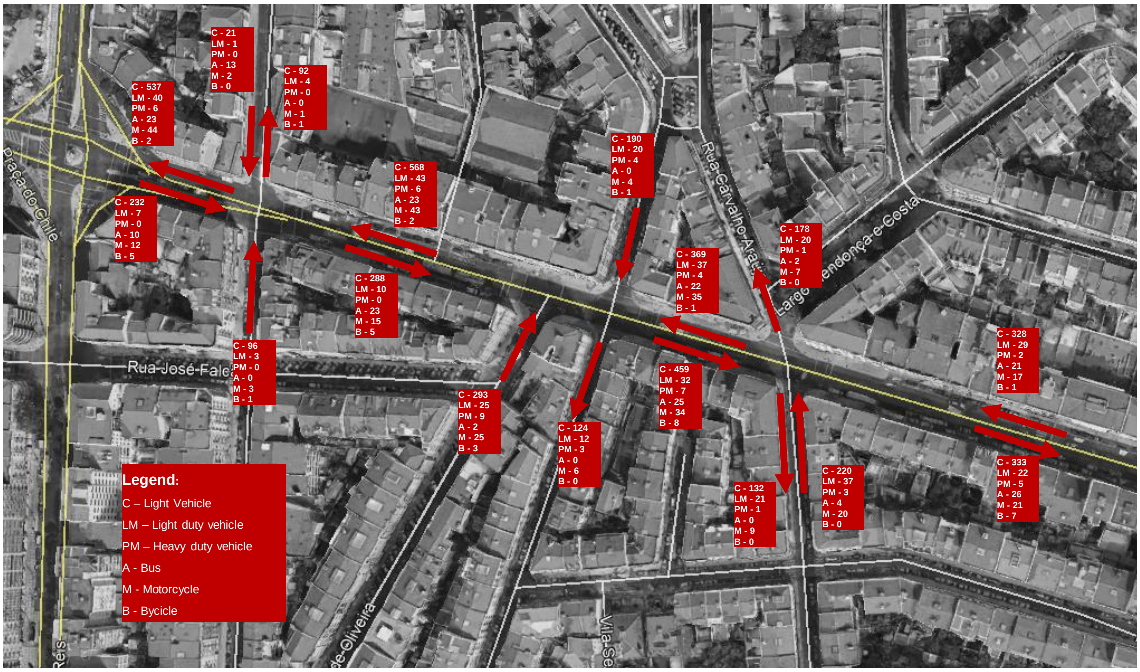


Figure 168. Traffic volumes, by transport mode, in the afternoon peak hour (17:00-18:00) – West Section of the section under study

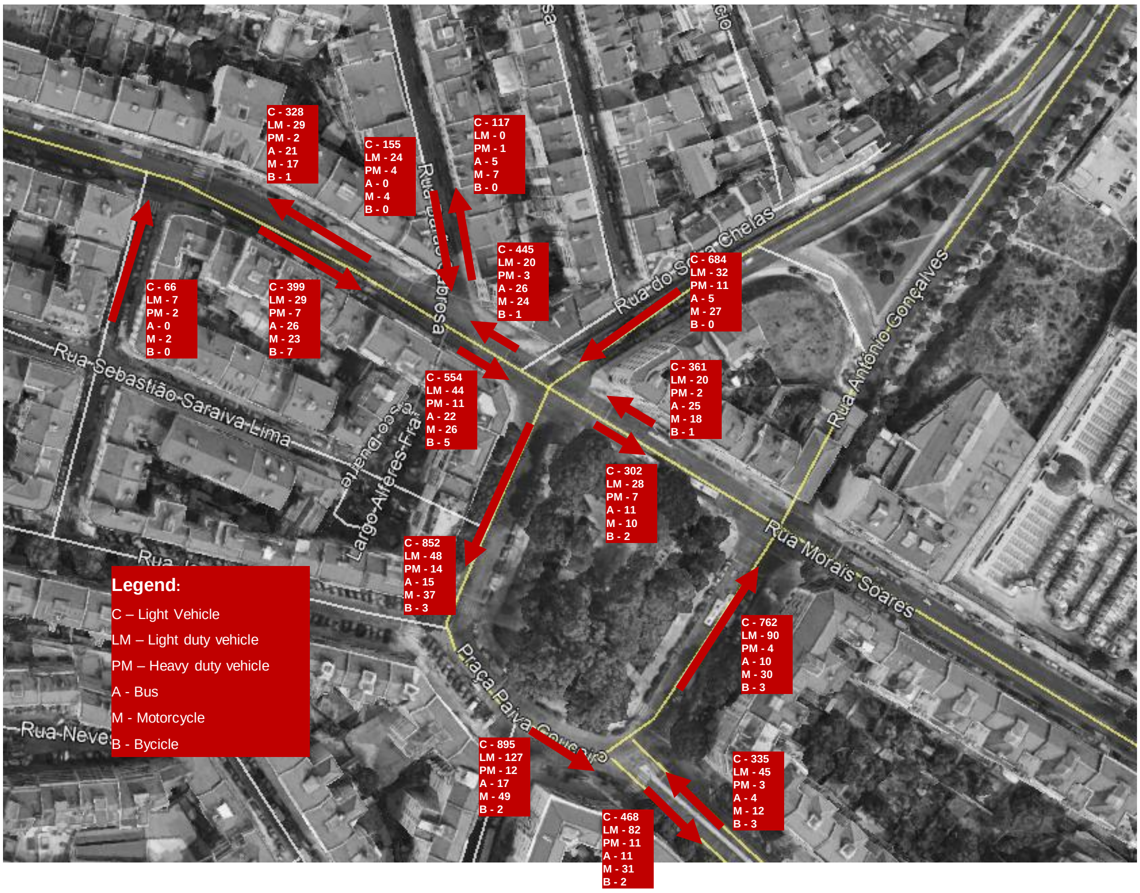


Figure 169. Traffic volumes, by transport mode, in the afternoon peak hour (12:15-13:15) – East Section of the section under study

Average Speed travel

The average speed measurement was made through the use of the floating car data, which allowed the average speed's measurement of light vehicles, buses and pedestrians. The measurement was made along Rua Morais Soares, between Praça Paiva Couceiro and Praça do Chile in both ways, split into small sections of 50 meters. The sample of the survey was composed by 12 pedestrians, 12 light vehicles and 12 buses distributed throughout the morning, lunch and afternoon periods.

The following images show the average speed travel measured by each analysed transport mode. This information, especially for pedestrians, require a deeper analysis jointly with the street space conditions, in order to understand the speeds' variation reasons.

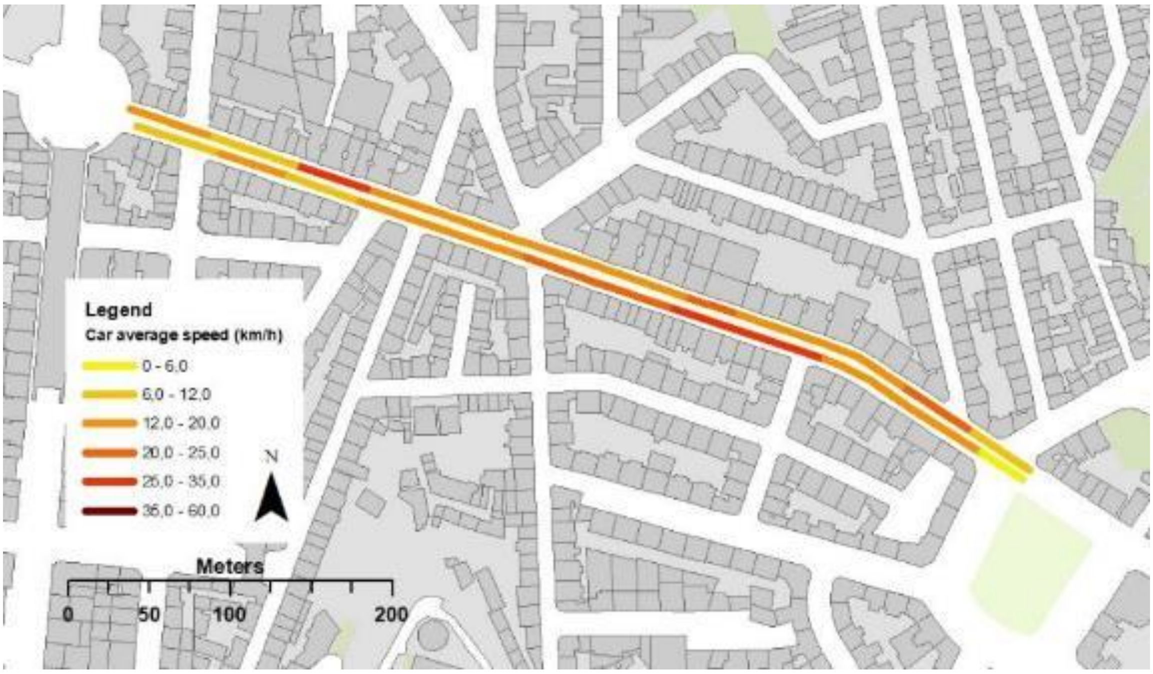


Figure 170. Car average speed (km/h)

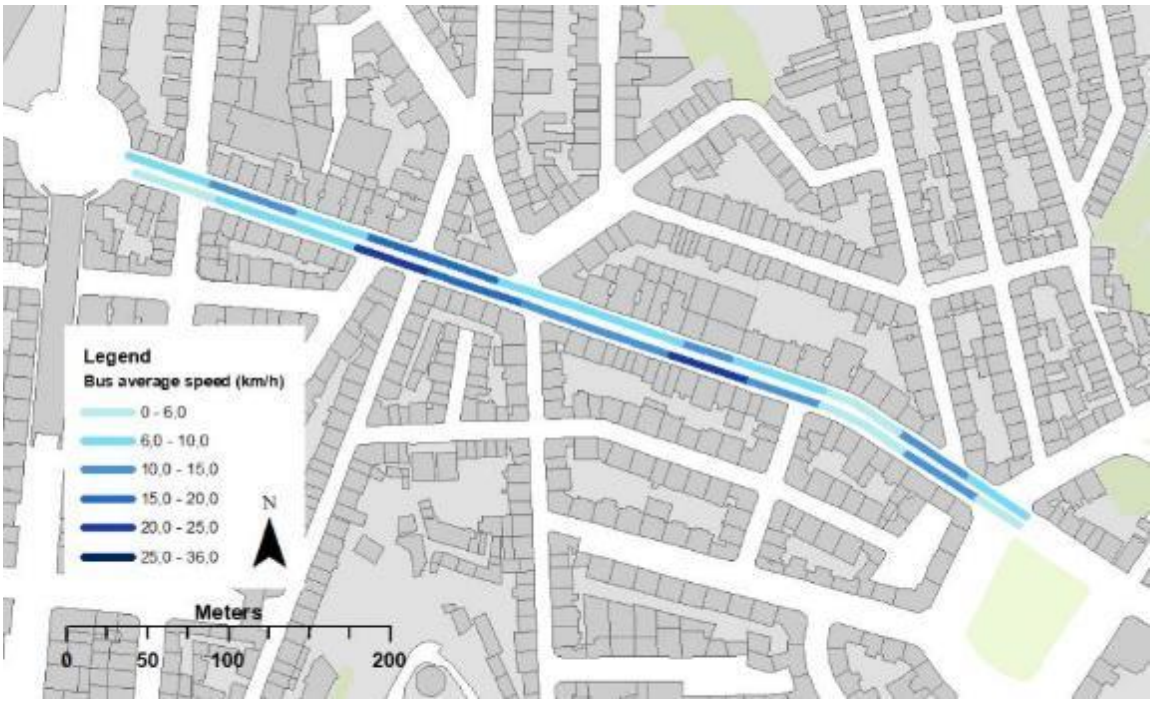


Figure 171. Bus average speed (km/h)

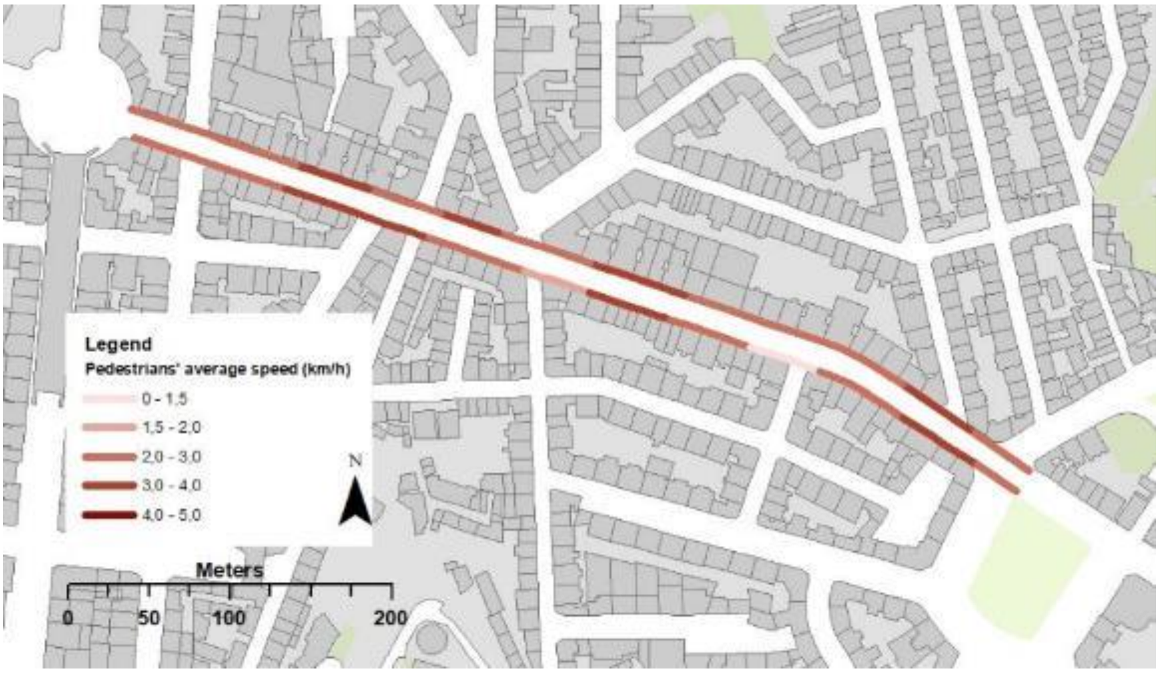


Figure 172. Pedestrians average speed (km/h)

In the appendix, the individual measurements are shown.

4.2.2 Accidents

Further important data to analyse is the number, type and location of the accidents occurring between 2015 and 2018. A period of 4 years was selected for evaluation, because there weren't any relevant changes in this section during that time and, in this way, it is possible to have a better identification of the dark spots. As it may be seen in the following table, this section has a high rate of accidents causing injuries during this period of four years, registering 45 pedestrian casualties, 25 collisions and 9 overturns in four years, which is a troubling indicator, especially referring to an urban street. This figure alone is indicative of some lack of preventive driving, probably excessive speed allied to some lack of visibility (second line parking may be one of the causes) in which the street design has big responsibility.

Table 28. Evaluation of the number of casualties, by type of accident between 2015 and 2018 (Source: ANSR – Road Safety National Association)

Type of accident	2015	2016	2017	2018	Total
Pedestrian casualties	6	17	12	10	**45**
Colision	9	4	7	5	**25**
Vehicle Overturn	1	5	2	1	**9**
Total	**16**	**26**	**21**	**16**	**79**

From the occurrences above listed, it resulted in 78 slight injures, from which 41 were caused by pedestrian casualties, 2 serious injuries and 3 deaths all caused by collisions.

Table 29. Number and type of casualties, by type of injury between 2015 and 2018 (Source: ANSR – Road Safety National Association)

Type of accident	Slight Injuries	Serious Injuries	Fatal Injuries	Total
Pedestrian casualties	41	2	3	46
Collision	28	0	0	28
Vehicle Overturn	9	0	0	9
Total	**78**	**2**	**3**	**83**

The following figures identify the locations where the accidents from 2015 to 2018 occurred. Unfortunately, accidents are spread all over the section, with pedestrian casualties in almost all the intersections. In Praça Paiva Couceiro, alone, 30 persons had suffered slight injuries and 2 people had died. From this square, the intersection between Praça Paiva Couceiro and Avenida Mouzinho de Albuquerque emerges very clearly.

The number and type of accidents here are the main reason to act in this section, to drastically reduce the number of casualties, in line with the strategy defined by Lisbon Municipality to have 0 deaths in Lisbon until 2030.

Figure 173. Location of the accidents occurred between 2015 and 2018, by type of injury (Source: ANSR – Road Safety National Association)

Figure 174. Location of the accidents occurred between 2015 and 2018, by type of accident (Source: ANSR – Road Safety National Association)

4.2.3 Parking/loading/servicing problems

A visible and sensible issue is the number, location and type of car parking along the street Morais Soares, and in some sections of Praça Paiva Couceiro. The large number of housing allied to numerous commerce and service areas, makes it difficult to conciliate between car parking for long periods and load/unloading bays. Besides, there is clearly an abusive utilization of the load/unload parking bays for parking with other purposes, which leads to an intense use of second line parking. The lack of police supervision is also a big problem that contributes for this abusive behaviour.

Other characteristics that seem inadequate, especially in the morning period, is the time period available for load/unload bays, from 9 AM to 7 PM. Since most of the stores and services need to do this operation before opening, usually between 9 AM and 10 AM, the parking bays are often occupied by other cars, which lead, again, to second line parking, during the peak hour.

The counting survey, made in December, collected data about average parking periods and has registered abusive occupation of load/unload parking bays. In parallel, a survey was held for freight vehicles' drivers, to know how long they take to perform their load/unload operations, considering the most usual type of commerce in that area. This time period will be necessary to evaluate the needs of parking areas around that type of commerce.

- Grocery and small supermarkets: 30 minutes
- Butchery and fishery: 5 – 10 minutes
- Bakery, Pastry and Restaurants: 3 – 5 minutes
- Pharmacies: 10 minutes

The counting survey was made through video recording, considering 30 minutes periods, from 8:00 to 18:30. The survey had identified individual parking spots and also areas where an abusive parking behaviour is practiced, like sidewalks and walking crosses. Each spot was characterized according with its use type, like paid regular parking, load/unload, disabled parking, motorcycle, reserved car/park.

Besides the infrastructure characterization, the plates of the parked vehicles were registered[6], in order to evaluate for how long the car is parked and know the parking rotation. For each area, it was registered also illegal second lane situations.

The following figures show several situations that were analysed. The section between Calçada Poço dos Mouros and Rua Carrilho Videira are completely overwhelmed by the second lane situations. This is caused, essentially, by commerce and services typology located in that section, which was already identified above, the lack of parking rotation and finally the lack of police enforcement.

[6] It was registered only the plates' four digits as to avoid vehicles' identification.

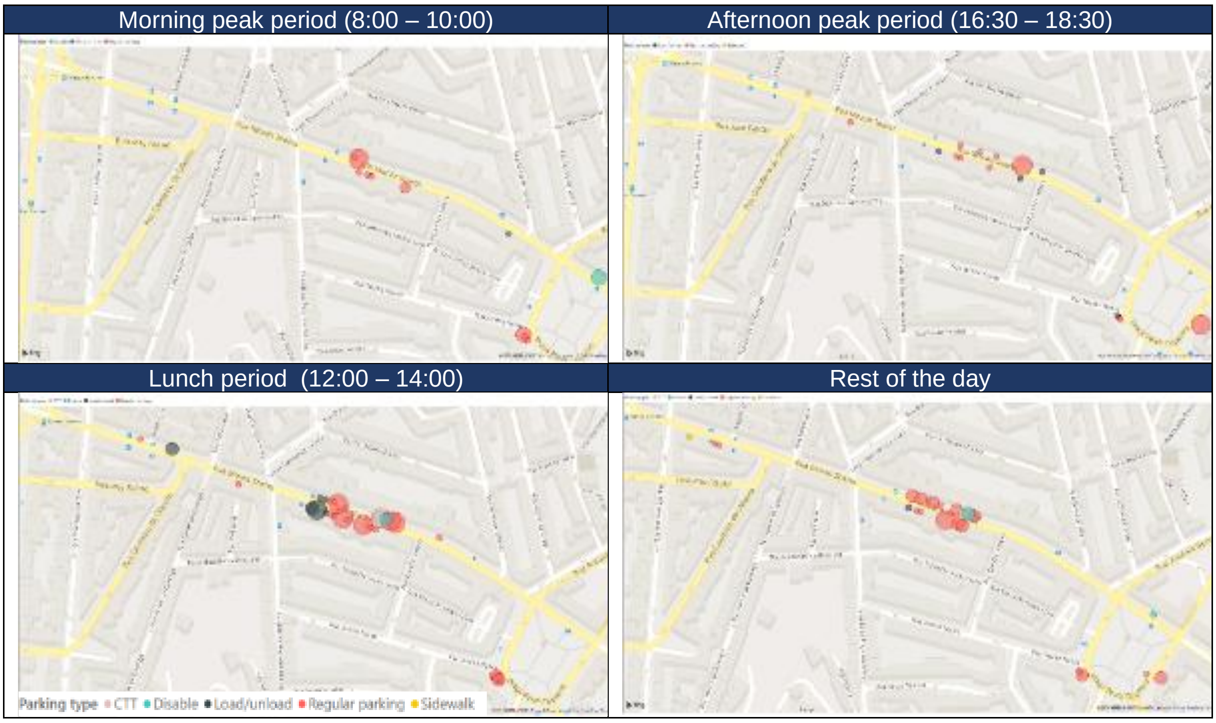


Figure 175. Registration of second lane occurrences (each small point corresponds to one occurrence)

Another negative characteristic is the abusive use of areas that, despite not being directed for parking, like sidewalks and walking crosses, are very often used to do that.

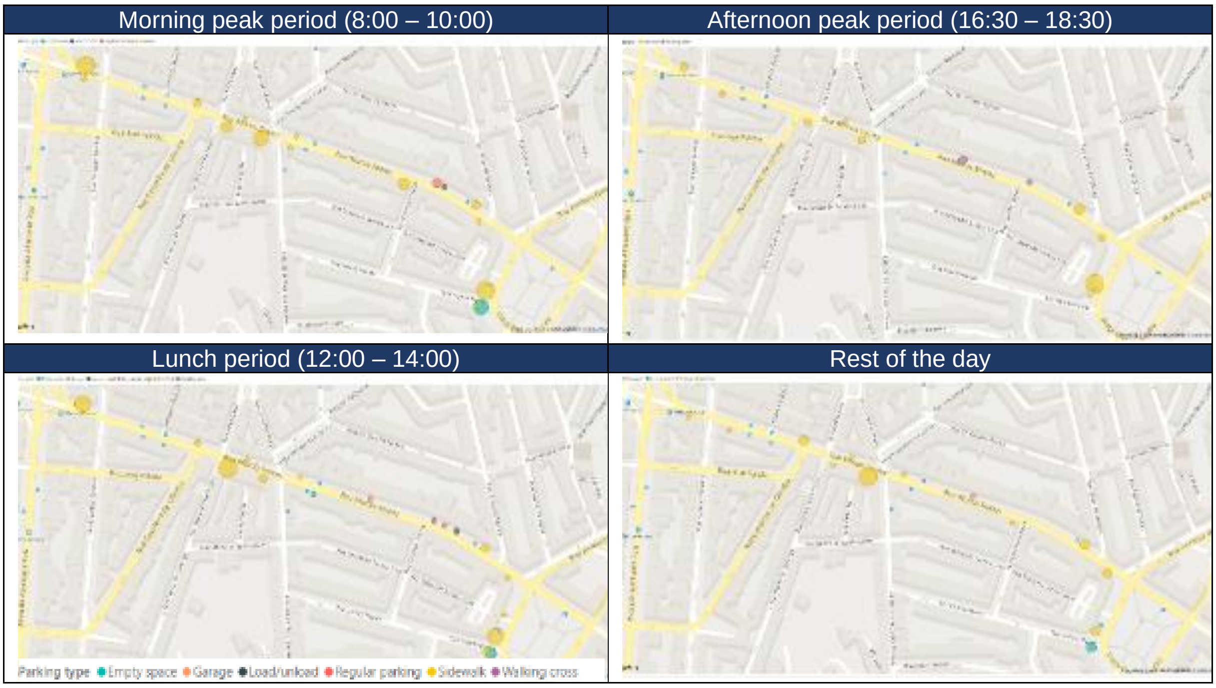


Figure 176. Registration of illegal parking occurrences (each small point corresponds to one occurrence)

Other visible conclusion of this work is the insufficient areas for motorcycle parking, which leads to these vehicles' abusive parking on sidewalks and around bus stops.

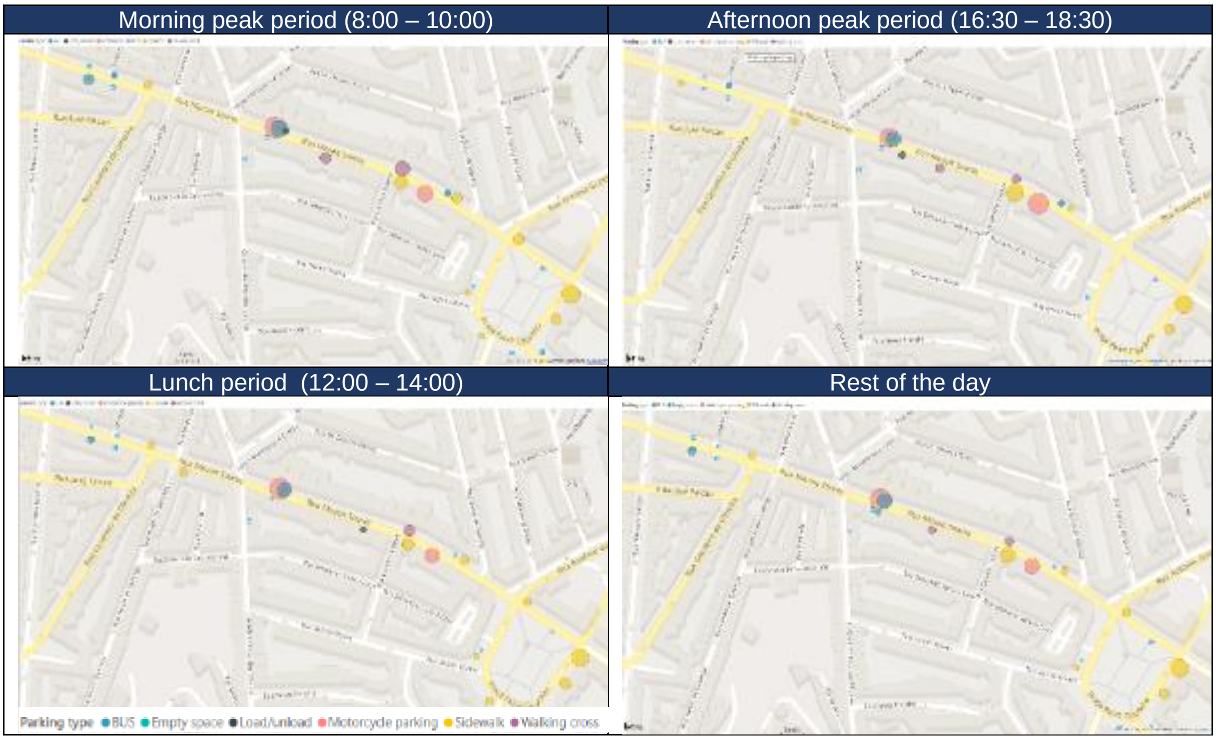


Figure 177. Identification of motorcycle parking occurrences (each small point corresponds to one occurrence)

Besides illegal parking, other problems in this section are the large parking periods which don't allow the implementation of an efficient parking rotation scheme. The following graphics show average parking time and average free parking space time, considering regular parking and load/unload bays, as well as the distribution of number of vehicles by parking times over the counting period. As it may be seen, in the graphics, for the load/unload bays, the average parking time is 107 minutes (which is too long), whereas in the regular parking bays, this period increases to 380 minutes. Regarding periods in which the parking bays are free, it may be seen that, on average, each load/unload area is free for 292 minutes, and each regular parking bay is free for 123 minutes. According with the analysis made, during 47% of the day, the load/unload bays are free, whereas the regular parking areas are only free for 10% of the period.

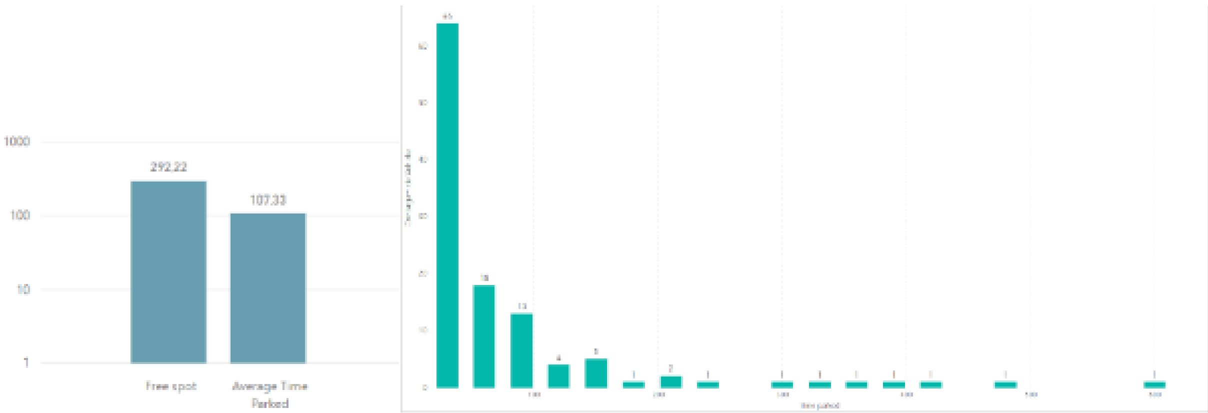


Figure 178. Load/unload parking periods characterization

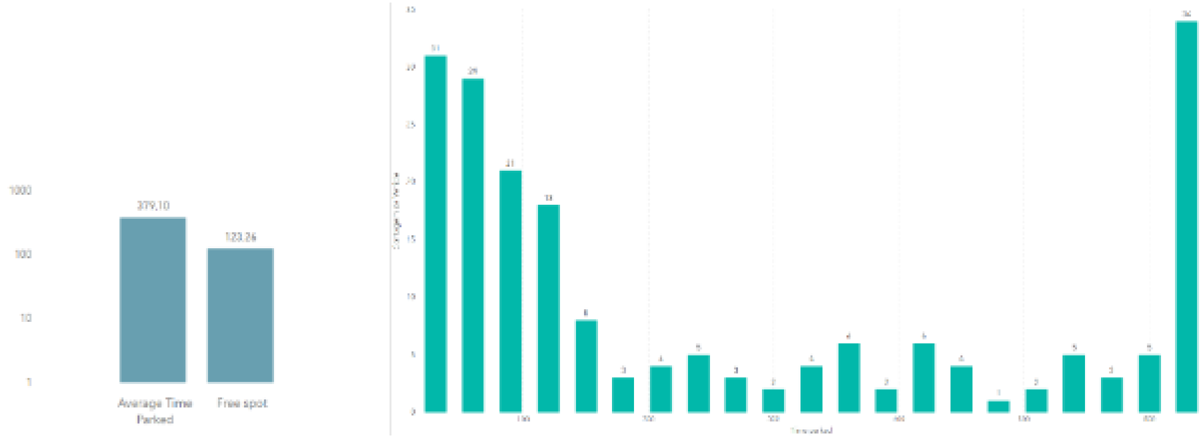


Figure 179. Regular parking periods characterization

In Appendix 8.2.6 are some examples of the analysis made for parking patterns are shown, namely the main issues' identification and average parking time characterization. This analysis allows to study each parking bay, individually.

4.2.4 Pedestrian volume, flows, mobility patterns

Besides parking characterization and traffic counting, in parallel, it was also made pedestrian counting for the same periods as traffic, through the use of video cameras. The counts were made in all section's crossings, considering not only pedestrian crossings but also those in non-signalized areas.

According to the obtained results, Wednesday was the day with higher pedestrians flows, with around 14% more pedestrians counted than Thursday. In both days, the morning peak hour was between 8:45 and 9:45 and the afternoon peak hour was between 17:00 and 18:00. The only difference between Wednesday and Thursday was the lunch period, since the higher flows occurred between 12:30 and 13:30 and between 12:15 and 13:15, respectively.

Considering the three periods, afternoon peak hour counted more 25% pedestrians than the morning peak period and 11% more pedestrians than the lunch peak period.

The following images show the pedestrian flows counted in the three periods under analysis, during their corresponding peak hour.

According with the pedestrian counting, the sections 1 and 2 and the west side of the section 3 are the most overloaded areas, which may be, also, justified by the strong connections between Rua Morais Soares' north and south zones which, many times, don't use this street like a destination point but only like a crossing point. In these sections, often, a peak period of 500 to 600 pedestrian per hour and per sidewalk is reached.

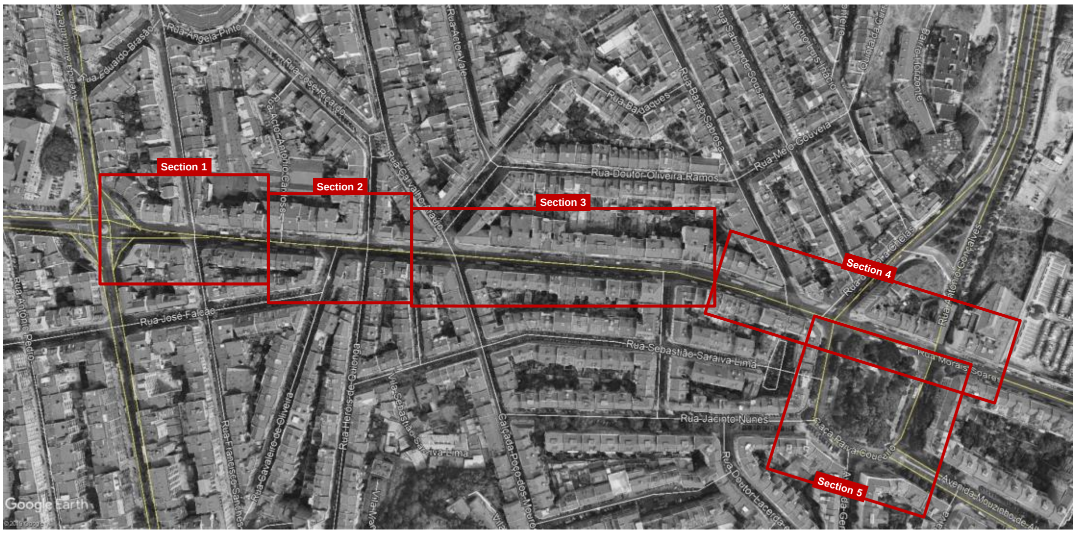


Figure 180. Location of the sections under analysis

The pedestrian counting for both days are shown in Appendix 8.2.5.

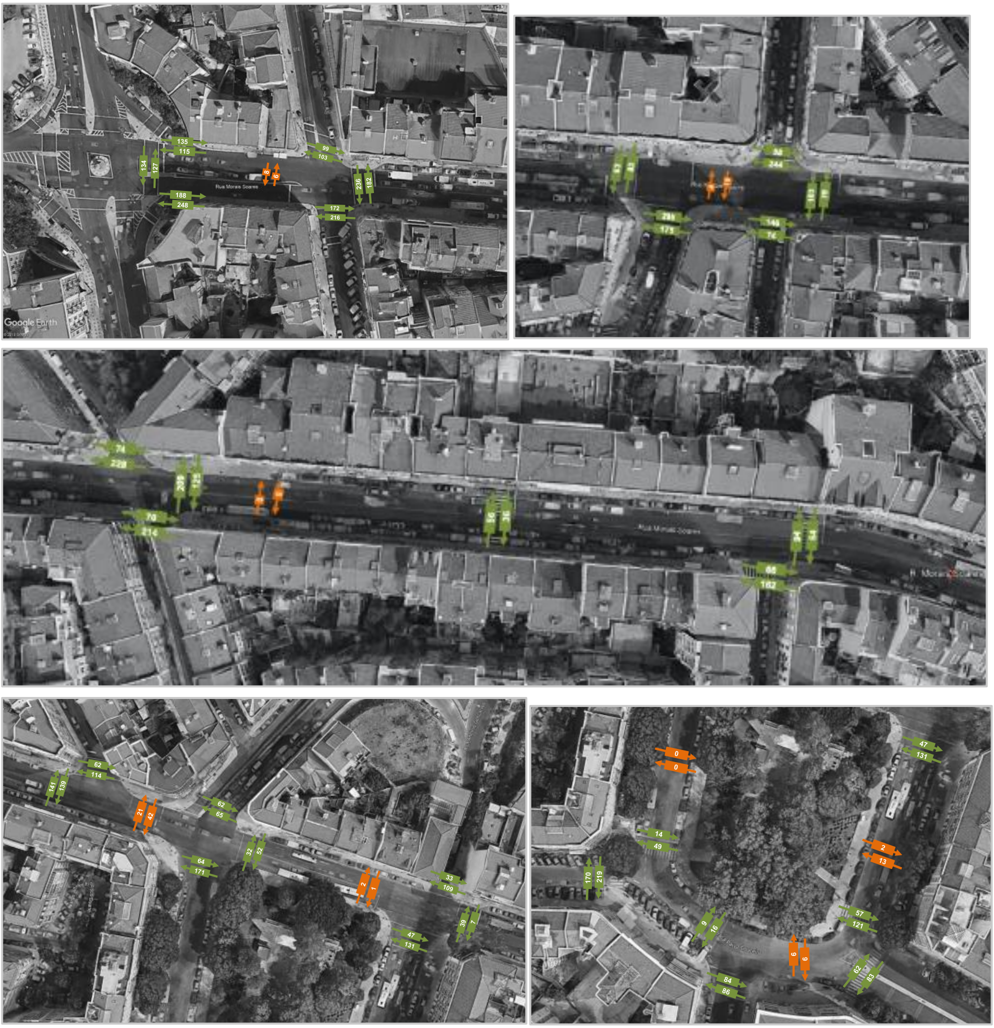


Figure 181. Pedestrian movements along the section, morning peak hour – Wednesday 11th December 2019

Figure 182. Pedestrian movements along the section, lunch peak hour – Wednesday 11th December 2019

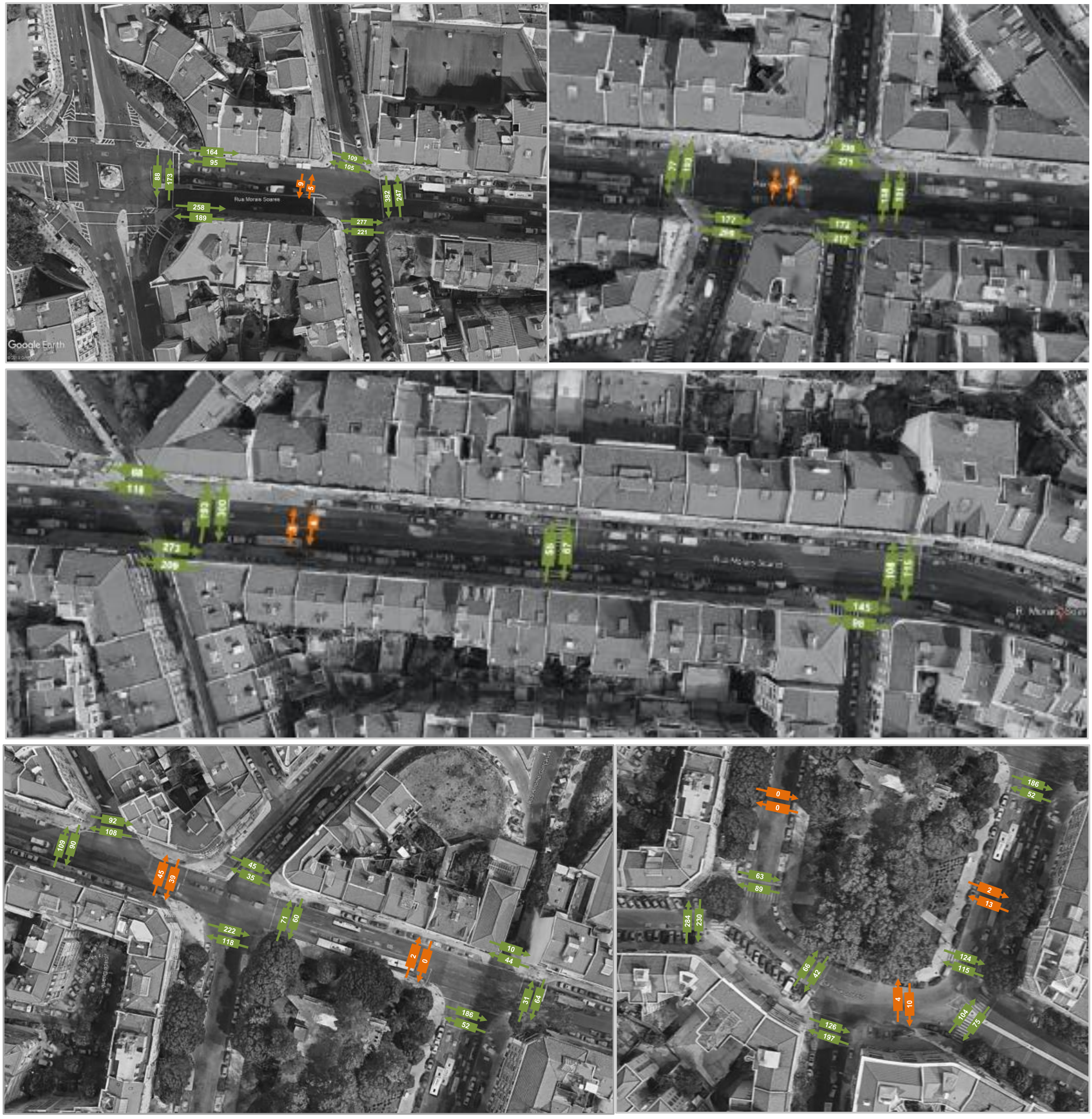


Figure 183. Pedestrian movements along the section, afternoon peak hour – Wednesday 11th December 2019

Besides counting, a survey was made to residents/visitors of the street as well as to shopkeepers. The survey was made to 150 residents/visitors and 50 shopkeepers, with the aim of gathering data about the way they access their destination and understand their mobility decisions. Information gathered was about:

- Used transport mode;
- Reason for choosing transport mode;
- To know where the car users parked/stopped their vehicle;
- Type of establishment to where the enquired went;
- Time in the establishment;
- Number of times the enquiry moves to the area for commercial reasons;
- Perception of the zone;

200 interviews were made, from which 50 were to shopkeepers and 150 to street's users – 30 to residents (20%) and 120 (80%) to other visitors. From the 30 residents, 21 live in the area for more than 10 years, and from the 120 visitors, 68 (45%) live less than 10 minutes walking distance from Rua Morais Soares. Regarding the gender of the interviewed residents/visitors, 74 were male and 76 female aged between 18 and 92 years old. The average age was 54 years. From this sample, 13 persons had mobility issues and were using some kind of support to move.

Used transport modes:

According with the obtained information, most of the people walk to Rua Morais Soares (53%). Bus is the second most used transport mode with 21%, followed by car with around 19%.

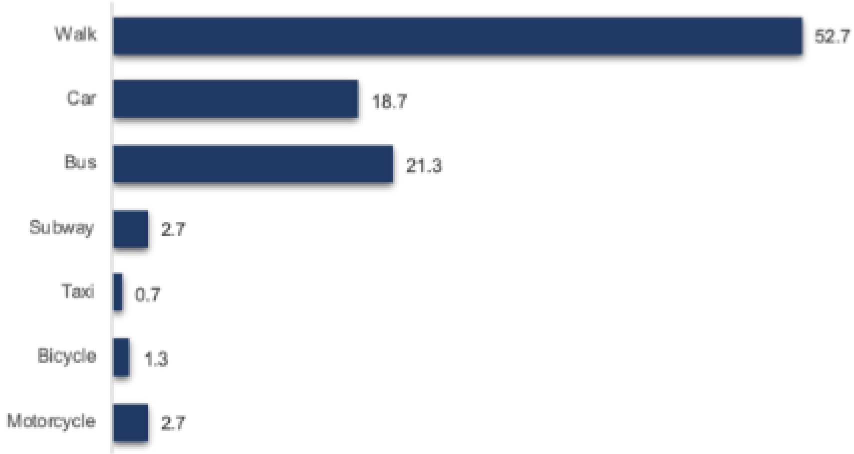


Figure 184. Mobility patterns' survey - Modal split

Analysing the transport modes by residents and visitors, the walking mode is still the most frequent mode chosen, with 93% by residents and 42% by visitors. Regarding other transport modes for visitors, public transport is the second most used transport (26% by bus and 3,3% by subway[7]) and 21% move by car.

[7] The subway station of Arroios, which is the closest station of this section, is currently on expansion works and is expected to open in 2021.

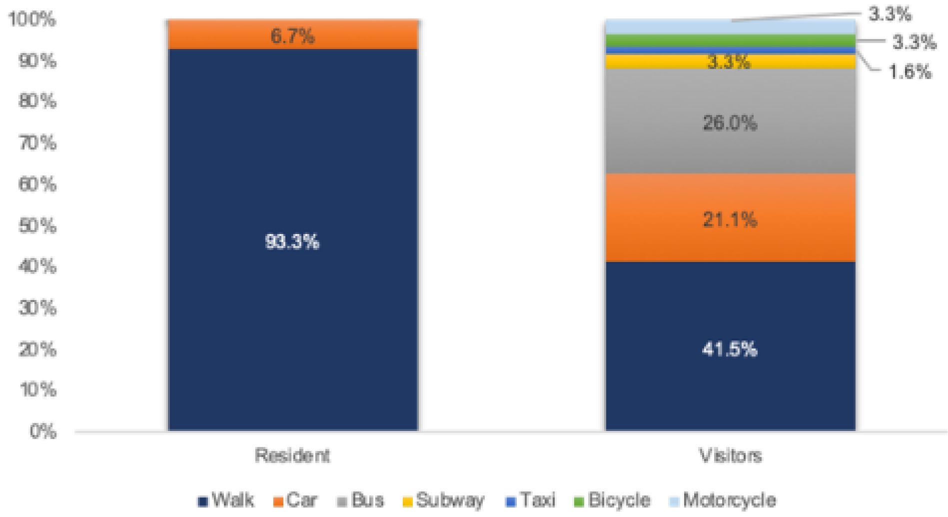


Figure 185. Mobility patterns' survey - Modal split by residents and visitors

In terms of mobility habits by gender, the most significant difference is the usage of car and bus. 23% and 15% of the male interviewees use car and bus, respectively, in contrast with female interviewees whom 15% and 28% use car and bus. In both gender, 53% of the interviewees walked to Rua Morais Soares.

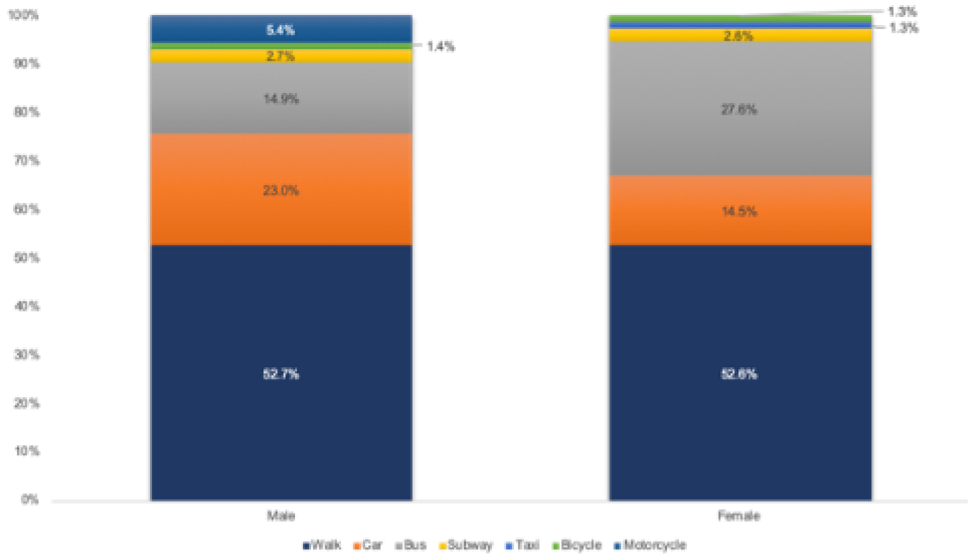


Figure 186. Mobility patterns' survey - Modal split by gender

Regarding the modal split by age, in all age groups walking was the most used transport mode. Clearly, the car is most used by the younger generations in contrast with the eldest group that only 5% used the car. In both young and seniors' groups the public transport is more used than the car, however, in the adults' group, the car users double the bus users.

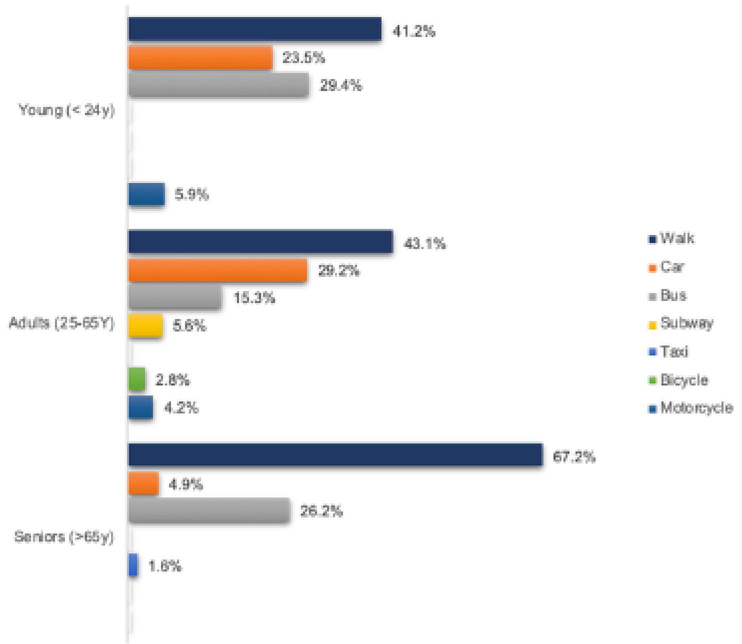


Figure 187. Mobility patterns' survey - Modal split by age group

Car parking location

From the people that had access to the street by car, 18% parked/stopped in the street and 82% in a surrounding street. From this sample, 53% had paid by their parking, 25% had parked without paying, 7% in second line and only one person has parked in a garage.

Regarding the distance between their car and the interviewee's destination, 54% left the vehicle on a distance less than 2 minutes walking, 15% between 2 and 5 minutes and 25% more than 5 minutes.

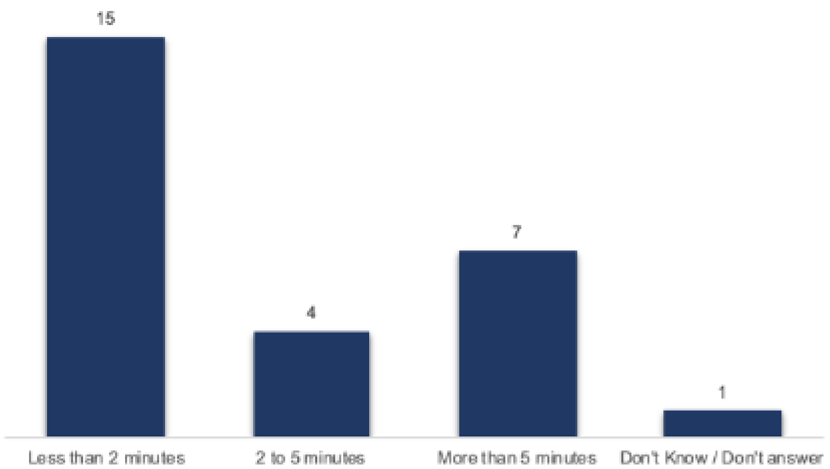


Figure 188. Mobility patterns' survey - distance between car parking location and the place of destination

Type of sought establishment and time spend there

The most three sought places by the sample were pastry shops and restaurants (57%), daily commerce shops (33%) and services and clinics (25%).

Considering the transport mode used to access the services, it is very difficult to assess a different pattern between them. The dispersion of services accessed by bicycle should be highlighted, despite the low use ratio by this transport mode, demonstrating this street's place diversity.

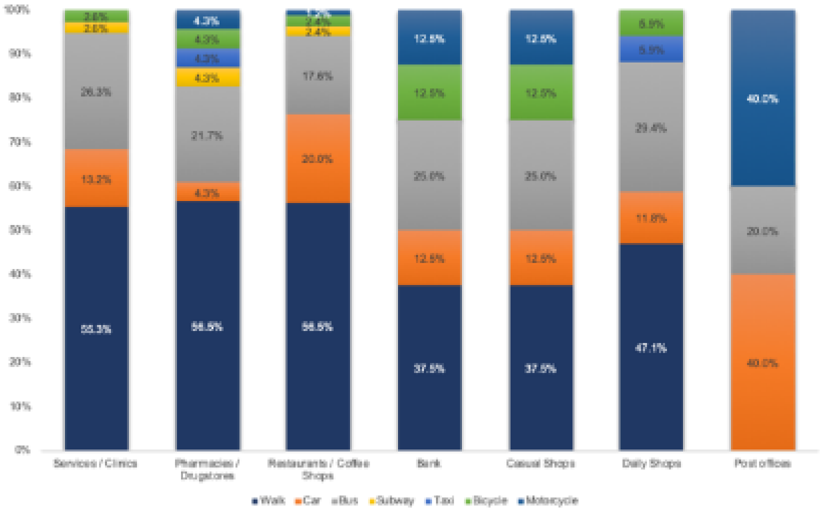


Figure 189. Mobility patterns' survey – used transport mode to access the places of destination

Regarding the time spent in the locations, there is a higher concentration in the length of time between 3 and 10 minutes and more than 15 minutes.

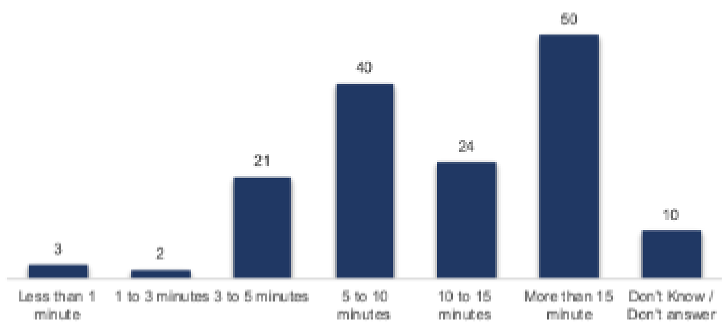


Figure 190. Mobility patterns' survey - time spent in the street

Analysing the time spent in the street by transport mode, the three most common transport modes used have similar mobility patterns. The only small difference concerns to the shortest period of time, since 10% of the car users had spent less than 3 minutes there while the other transport modes users don't usually spend so little time there.

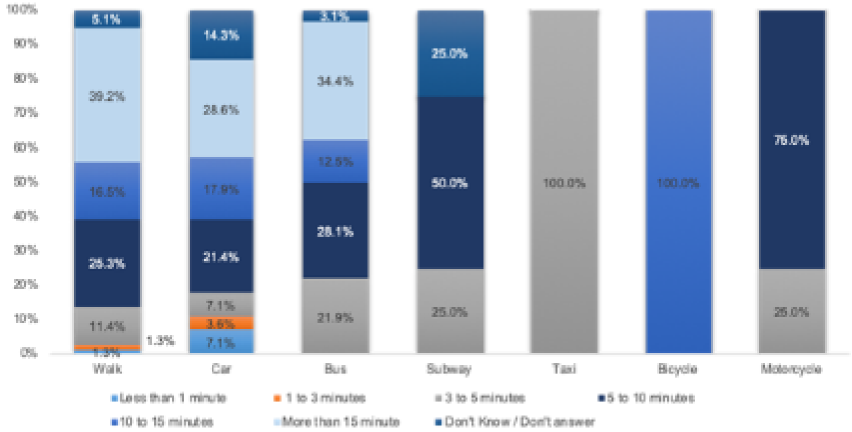


Figure 191. Mobility patterns' survey - time spent by transport mode

<u>Frequency of accessing Rua Morais Soares</u>

More than a half of the interviewees are daily users of the street (61%) and 18% go there more than once a week, which demonstrates the capacity of attracting frequent users to the street.

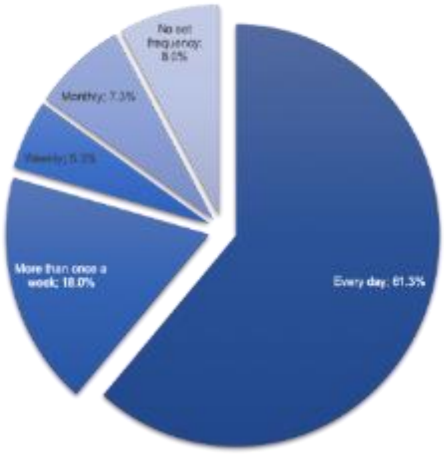


Figure 192. Mobility patterns' survey - Frequency of accessing

<u>Zone perception</u>

Several statements were elaborated about the area under study. The interviewees had to agree or disagree in a 1 to 4 scale, in which the 1 means "totally disagree" and 4 "totally agree".

Regarding road traffic, the interviewees agree that the vehicle speed is too fast, the traffic volume is too high, the street is too noisy and there is too much cars parked/stopped on sidewalks. In a safety level, there is a common sense of security in the street and the lightning is good. Regarding pedestrian accessibility there is more diverse opinions about the sidewalk's width, despite most of the people agree that there are too many obstacles in the sidewalks. Another very important characteristic is the lack of places to rest.

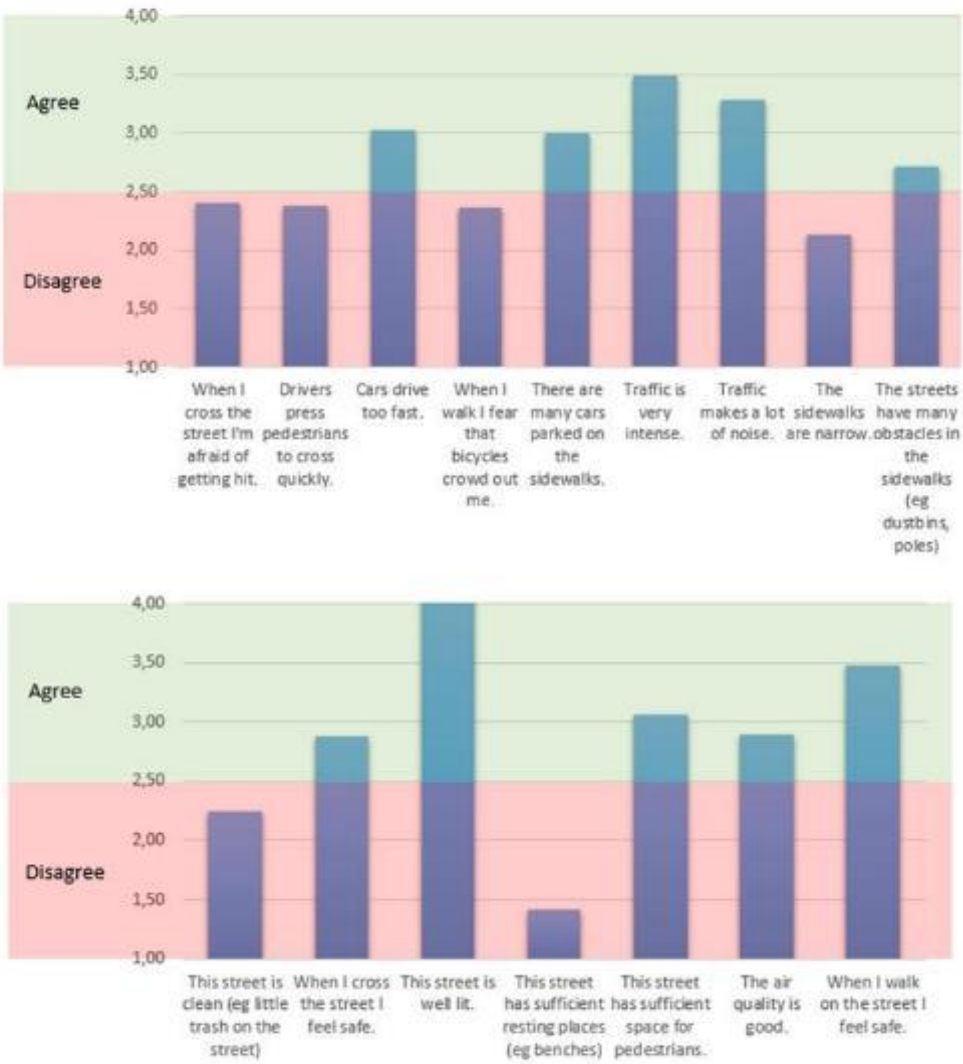


Figure 193. Mobility patterns' survey - perception about the zone

Analysing the survey made to shopkeepers, the questions were more focused in their mobility patterns. From the sample of 50 interviewees, 82% were shop's employees and 18% were the shops' owners.

The survey covered several types of activities, as shown in the following graphic. 54% of the establishments have more than 10 years of activity in the same place. 58% are considered micro-business, 8% small-business, 16% medium company, and 18% a big company (according with their invoice amount.

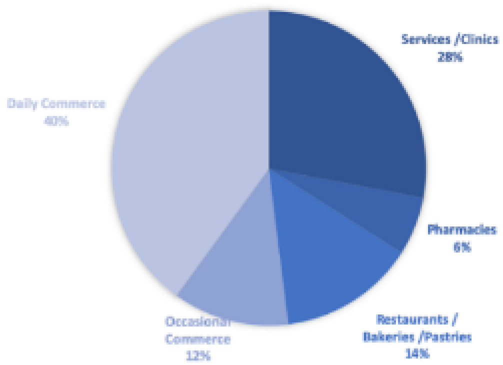


Figure 194. Mobility patterns' survey - Type of commerce where the interviewees worked

Regarding their mobility patterns, 36% reached the establishment by foot and 34% by car. 30% used public transport. From the 34% of the shopkeepers whom dislocated by car, 29% parked on the street and 71% on its surroundings. 59% parked in a paid parking place, instead of 41% in an unpaid parking place. None interviewee had answered garage or second line.

4.2.5 Air and noise pollution

Lisbon has opened a tender process to buy and install 80 air quality and noise meters all around the city, that should be operational by the end of January 2020. For now, Lisbon has only 5 air quality meters installed and none of them is installed in the immediate surroundings of Rua Morais Soares and Praça Paiva Couceiro so the available air quality values are not specific for this area. As long as new values are measured and available, they will be considered in this project.

In terms of noise measure, there is available a noise map for all the city, for daily and night periods. The section under study, given the importance of the street for the city's urban network, has the upper level of the considered scale for both periods. According with the following figures, in the daily period, the noise levels are higher than 70 dB and, during the night period, are higher than 60 dB.

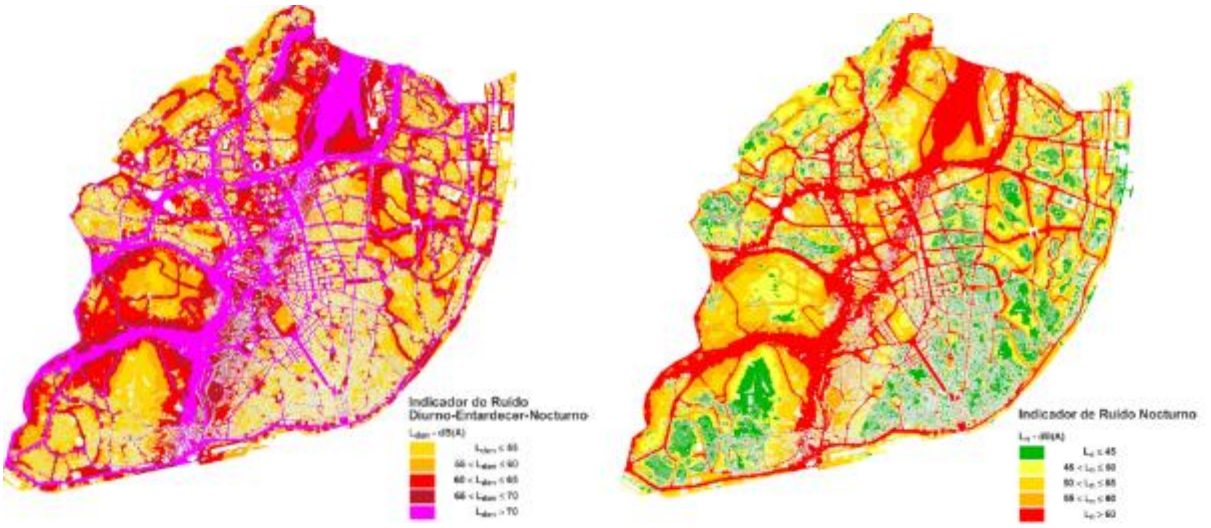


Figure 195. Lisbon's noise map - left: day-evening-night noise map / right: nocturnal noise map

4.3 Design objectives

Taking into consideration the main issues identified in the section as well as the municipality policy context, some suggestions, segregated by categories will be added to this chapter. These suggestions require further analysis and simulations, but will, evidently, be an initial point for design exercise.

4.3.1 Main expected outcomes

The following table shows the main issues obtained from the section's analysis and a list of possible solutions to be implemented, that should improve current conditions.

Table 30. Main issues identified

Issues	Possible Solutions
Pedestrian	
– Unsuitable space for walking in Rua Morais Soares with narrow sidewalks and lot of obstacles. – Inexistence of places to sit and rest in Rua Morais Soares. – Despite the large areas available to walk and the numerous places to sit and rest in Praça Paiva Couceiro, the road between the square and the street around it is clearly a barrier, considering the heavy flow and high traffic speed there. – Dangerous walking crosses with high risk of pedestrian casualties in both Rua Morais Soares and Praça Paiva Couceiro. – Very large casualties' number. – High probability of severance in Rua Morais Soares. – Several cases of abusive car and motorcycle parking on sidewalks.	– Sidewalks enlargement of public space quality improvement. Very frequently the problem is not the sidewalks' width but the existence of several obstacles there. – Creation of places to sit and rest; – Creation of accessible crosswalks between Praça Paiva Couceiro and all other stress areas in order to create a continuity for pedestrians; – Adaption of the number and location of crosswalks along the section to reduce the possibility of severance. – Creation of a continuity between Praça Paiva Couceiro and the west side street; – Propose the implementation of a more comfortable pavement. – Increase police enforcement /Physical barriers on some sidewalks?
Cars	
– Heavy traffic flow, considering the location of Praça Paiva Couceiro in one of the busiest road connectors from the city's eastern area and TEN-T and the city centre – assumed as one as of the five city's ring road. – High traffic speed (according with the average car speed survey, the speed was not exaggerated, although was one of the main complains by the street's users); – Several issues regarding second line parking;	– Narrowing road width; – Removal of the road lanes between Praça Paiva Couceiro and West side street; – Increase police enforcement to decrease second lane use.
Public Transport	
– Constraints in the BUS circulation, especially due to the very frequent second lane parking;	– Creation of Bus Lanes (along the street, in the intersections?);

	– Changing traffic lights operation
Cycling and micromobility systems	
– Lack of conditions for use of bicycle and other micromobility systems, due to the lack of infrastructure; – Bus traffic volume is very high which increases the sense of insecurity;	– Creation of a segregated infrastructure; – Decrease motorized vehicles' speed; – Creation of bicycles and other micro mobility parking bays;
Motorcyclists	
– Very low parking offer; – Frequent use of sidewalks for parking motorcycle; – Significant number of motorcycle users	– Increase motorcycle parking bays; – Awareness sessions for the abusive sidewalk parking;
Parking	
– Heavy parking pressure from residents, visitors and shopkeepers; – Consensus second line use. – Large number of illegal parking; – Low parking rotation, with a very high average parking time on regular park areas.	– Reorganization of parking areas (number, type of parking, regulation, location) – Increase parking rotation in some sections. (time parking restriction, other parking solutions for residents)
Load/Unload	
– Several constraints about load/unload parking with abusive occupation from the other users; – Load/unload parking schedule not always adequate. Starting only at 9, doesn't suit to the needs. In the afternoon, those areas are often free. – High demand in the morning and lunch hour and low demand in the afternoon.	– Reorganization of parking areas (number, type of parking, regulation, location); – Increase police enforcement regarding abusive use of load/unload parking – Change load/unload parking bays management, in order to suit it to the demand.
Air Quality	
– High levels of noise, based on the noise map and in accordance with users opinion; – Lack of air quality measurements.	

4.3.2 Key Performance Indicators

The core module of SPAS referred in the document "Input for D5.5 Cross-Site Assessment of Case Study Design Packages" is listed in the following table.

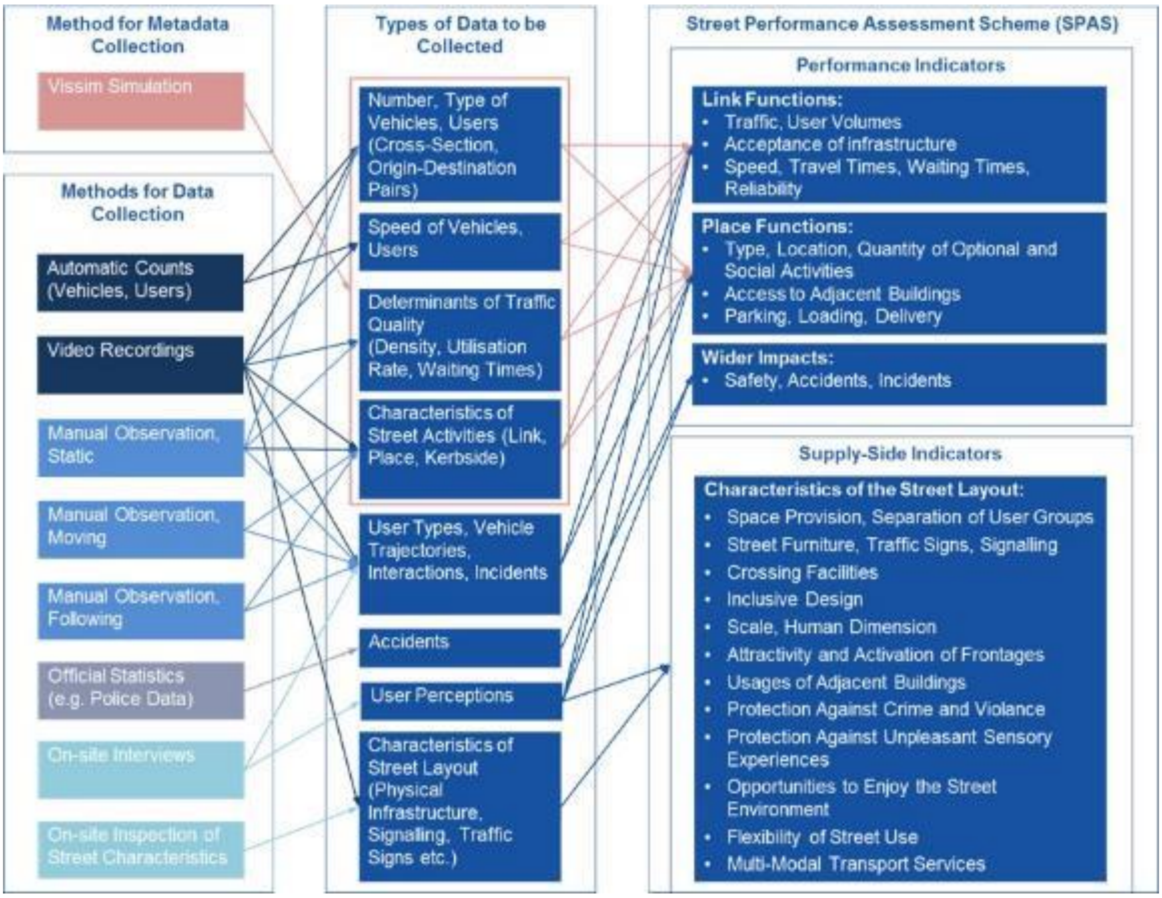


Figure 196. Street Performance Assessment Indicators (Source: Input for D5.5 Cross-Site Assessment of Case Study Design Packages)

The main expected outcomes arise from public space intervention, offering better public space quality to pedestrians, improving public transport operations and trying to promote a modal shift for other active modes like bicycles and other micro-mobility systems as well as to increase safety, reducing traffic level and average speed. Besides public space intervention, parking management should also be changed in order to increase its efficiency, avoiding second lane and illegal parking. All the interventions should promote a better use of public spaces, road network and parking bays.

As so, the main indicators that will be considered are the following:

<u>Link Functions:</u>

- Traffic volume – Comparison between current and future traffic volumes;
- Average travel speed;
- Existence of congestion problems;
- Evaluation of public transport delays;
- Modal split – evaluation of used transport modes;
- Number of people walking and crossing the street;
- Number of public transport users

Place Functions:

- Quantity of social activities present before and after the interventions, taking advantage of more space available;
- Existence of places to stay and rest along the street;
- Age groups frequenting the section area (With the objective of attracting younger people to the street);
- Number of abusive use of load/unload parking bays;
- Number of illegal and second lane parking occurrences;
- Parking rotation time and average parking periods;
- Average time spending in the section under analysis;
- Attractiveness of new type of commerce;
- Economic data regarding ATM movements and shops payments (to be confirmed)

Wider Impacts

- Number of accidents;
- Periodic measurement of noise and air quality;

4.4 Outline of Policy context

Lisbon is developing a Strategic Vision for Mobility until 2030 (MOVE Lisboa). The document is under approval, but the broad lines are known and have already started to be implemented in the past years. This document will be a baseline for Lisbon's SUMP, whose tender process shall be launched soon.

The document MOVE Lisboa defines the mobility guidelines for Lisbon to become more humanised, healthier, and with enhanced quality of life. This document aims to, "*Create a people-centred mobility ecosystem that is accessible, useful, reliable, and safe, built on an integrated public transport network complemented by innovative solutions that enable conscious and sustainable choices, positioning Lisbon as the European capital of reference in the area of mobility by 2030.*

The Strategic Vision for the Mobility in Lisbon is based on 5 networks, 5 services, and 5 transversal axes that should be articulated and should overlap in a coherent way, giving shape to the planned multimodal and intermodal transport system:

5 Networks	**5 Services**	**5 Transversal axes**
– Pedestrian – Public transport – Road – Cycle – Interfaces	– Parking – Shared Transport – Urban Logistics – Additional Mobility – Tourist Transport	– Resource Management, Control, and Optimisation – Information, Promotion, Awareness, and Public Participation – Financing – Regulation – Monitoring, Evaluation, and Review

The vision for each network, services and axes are presented in the Appendix.

4.5 Tasks to be carried out in the street design exercise. Using the MORE tools

In the following, the action plan's chronogram for the next six months is shown (from 20th January to 17th July). The plan below includes the use of the tools included in WP4 deliverable.

Task	Objective	From 10/02/2010 to 10/08/2020 (W1–W27)
Focus Group realization	Internal meeting with municipality departments to scope out early preferences of design; Presentation of the data gathered so far; Define how to conduct the meeting with the community;	W4
First Design day realization	Presentation of the project to the community Presentation of the data gathered so far Visualization on map of the main issues Formation of different groups to discuss addtional issues [2] Divulgation of tools as to invite people to use them to propose their ideas	W5–W6
Upload the comments to LineMaps and Traffweb	Work done inside municipality	W6–W9
Online consultation via Traffweb	Divulgation of Traffweb in the municipality online site [1] Link invitation to the first focus group participants	W9–W13
Internal validation of the comments via Traffweb	Summary of the valid comments and suggestions	W13, W15
Second Design day	Evaluation of the suggestions and comments made by online tools Adaption of the new solutions to the problem Work in 3 or 4 different scenarios. [2]	W16–W18
Microssimulation using Vissim	Evaluate the expected behaviors of the road users	W1–W2, W19–W21
Work on the base case using data gathered		W1–W2
Work on the scenarios		W19–W21
Appraisal framework tools	Evaluation of performance indicators Cost-benefit solutions	W22–W27

BUDAPEST MEETING (W3)

BRUSSELS MEETING (W14)

Figure 197. Action Plan from January 2020 to July 2020

1 - Evaluate with Buchanan Consulting about this possibility

2 - With blocks, If available

For the two design days that are planned to take place, it is expected to invite the following entities:

First Design Day	
Municipal department	Public Space Municipal Department
	Municipal Mobility Directorate
Local Authority	Parish council of Penha de França
Police	Municipal Police
Mobility and parking municipal company	EMEL
Public Transport	Carris
Citizen Associations	Vizinhos em Lisboa: Vizinhos da Penha de França
	Shopkeepers – with support of Parish council of Penha de França
	Residents – with support of Parish council of Penha de França
	Lisbon Transport User's Comission
	MUBi – Urban cycling mobility association
	ACAM - Association of Self-Mobilized Citizens
	ACAPO - Blind association
	Gebalis

Second Design Day	
National Authority	IMT - Mobility Transport Institute
Municipal Department	Public Space Municipal Department
	Mobility Management Municipal Department
	Mobility Studies and Planning Division
	Mobility Operations Division
	Traffic Management Division
Local Authority	Parish council of Penha de França
Police	Municipal Police
Citizen Associations	Shopkeepers – with support of Parish council of Penha de França
	Residents – with support of Parish council of Penha de França
Mobility and parking municipal company	EMEL
Public Transport	Carris
Electric Mobility	Mobi.E

5 Design Brief of City Feeder Route – LONDON

This section describes the physical layout, key features and existing patterns of use concerning the selected stress sections of the feeder routes in each city.

5.1 Introduction

5.1.1 Overview

The different characteristics of the street lend themselves to a range of activities taking place which are partly dictated to by its surroundings, time of the day and day of week.

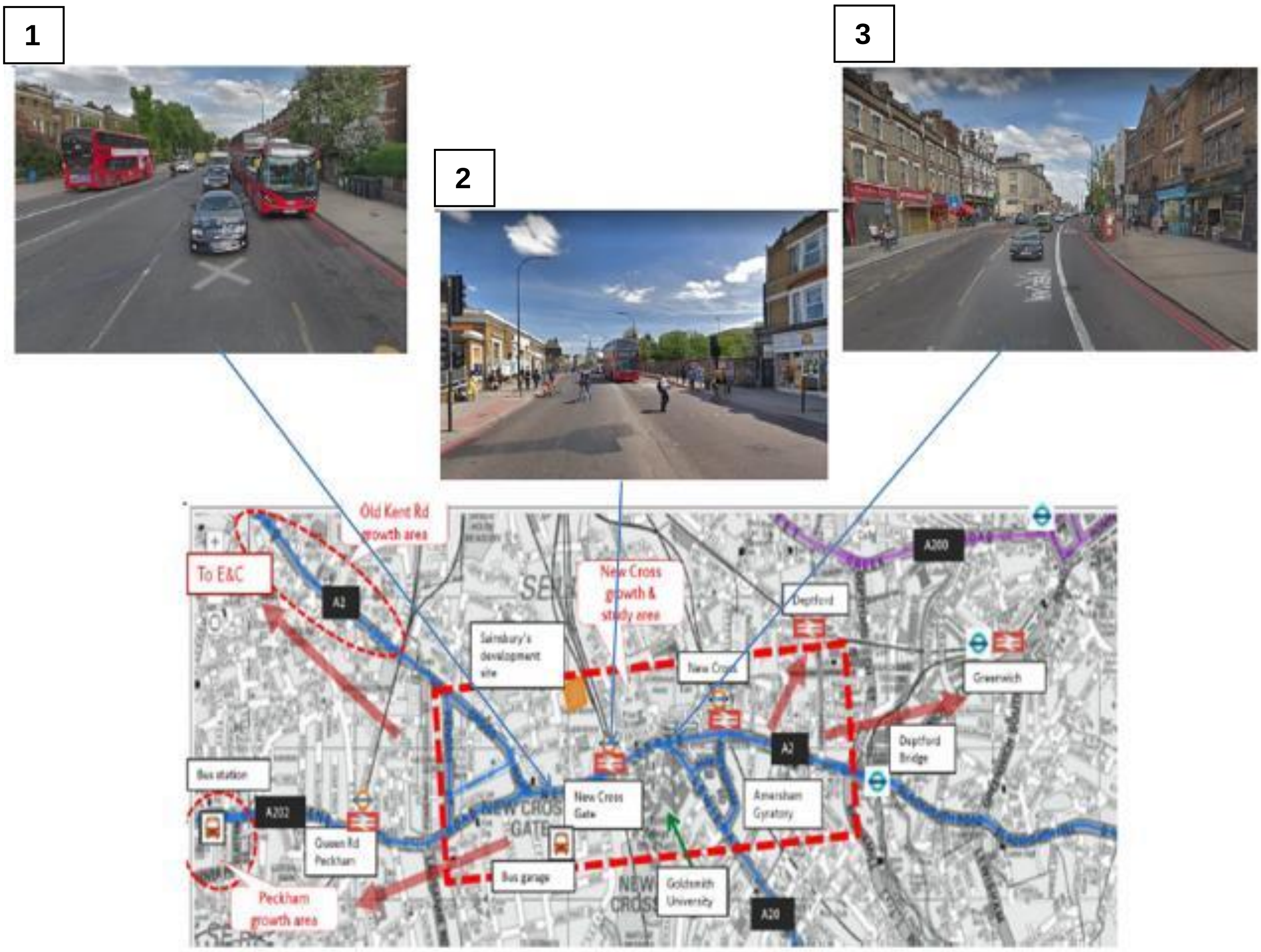


Figure 198. Illustration of the different urban environments seen in the study area

Table 31. Characteristics of the street

Characteristics Section 1	Characteristics Section 2	Characteristics Section 3

Wide carriageway	Restricted road space	Variable carriageway width
Bus lane in one direction	Higher pedestrian density	Commercial land use
Residential land use	Station exit directly onto street	High street/road environment
Busy location for bus-bus interchange	Transitioning to high street environment	Pedestrian activity
	Commercial land use with small shops, cafes and restaurants	Bus lane in one direction

Outside of New Cross Gate station, while the dominant activity is people going into and out of the station, the nature of the environment and proximity of people also results in many of them stopping to meet and talk. Conversely, where people are waiting for buses, such as to the northern end of Lewisham Way, this wasn't observed as lending itself to such a level of social interaction; however, this was replicated outside of the larger retail premises and coffee shop to the south.

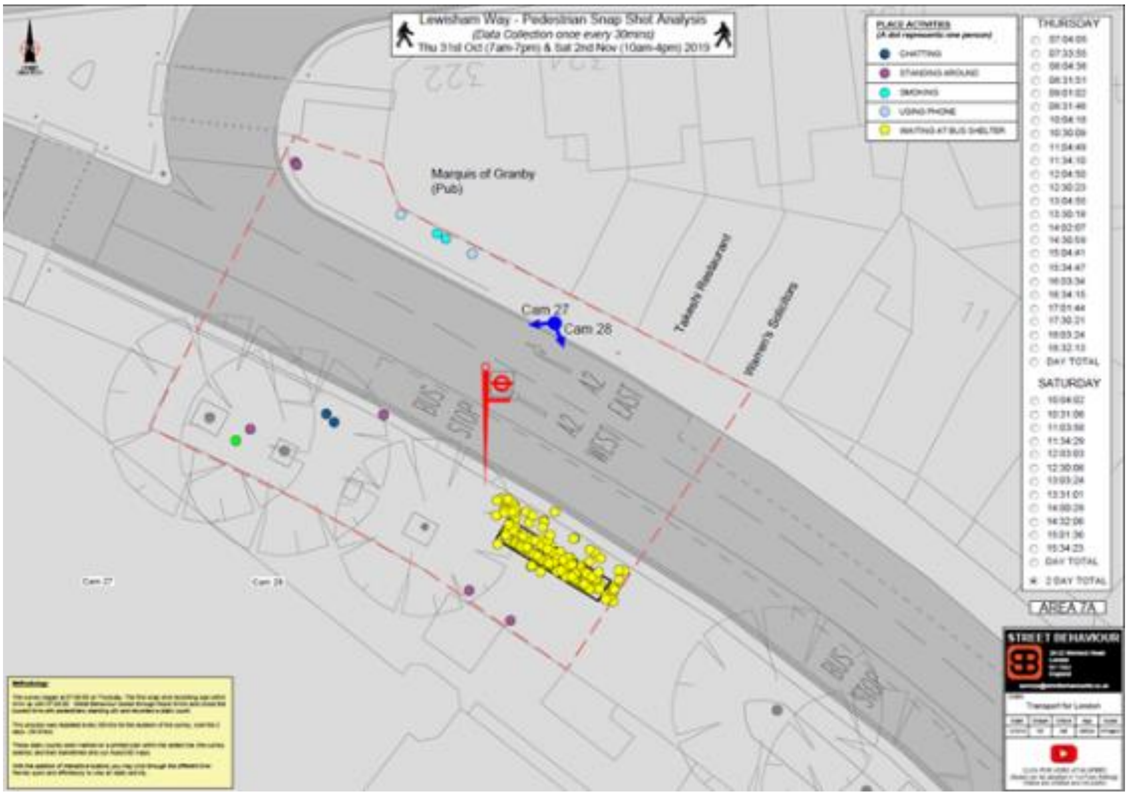


Figure 199. Illustration of the observed activities taking place in the area around a bus stop on Lewisham Way

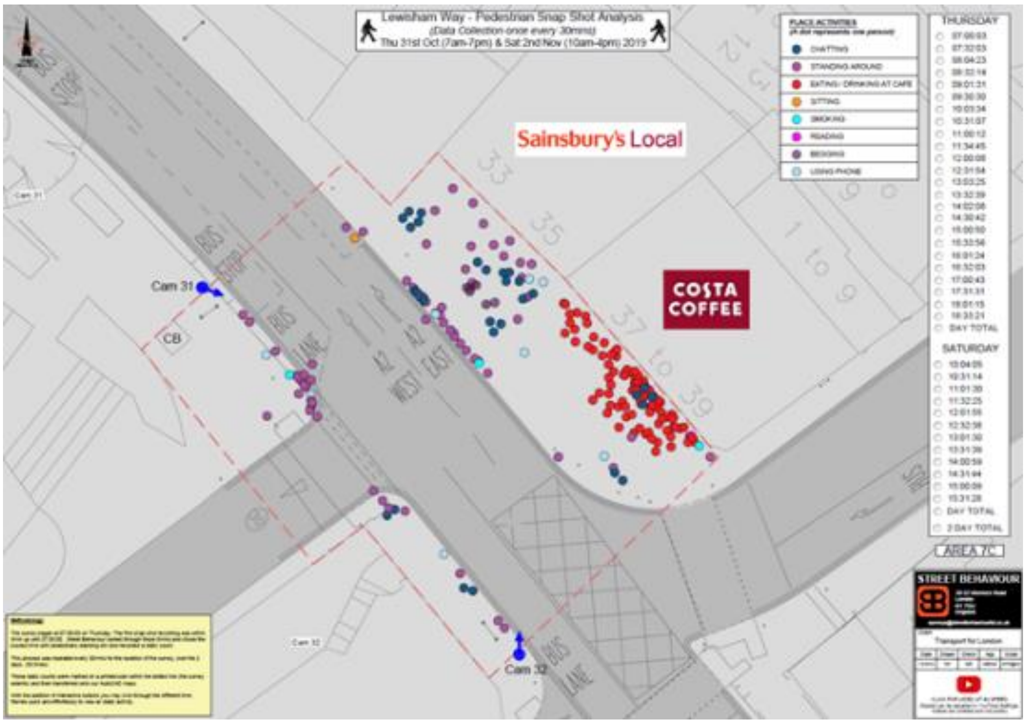


Figure 200. Illustration of the observed activities taking place outside Sainsbury's Local and Costa coffee

The quality of the street environment also has a role to play in this, which again is influenced by the amenity and quality of the street environment as well as the time of the day.

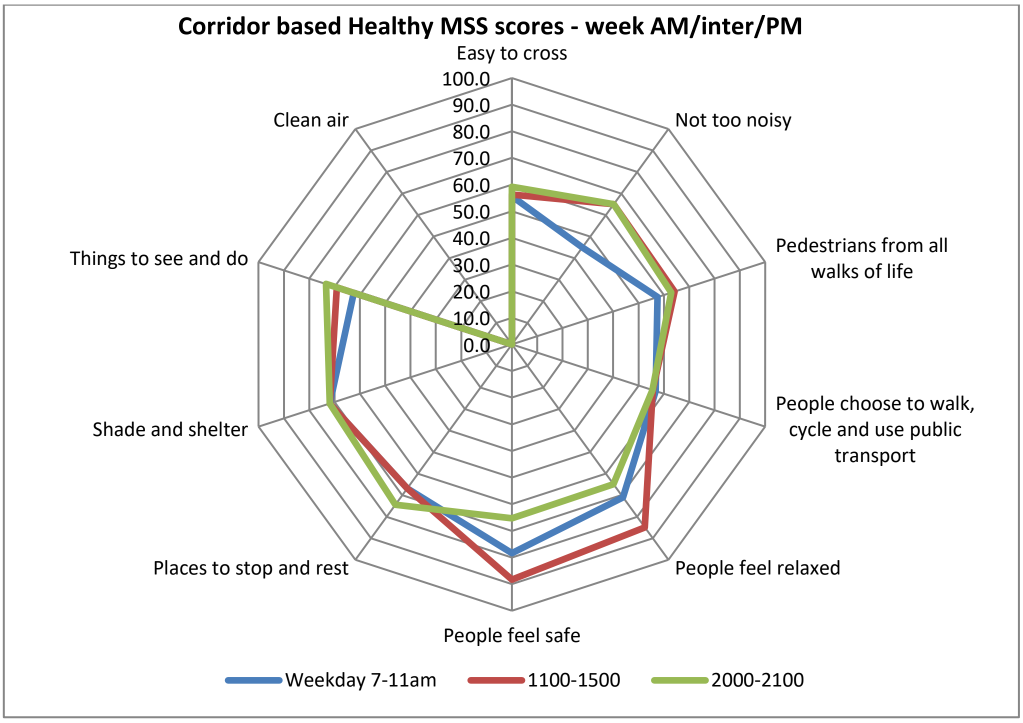


Figure 201. Overview of the Healthy Street Mystery Shopper Survey corridor scores, broken down by time of day

5.1.2 Road Users and Patterns of Use

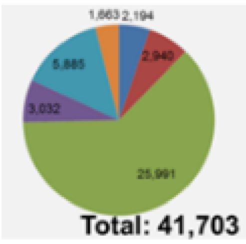
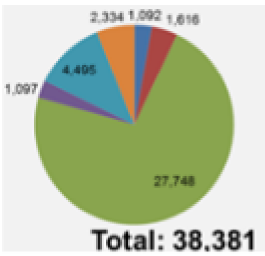
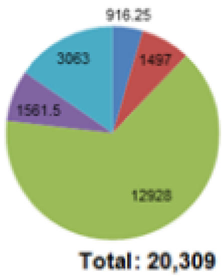
Total person movement can be found in the table below for the locations numbered in Chapter 2.3 along the stress section with data specified for both directions unless stated otherwise.

Daily mode share average along New Cross Road shows a considerable domination by private cars and Light Goods Vehicles. However, when compared with hourly data for sustainable modes the importance of New Cross as a place function is also clear.

Buses (including coaches) and pedal cycles both account for seven per cent of total flows at this point on the corridor, and motorcycles nine per cent – a higher mode share for these modes than anywhere else along the corridor. Light Goods Vehicles (LGV) and Heavy Good Vehicles (HGV) mode share remain relatively constant along the length of the corridor. This reflects the function of the A2 for commercial traffic and the location of commercial and industrial land along the most central section of the corridor.

Table 32. Overview of the main ways people travel along the corridor

(N.B. Count point on one-way section of gyratory)

	Section 1	Section 2	Section 3
Pedestrian Count/ Hr (AM)	616	2,260	500
Bus Passengers (per hour AM peak) **Boarders** **Alighters**	 575 28	 450 37	 240 19
Rail Station (AM peak: 7:00-9:30**)** **Entry & Exits**	N/A	5,849	3,217
Mode Share (avg daily flows**)** PedalCycles Motorcycles CarsTaxis BusesCoaches LightGoodsVehicles			

5.1.3 Existing Road Layout

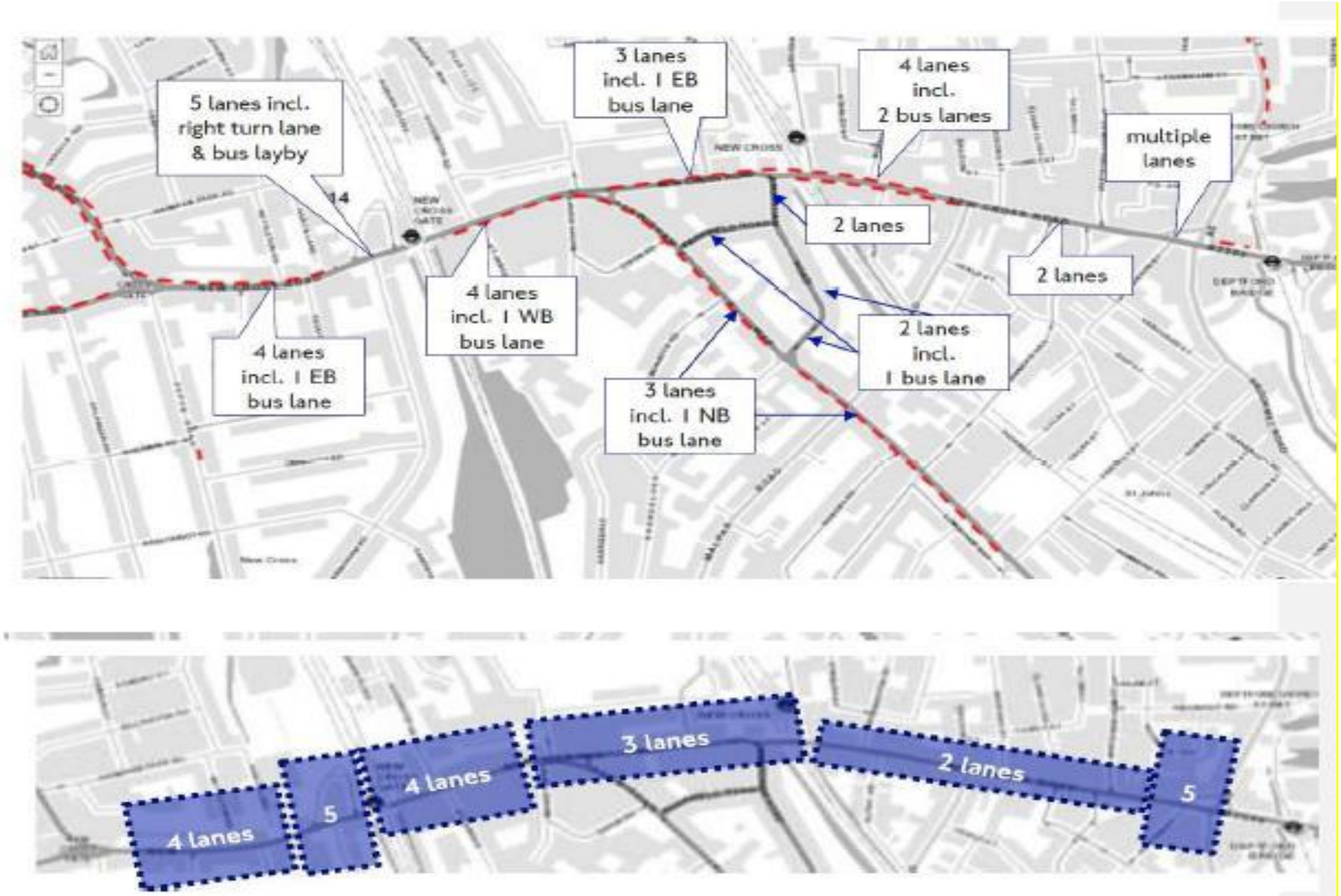


Figure 202. Overview of existing the road layout, the number of lanes in different sections and their purpose

5.1.4 Parking, Loading and pedestrian crossing facilities

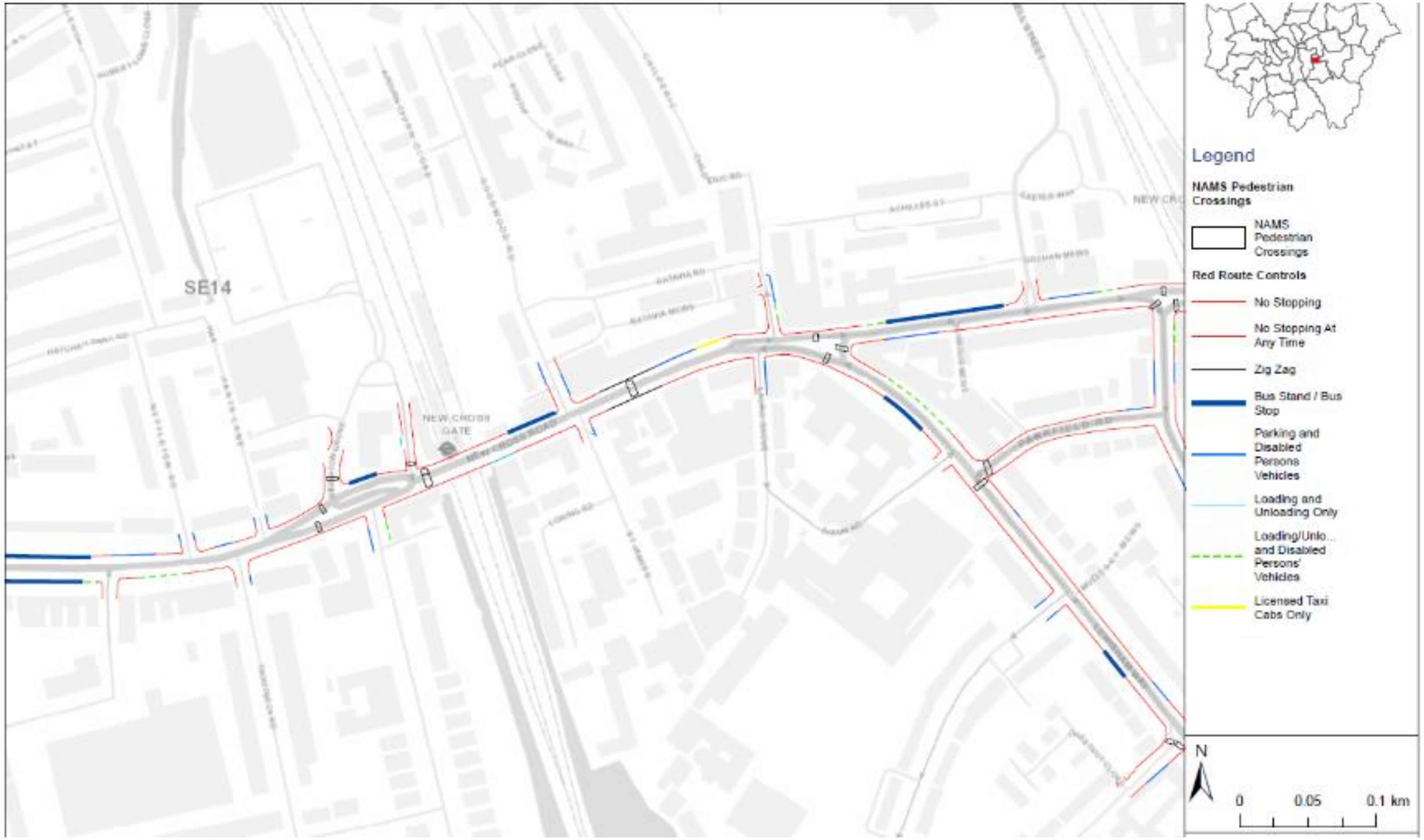


Figure 203. Outline of parking and loading restrictions in the study area (west of Lewisham Way)

Figure 204. Outline of parking and loading restrictions in the study area (east of Lewisham Way)

5.1.5 Bus Overview

New Cross is well served by the bus network with services connecting to wider south east London and the city. There are 10 east-west routes serving the A2 with bus lanes providing existing priority already along much of the stress section. Bus stop locations can also be seen below.

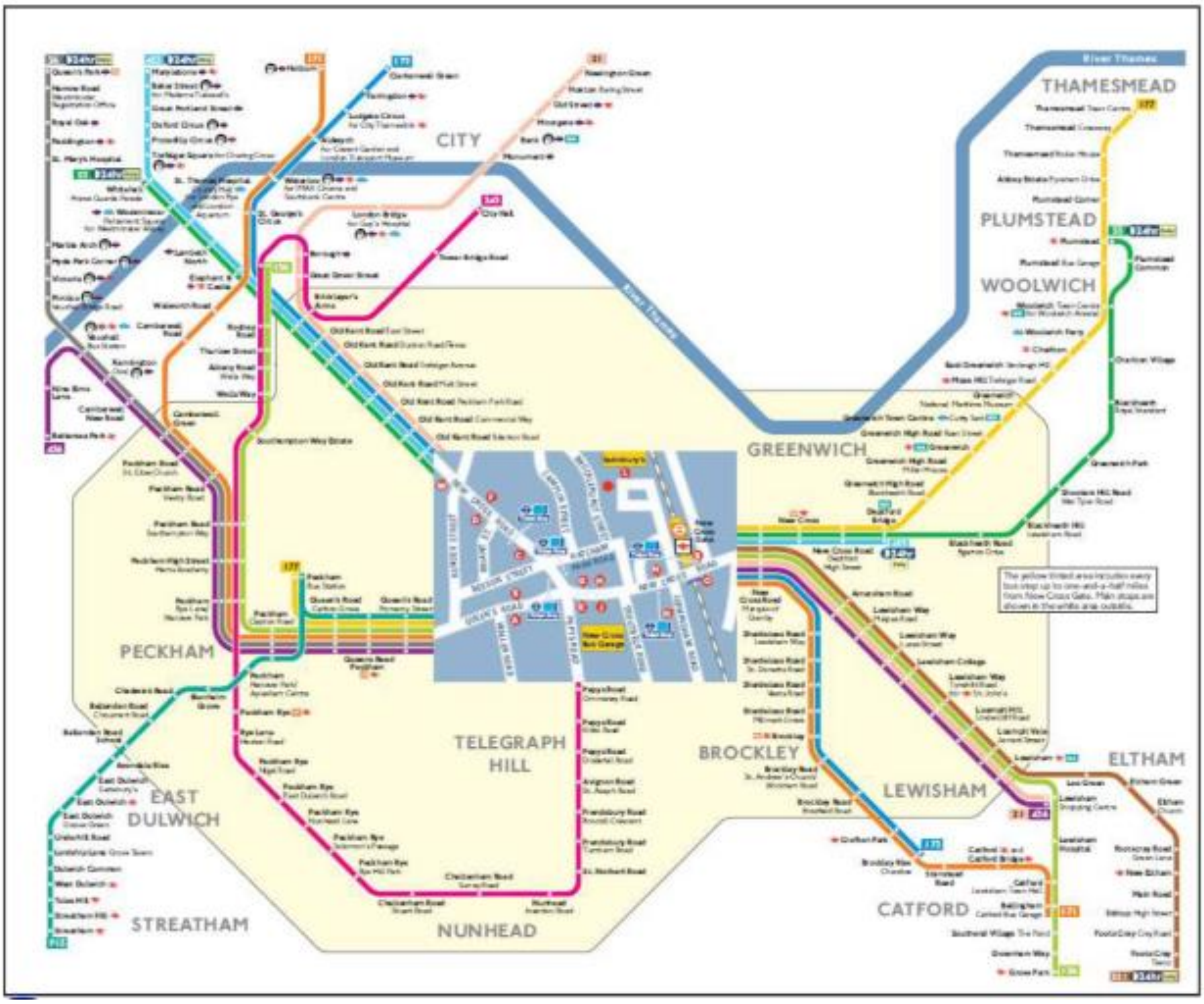


Figure 205. Spider diagram of bus network running through study area and wider destinations

Figure 206. Locations of bus stops in the study area, alongside stations

5.2 Key Problems and Issues to be addressed in the Design Exercise

Data collection and analysis has identified a number of issues for road and street users on New Cross Road. Details of the most significant issues follow here.

5.2.1 Pedestrian Severance

There is high pedestrian density between New Cross Gate and New Cross stations, as well as at key bus interchange locations along the corridor in both AM and PM peaks.

Pedestrian severance data (an experimental dataset within TfL which is a combination of aggregated traffic speed from Traffic Master (2014/15 AM), motor vehicle flow from the Highway Assignment Model (HAM), HGV flow (HAM), and road width derived) shows approximately mid-way along Old Kent Road, at New Cross Gate station, Deptford Bridge station and over Blackheath, pedestrian severance is higher than elsewhere along the inner section of the corridor. Looking into the data that combine to create this indicator, it appears that HGV flows and traffic speeds, as well as a lack of pedestrian crossing facilities are the main factors contributing to high pedestrian severance in these locations.

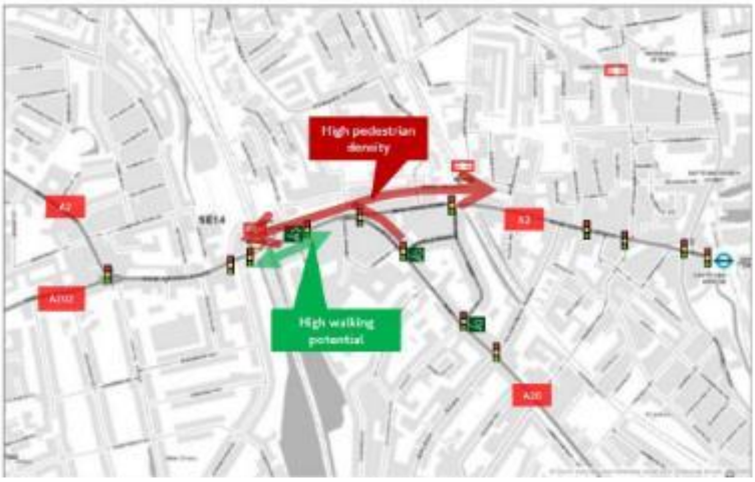


Figure 207. Illustration of existing high levels of pedestrian flows and an identification of where there may be future demand

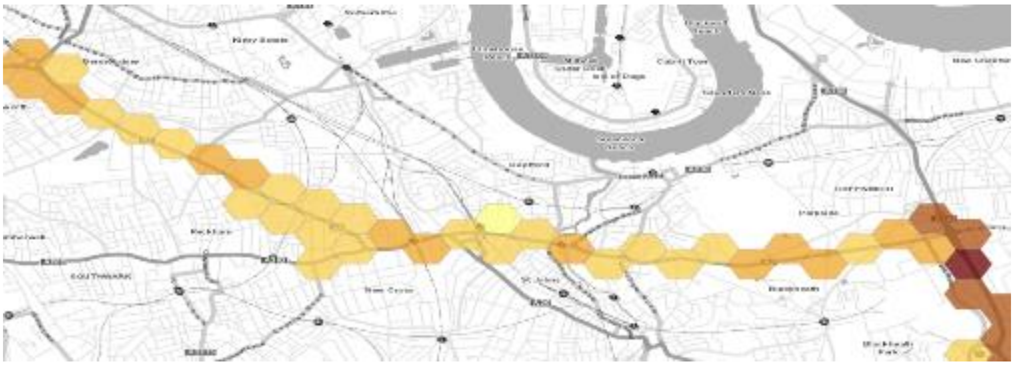


Figure 208. Image showing experimental TfL pedestrian severance data, with darker shades indicating higher levels of severance

The severance caused by the road sees people cross at a number of informal locations, namely those not controlled by lights or with an island. This includes large volumes of people crossing in the area immediately to the east of guard railing outside New Cross Gate station, near the Sainsbury's and Costa on Lewisham Way (see Figure 209 below), and near New Cross station, highlighting the natural demand for access to and from these locations.

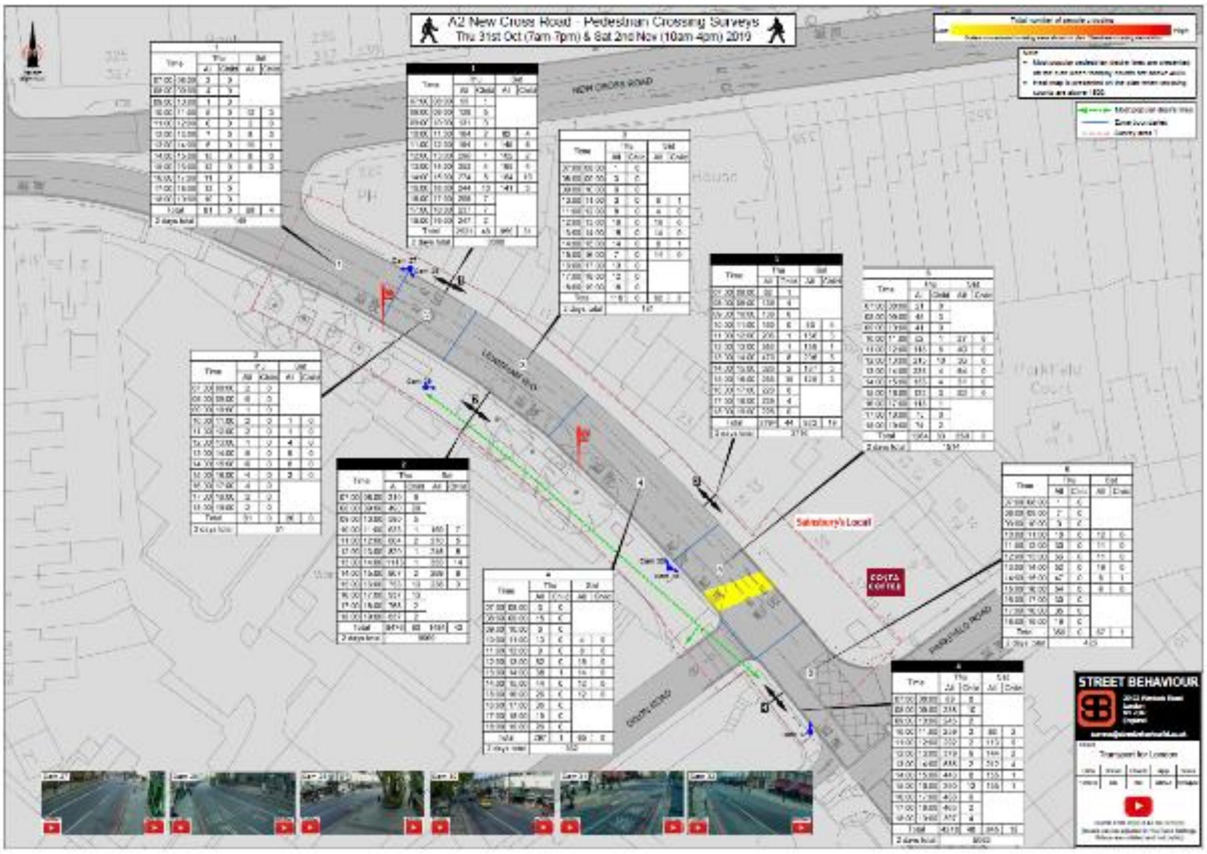


Figure 209. Mapping and counts of informal crossing points, with the yellow zone indicating a significant number of people crossing in this area

Surveys were undertaken in November 2019 to assess the pedestrian demand for crossing. Whilst earlier in Chapter 2.3 highlights formal crossing points, there are several locations in which people are crossing the road outside of any control. On the day of observation, which took place over 12 hours from 7am to 7pm, this includes:

- Almost 800 people crossing between the controlled crossing at New Cross Road with Queen's Road and by the entrance to New Cross Gate Retail park, with most of these being observed between Pepys Road and the north side of New Cross Road opposite (over 1/3 of people) and just to the west of New Cross Bus garage and the opposite side of New Cross Road;
- Over 1,700 people crossing between the formal crossing to the west of New Cross Gate and the crossing to the east of Goodwood Road/St James's, with approximately 40% of these happening immediately to the east of the pedestrian guard railing outside New Cross Gate station;
- Almost 2,200 people crossing between the formal crossing at the northern end of Lewisham Way and to the south of Parkfield Road, with almost 60% of these being in the area of Dixon Road and the opposite retail units;
- Nearly 500 people crossing Amersham Road Between the junction with New Cross Road and Parkfield Road;
- About 1,200 people crossing New Cross Road to the east of New Cross station and Alpha Road;
- Approximately 400 people crossing New Cross Road between Florence Road and the crossing to the east of Watson's Road, with over 800 further crossing between this crossing and the next one by Tanner's Hill.

5.2.2 Collisions and Vulnerable Road Users

There is a higher than average number of Killed and Seriously Injured along New Cross Road, particularly effecting pedestrians, cyclists, and powered two-wheeler users compared to their mode share. Between 2014 and 2017, this saw 348 injuries being recorded, with 29 serious injuries in this timeframe and two fatalities. The figures below outline the all road user's mode split of casualties that occurred on New Cross Road between 2013 and 2016 and the location of these.

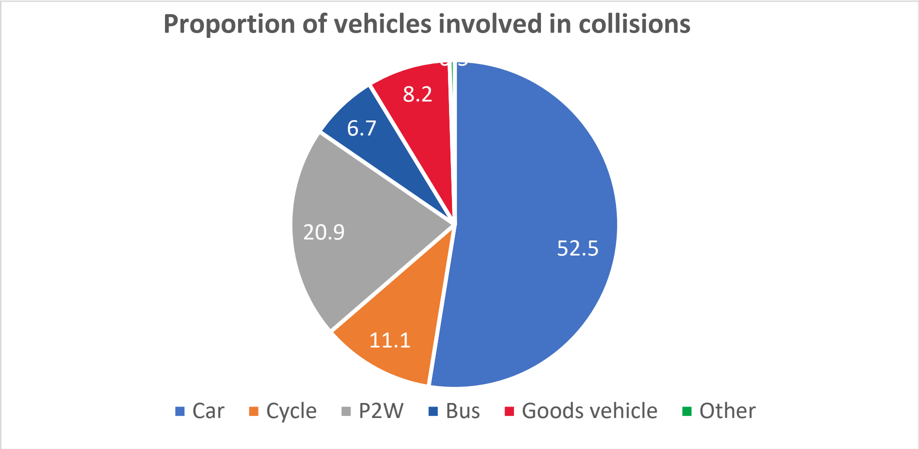


Figure 210. Proportion of vehicles involved in collisions within the study area

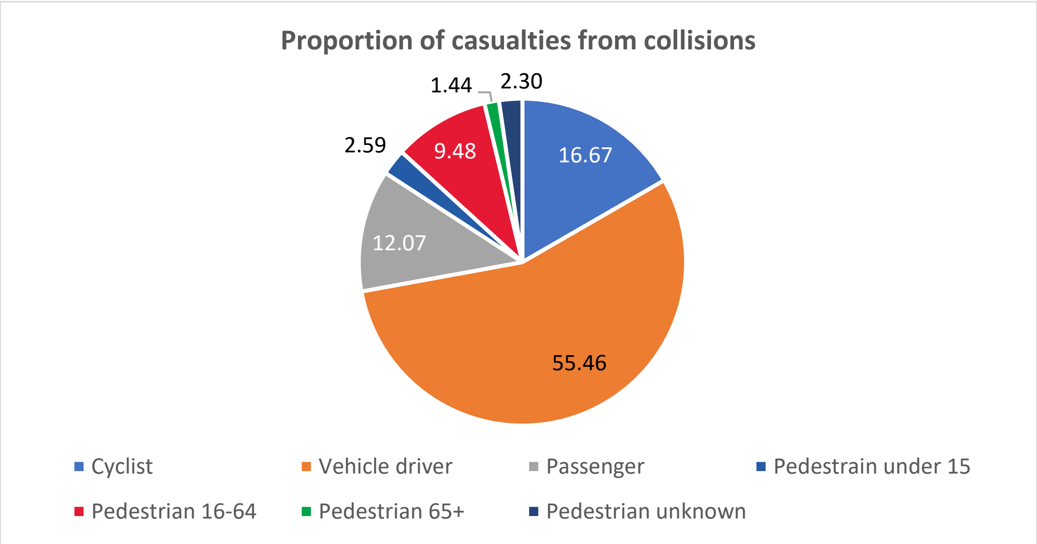


Figure 211. Proportion of different casualty types from collisions

5.2.3 Cycling facilities

There are no formal cycling routes provided along the A2 at New Cross Road however cycle superhighway 4 and Quietway routes are located a short distance away from the corridor. Despite the lack of facilities there is considerably high demand for cycling, particularly between the stations.

Cycle parking facilities are provided outside New Cross Gate Station and on street but high levels of fly parking, pictured below, suggests demand exceeds supply.

Figure 212. Images highlighting the lack of cycle infrastructure, in this case cycle parking

5.2.4 Air quality

PM_{10} levels reach the EU limit along the western section of the A2 within the study area. Whilst NO_2 levels greatly exceed EU limit along entire A2 corridor.

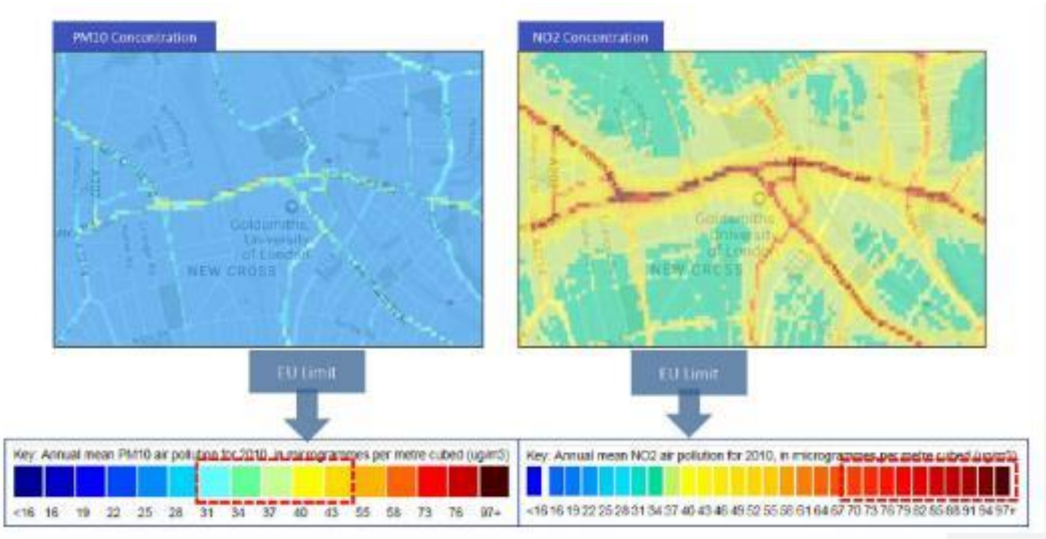


Figure 213. Images showing levels of PM10 and NO2 concentrations and how they compare to EU limits

5.2.5 Freight and servicing

Amersham Gyratory on the A2 forms part of the TLRN abnormal loads network for large or heavy vehicles, as well as local access for servicing vehicles for New Cross and Deptford town centres. Freight flows are considerably high along New Cross Road and into Deptford as seen below.

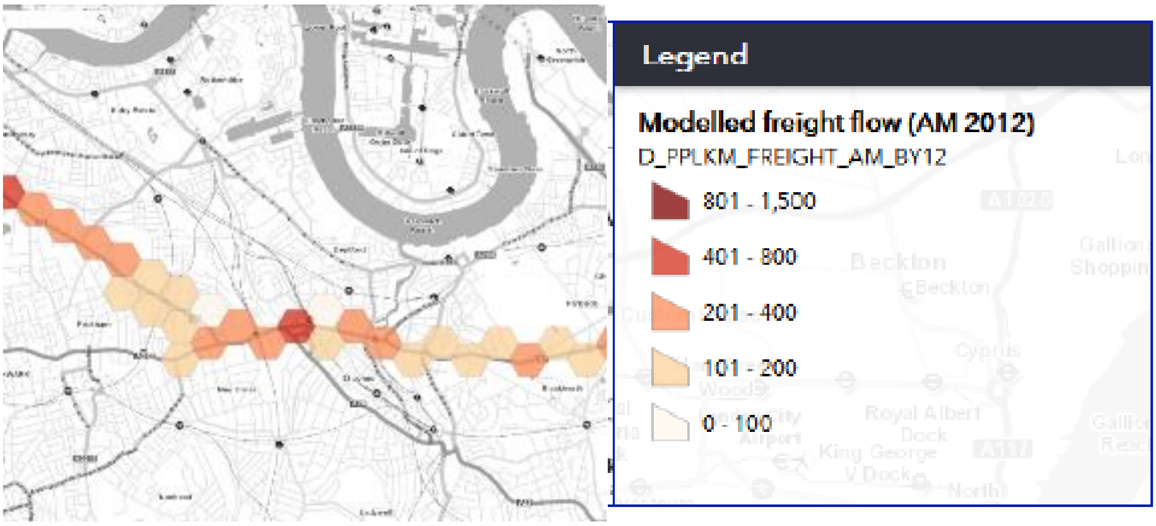


Figure 214. Illustration of modelled freight flows along the corridor, with darker colours showing higher modelled demand

To accommodate healthy streets improvements along New Cross Road, there may well be a requirement to manage servicing and deliveries and reduce freight flows at certain times of day.

5.2.6 Journey time reliability and vehicle delays

Journey time reliability is very low along New Cross Road, at the junction of the A2 and A202 and Deptford where road capacity is most constrained. Vehicle delay in the PM peak is significantly worse than that experienced during the AM with most of the corridor subject to delays of more than 1.5 minutes per kilometre, as shown below.

Figure 215. Data showing the level of delay experienced by vehicles, with darker colours showing greater levels of delay

5.2.7 Parking and Loading

There are a number of parking and loading bays located along the corridor. Figure 216 below highlights those located on Queen's Road running east along New Cross Road and principally serving commercial properties. As these are located on a red route there are restrictions as the when they can legally be used.

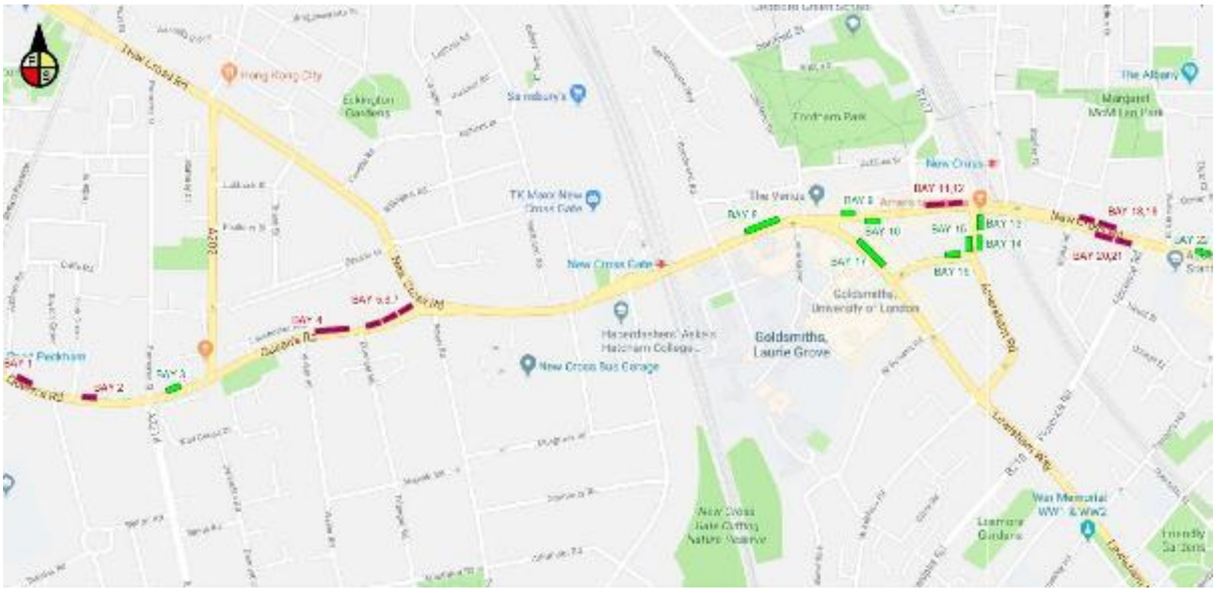


Figure 216. Identified parking bays located on Queen's Road and New Cross Road

An example of the restrictions in place at the sites can be found in Figure 217 below which is typical of the restrictions along the corridor. Variation in the level of restriction is found through the exceptions that apply, based around the extent to which loading, blue badge holders and general parking are allowed between the hours of 10am – 4pm.

Figure 217. Example of parking restriction sign

Restrictions are in place along the corridor to maintain capacity in order to reduce the level of delay experienced when travelling along the road. This is particularly important for buses as a key location in the movement of local services. Through a series of snapshot surveys on different days (between 0600 – 2100) a variety of illegal parking was observed at the bays highlighted in Figure 216, which are illustrated in Table 33 below.

Table 33. Overview of observed levels of illegal parking at selected sites within the study area

Bay number	Day	Illegal parking percentage[8]	In bus lane
6	Wed	47%	Yes
	Sat	64%	
8	Wed	21%	No
	Sat	24%	
12	Wed	0%	Yes
	Sat	0%	
18	Wed	40%	Yes
	Sat	8%	
22	Wed	52%	Yes
	Sat	78%	

Parking in these locations, be it illegal or not, can have a detrimental impact on the operation of buses along the corridor, with the level of delay varied.

5.2.8 Bus speeds

New Cross is well served by the bus network and plays a critical role in accessing and interchanging for many public transport users. Along most of the inner section of New Cross Road going westbound into central London, bus speeds are less than 10mph during the morning peak with intermittent bus lanes along the corridor.

Despite the availability of bus lanes along the corridor (Chapter 2.3.7), this slow level of speed has a detrimental impact on bus reliability for all services passing through the area. This includes individual buses experiencing delays of up to 45 seconds travelling eastbound on the A202 in the AM and PM peak against the scheduled run time, and the same level of delay travelling east and westbound at the junctions with Lewisham Way and Amersham Road. This is in addition to the delay that services experience where they do not have any form of priority, which can be as significant as 180 seconds.

5.3 Outline of Policy context

5.3.1 Mayor's Transport Strategy (MTS)

At the heart of the MTS is the Mayor's ambition to reduce Londoners' dependency on cars in favour of active, efficient and sustainable modes with a target for 80% of all trips in London to be made by walking, cycling and public transport by 2041.

[8] Of observed total parking level

Analysis shows that, including trips to/from outside the Greater London area, sustainable mode share for trips in central and inner London in 2041 will need to be 95 and 90 per cent respectively to achieve 80 per cent sustainable mode share overall. In outer London, this will need to be 75 per cent, which is significantly higher than current sustainable mode share in outer London (see Appendix 8.3.1).

The A2 New Cross road section falls within Inner London and any re-design should play an important role in achieving the Mayor's vision for inner London. The 2018 MTS sets out key principles to tackle urban challenges which exist in inner London, and as illustrated throughout this report and above, such as severe congestion, poor air quality and limited access to green space.

Key proposals for Inner London include:

- Transforming facilities for people cycling;
- Encouraging more people to travel by bus by improving bus journey times and ensuring services are properly prioritised on London's streets;
- Creating a series of accessible 'strategic interchanges' which will make it easier to switch between rail, bus, walking and cycling and provide more step-free options in inner London.

5.3.2 The Healthy Streets Approach

The Healthy Streets Approach provides the framework for putting human health and experience at the heart of planning the city. The MTS is the first transport strategy in the world to apply the Healthy Streets Approach to the entire transport system to a city like London.

It uses ten evidence-based indicators (Figure 218 below) to assess the experience of being on our streets. Good performance against each indicator means that individual streets are appealing places to walk, cycle and spend time. Improvements against all the indicators across the city's streets will radically transform the day-to-day experience of living in London, helping to fulfil the strategy's overall aim of creating a better city for more people to live and work in.

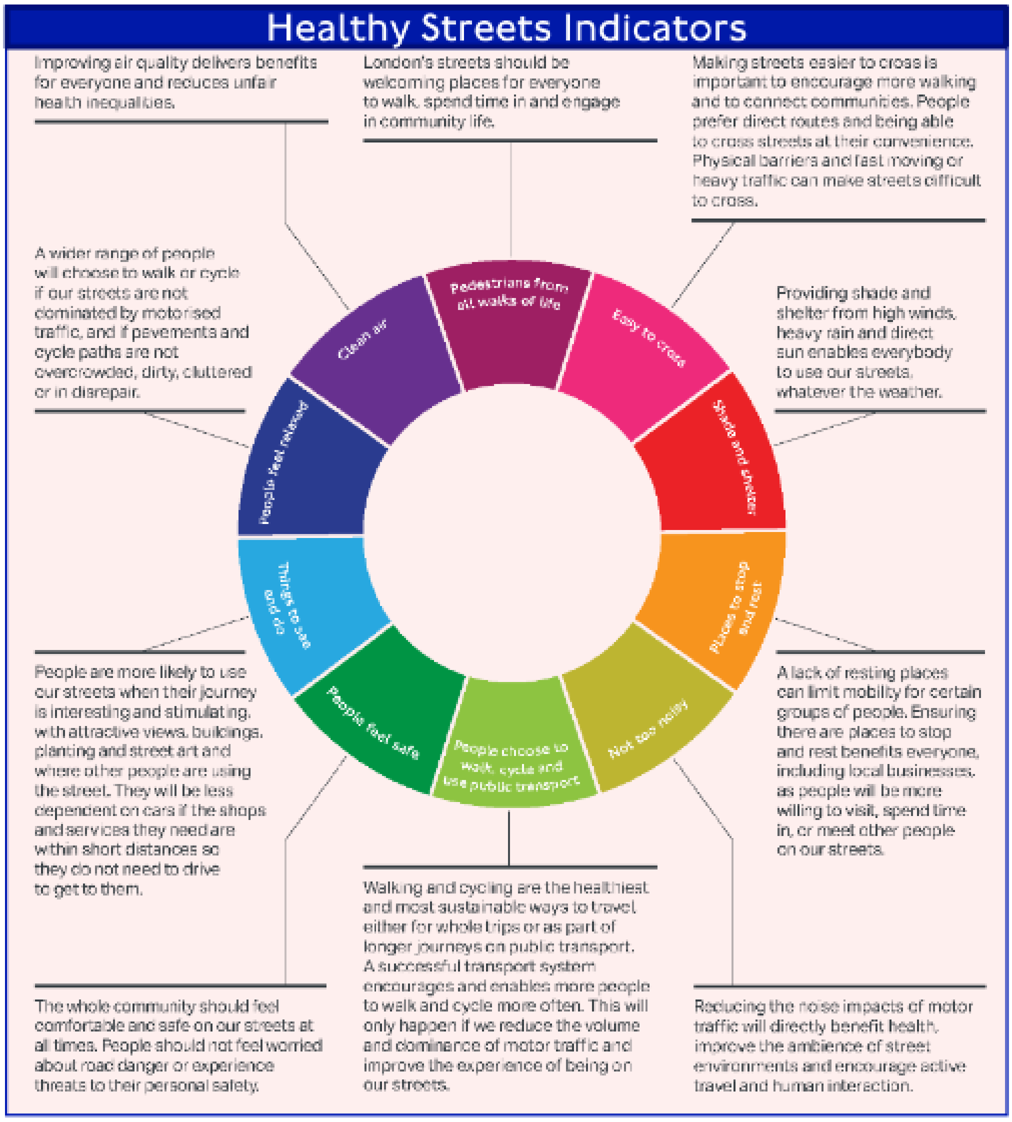


Figure 218. Indicators underpinning the Healthy Streets Approach

5.3.3 Lewisham Transport Strategy

Any changes to New Cross Road should help deliver the London Borough of Lewisham's Transport Strategy. The strategy sets out key priorities for the A2 including:

- Focusing on safety and delivering Vision Zero. Pedestrian safety around New Cross is a particular area of concern;
- Reducing car ownership and private car trips to improve air quality.

Relevant proposals include the A2 New Cross Road/ Amersham Gyratory removal to:

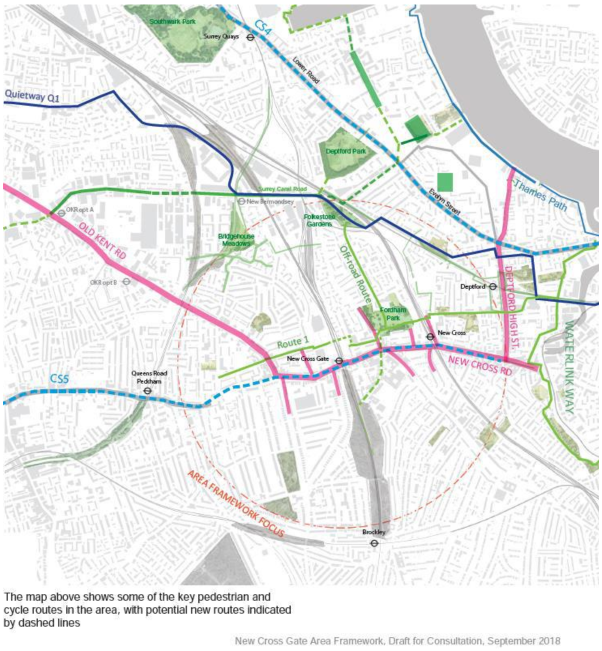
- Transform the A2 New Cross Road and area surrounding the station;
- Improve pedestrian comfort and permeability;
- Create an easily accessible High Street;

- Improve cycle facilities;
- Reduce traffic dominance.

Further proposals are set out in the New Cross Masterplan which should be considered as part of the design work for the A2 New Cross Road.

5.3.4 New Cross Gate Area Framework

The following key objectives have been identified for New Cross Road in the draft New Cross Gate Area Framework:



1. **Improve the pedestrian environment** by widening footways at key locations, enhancing crossing and connecting to existing and proposed new routes;
2. **Improve bus journey time and interchange**, particularly around New Cross Gate;
3. **Provide improved cycle infrastructure** along the A2, complimenting CS4 and QWI;
4. **Improve road safety**, particularly at collision hotspots;
5. Investigate opportunities to enhance **greening in order to improve air quality** and the quality of the environment / protect the High Street

Figure 219. Map showing some of the key routes for people walking and cycling in and around the study area alongside the agreed objectives in the draft New Cross Gate Area Framework

5.4 Design objectives

5.4.1 Outcomes

Taking into consideration the objectives presented in the policy context and the key problems to be addressed, this section will outline the road uses and users considered as priority for New Cross Road and the priorities for the design exercise.

Overarching outcomes have been identified below which align to the Mayor's Transport Strategy, as well as subsequent TfL Strategies that can be found in Appendix 8.3, and Borough local plans.

Table 34. Indicated priorities based on supporting delivery of the Mayor's Transport Strategy and Borough based local plans

Key Priorities	
Provide safe and consistent cycle provision	Introduce road danger reduction measures
Improve bus journey time	Improve air quality
Improve walking conditions	Improve access to public transport
Reduce severance for pedestrians	Improve interchange between modes
Reduce speed	Reduce private car trips and consolidate freight

In creating road space designs that deliver the above key priorities, road user requirements have been considered in the table below alongside measures that will be used to evaluate success in achieving these outcomes.

Table 35. Identified road user requirements for consideration

Road/ Street User	Provision	Measure
Pedestrians	• Provide safe & direct pedestrian crossings • Increase footway provision • Provide consistent pedestrian wayfinding • Reduce vehicle speeds	• Crossing facilities • Width of footway • Opportunities to sit • Further street furniture • Trees & greenery • Speed limit • Improved urban realm
Cyclists	• Provide safe & consistent cycle provision • Reduce vehicle speeds • Provide secure cycle parking	• Increased cycling flows • Reduced casualty rates • Special characteristics for cycling provision (advanced stop lines, bike boxes, bending in, bending out, two-stage left turn) • Type, width and buffer of cycling provision- see TfL cycling quality criteria • Speed limit
Bus Passengers	• Safe & accessible bus stop provision • Provide seating at bus stops and interchanges • Improve bus priority to reduce bus journey times	• Width of footway • Provision of priority lanes for buses • Surveillance & street lighting • Bus stop equipment • Crossing facilities • Improved urban realm
Rail Passengers	• Increase footway provision • Provide consistent wayfinding to improve interchange facilities	• Width of footway • Surveillance & street lighting • Crossing facilities

		• Improved urban realm
Car Drivers/ Passengers	• Cleaner & greener vehicles • Sustainable mode shift	• Reduced traffic volumes • Improved air quality • Speed limit • Number of lanes for general traffic • Reduced collisions
Motorcyclists	• Visibility improvements of infrastructure • Signing/ road marking improvements to reduce conflicts	• Reduced collisions • Allowed user groups in each lane
Taxi & PHV Drivers	• Cleaner & greener vehicles • Dedicated drop off/ pick up points at interchange locations	• Improved air quality • Speed limit • Parking/ loading facilities- type & restrictions
Taxi & PHV Passengers	• Accessible taxi ranks • Dedicated drop off/ pick up points at interchange locations	• Parking/ loading facilities- type & restrictions
HGV & LGV Drivers	• Clear & concise restrictions for Parking & Loading • Convenient locations for Parking & loading • Consolidate & re-time deliveries • Rear access • Out of area waiting facilities	• Improved air quality • Parking & loading facilities- type & restrictions • Reduced traffic volumes

5.4.2 Times of Day

The design exercise will develop and test road space designs for five temporal periods of as follows.

Period	Time
AM Peak	7:00- 9:30
Inter- peak	9:30-16:00
PM Peak	16:00-19:00
Evening	19:00-22:00
Weekends	10:00- 16:00

5.4.3 Impacts for Feeder Route

Designs developed for each time period should have regard to the movement and place functions along the entire Feeder Route to the Trans-European Network (TEN-T) Interface and beyond.

Most trips on the European road transport network begin or end in urban areas (see Appendix 8.3.4 for a map of the TEN-T). While some parts of the inter-urban road network suffer from delays and unreliability, most problems occur in larger urban areas. Here the delays and variability in travel times can undermine the efficiency of road transport across Europe – resulting in delays to road passengers and missed slots for freight vehicles.

At the same time, the major corridor feeder roads, the A2 New Cross Road, are called upon to meet a variety of urban economic and social needs. The focus of MORE is on these Urban Nodes and on improving the efficiency and effectiveness of the main roads that feed traffic to/from the interurban road links of the TEN-T, also taking into account the scope for modal transfers.

5.5 Tasks to be carried out in the street design exercise.

Our action plan for Jan 2020 to July 2020 can be found below setting out how each of the WP4 tools developed in MORE (design blocks and acetates, Linemap, Traffweb, VISSIM, Appraisal framework tool) will be applied, followed by further details of each of the tasks.

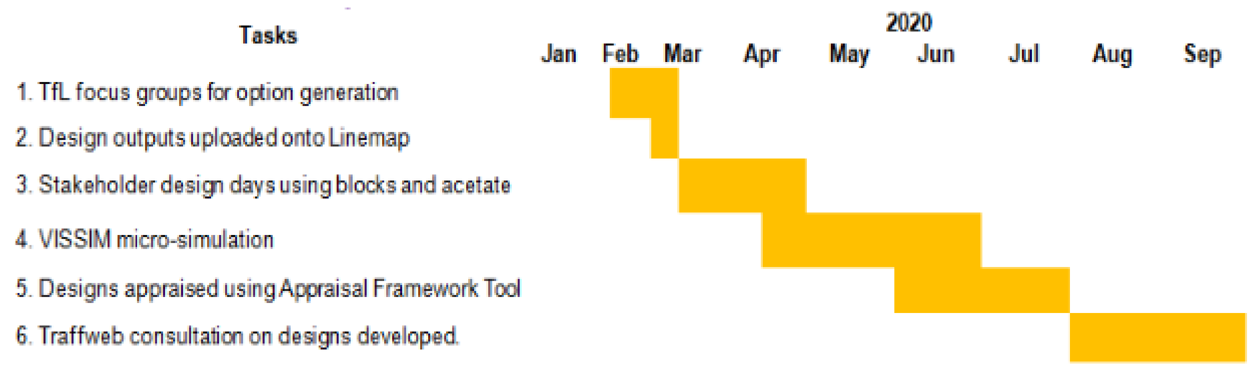


Figure 220. MORE action plan

- Task 1 - The toolkit will enable groups to try out different combinations of street design elements on scale plans of the stress section, using coloured physical blocks (e.g. representing loading or bus stop bays) and acetates (e.g. representing a bus or cycle lane). Records of design options are obtained by replacing the blocks and acetates with sticky labels of the same colour and size.
- Task 2 - Outputs of the design days will be a set of design preferences (at different times of day / year) which will be digitized and uploaded onto Linemap for further consideration.
- Task 3 - Members of the Public, community and business groups that signed up to be involved in the MORE project during engagement carried out in Summer 2019 will be invited to a number of design days using the physical road- space design toolkit.

- Task 4 - VISSIM model to be updated with PTV enhancements up to April 2020 in advance of design simulations to be run. Once VISSIM outputs received and impacts validated, each design option will be appraised according to selected Performance Indicators and assessed.
- Task 5 - Designs will be available to comment on the Traffweb tool for stakeholders on the MORE London mailing list.
- Task 6 - Designs created using the physical road-space design toolkit and further commented on Traffweb will be preliminary screened for acceptability and shortlisted by professionals and planners.

6 Design Brief of City Feeder Route – CONSTANTA

6.1 Introduction

6.1.1 Stress Section and Road Users

After analysing the corridor's characteristics, and discussions with the municipality decision-taking level, it was decided to select the area around the junction of I.C. Bratianu Boulevard with Dezrobirii and Cumpenei Street (approx. 200 m on each arm of the junction - see map below) as the section with the highest need of intervention. This was identified as such due to the fact that it accommodates all types of traffic and because there are a lot of traffic conflicts between road users.

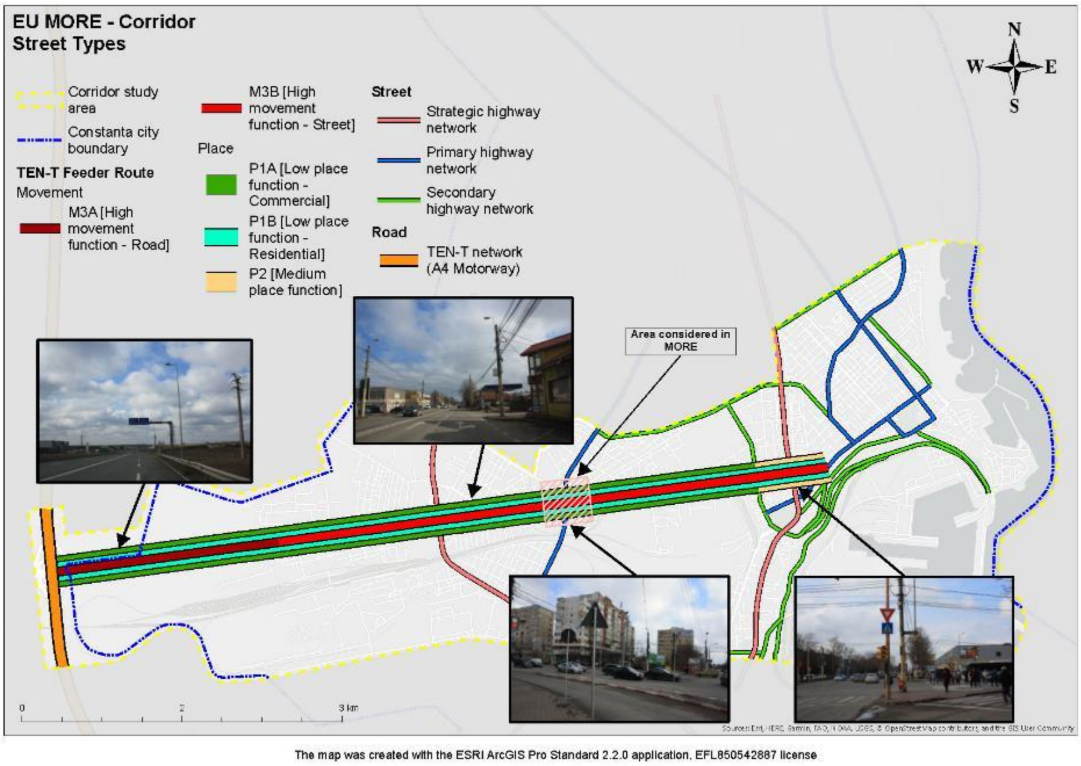


Figure 221. MORE Stress Section Area map

The Stress Section is one of the busiest areas on the Feeder Route due to the fact that it accommodates around 4,000 residents of which 2,911 people are living in collective housing buildings/blocks of flats. There are more than 40 individual businesses including banks (4 units), medical units (9 units), beauty salons (4 units), food shops (3 units), sports books /casinos (6 units) and a shopping mall (1 unit).

Figure 222. MORE Stress Section Area

The Stress Section is located at the crossroad of two most circulated streets in the City, respectively, I.C. Bratianu Boulevard and Cumpenei Bridge and Dezrobirii streets. These streets represent an important artery in the city street network ensuring the takeover of major flows of the city in the direction of SV-NE and making the connection between the national roads that cross the city (E87, DN3 and DN2A). This street section is part of the primary street network and ensures the connection with the Industrial Area, Constanta Port, A2 Motorway and the ring road of Constanta (A4), Mihail Kogalniceanu International Airport, Mamaia resort and the City Centre.

The street infrastructure in the Stress Area does not provide any dedicated bus lanes or bicycles lanes, even though the space is pretty generous for this kind of infrastructure and the maximum speed limit is 50 km/h with some limitations when approaching the junction. The map below presents the traffic conditions in the area, where we can see numbers of lanes of each street and the vertical and horizontal street markings and signage.

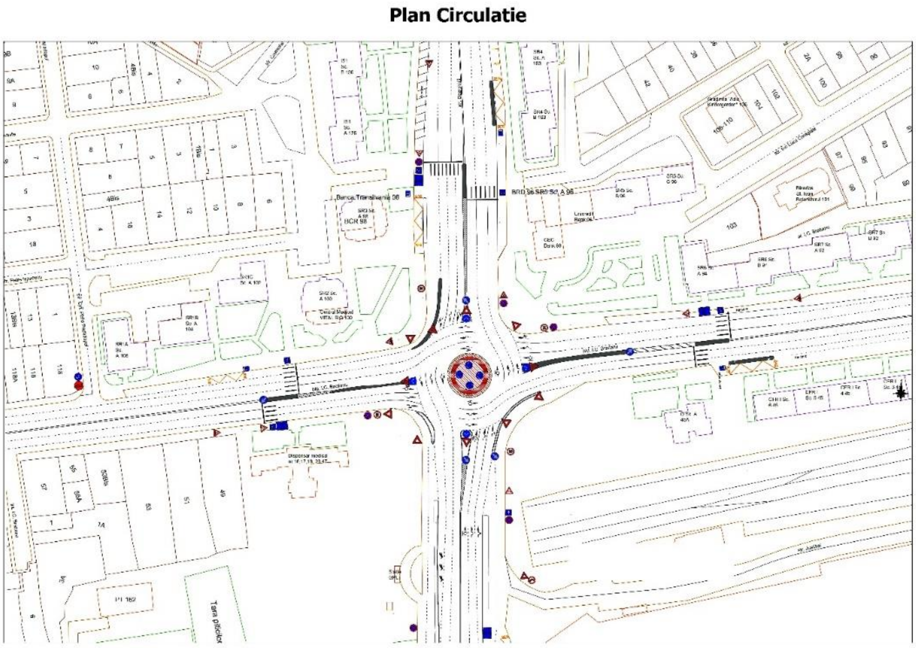


Figure 223. MORE Stress Section Area – Traffic Plan

6.2 Key Problems and issues to be addressed in the design exercise

6.2.1 Public Transport

The Stress Section Area is well served by the local public transport network which ensures good links around the City with high frequency as well as inter-country transport. Three important local bus routes service the area, respectively no. 48 and no. 102N (starting from the Industrial Area – CT BUS garages to the North of the City – Faleza Nord neighbourhood with a length of 17.5 km/route and an average frequency of 4/5 minutes) and no. 102P (starting from the Industrial Area – CT BUS garages to the Mamaia resort entrance/Mamaia Boulevard with a length of 18.9 km/route and an average frequency of 4/5 minutes).

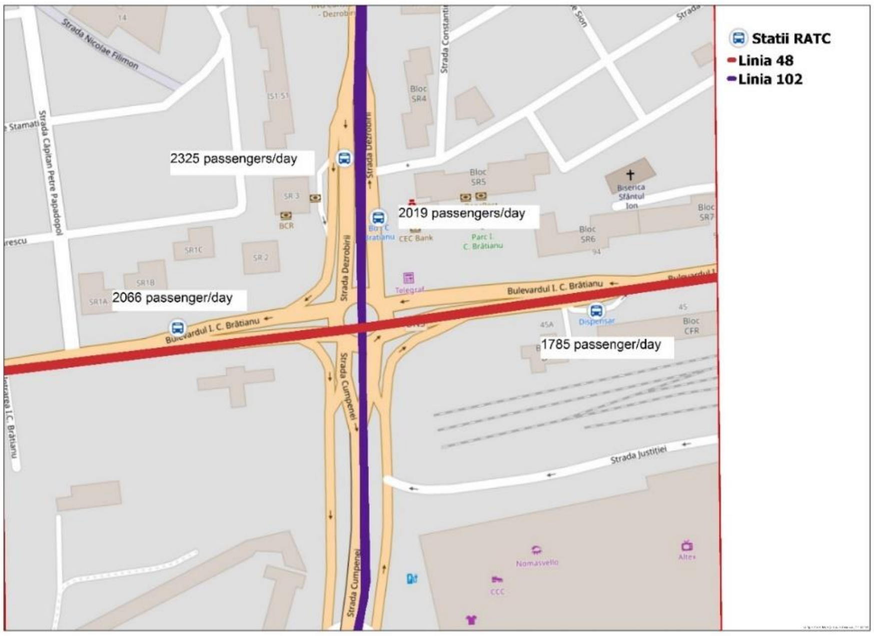


Figure 224. Locations of bus stops and number of passengers/day

There are 4 bus stops in the area, all of them are ‘Bus Bay’ type, according to the data collected in March 2020, around 8,195 travellers/day are using the local transport service in the Stress area. Data regarding the public transport was collected from each of the four bus stops, the number of people alighting and boarding each bus were counted on a normal working day from 6 AM to 10 PM.

Below are presented four graphics regarding the number of people alighting and boarding on each of the bus stops during the period of a full day.

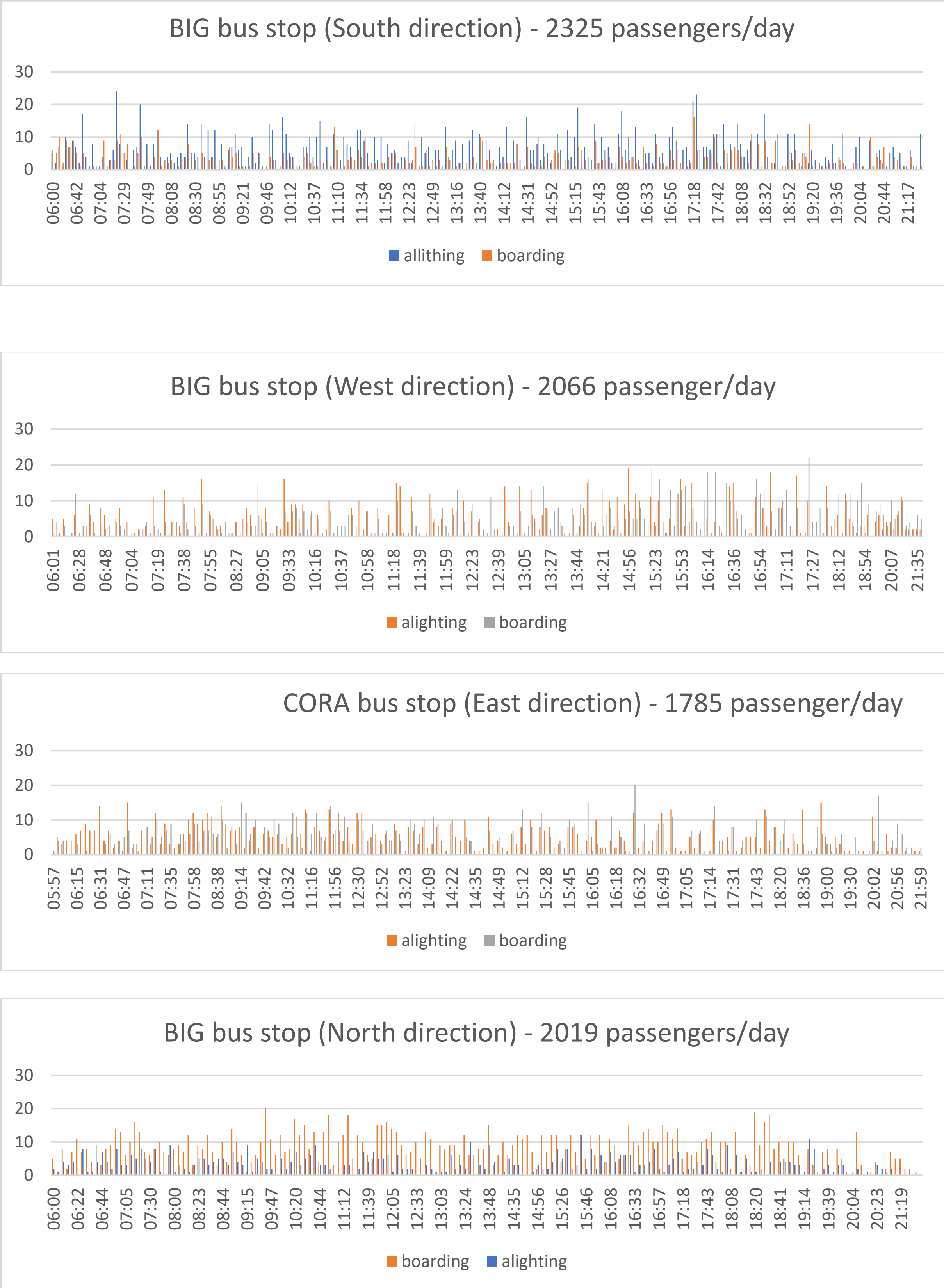


Figure 225. Number of passengers/bus stops in the Stress Area

6.2.2 Pedestrian flows

In order to estimate the number of pedestrians using the area, a data collection exercise was conducted starting with the establishment of the 22 counting points, as show below.

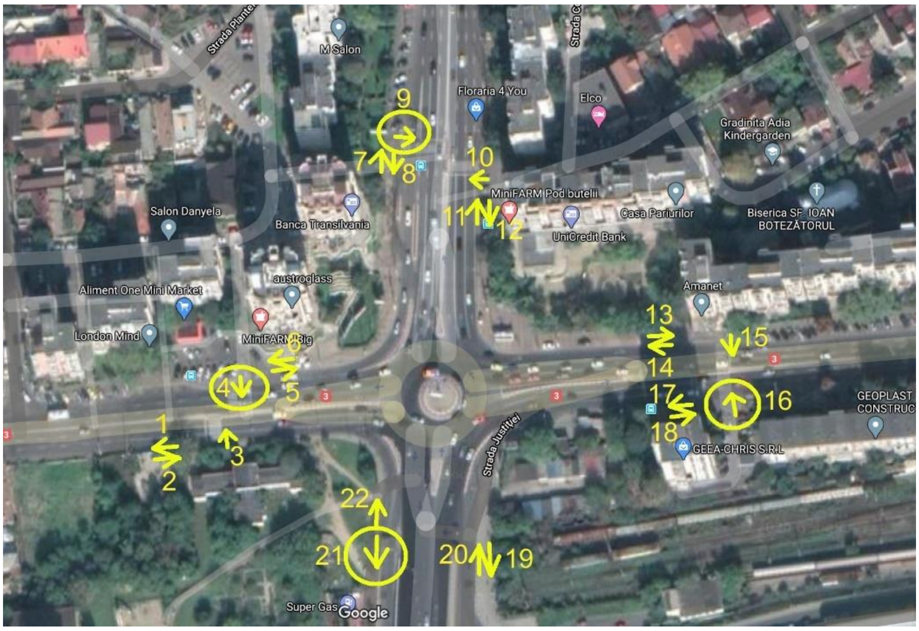


Figure 226. Pedestrian counting points

We registered the number of pedestrians on the sidewalks and their travel direction, the number of people crossing the streets both legally and illegally between 6 AM and 10 PM on a normal working day (Thursday). After analysing the data we noted that 37,295 used the area and we also identified the peak morning hours between 11:00-12:00, with a total of 3,528 pedestrians and also the evening peak hours between 15:45-16:45. This is shown below.

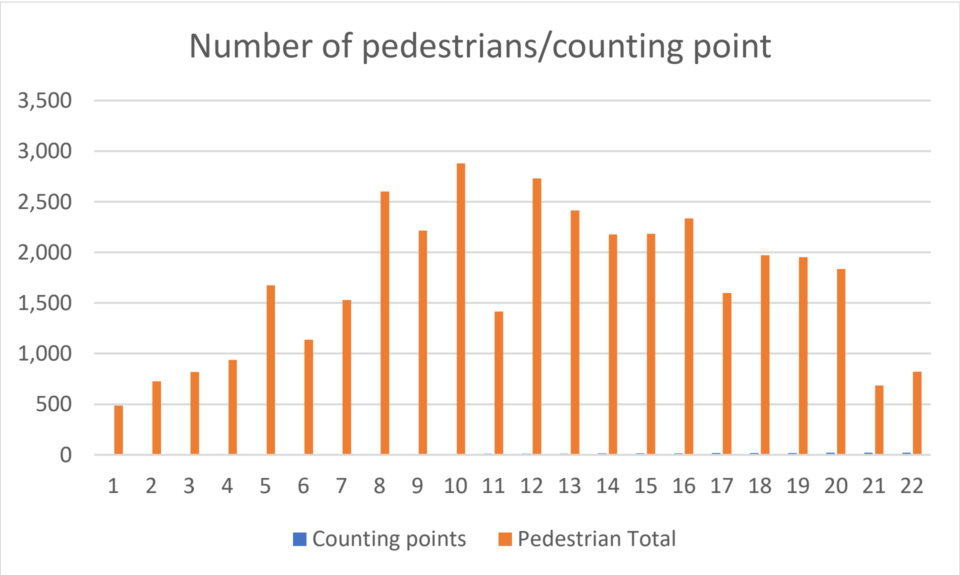


Figure 227. Pedestrian counts

As we can see from the data provided above, the less-used area is on the west side of the Stress Section. One of the reasons for this is the low place function for this area for both residential and commercial. This might constitute an advantage when thinking at further improvements of the area.

Another important aspect regarding to pedestrians is related to the illegal crossings. During the day 61 people crossed the street illegally, both male and female, most of them with an age between 36-65 years old. Even though the percentage of people crossing the street illegally seems relatively small, around 0.16 % of all pedestrians using the area, there is still a big problem related to pedestrian safety. The main causes of accidents on the Feeder Route are illegal crossings and not granting priority to pedestrians.

In order to discourage illegal crossing and for increasing the pedestrian safety, the municipality implemented a series of measures in the last period, as follows:

- Repositioning the pedestrian crosswalks and moving them away from the junction; and
- Building of pedestrian islands in the middle of the street, due to the large width of the streets.

Figure 228. Improved pedestrian crossings with median isles

We also counted the stationary activities of people around the area by circulating and registering from a list of predefined activities, then marking their positions on a map. This was done in sets of 30 minutes at a time.

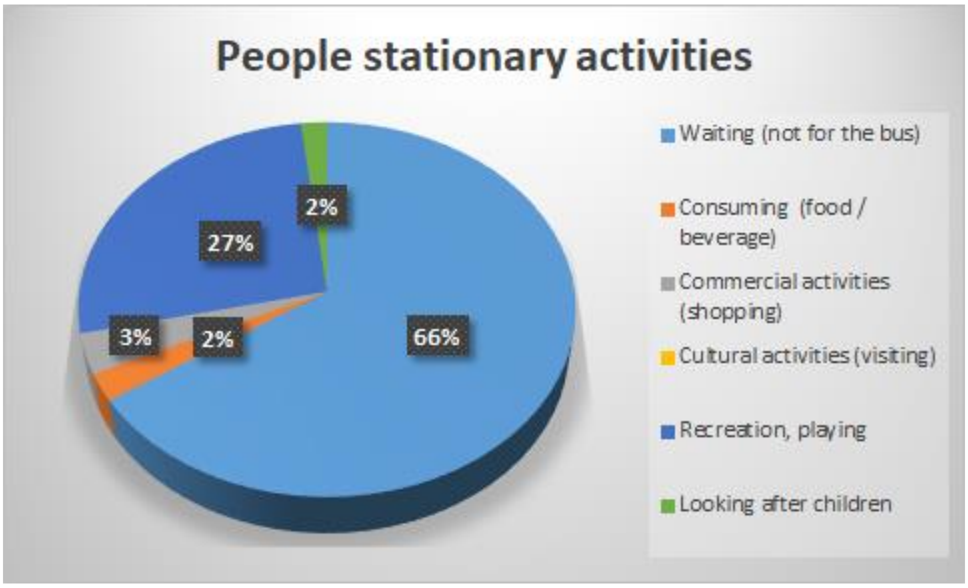


Figure 229. People stationary activities

6.2.3 General traffic

In Constanta and of course in the Stress Section Area the traffic is dominated by private vehicles. According to our counting a number of 61,730 vehicles enter the Stress Area during a one day period from 6:00 AM to 10:00 PM. The counting registered bicycles (70), private vehicles /cars (57,229), light freight vehicles (3,383), heavy freight vehicles (255) and buses (793), the traffic composition is presented in the chart below.

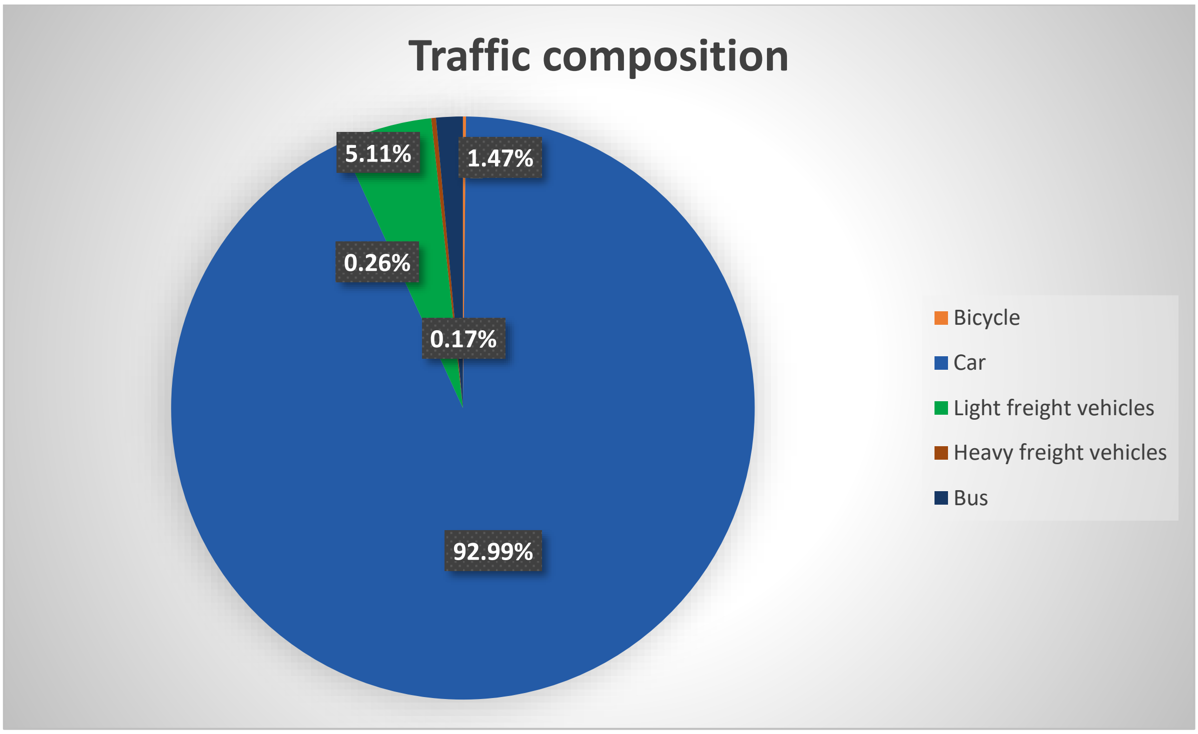


Figure 230. Stress area traffic composition

The morning peak hour was identified between 07:15 AM and 08:15 AM, with a total number of 4,635 vehicles and the evening peak hour between 04:45 PM and 05:45 PM, with a total number 5,698 vehicles.

The average travel time inside the Stress Section Area is presented in the Appendix and in the table below you can see the peak hour average travel time.

Table 36. Peak hour average travel time

Average travel time					
Direction	**Distance (m)**	**Morning peak**		**Evening peak**	
		Time (s)	**Speed (km/h)**	**Time (s)**	**Speed (km/h)**
Bd. Bratianu West - Bd. Bratianu East	930	84	39,86	85	39,39
Bd. Bratianu East - Bd. Bratianu West	930	82	40,83	392	8,54
Str. Dezrobirii - Str. Cumpenei	1550	178	31,35	179	31,17
Str. Cumpenei - Str. Dezrobiri	1550	154	36,23	210	26,57

Parking inside the Stress Area is allowed only in special designated places, there are some on street parking places as presented below. Even though the Local Police applied 1897 fines in the last two years for illegal stopping and parking in the area, this is still an issue for the Stress Area.

Figure 231. Parking Habits

6.2.4 Air Quality and Noise

After analysing the findings of the 2018 air quality assessment, we observed that there were some hours exceeding NO_2 (hours exceeding for the values of 40 µg/mc - limit value for people health) and NOx (hourly and maximum hourly admissible values of 30 µg/mc – critical annual level for the protection of the greenery), but also exceeding PM_{10} for the hourly values, as shown in the figure below.

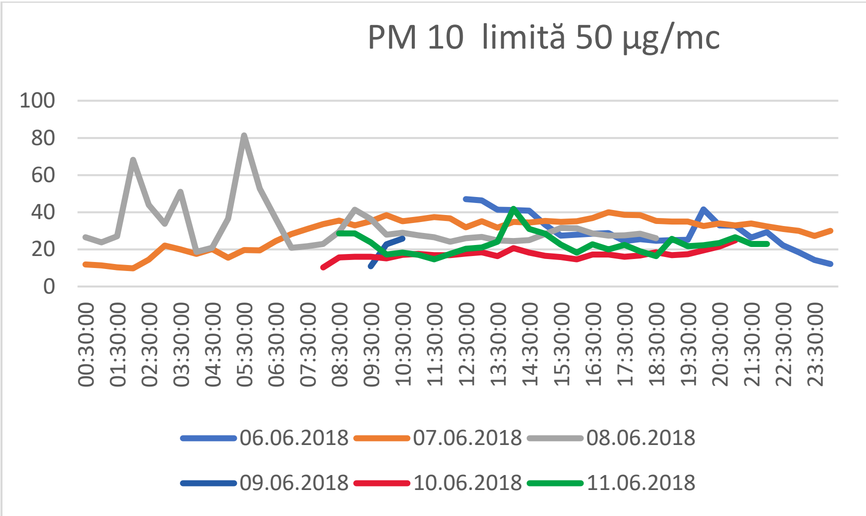


Figure 232. PM_{10} emissions registered in the Stress Section Area

Regarding the noise emissions in the Stress Section Area, an extract from the city noise map representing levels in the area is presented below.

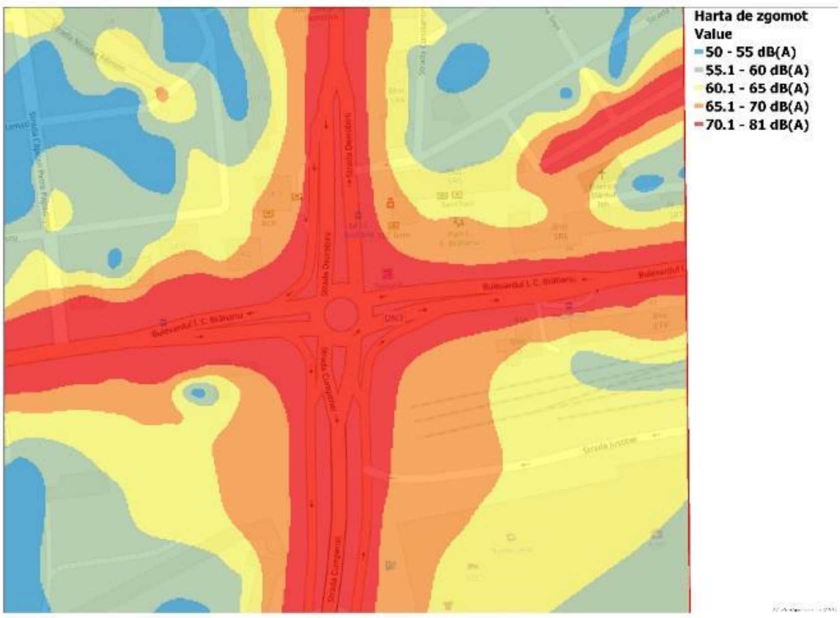


Figure 233. Noise emissions registered in the Stress Section Area

6.3 Outline of Policy context

SUSTAINABLE URBAN MOBILITY PLAN CONSTANTA GROWTH POLE (Constanta SUMP)

The Constanta SUMP is aiming to achieve a sustainable, safe, integrated and accessible transport system, connecting people and places, supporting the economy, environment and quality of life, in the Constanta Growth Pole. High level and operational objectives of the SUMP are listed in the table below. They form the framework through which the MORE street design and modelling work will be developed.

Table 37. High level and operational objectives of the SUMP

High Level Objectives	Operational Objectives
1. **ACCESSIBILITY** – Ensure all citizens are offered transport options that enable access to key destinations and services	- Increase number of people with good access to public transport services to major attractors - Increase density of the cycle network - Increase the percentage of fully accessible public transport vehicles - Increase accessibility for pedestrians (quality of surface, crossings and obstructions) - Reduce the number of vehicles searching for a car parking space - Reduce bus journey times along key corridors of the highway network - Improve accessibility to Mamaia - Increase engagement with socially excluded groups - Increase frequency of bus services
2. **SAFETY AND SECURITY**	- Reduce fatal and serious accidents - Improve pedestrian safety - Increase the awareness level on safety and security issues - Reduce the number of inappropriately parked vehicles
3. **ENVIRONMENT** – Reduce air and noise pollution, greenhouse gas emissions and energy consumption	- Reduce CO, NOx, VOCs, PM10 and CO2 emissions - Reduce noise and vibration levels - No net loss of biodiversity. Improve biodiversity where possible - No reduction in site integrity of Natura 2000 sites - Reduce material use and waste production - Increase percentage of environmentally friendly vehicles
4. **ECONOMIC EFFICIENCY** – Improve the efficiency and cost-effectiveness of the transportation of persons and goods	- Increase pedestrian area - Increase the awareness level on alternative modes of transport - Increase non-car mode share - Reduction of journey time - Minimise congestion - Reduce vehicle operating costs (maintenance)
5. **QUALITY OF URBAN ENVIRONMENT** - Enhancing attractiveness & quality of urban environment for the benefit of citizens, economy and society as a whole	- Rebalance the use of highway space, reduce dominance by private car - Protect and enhance cultural heritage - Increase the sustainable mobility awareness level

The Constanta SUMP emphasized that a number of principal boulevards located throughout the City, including the MORE Feeder Route, I.C. Bratianu Boulevard have been identified as being congested and suffering from high traffic flows, limited pedestrian, cycle and public transport connectivity and poor highway safety. For these reasons, the SUMP proposes the following objectives for improving I.C. Bratianu Boulevard:

- Increase the length of bicycle lanes;
- Increase the operation speed of public transport;
- Increase the accessibility for pedestrians (surface quality, pedestrian crossings and obstacles);
- Increase the non-car mode share;
- Reduce travel time;
- Reduce traffic congestion;
- Reduce vehicle operation costs (maintenance);
- Reduce the number of cars searching for a parking space; and
- Reduction of emissions of CO, NOx, VOCs, PM_{10} and CO_2.

6.4 Design objectives

Taking into consideration the SUMP objectives and also the issues identified in the Stress Section Area the main objectives of MORE design are:

- To improve safety and security for pedestrians;
- To increase the number of bicycle users;
- To improve the Local Public Transport services;
- To improve the quality of the urban environment inside the Stress Area;
- To reduce air and noise pollution.

In the table below we present the specific objectives for each of the street user groups and possible measures, in relation to the City SUMP, that have to be considered during the design exercises implemented with MORE tools.

Table 38. Objectives and measures for street user groups

Road/ Street User	Provision	Measure
Pedestrians	• Provide safe & direct pedestrian crossings • Increase footway provision • Provide consistent pedestrian wayfinding • Reduce vehicle speeds • Adapt the pedestrian infrastructure to the needs of people with reduced mobility	• Crossing facilities • Width of footway • Opportunities to sit • Further street furniture • Trees & greenery • Speed limit • Improved urban realm
Public transport users	• Safe & accessible bus stop provision • Provide seating at bus stops and interchanges	• Width of footway, especially in the proximity of bus stops • Provision of priority lanes for buses • Surveillance & street lighting

	• Provide dedicated infrastructure for buses • Improve bus priority to reduce bus journey times	• Bus stop equipment • Crossing facilities • Improved urban realm
Cyclists	• Provide safe & consistent cycle infrastructure • Reduce vehicle speeds • Provide secure cycle parking	• Increased cycling flows • Reduced casualty rates • Speed limit
Car Drivers/ Passengers	• Cleaner & greener vehicles • Sustainable mode shift • Signing/ road marking improvements to reduce conflicts • Law enforcement	• Reduced traffic volumes • Improved air quality • Speed limit • Number of lanes for general traffic • Reduced collisions • Signing/ road marking improvements to reduce conflicts
Taxi Drivers and Passengers	• Cleaner & greener vehicles • Accessible taxi ranks • Dedicated drop off/ pick up points	• Improved air quality • Speed limit • Parking/ loading facilities- type & restrictions

The designs developed and simulations will be tested for the following periods:

Table 39. Designs tested at different times of day

Period	**Time / season**
Morning peak	07:15 AM - 08:15 AM
Inter-peak	12:00 AM – 01:00 PM
Evening peak	04:45 PM - 05:45 PM

Our action plan for 2020-21 activities can be found below setting out how each of the WP4 tools developed in MORE (design blocks and acetates, Linemap, Traffweb, VISSIM, Appraisal framework tool) will be applied.

Table 40. Design Options - Action Plan

Tasks	2020							2021
	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Stakeholders design days using blocks and acetates								
Design outputs uploaded onto Linemap								
Traffweb consultation on developed designs								
Focus groups for option generation								
Vissim micro simulations		Develop the model						
Design apraisals using Appraising framework tool								

The first Focus Group is planned for end June with the public stakeholders in order to obtain a common vision regarding the priorities of street space reallocation.

Table 41. Stakeholders to be invited to First Focus Group

First Focus Group	
National Authority	National Company for Road Infrastructure Administration (CNAIR – responsible for managing the national road network)
	National Road Police
Municipality Departments	Public Services management Department (roads, taxi, public transport, green spaces, public lightning)
	Development and European Funding Department (responsible for the SUMP implementation and obtaining funding for the SUMP projects implementation)
	Urban Planning and Land Use Division
	House Owners Association Department
	Local Police Department
Municipality Company	Confort Urban Company (responsible for road works and parking management)
	CT BUS Company (local public transport)

7 Design Brief of City Feeder Route – MALMO

7.1 Current conditions: Design objectives and methodology

7.1.1 Overall objectives

The primary aim of the exercise is to use traffic simulation models to test strategies to reduce traffic congestion in the Western Harbour area, by adopting a traffic gating strategy using advanced traffic signal control, and introducing mobility hubs with car parks, encouraging drivers to switch to bus, cycling or micro-mobility modes for the 'last mile'.

More specifically, the objective of the simulation is to work with the existing traffic signals along the entire route in order to reduce the time it takes to get across the bridge that connects Western harbour with Universitetsholmen.

In addition to the signal simulations two different locations for mobility hubs will be examined. The aim of introducing the hubs is to investigate different effects on mobility behaviour in Nyhamnen with reduced queuing times and less traffic as a result. The district is located between the sustainable urban district Western harbour and the international TEN-T road network (Figure 234).

Figure 234. Western harbour is shown as 1, Nyhamnen as 2 and the TEN-T road network as 3

7.1.2 Methodology and Strategy for Metering Traffic Signal Control

Western harbour is a major destination and work zone located on the urban feeder route to/from the TEN-T road network, which applies stress on the urban feeder route capacity with its road user demand during peak traffic. With the continuous development of Western harbour and the upcoming development of Nyhamnen, road user demand is likely to drastically increase. For this reason, and to reduce negative externalities, active traffic management can be used to maintain traffic flows and control potential bottlenecks.

In the MORE project, active traffic management through metering traffic signal control is investigated for morning peak traffic at the urban feeder route in the west/southbound direction. The purpose is to reduce congestion in the city's urban districts of Western harbour and Nyhamnen during morning peak traffic.

In this case, the purpose of metering traffic signal control is to artificially create bottlenecks in controlled locations to reduce congestion in urban districts. In the current situation, the city experiences uncontrolled bottlenecks in the portal between Nyhamnen and Western harbour. The uncontrolled bottlenecks are likely to expand with the development of Nyhamnen.

To reduce congestion in the city's urban districts during morning peak traffic, the traffic will be artificially withheld at Frihamnsviadukten and Västkustvägen. The arrangement will be done by gating southbound traffic at intersections B, C, D and E without disturbing infrastructure of national interests. The methodology between Macro, Meso and Micro models is explained in the section, "Hybrid Dynamec and Vissim method".

To reduce risks for spillover traffic to parallel corridors, the gating is actualized in a two-step process.

Firstly, gating is initiated at intersections B, C and D triggered by real time queue data from location Klaffbron & Universitetsbron (Figure 235). When the queues at intersections B, C and D have built up to a certain degree, gating will be initiated at intersection E. During the gating, queue control will be established for all intersections. Queue control at intersection E is especially important so as not to disturb Spillepengen Trafikplats, which provides access to Malmö Harbour, a harbour of national importance for logistics. Queue control at intersection B is also important as a precaution to not disturb the traffic signal system southeast of intersection B, which is the main urban feeder route from northeast.

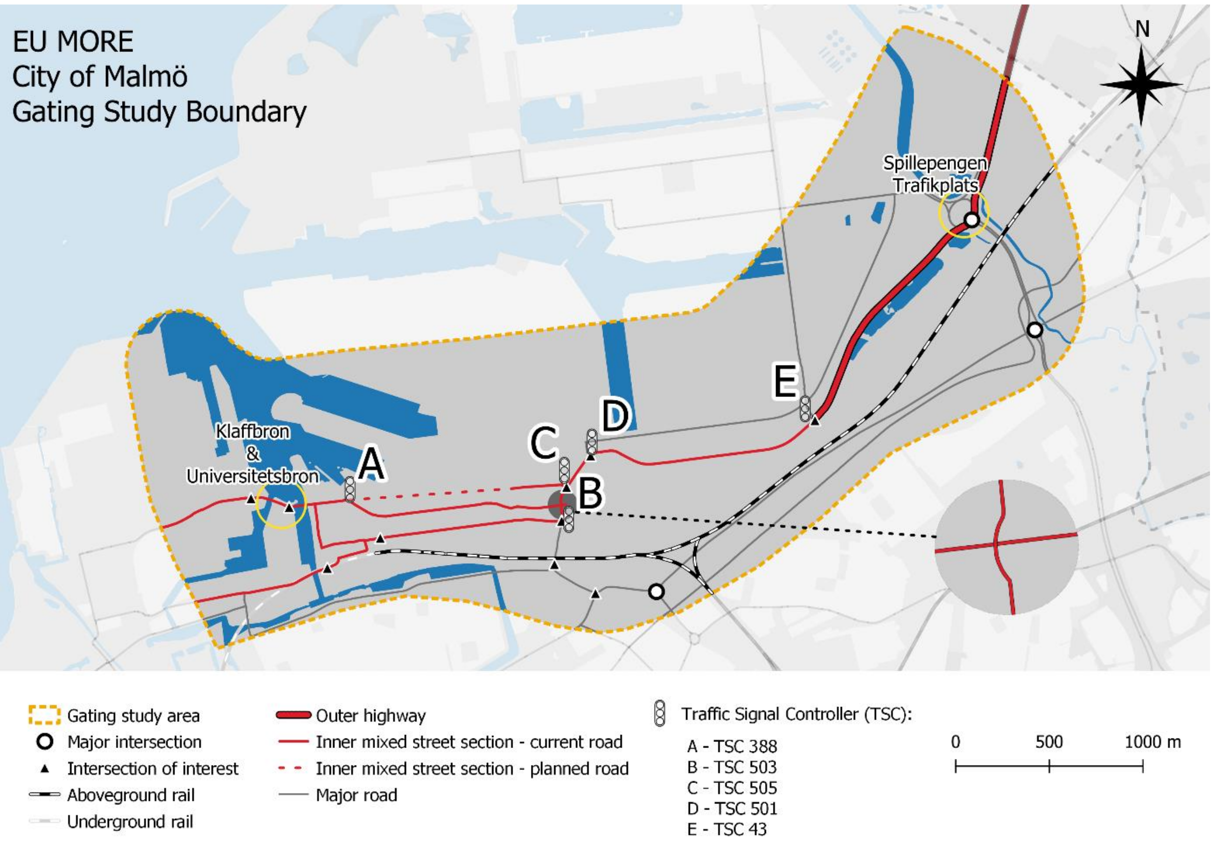


Figure 235. Gating study area

7.2 Methodology and Strategy for Simulations

With the objective to handle the congestion in the inner parts of Malmö, the strategy of gating will be analyzed using traffic models. The first step for the models is to analyze today's bottlenecks. After suggesting a solution for the bottleneck problems, the model will be remade and new results will be analyzed and dealt with. If a problematic bottleneck situation is being handled, the models can show how the new traffic situation is affecting other parts of the network.

The policy strategy includes gating and hubs which must be considered in the models. There are no traffic simulation models that can handle the real situation of a person that changes vehicles. With a hub, the whole trip could be described in a simplified way: driving a car, parking it, walking to the bus, and continuing the trip with the bus. To attack this problem, the simulation model must be programmed in a way that can "simulate" this behavior in another way. We have explored different ways of modelling the gating and hubs strategy using two different simulation programs, Dynameq and Vissim, to investigate the optimal method to manage this task.

7.2.1 Dynameq

During 2017 and 2018, the city of Malmö developed a model for car traffic within the city and the closest relevant surrounding areas using the modelling tool Dynameq. The model was coded completely from scratch. The Dynameq model is used on an ongoing basis in Malmö's work with traffic analysis and is continuously updated and developed by consultants.

Dynameq is a software for mesoscopic analyses of traffic flows in a road network. The software works with a dynamic route choice in comparison to, for example, the macroscopic model Emme, which establishes the whole matrix once and remains static. With the dynamic route choice, the matrix will input groups of vehicles over specific simulation times, such as the morning rush hour, to better simulate the real variations in traffic flows over time during a day. Dynameq has been developed by Inro, a Canadian company which also develops the macro-model Emme. The two programs are similar in structure and coding, which allows the matrices and traffic network to be read from Emme into Dynameq. The network in Dynameq is more detailed at the intersection level and contains information about the signal timing plan.

The model handles only car and heavy vehicle traffic including buses on separate routes. Pedestrians, cyclists and public transport passengers are not included, and subsequently don't affect car traffic in the model through possible conflicts. The free flow can thus be overestimated in certain areas. It should be noted, however, that although the model doesn't have a direct input for pedestrians and cyclists, consideration has been taken where these modes of transport affect the delay for motor vehicles.

The model is coded at a detailed level for all of Malmö municipality but also includes more general coding for all of Burlöv municipality and parts of Lomma municipality up to Lomma. An overview of the model extents is shown in Figure 236.

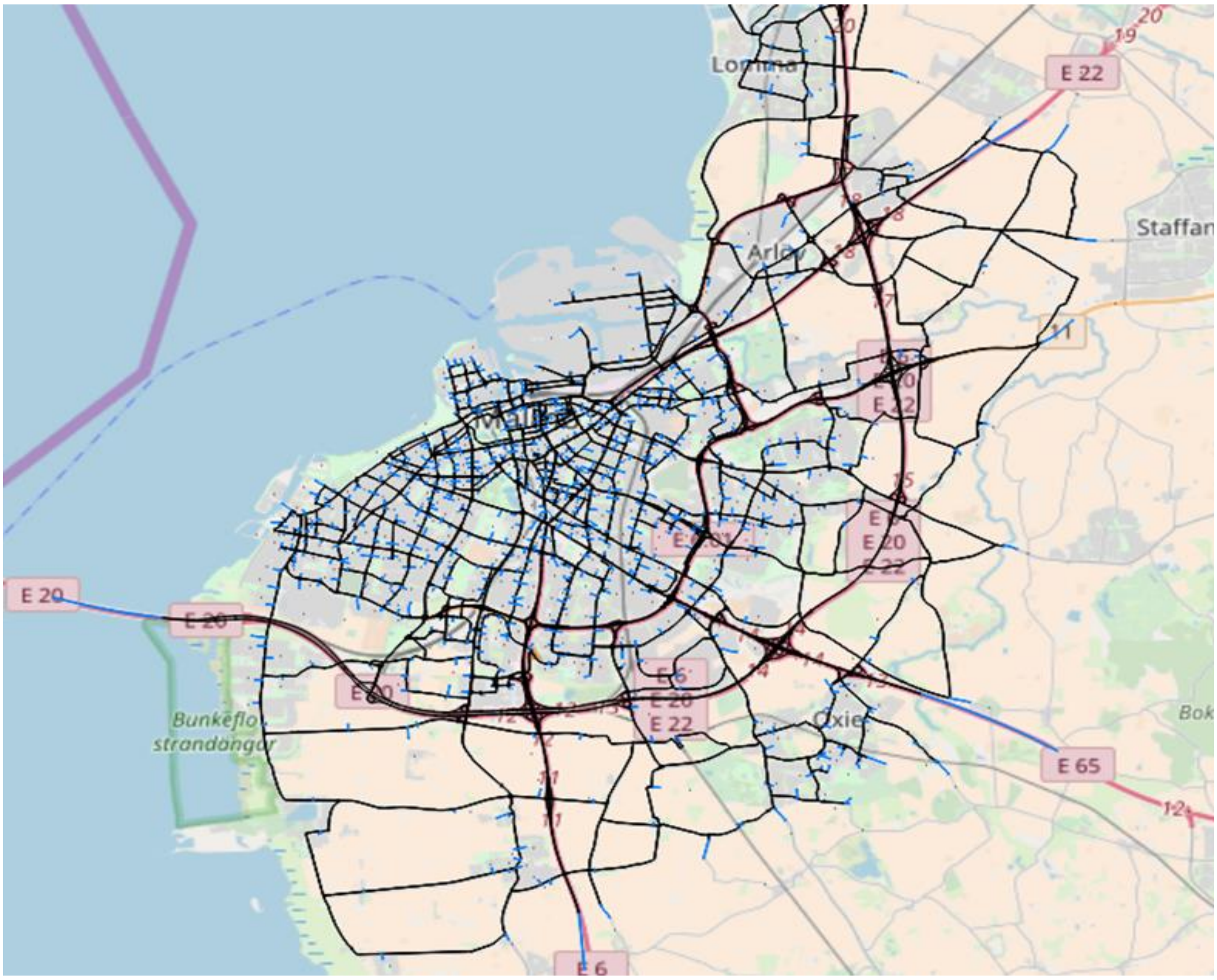


Figure 236. An overview of the entire Dynameq model

7.2.2 Modelling Nyhamnen with Dynameq

By using the existing Dynameq model for Malmö, one can model more realistic and reality-based queue development and route choices of traffic to the hubs (the change points between cars and shuttle buses to Nyhamnen and Western harbour), all while the modelling continues dynamically. There are no functions in this program to simulate a trip via a hub, requiring an alternate method to represent this new way of travel The input of new and specific paths with individually counted trip times between the hubs and the destinations in Western harbour and Nyhamnen allows for the possibility of cars to take this route, in addition to the real road network. Through simple conversion factors, these cars can then be transformed to single passengers. This modelling will be built so the traffic within Nyhamnen (and only in Nyhamnen) will be controlled with the help of gating, i.e. through time setting in individual traffic signals, the flow in Nyhamnen is controlled. For the purposes of gating, the following intersections need to be considered (also shown in Figure 237):

- 1. Västkustvägen - Grimsbygatan

- 2. Västkustvägen - Carlsgatan
- 3. Neptunigatan - Skeppsbron
- 4. The area around Universitetsbron in the eastbound direction (to avoid traffic from the east of Nyhamnen circumnavigating the area and taking a “back way” in).

Alternatively, the area can be extended to consider all of Western harbour via the inclusion of the following intersections:

- 5. Nordenskiöldsgatan - Universitetsbron
- 6. Neptunigatan - Skeppsgatan
- 7. Neptunigatan - Västra Varvsgatan

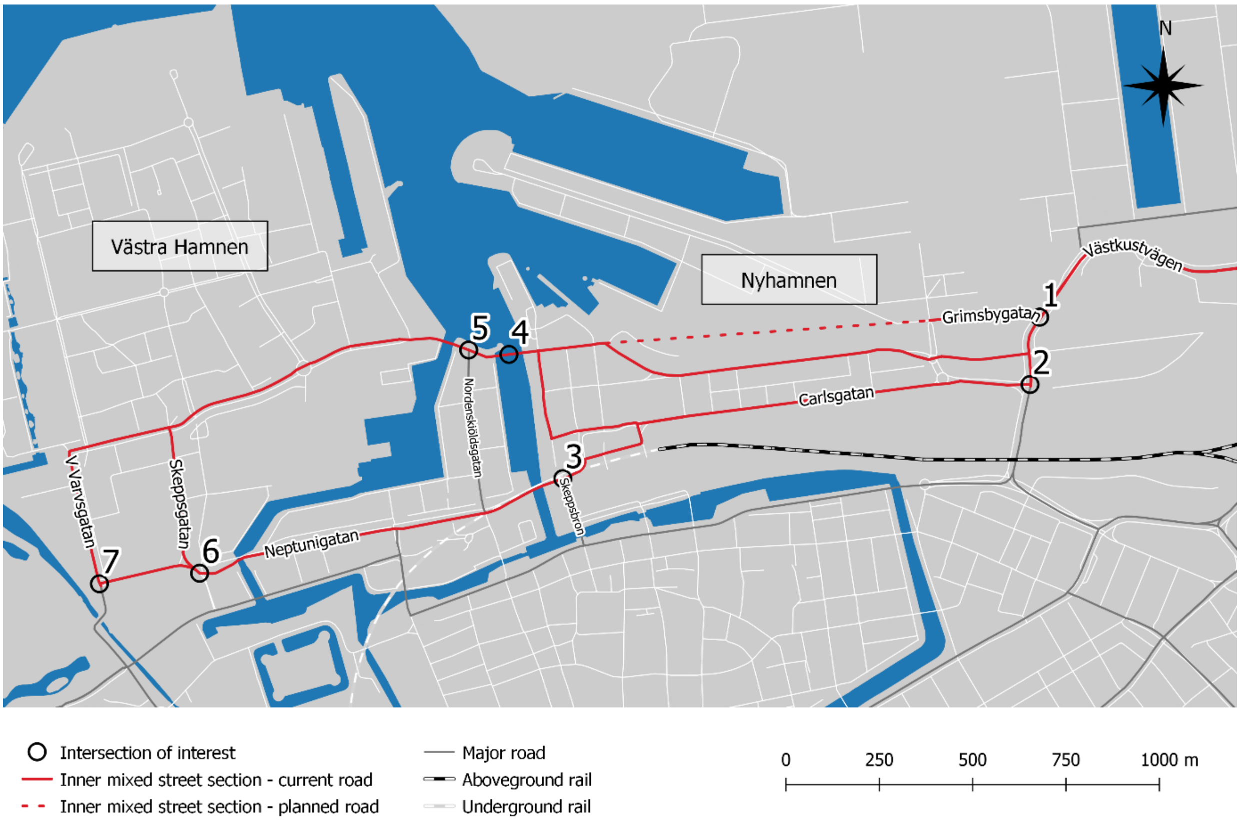


Figure 237. An overview of the important intersections

Analysis will only be done for the morning rush hour, since it is deemed to be the most critical in this case. If the gating and hub establishment works, the traffic flow in the eastbound direction will automatically be even less in the afternoon.

7.2.3 Modelling with a Clipped Area

Another way of modelling could be to cut the main Dynameq model around Western harbour and Nyhamnen, so the generated model is comparable in size to that used in the Vissim part of the method (described later). Then, only traffic from the east going toward Nyhamnen and Western harbour is considered. The hubs are modelled in the same way as in the larger model, with new legs generated between the centroids in Western harbour/Nyhamnen and the hubs.

The disadvantage with a clipped model area is that through traffic from east to west via Neptunigatan and Stora Varvsgatan which doesn't have a destination of Western harbour or Nyhamnen will be stuck in queues without the possibility to choose the new leg via "the hub". To handle this, these occurrences should be nulled in the matrix by assuming that they have chosen other roads in Malmö outside of the model area to avoid a long queue.

7.2.4 Vissim

A microscopic simulation environment, Vissim, is used to analyze the active traffic management measures. Vissim can simulate complex vehicle interactions realistically on a microscopic level, which in this case is especially needed due to the active traffic signal control. Vissim can be used for separate intersections or larger areas where multiple roads and intersections are connected in a network. Vissim handles all vehicle classes such as cars, trucks and buses in different sizes, pedestrians and bicycles with different speeds. The software allows us to model geometries with any level of complexity.

7.2.5 Modelling Nyhamnen with Vissim

First, the measures are tested when the parallel main urban feeder route, Stockholmsvägen, is excluded. Secondly, the measures could be tested including Stockholmsvägen to study the measures from a mesoscopic point of view regarding spill over traffic (Figure 238).

In 2019, the city of Malmö developed a Vissim model for the current and future situations to be used in both the MORE project and in the line production for Nyhamnen. The model was recently extended to include the intersections D and E (Figure 235). The blue area in Figure 238 shows the scope of the model. The red area shows the necessary extension of the Vissim model to study the measurements from a mesoscopic point of view, including the parallel main urban feeder route.

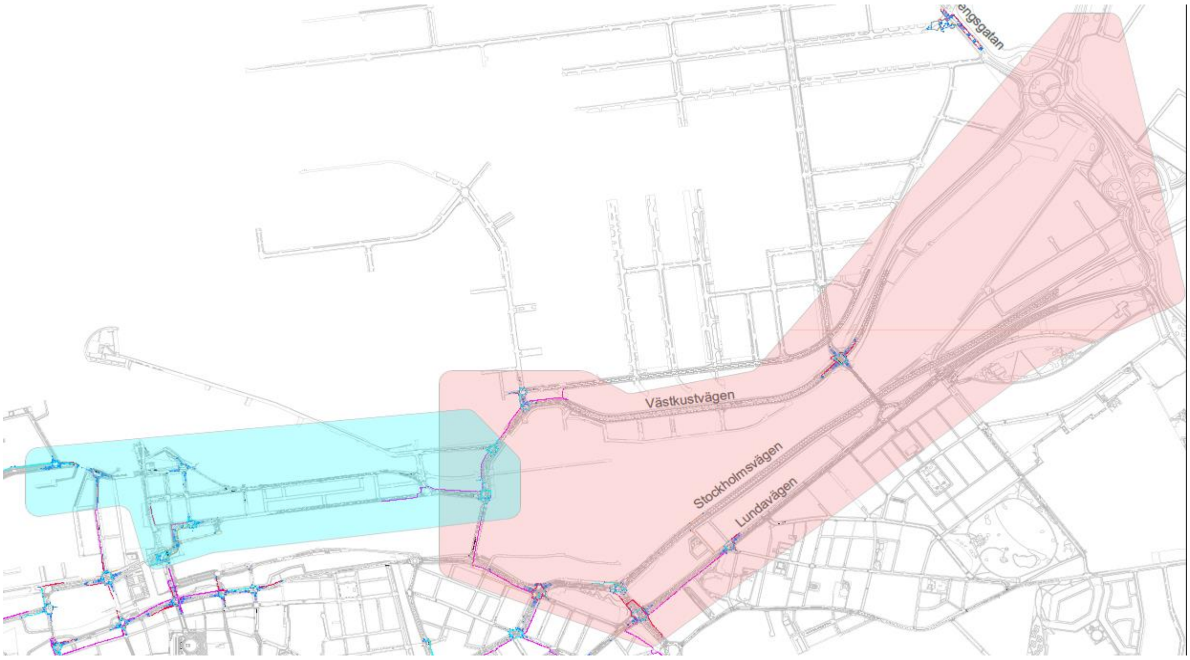


Figure 238. Scope for the mesoscopical simulation model

If only the Vissim model was used, we would not get the full analysis of how the city is affected. Since large traffic flows are being affected, it is assumed that these affects will spread out over a larger area than the model handles. It is also hard to manage a larger Vissim model with the OD-matrices, as they must be done manually with many assumptions for each route choice.

7.2.6 The Hybrid Dynameq and Vissim Method

By combining the advantages of Dynameq's large model area and Vissim's traffic signal details, the precision of the result will likely increase. Through this method, route choices are available across the entire model but queues can still be studied only from the east.

We proceed from the current Dynameq model for Malmö, version 2.0.

1. Initiate new travel matrices from the Malmö model v 2.0 which will be developed for macro analysis during the beginning of 2020 in Dynameq v 2.1. This applies to both the current year and the prognosis year, for the morning and afternoon.
2. Calibrate the current model against measurement data.
3. Refine and break down the traffic network and "legs" in Nyhamnen and Western harbour as needed.
4. Use the current Vissim-model that Malmö has built for analysis of Nyhamnen to understand reasonable traffic volumes for Nyhamnen and which traffic flows will direct the signal controls for the gates.
5. Develop new signal times for the gating arrangement. The signal times will be developed through use of follow-up times and the signal timing plan.

6. Use the new signal times from step 4 in the Dynameq model, both for current and prognosis years. The different time periods in the simulation can receive different signal schedules and, in this way,, we can see that the car traffic load in Nyhamnen can be held at an equal level.
7. Code the legs from the hub(s) to the respective centroid(s) in Western harbour and Nyhamnen. The times for every leg are counted out individually as a function of first and foremost the travel time for the shuttle bus, but also for the waiting time, parking time and a conversion of the financial cost to a general time cost for parking within Western harbour and Nyhamnen. This generalized time cost is taken from the Swedish Transport Administration’s analysis method and calculated economic values for the transport sector (Trafikverket’s ASEK). The legs should, in theory, give infinite capacity so that the travel time is not dependent on how many choose the shuttle bus. The hubs and the legs can be developed differently depending on the scenario.
8. Count the shuttle bus travel time by coding in the bus as its own line in the model and then taking the travel time from that.
9. Run the model with 5-10 different random numbers to minimize the effect of single occurrences in the simulation.
10. Build up the model in Vissim from the Sege/Spillepengen interchange in the east to Stora Varvsgatan/Neptunigatan in the west. To simplify the work, the centroids and legs must correspond to the coding in Dynameq so the matrices can transform automatically. When it comes to the western boundary within Western harbour, a further simplification is needed to make Vissim comparable with Dynameq.
11. Clip out the designated Vissim area in Dynameq so the road network and centroids/legs are identical.
12. In Vissim, the queue lengths are analyzed dynamically in a more detailed manner. The thought is to use dynamic road choices even in the Vissim analysis. The model simulations in Vissim must be done iteratively since both the signal timing plan, which is a part of gating, and the traffic flows on the streets are variable. The final queue lengths taken from the model have converged to a reasonable level.
13. A new analysis can be done in the larger Dynameq network based on the new signal times in Vissim. With a new iteration in the larger Dynameq model, the precision in route choices will be improved. This also includes an estimation of how many will use the hubs.

A possible visualization of the Vissim model is shown in Figure 239.

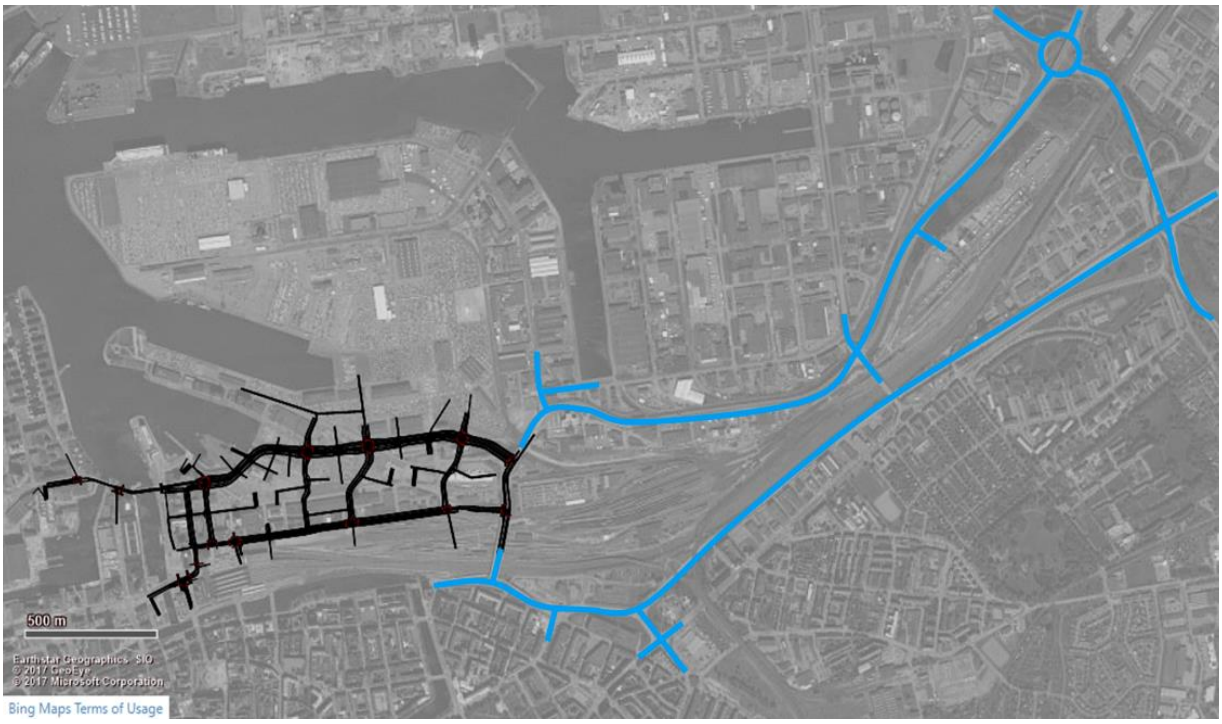


Figure 239. Vissim model

7.2.7 Advantages and Disadvantages of the Hybrid Method

The following text outlines the advantages and disadvantages of the analyses done with Dynameq in combination with Vissim.

Advantages:

- Everything is handled in one model without extra manual work. This means that errors from incorrect sources can be minimized, and it becomes easier to see the whole picture when handling the model.
- Can be modelled either with the whole Dynameq model area or, alternatively, with a smaller clipped area which only describes traffic from the east. If a clipped area is chosen, the traffic which otherwise chooses other roads outside of the model area must be discounted.
- Can handle generalized costs such as parking in a simpler and more understandable way through time values taken from Trafikverket's ASEK.
- Can handle travel time from hubs to centroids for individual destination points in Western harbour and Nyhamnen.
- By using the whole Dynameq model for Malmö, the effect of the whole road network and traffic re-routing can be considered. In this way, even traffic from the south and west can choose the system with the hubs.
- Vissim can handle traffic signals and "minute by minute" detection in a more detailed and dynamic way.

- Congestion which cars experience due to pedestrian and bicycle traffic in the intersections and secondary conflict is handled by Vissim in a more detailed way.

Disadvantages:

- Traffic flow data is dependent on the quality of the hourly matrices in Dynameq. These matrices come from the Malmö Emme model.
- If one handles gating in the larger model, which includes all of Western harbour and Nyhamnen including entrances in the south, this will probably create more queue building in central Malmö.
- It is always a challenge to work iteratively with two models with different origins. It will be important to have the same centroid placement in both models to transform matrix values in a simple manner.

7.3 Conclusion

Since there are different ways to handle this assignment, we have considered the pros and cons of several methods. By only using Dynameq, it would be difficult to achieve the necessary precision in the traffic signals that is demanded for a properly working gating system. By only using Vissim, the effects of changing traffic flows would not be seen outside the modeling area (such as where the queues are spreading out, or alternative route choices).

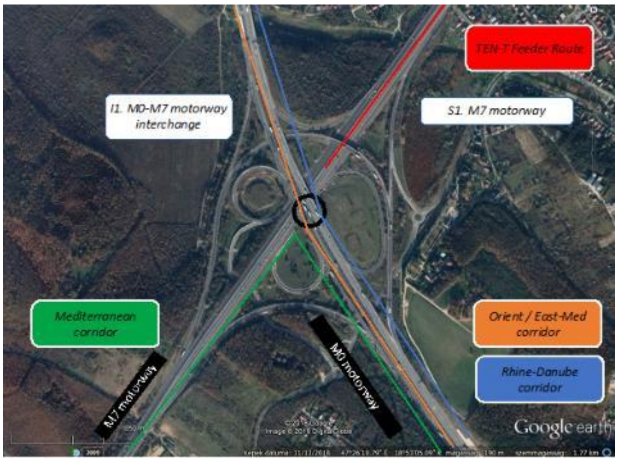
The most important requirement of the simulations is being able to see the traffic effects in a larger network so that the results of this project do not adversely impact other roads or upcoming projects outside of Nyhamnen. To achieve trustworthy results, the metering traffic signal control must also be programmed in a detailed way. Therefore, the hybrid model using both Dynameq and Vissim provides the best solution, and is what we recommend for the MORE project.

8 Appendices

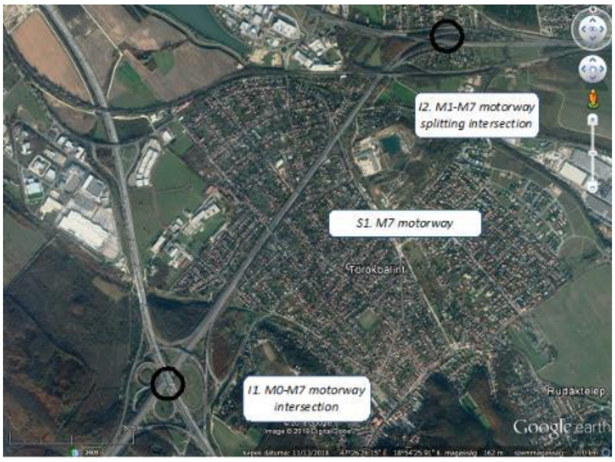
8.1 Budapest

8.1.1 Urban Feeder Route in pictures

<u>I1 – M0-M7 motorway intersection</u>



S1 – M7 motorway section (2x2+1, 130km/h) M3A / P1B



I2 – M1-M7 motorway splitting-intersection M3A / P1B; P1A †

S2 – M1-M7 motorway outer section (2x3+1, 100km/h)

I3 – Egér road intersection

S3 – M1-M7 motorway inner section (2x3+1, 100km/h) M3A / P1B

I4 – Kelenföld railway station interchange

S4 – Budaörsi road outer section (2x3+1, 70km/h) M3A / P2

I5 – Nagyszőlős street intersection

S5 – Budaörsi road inner section (2x2, 50km/h) M3B / P2

I6 – BAH-interchange

S6 – Hegyalja road outer section (2x2, 50km/h) M3B / P2

I7 – Sánc street intersection

S7 – Hegyalja road inner section (2x2, 50km/h) M3B / P1B

I8 – Döbrentei square intersection

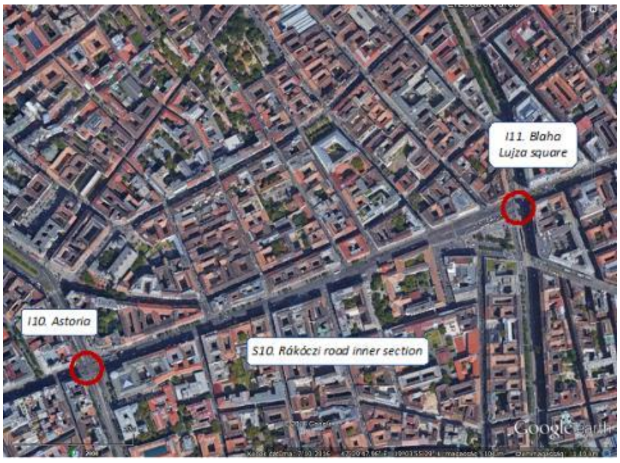
S8 – Erzsébet bridge section (2x2+1(bus line), 50km/h) M3B / P1B

I9 – Ferenciek square interchange

<u>S9 – Kossuth Lajos street section (2x2+1 (bus line), 50km/h) M3B / P3</u>

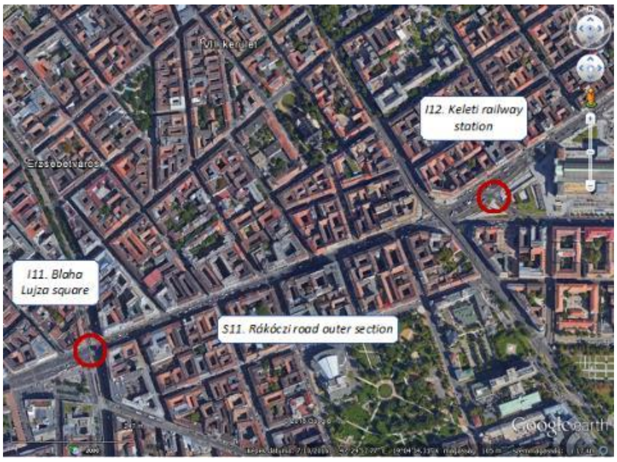
I10 – Astoria interchange

S10 – Rákóczi road inner section (2x2+1(bus lane), 50km/h) M3B / P3

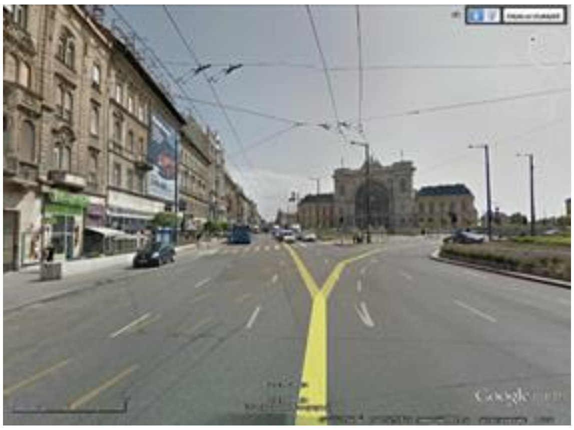


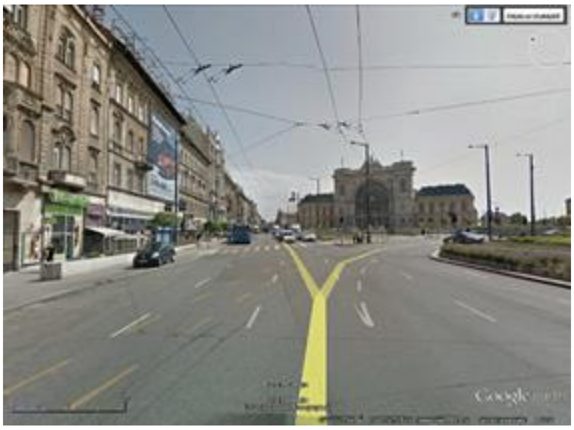
I11 – Blaha Lujza square

S11 – Rákóczi street outer section (2x2+1(bus line), 50km/h) M3B / P2



I12 – Keleti railway station interchange





8.2 Lisbon

8.2.1 Lisboa: Strategic Vision for Mobility until 2030

5 Networks
Pedestrian Network
Vision MOVE Lisboa proposes a continuous, connected, and inclusive pedestrian network that guarantees comfortable and safe travels between residential areas, infrastructures, services, and local commerce, linking these functions to public transport. This network should be attractive, inviting, and accessible to all, regardless of their pedestrian mobility abilities. The whole city should become safer through the diffusion of calming measures and the implementation of protected areas.

Public Transport

Vision

Lisbon should have a comprehensive and accessible public transport system, planned and managed in perfect harmony with the municipal and metropolitan mobility strategies. At the metropolitan level, the priority in terms of public investment in public transport services and their supporting infrastructures should be the development of new rapid transit transport corridors and the increase in connections to Lisbon, including the improvement of the last mile at the ends of the trip, in line with the principles approved at the Summit of the Metropolitan Areas of Lisbon and Porto, in March 2018. The system should be seamlessly interconnected with the rest of the other transport networks and services, and be supported by the single metropolitan pass that drastically simplifies accessibility on public transport. It should guarantee frequency and fluidity, benefiting from its own space-channel and traffic light priority at the intersections, guaranteeing the mobility of its residents and visitors, as well as students and workers who enter the city every day.

Road Network

Vision

MOVE Lisboa proposes a road network that increases the importance and the fluidity on the circular axes of the city and reduces the importance of the radial axes, protecting the centre through increasingly restrictive crown areas. These should be part of a new mental map of circulation in the city, which will promote a more rational use of the automobile and reduce the need to cross the neighbourhoods. Actual traffic speed should be reduced, especially in the local roads, thus increasing road safety. The vehicles that use it must progressively become decarbonised, connected, and shared. Harmonious and safe coexistence among the various modes that share the network should then be a reality.

Cycle Network

Vision

Supported by a continuous, effective and safe network that promotes the daily use of the bicycle on the home-work/school routes by people of all ages, Lisbon proposes to be a cycling city. It should also have a comprehensive network of parking facilities and offer shared bicycle services. The use of the bicycle as a mode of transport should be easy and attractive for this mode to gain relevance in the modal split.

Interface Network

Vision

MOVE Lisboa proposes that the city teams with an efficient and coherent network of interfaces that guarantees the smooth and comfortable interconnection of all modes of the public transport system – municipal, intermunicipal, regional, as well as national and international. This network will comprise: top-level interfaces, which will be the preferred link from neighbouring counties; medium-sized internal interfaces, from where it should be possible to reach any part of the city with one transfer at most; and small nodes next to the centralities, where at least two to three modes intersect, connecting the whole city to the mid-level and upper-level interfaces, at most at the distance of one transfer.

5 Systems

Parking

Vision

MOVE proposes a parking policy that is fully articulated with the city's mobility policies and that adjusts the supply for residents, visitors, and operators of urban logistics in every part of the city. This policy must be supported by an intelligent information system, one which guarantees a high quality of service to the users, as well as a better operational management capacity. Built-in parking should be prioritised against the occupation of the public space, especially in long-term parking, regaining pedestrian spaces and creating public transport corridors and bicycle paths in the centre of the city, as well as access to shared systems, where the PT network is stronger, and promoting Park & Ride solutions in the periphery. The parking of vehicles which are more sustainable than the internal combustion vehicles should be favoured, in order to encourage the replacement of the latter until these new vehicles are representative in the city's car fleet.

Shared Transport and at Request

Vision

MOVE Lisboa proposes that Lisbon promote the emergence of shared and on demand transportation systems which offer different options for different target groups and different destinations throughout the day. In this way, each person will be able to choose, at a given moment, the mode of transport most appropriate to the characteristics of their travel, which will make urban mobility more flexible, efficient, sustainable and inclusive.

Urban Logistics

Vision

Lisbon proposes the development of a sustainable urban logistics system that integrates the needs of local partners and constitutes a factor for economic growth. The city's logistics management model should make use of technologically advanced solutions, information systems, more efficient chains and more compact, lighter and greener vehicles, with higher storage footprint, which will distribute more cargo in less travels. The historic part of the city should gradually become a green urban logistics zone, accessible only to environmentally friendly vehicles, in line with the goals of the White Paper on transport.

Additional Mobility

Vision

MOVE Lisboa offers a set of supplemental services to meet the mobility needs of specific groups of the population who require tailor-made solutions. These services should be made available to the entire population and will tend to be free for the most disadvantaged populations. It is also proposed, whenever necessary, to create new proximity solutions for the essential functions of daily life.

Tourist Transport

Vision

MOVE Lisboa intends to promote walking, cycling, and public transport for tourists, and to ensure the existence of environmentally sustainable tourist transport services in the city which, in close articulation with the transport network, make it possible to respond the expectations of its visitors, particularly those with limited mobility, minimising the impacts on those who live and use the city on a daily basis. Thus, in addition to its light, its intricate neighbourhoods, its historical heritage, its culture and its identity, Lisbon will be able to offer tourists excellent experiences, allowing them to enjoy a qualified public space while ensuring tranquillity to both residents and visitors.

5 Transversal Axes

Media Management, Control and Optimisation

In order to achieve an effective mobility management and mobility system which leads to increasing efficiency, safety, and comfort of travels in various modes, Lisbon assumes itself as a smart city, with an Integrated Management Platform of Lisbon (PGIL – Portuguese acronym), a dedicated data collection and processing structure based on the latest technologies and the best analysis, management, and control algorithms. Lisbon also assumes itself as a dynamic innovation ecosystem, packed with entrepreneurs, start-ups and investors, capable of attracting lighthouse projects like Sharing Cities and global events like the Web Summit.

Lisbon proposes that the analysis, control and optimisation of mobility system resources take place in an Integrated Operational Centre (COI – Portuguese acronym), incorporated in PGIL, which concentrates all relevant information for the mobility management of Lisbon and, whenever possible, of the Metropolitan Area.

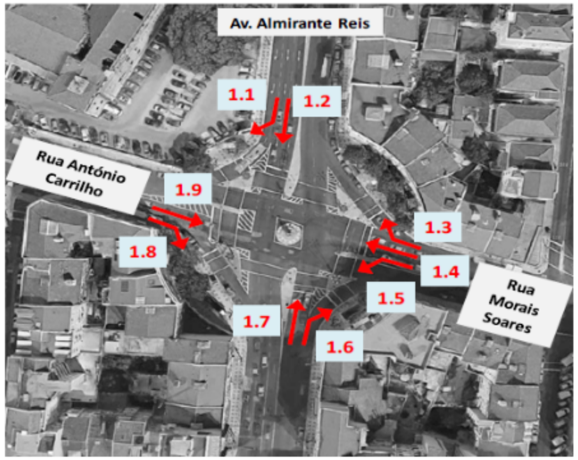
Information, Promotion, Awareness, and Public Participation

In order to enhance the transport infrastructures and maximise their use, it is essential that users have access to clear, simple and interesting information that allows them to make the best use of the system, aware of the existing options and of how to make use of them. On the other hand, it is necessary to promote the most rational options and to ensure that public transport and active modes are truly appealing.

Adding a small budget for information and promotion to a large infrastructure investment can lead to very considerable gains in terms of the number of users.
Financing
The implementation and success of measures to materialise the city's strategic vision for mobility depends on Lisbon's ability to ensure the financial sustainability of the mobility and transport system. This implies, on the one hand, a rational and balanced management of available resources, and on the other, the proactive demand for diversified forms of financing, including structural funds, Community funds, and private funds.
Regulation
The successful implementation of the Lisbon mobility strategic vision also depends on the development of legal, institutional, and regulatory mechanisms to ensure the effective implementation of the measures defined to improve the transport system. The normative instruments oblige the dominant policies, thus they can be used to change the mindsets and behaviours of people, institutions, and businesses by imposing rules, adopting taxes, and creating incentives. To this end, European, national and local legislation and regulations have been created so as to encourage active modes, promote inclusive accessibility, reduce carbon emissions, increase energy efficiency, reduce traffic congestion, and increase road safety. MOVE Lisboa proposes to create or revise regulations that promote the sustainability and effectiveness of the transport system.
Monitoring, Assessment and Review
Public management processes with direct implications on people's daily lives should include monitoring mechanisms that aggregate and process their data and information, producing a set of key indicators to support decision-making. Monitoring can be used to assess processes and make changes that allow for the continuous improvement of the mobility system, greater efficiency of travels, and increased satisfaction of system users. In order to accomplish the strategy, a 3rd generation Sustainable Urban Mobility Plan (PMUS – Portuguese acronym) will be implemented in the city of Lisbon. Monitoring, assessment, and review of the mobility system will be carried out based on the management and control systems as well as on participatory observation platforms of the mobility system, with a set of indicators of public access.

8.2.2 Plant of the section under stress: Parking bays location

8.2.3 Survey: Traffic counting



P1
CONTAGEM DE VEÍCULOS
DIA 11 DEZEMBRO 2019

		Mov. 1						Mov. 2						Mov. 3						Mov. 4						Mov. 5					
Início	Fim	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas
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7:45	8:00	58	4	1	2	0	0	195	20	3	2	6	1	19	0	0	3	0	0	54	4	0	1	3	0	40	5	0	2	1	0
8:00	8:15	94	5	0	2	1	1	226	26	2	3	4	0	14	2	2	0	0	0	82	2	0	2	7	0	58	3	0	1	1	1
8:15	8:30	88	3	1	0	2	0	250	23	2	3	12	0	13	3	0	3	0	0	115	4	0	1	7	1	49	3	1	2	6	0
8:30	8:45	69	4	3	3	2	0	249	28	2	2	17	1	21	2	0	3	1	0	98	3	0	1	10	0	43	5	0	0	6	0
8:45	9:00	49	4	0	1	2	1	258	19	1	2	19	2	12	1	0	4	0	0	108	3	0	2	15	3	39	3	2	1	6	0
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9:15	9:30	58	4	0	3	2	0	311	24	3	5	12	2	16	2	1	5	2	0	84	5	0	3	6	4	45	4	1	2	3	0
9:30	9:45	38	6	0	1	5	1	286	23	3	2	15	1	12	2	0	5	1	0	75	3	0	1	8	4	42	4	0	0	4	0
9:45	10:00	70	8	1	1	2	1	231	25	4	6	4	1	19	2	0	3	0	0	62	6	0	0	3	1	41	3	0	1	4	2

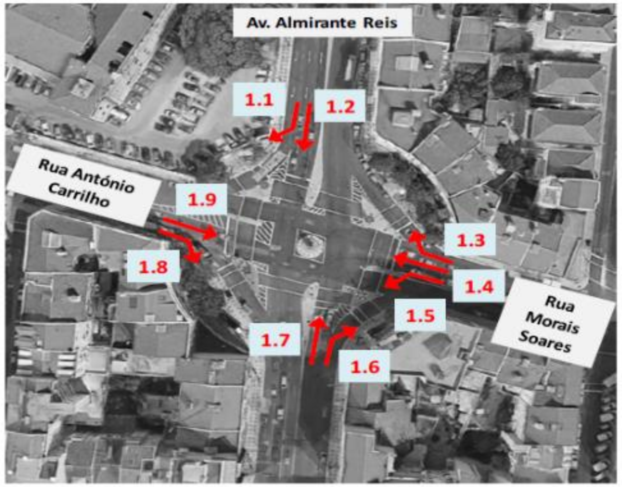
		Mov. 1						Mov. 2						Mov. 3						Mov. 4						Mov. 5					
Início	Fim	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas
12:00	12:15	24	2	2	0	0	0	196	20	2	2	0	2	18	2	0	0	0	0	52	8	0	0	8	0	39	2	2	0	4	0
12:15	12:30	46	0	2	1	1	0	203	16	0	2	8	1	22	1	0	2	1	0	67	5	0	2	5	0	39	3	0	1	6	0
12:30	12:45	43	2	0	1	2	1	207	13	1	0	11	2	25	0	0	2	3	0	61	4	0	0	10	0	38	2	0	1	5	0
12:45	13:00	42	1	0	1	4	0	224	10	0	1	7	1	20	2	0	2	2	1	59	4	0	0	6	1	53	2	0	1	3	0
13:00	13:15	54	3	2	0	5	1	215	9	2	1	3	2	19	3	0	1	3	2	58	3	0	2	7	1	55	1	1	1	4	0
13:15	13:30	57	3	2	1	6	2	223	7	1	1	5	1	17	2	1	1	3	1	48	4	0	2	8	0	48	2	0	0	2	1

		Mov. 1						Mov. 2						Mov. 3						Mov. 4						Mov. 5					
Início	Fim	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas
16:30	16:45	54	6	0	1	1	0	204	12	2	0	1	0	25	1	0	2	1	1	49	2	0	1	6	0	22	1	0	2	3	1
16:45	17:00	67	7	1	0	4	0	201	9	3	1	7	2	23	1	0	4	1	1	53	2	1	2	9	2	42	2	0	3	6	2
17:00	17:15	46	2	0	0	0	0	226	11	1	2	1	3	28	1	1	2	2	0	61	1	0	3	7	1	43	2	1	1	4	2
17:15	17:30	38	5	1	0	0	0	193	14	0	1	5	1	23	2	0	0	0	0	50	2	1	2	7	1	41	1	0	1	4	0
17:30	17:45	44	3	1	3	1	0	203	10	2	2	4	0	34	3	2	5	0	1	47	4	0	1	6	0	52	1	0	1	7	1
17:45	18:00	74	9	0	1	2	0	277	9	2	3	4	1	27	3	1	1	1	0	42	1	0	2	5	1	51	0	1	2	5	1

Mov. 6						Mov. 7						Mov. 8						Mov. 9					
Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas
3	1	0	1	1	0	144	6	3	3	6	1	11	1	1	0	2	0	17	5	0	1	1	0
4	0	0	0	0	0	152	14	6	4	6	0	15	3	0	0	1	0	22	2	0	3	0	0
2	1	0	0	0	0	209	11	1	3	4	0	6	1	0	0	1	0	27	2	0	0	1	0
0	0	0	0	0	0	231	12	1	3	5	1	9	2	1	0	3	0	24	4	0	2	0	0
2	0	0	0	0	0	255	19	1	2	7	0	10	3	0	0	2	0	25	3	1	1	3	0
1	0	0	0	0	0	237	17	2	3	6	2	9	1	1	0	1	0	31	3	0	0	6	0
3	1	0	0	0	0	265	11	0	1	6	1	13	1	0	0	0	0	35	4	0	3	3	0
2	1	0	0	0	0	266	15	0	3	7	0	17	4	0	1	2	0	26	4	0	1	3	0
1	0	0	0	1	0	228	17	3	2	12	1	14	3	0	0	1	0	27	3	0	2	3	1
0	0	0	0	0	0	217	17	1	2	5	0	11	1	0	1	0	1	32	3	0	3	1	0

Mov. 6						Mov. 7						Mov. 8						Mov. 9					
Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas
6	2	0	0	0	0	262	18	2	2	16	4	16	0	0	0	2	0	34	0	0	4	8	0
11	0	0	0	0	0	258	17	2	3	7	1	15	2	0	0	0	1	42	1	0	1	5	0
1	0	0	0	1	0	249	19	1	3	4	0	13	0	3	0	1	1	25	0	0	1	3	1
10	0	0	0	0	0	317	21	1	4	12	2	12	1	0	0	2	0	40	2	0	3	2	0
3	0	0	0	1	0	302	18	2	2	9	1	10	1	2	0	1	0	27	2	0	2	4	0
1	0	0	0	0	0	313	19	1	3	11	1	13	2	0	0	1	0	33	3	0	1	3	0

Mov. 6						Mov. 7						Mov. 8						Mov. 9					
Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas
8	0	0	0	0	0	360	11	3	2	5	1	12	0	0	0	2	0	32	2	0	2	2	1
10	0	0	0	1	1	394	22	3	2	19	2	11	1	0	0	5	0	38	1	0	2	2	1
11	0	0	0	3	0	430	10	2	1	15	0	11	4	0	0	1	1	34	0	0	5	2	1
7	1	0	0	2	0	399	12	3	3	11	2	20	1	0	0	0	0	38	1	0	5	4	2
14	1	0	0	1	0	444	17	3	2	13	1	21	2	2	0	2	0	47	2	0	3	3	0
16	1	0	0	0	1	458	17	5	1	12	0	15	3	2	0	5	0	50	1	0	4	4	0



P1

CONTAGEM DE VEÍCULOS
DIA 12 DEZEMBRO 2019

		Mov. 1						Mov. 2						Mov. 3						Mov. 4						Mov. 5					
Início	Fim	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas
7:30	7:45	31	3	0	2	3	0	174	26	2	1	6	1	11	1	0	2	1	0	39	2	0	1	4	2	30	4	0	2	0	3
7:45	8:00	62	4	0	2	5	0	198	18	9	2	8	0	19	3	0	3	1	0	66	3	0	1	3	0	39	3	0	1	4	0
8:00	8:15	82	7	1	2	4	0	232	17	3	4	5	1	21	2	0	3	2	0	101	7	1	2	5	1	55	5	0	1	2	1
8:15	8:30	79	3	2	1	3	0	256	22	2	1	9	0	17	3	0	2	0	0	87	3	0	2	6	0	47	2	0	1	4	1
8:30	8:45	75	4	1	1	0	1	333	21	4	1	11	2	18	1	0	3	0	0	87	3	0	0	4	2	51	3	0	2	8	2
8:45	9:00	64	6	2	2	3	1	289	19	3	2	9	0	17	3	0	2	2	1	92	8	2	2	5	1	46	6	0	2	6	1
9:00	9:15	51	6	0	0	0	0	297	24	1	3	10	3	19	3	2	2	1	0	91	2	0	1	8	4	66	6	0	0	6	1
9:15	9:30	56	3	1	2	1	1	305	21	3	3	11	1	17	2	1	2	1	0	70	6	1	1	5	1	51	3	0	2	5	0
9:30	9:45	36	1	0	1	0	0	256	17	6	6	12	1	16	3	0	3	0	0	75	14	0	1	4	0	49	7	1	3	4	1
9:45	10:00	58	1	0	0	1	0	224	15	6	4	8	0	27	1	0	2	4	1	72	5	1	2	5	0	36	1	0	2	3	0

		Mov. 1						Mov. 2						Mov. 3						Mov. 4						Mov. 5					
Início	Fim	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas
12:00	12:15	40	6	0	1	1	0	257	22	0	0	7	1	23	2	1	3	1	0	31	3	0	1	10	0	41	3	1	1	3	0
12:15	12:30	56	4	0	1	2	1	263	16	3	2	13	2	21	1	0	2	2	0	52	5	1	1	11	0	54	3	0	1	5	1
12:30	12:45	33	2	0	0	2	1	221	17	2	1	3	0	25	2	0	2	1	0	59	5	0	1	4	5	43	3	1	1	6	0
12:45	13:00	46	3	1	2	1	0	242	18	4	1	8	2	21	3	0	2	1	0	53	4	1	1	5	1	47	5	0	2	8	0
13:00	13:15	42	3	0	0	3	1	203	10	1	0	6	1	16	2	0	4	0	0	44	4	0	2	13	0	36	3	0	1	3	0
13:15	13:30	45	3	1	1	1	1	222	11	2	2	12	2	14	4	1	3	1	1	46	3	1	1	9	0	35	2	1	1	4	0

		Mov. 1						Mov. 2						Mov. 3						Mov. 4						Mov. 5					
Início	Fim	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motos	Bicicletas
16:30	16:45	54	9	0	1	0	0	199	12	0	1	0	2	26	1	0	4	2	0	56	2	0	1	4	1	34	1	0	2	7	0
16:45	17:00	67	8	1	1	3	0	207	6	2	3	3	0	25	1	0	3	1	0	41	5	1	2	3	0	35	3	0	2	7	1
17:00	17:15	39	3	0	1	4	0	192	10	2	3	7	3	41	2	2	0	1	1	52	6	0	2	2	1	42	3	0	1	4	0
17:15	17:30	53	1	0	2	0	0	194	14	0	0	5	2	34	3	0	3	1	0	56	5	0	3	8	2	55	4	1	2	6	1
17:30	17:45	61	7	1	3	2	0	225	16	1	2	3	1	28	3	1	1	0	1	48	4	0	3	5	3	45	3	0	1	8	2
17:45	18:00	73	5	2	1	1	0	274	11	2	1	6	1	30	4	0	2	0	1	60	4	0	2	6	2	47	3	0	2	7	3

Mov. 6						Mov. 7						Mov. 8						Mov. 9					
Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas
0	0	0	0	0	0	120	6	0	3	2	1	9	1	0	0	0	0	18	5	0	1	1	0
2	0	0	0	0	0	160	9	2	2	2	0	8	1	0	0	1	0	30	2	0	2	0	0
4	1	0	0	0	0	219	8	0	2	3	0	13	1	0	0	1	0	34	2	0	1	2	0
6	0	0	0	1	0	242	7	2	4	3	1	14	1	0	0	1	0	26	1	0	1	0	0
3	1	0	0	0	1	280	6	2	3	6	1	7	0	2	0	0	0	24	1	1	1	1	0
5	0	0	0	1	0	223	6	2	4	7	1	9	1	1	0	1	0	21	2	0	2	2	0
2	1	0	0	0	0	252	10	0	4	7	1	12	1	0	0	3	0	29	1	0	1	1	0
6	0	0	0	1	0	255	8	1	2	5	1	10	1	0	0	1	1	35	3	0	1	2	0
8	0	0	0	0	0	236	11	1	1	3	0	20	2	0	0	3	0	35	1	0	0	2	0
2	1	0	0	3	0	221	6	3	1	2	0	12	0	1	1	0	1	24	1	0	0	1	1

Mov. 6						Mov. 7						Mov. 8						Mov. 9					
Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas
9	0	0	0	0	0	314	26	0	3	8	2	14	0	1	0	0	0	28	5	1	2	1	0
6	0	0	0	3	0	291	19	2	4	12	2	19	2	0	0	3	0	31	2	1	2	3	0
8	0	0	0	0	0	342	21	3	4	13	1	14	2	0	0	2	1	33	1	0	1	2	0
11	0	0	0	2	0	311	16	3	4	15	2	16	3	0	1	4	1	40	3	1	1	3	0
7	0	0	0	1	0	295	23	1	1	13	1	25	3	0	2	2	0	43	2	0	0	4	3
5	0	0	0	2	0	334	25	3	4	17	2	28	2	0	2	5	0	51	3	0	1	2	0

Mov. 6						Mov. 7						Mov. 8						Mov. 9					
Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas	Ligeiros	Vans Mercadorias	Pesados Mercadorias	Autocarros	Motas	Bicicletas
11	0	0	0	0	0	401	12	5	2	6	0	18	0	0	0	1	1	29	2	0	1	3	4
9	0	0	0	1	0	456	24	2	3	13	0	12	4	0	0	1	0	46	1	0	2	2	0
5	0	0	0	0	0	418	13	2	1	7	1	11	1	0	0	2	1	47	1	0	1	3	0
10	1	0	0	1	0	442	22	3	2	10	0	16	0	1	0	2	0	48	1	0	2	4	1
15	0	0	0	3	1	458	25	5	3	14	1	22	1	2	0	4	0	61	2	0	3	2	1
9	1	0	0	0	0	443	19	3	1	22	2	21	2	0	0	3	0	54	1	0	3	3	2

8.2.4 Survey: Average speed travel

SENTIDO PRAÇA DO CHILE -> PRAÇA PAIVA COUCEIRO Indicação dos pontos de medição (50 em 50 metros)	Rua Morais Soares Nº:	Código do Ponto	Peão_1	Peão_2	Peão_3	Peão_4	Peão_5	Peão_6
Esquina da Praça do Chile	173	INÍCIO	09:39:01	10:16:00	11:55:30	12:55:27	17:39:47	17:55:29
Esquina após Rua Francisco Sanches	157	A	09:39:49	10:16:34	11:57:57	12:57:58	17:40:24	17:57:58
Toldo vermelho Supermercado Japão	135	B	09:40:32	10:17:51	12:00:13	12:59:52	17:41:08	18:00:26
Esquina antes da Rua Cavaleiro de Oliveira (casa das chaves)	107	C	09:41:21	10:18:25	12:01:26	13:01:43	17:42:15	18:01:43
Primeiro prédio depois da Rua Heróis de Quionga (Vitrine)	103	D	09:42:10	10:19:15	12:03:05	13:02:59	17:42:57	18:02:59
Último prédio antes da Calçada Poço dos Mouros (multiopticas)	93	E	09:42:59	10:19:51	12:04:43	13:04:52	17:44:48	18:04:52
Paragem BUS (Pastelaria Flor)	89	F	09:45:02	10:21:09	12:07:23	13:07:22	17:45:57	18:07:22
Frutaria	75	G	09:45:39	10:21:56	12:08:00	13:08:22	17:46:37	18:09:02
Euroshop	65	H	09:46:17	10:23:00	12:08:49	13:09:38	17:48:13	18:11:00
Passadeira primeiro prédio a seguir à Rua Carrilho Videira	55	I	09:48:44	10:23:41	12:20:55	13:20:33	17:49:38	18:21:10
Toldo branco do Bom Paladar (Buondi)	45	J	09:49:32	10:24:54	12:21:48	13:21:48	17:50:22	18:23:59
Ultimo prédio esquina para a Praça Paiva Couceiro	41	K	09:50:31	10:25:31	12:23:10	13:23:32	17:51:01	18:25:36
P Paiva Couceiro Jardim		L	09:52:31	10:26:22	12:25:01	13:24:58	17:52:41	18:27:01
	HORA DE INÍCIO		09:39:01	10:16:00	11:55:30	12:55:27	17:39:47	17:55:29
	HORA DE FIM		09:52:31	10:26:22	12:25:01	13:24:58	17:52:41	18:27:01

Código do Ponto	HORAS DOS PERCURSOS DE LIGEIROS Veículo_1	Veículo_2	Veículo_3	Veículo_4	Veículo_5	Veículo_6
INÍCIO	07:35:34	07:57:38	11:40:31	12:31:14	17:22:05	17:54:34
A	07:35:42	07:58:00	11:41:20	12:31:34	17:22:21	17:55:03
B	07:35:51	07:58:12	11:41:28	12:32:01	17:22:54	17:55:11
C	07:36:43	07:58:30	11:41:42	12:32:27	17:23:14	17:56:01
D	07:37:16	07:58:48	11:41:52	12:32:36	17:23:32	17:56:13
E	07:37:23	07:59:02	11:41:59	12:32:43	17:23:57	17:56:24
F	07:37:30	07:59:25	11:42:06	12:32:50	17:24:22	17:56:30
G	07:37:34	07:59:34	11:42:12	12:32:59	17:24:35	17:56:41
H	07:37:40	07:59:51	11:42:15	12:33:12	17:24:45	17:56:50
I	07:37:44	07:59:55	11:42:32	12:33:19	17:24:52	17:56:59
J	07:37:53	08:00:03	11:42:52	12:34:45	17:25:06	17:57:13
K	07:38:59	08:01:10	11:43:01	12:34:52	17:25:15	17:57:36
L	07:40:05	08:02:08	11:44:01	12:35:11	17:25:51	17:58:12
HORA DE INÍCIO	07:35:34	07:57:38	11:40:31	12:31:14	17:22:05	17:54:34
HORA DE FIM	07:40:05	08:02:08	11:44:01	12:35:11	17:25:51	17:58:12

Código do Ponto	HORAS DOS PERCURSOS DE AUTOCARROS BUS_1	BUS_2	BUS_3	BUS_4	BUS_5	BUS_6
INÍCIO	07:47:04	09:24:54	12:57:30	13:20:40	16:24:12	17:00:21
A	07:48:29	09:25:29	12:57:55	13:20:55	16:25:00	17:00:51
B	07:48:40	09:26:13	12:58:35	13:21:38	16:25:10	17:01:10
C	07:49:06	09:26:45	12:58:46	13:21:51	16:25:39	17:01:30
D	07:49:14	09:26:50	12:58:54	13:22:09	16:25:48	17:01:40
E	07:49:19	09:26:56	12:59:02	13:22:18	16:26:45	17:02:27
F	07:49:32	09:27:22	12:59:14	13:22:25	16:26:55	17:02:48
G	07:49:57	09:27:38	12:59:56	13:23:10	16:27:02	17:02:55
H	07:50:04	09:27:45	13:00:04	13:23:21	16:27:09	17:03:04
I	07:50:09	09:28:01	13:00:19	13:23:36	16:27:48	17:03:33
J	07:51:28	09:29:00	13:00:39	13:23:56	16:30:06	17:05:03
K	07:51:36	09:29:12	13:00:56	13:24:13	16:30:16	17:05:24
L	07:52:11	09:29:48	13:01:45	13:24:45	16:30:54	17:06:03
HORA DE INÍCIO	07:47:04	09:24:54	12:57:30	13:20:40	16:24:12	17:00:21
HORA DE FIM	07:52:11	09:29:48	13:01:45	13:24:45	16:30:54	17:06:03

SENTIDO PRAÇA DO CHILE -> PRAÇA PAIVA COUCEIRO Indicação dos pontos de medição (50 em 50 metros)	Rua Morais Soares Nº:	Código do Ponto	HORAS DOS PERCURSOS DE PEÕES Peão_1	Peão_2	Peão_3	Peão_4	Peão_5	Peão_6	Média Peão
Esquina da Praça do Chile	173	INÍCIO							
Esquina após Rua Francisco Sanches	157	A	3.75	5.29	1.22	1.19	4.86	1.21	2.92
Toldo vermelho Supermercado Japão	135	B	4.19	2.34	1.32	1.58	4.09	1.22	2.46
Esquina antes da Rua Cavaleiro de Oliveira (casa das chaves)	107	C	3.67	5.29	2.47	1.62	2.69	2.34	3.01
Primeiro prédio depois da Rua Heróis de Quionga (Vitrine)	103	D	3.67	3.60	1.82	2.37	4.29	2.37	3.02
Último prédio antes da Calçada Poço dos Mouros (multiopticas)	93	E	3.67	5.00	1.84	1.59	1.62	1.59	2.55
Paragem BUS (Pastelaria Flor)	89	F	1.46	2.31	1.12	1.20	2.61	1.20	1.65
Frutaria	75	G	4.86	3.83	4.86	3.00	4.50	1.80	3.81
Euroshop	65	H	4.74	2.81	3.67	2.37	1.88	1.53	2.83
Passadeira primeiro prédio a seguir à Rua Carrilho Videira	55	I	1.22	4.39	0.25	0.27	2.12	0.30	1.43
Toldo branco do Bom Paladar (Buondi)	45	J	3.75	2.47	3.40	2.40	4.09	1.07	2.86
Ultimo prédio esquina para a Praça Paiva Couceiro	41	K	3.05	4.86	2.20	1.73	4.62	1.86	3.05
Praça Paiva Couceiro Jardim		L	1.50	3.53	1.62	2.09	1.80	2.12	2.11
	TOTAL DO PERCURSO		2.67	3.47	1.22	1.22	2.79	1.14	2.09

Código do Ponto	HORAS DOS PERCURSOS DE LIGEIROS Veículo_1	Veículo_2	Veículo_3	Veículo_4	Veículo_5	Veículo_6	Média Veículo
INÍCIO							
A	22.50	8.18	3.67	9.00	11.25	6.21	10.14
B	20.00	15.00	22.50	6.67	5.45	22.50	15.35
C	3.46	10.00	12.86	6.92	9.00	3.60	7.64
D	5.45	10.00	18.00	20.00	10.00	15.00	13.08
E	25.71	12.86	25.71	25.71	7.20	16.36	18.93
F	25.71	7.83	25.71	25.71	7.20	30.00	20.36
G	45.00	20.00	30.00	20.00	13.85	16.36	24.20
H	30.00	10.59	60.00	13.85	18.00	20.00	25.41
I	45.00	45.00	10.59	25.71	25.71	20.00	28.67
J	20.00	22.50	9.00	2.09	12.86	12.86	13.22
K	2.73	2.69	20.00	25.71	20.00	7.83	13.16
L	2.73	3.10	3.00	9.47	5.00	5.00	4.72
TOTAL DO PERCURSO	7.97	8.00	10.29	9.11	9.56	9.91	9.14

Código do Ponto	HORAS DOS PERCURSOS DE AUTOCARROS BUS_1	BUS_2	BUS_3	BUS_4	BUS_5	BUS_6	Média BUS
INÍCIO							
A	2.12	5.14	7.20	11.76	3.75	6.02	6.00
B	16.36	4.10	4.50	4.18	18.00	9.44	9.43
C	6.92	5.60	16.36	14.12	6.21	8.79	9.67
D	22.50	32.83	22.50	10.04	20.00	19.90	21.30
E	36.00	32.56	22.50	20.00	3.16	3.79	19.67
F	13.85	6.93	15.00	25.28	18.00	8.76	14.64
G	7.20	11.26	4.29	4.05	25.71	25.48	13.00
H	25.71	24.86	22.50	15.69	25.71	20.11	22.43
I	36.00	11.41	12.00	12.08	4.62	6.12	13.70
J	2.28	3.05	9.00	8.86	1.30	2.00	4.42
K	22.50	15.00	10.59	10.72	18.00	8.57	14.23
L	5.14	5.00	3.67	5.58	4.74	4.62	4.79
TOTAL DO PERCURSO	7.04	7.35	8.47	8.81	5.37	6.32	7.22

SENTIDO PRAÇA PAIVA COUCEIRO -> PRAÇA DO CHILE Indicação dos pontos de medição (50 em 50 metros)	Rua Morais Soares Nº:	Código do Ponto	HORAS DOS PERCURSOS DE PEÕES Peão_1	Peão_2	Peão_3	Peão_4	Peão_5	Peão_6
Praça Paiva Couceiro Jardim		L	09:00:14	09:55:43	12:12:00	13:00:10	16:37:19	17:40:09
Esquina a seguir à Clinica Prontodente	46	K	09:00:53	09:56:26	12:12:47	13:01:54	16:38:23	17:41:58
Talho 29 toldo vermelho	50	J	09:01:34	09:57:11	12:13:33	13:03:39	16:39:29	17:43:56
Passadeira Farmácia são João	56	I	09:02:11	09:58:57	12:15:24	13:05:27	16:41:27	17:47:56
CTT	66	H	09:02:59	09:59:48	12:16:22	13:07:09	16:42:40	17:49:52
Bazar Económico II	70	G	09:03:48	10:00:48	12:17:27	13:08:48	16:44:02	17:52:11
Montepio	80	F	09:04:25	10:01:28	12:18:09	13:10:12	16:45:04	17:53:41
Esquina após Rua Carvalho Araújo (quiosque)	88	E	09:05:05	10:02:15	12:19:00	13:12:15	16:46:14	17:55:28
Semáforo (Mercado Morais Soares)	102	D	09:05:36	10:03:06	12:19:53	13:13:51	16:47:25	17:57:12
Semáforo (NOTE)	116	C	09:06:16	10:03:59	12:20:58	13:15:49	16:48:21	17:59:06
Prédio a seguir ao túnel	132	B	09:06:53	10:04:39	12:21:42	13:17:40	16:49:16	18:00:38
Semáforo antes da esquina (Lla Pronto a vestir)	162	A	09:07:30	10:05:30	12:22:52	13:19:08	16:50:09	18:02:39
Esquina da Praça do Chile (Gold_Tec	174	FIM	09:08:21	10:06:24	12:23:39	13:20:41	16:51:21	18:04:42
	HORA DE INÍCIO		09:00:14	09:55:43	12:12:00	13:00:10	16:37:19	17:40:09
	HORA DE FIM		09:08:21	10:06:24	12:23:39	13:20:41	16:51:21	18:04:42

Código do Ponto	HORAS DOS PERCURSOS DE LIGEIROS Veículo_1	Veículo_2	Veículo_3	Veículo_4	Veículo_5	Veículo_6
L	07:43:20	08:04:25	11:46:04	12:37:34	17:29:53	18:01:18
K	07:43:49	08:04:35	11:46:41	12:38:27	17:30:49	18:02:14
J	07:43:58	08:05:04	11:46:46	12:38:34	17:30:58	18:02:21
I	07:44:10	08:05:41	11:47:00	12:38:42	17:31:15	18:02:27
H	07:44:18	08:05:54	11:47:08	12:38:50	17:31:30	18:02:36
G	07:44:30	08:06:01	11:47:14	12:38:54	17:32:05	18:02:43
F	07:44:43	08:06:19	11:47:22	12:39:01	17:32:16	18:02:52
E	07:44:51	08:06:43	11:47:59	12:39:09	17:32:25	18:03:00
D	07:44:59	08:06:48	11:48:04	12:39:34	17:32:59	18:03:55
C	07:45:08	08:07:02	11:48:10	12:40:04	17:33:07	18:04:07
B	07:45:13	08:07:18	11:48:14	12:40:10	17:33:15	18:04:17
A	07:45:48	08:07:30	11:48:48	12:40:29	17:33:22	18:04:48
FIM	07:46:03	08:07:59	11:49:08	12:40:45	17:33:29	18:05:00
HORA DE INÍCIO	07:43:20	08:04:25	11:46:04	12:37:34	17:29:53	18:01:18
HORA DE FIM	07:46:03	08:07:59	11:49:08	12:40:45	17:33:29	18:05:00

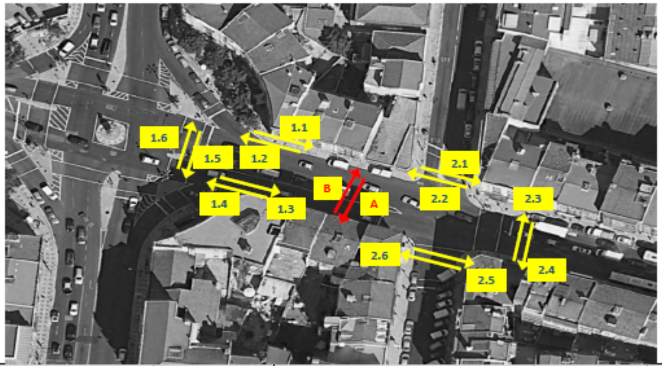
Código do Ponto	HORAS DOS PERCURSOS DE AUTOCARROS BUS_1	BUS_2	BUS_3	BUS_4	BUS_5	BUS_6
L	08:09:44	09:15:00	13:05:20	13:27:30	16:34:56	17:15:03
K	08:10:10	09:15:22	13:06:10	13:27:51	16:35:27	17:15:42
J	08:10:25	09:15:49	13:06:20	13:28:33	16:35:43	17:15:53
I	08:10:54	09:16:30	13:06:46	13:29:21	16:36:44	17:16:23
H	08:11:13	09:17:10	13:06:59	13:29:38	16:37:03	17:16:44
G	08:11:24	09:17:26	13:07:14	13:29:48	16:37:18	17:16:59
F	08:11:57	09:17:55	13:07:25	13:30:10	16:37:46	17:17:20
E	08:12:07	09:18:05	13:08:11	13:30:57	16:38:45	17:17:58
D	08:12:14	09:18:13	13:08:18	13:31:31	16:39:02	17:18:11
C	08:12:21	09:18:26	13:08:34	13:31:42	16:39:15	17:18:23
B	08:12:40	09:19:21	13:09:07	13:31:56	16:40:08	17:18:46
A	08:13:06	09:20:15	13:09:15	13:32:04	16:41:01	17:19:04
FIM	08:13:41	09:20:31	13:09:45	13:32:35	16:41:16	17:19:36
HORA DE INÍCIO	08:09:44	09:15:00	13:05:20	13:27:30	16:34:56	17:15:03
HORA DE FIM	08:13:41	09:20:31	13:09:45	13:32:35	16:41:16	17:19:36

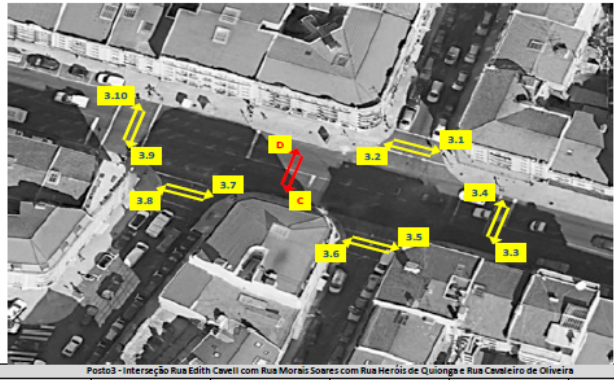
SENTIDO PRAÇA PAIVA COUCEIRO -> PRAÇA DO CHILE Indicação dos pontos de medição (50 em 50 metros)	Rua Morais Soares Nº:	Código do Ponto	HORAS DOS PERCURSOS DE PEÕES Peão_1	Peão_2	Peão_3	Peão_4	Peão_5	Peão_6	Média Peão
Esquina da Praça do Chile		L							
Esquina após Rua Francisco Sanches	46	K	4.62	4.19	3.80	1.73	2.83	1.64	2.50
Toldo vermelho Supermercado Japão	50	J	4.39	4.00	3.96	1.72	2.72	1.53	3.05
Esquina antes da Rua Cavaleiro de Oliveira (casa das chaves)	56	I	4.86	1.70	1.62	1.65	1.52	0.75	2.02
Primeiro prédio depois da Rua Heróis de Quionga (Vitrine)	66	H	3.75	3.53	3.13	1.77	2.48	1.56	2.70
Último prédio antes da Calçada Poço dos Mouros (multiopticas)	70	G	3.67	3.00	2.74	1.83	2.18	1.29	2.45
Paragem BUS (Pastelaria Flor)	80	F	4.86	4.50	4.32	2.14	2.91	2.01	3.46
Frutaria	88	E	4.50	3.83	3.50	1.46	2.58	1.68	2.93
Euroshop	102	D	5.81	3.53	3.39	1.88	2.53	1.73	3.14
Passadeira primeiro prédio a seguir à Rua Carrilho Videira	116	C	4.50	3.40	2.79	1.52	3.25	1.59	2.84
Toldo branco do Bom Paladar (Buondi)	132	B	4.86	4.50	4.09	1.62	3.22	1.95	3.37
Ultimo prédio esquina para a Praça Paiva Couceiro	162	A	4.86	3.53	2.57	2.06	3.43	1.49	2.99
P Paiva Couceiro Jardim	174	FIM	3.53	3.33	3.83	1.93	2.50	1.46	2.76
P Paiva Couceiro Jardim	TOTAL DO PERCURSO		4.44	3.37	0.05	1.76	2.57	1.47	2.27

Código do Ponto	HORAS DOS PERCURSOS DE LIGEIROS Veículo_1	Veículo_2	Veículo_3	Veículo_4	Veículo_5	Veículo_6	Média Veículo
L							
K	6.21	18.00	4.86	3.40	3.21	3.21	6.48
J	20.00	6.21	36.00	25.71	20.00	25.71	22.27
I	15.00	4.86	12.86	22.50	10.59	30.00	15.97
H	22.50	13.85	22.50	22.50	12.00	20.00	18.89
G	15.00	25.71	30.00	45.00	5.14	25.71	24.43
F	13.85	10.00	22.50	25.71	16.36	20.00	18.07
E	22.50	7.50	4.86	22.50	20.00	22.50	16.64
D	22.50	36.00	36.00	7.20	5.29	3.27	18.38
C	20.00	12.86	30.00	6.00	22.50	15.00	17.73
B	36.00	11.25	45.00	30.00	22.50	18.00	27.12
A	5.14	15.00	5.29	9.47	25.71	5.81	11.07
FIM	12.00	6.21	9.00	11.25	25.71	15.00	13.20
TOTAL DO PERCURSO	13.25	10.09	11.74	11.31	10.00	9.73	11.02

Código do Ponto	HORAS DOS PERCURSOS DE AUTOCARROS BUS_1	BUS_2	BUS_3	BUS_4	BUS_5	BUS_6	Média BUS
L							
K	6.92	8.18	3.60	8.57	5.81	4.62	6.28
J	12.00	6.64	18.00	4.29	11.25	16.36	11.42
I	6.21	4.40	6.92	3.75	2.95	6.00	5.04
H	9.47	4.52	13.85	10.59	9.47	8.71	9.44
G	16.36	11.29	12.00	18.00	12.00	11.64	13.55
F	5.45	6.16	16.36	8.29	6.43	8.62	8.55
E	18.00	18.06	3.91	3.79	3.05	4.72	8.59
D	25.71	22.50	25.71	5.32	10.59	14.03	17.31
C	25.71	13.85	11.25	16.36	13.85	15.14	16.03
B	9.47	3.27	5.45	13.07	3.40	7.79	7.08
A	6.92	3.33	22.50	20.94	3.40	9.80	11.15
FIM	5.14	11.25	6.00	5.88	12.00	5.67	7.66
TOTAL DO PERCURSO	9.11	6.53	8.15	7.08	5.68	7.91	7.41

8.2.5 Survey: Pedestrian Counting

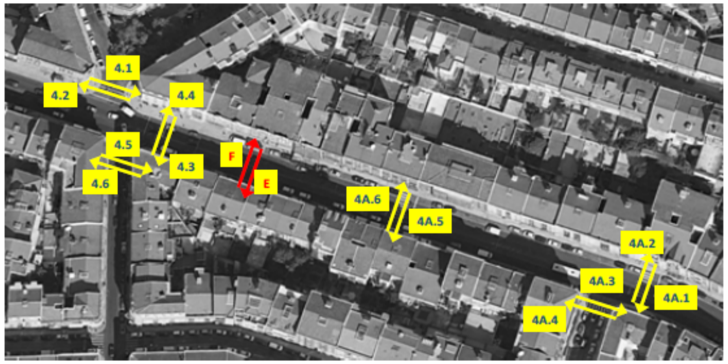


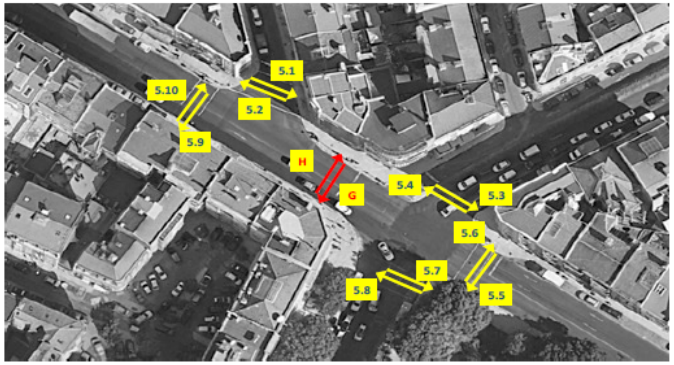


CONTAGENS PEOES DIA 11.DEZ.2019		Posto1 - Entrada Oeste da Rua Morais Soares						Posto2 -Cruz. Rua Carlos Mardel com a Rua Morais Soares e com a Rua Francisco Sanches								Posto3 - Interseção Rua Edith Cavell com Rua Morais Soares com Rua Heróis de Quionga e Rua Cavaleiro de Oliveira											
		N		E		S		N		E		S		Fora		N		E		S		SW		W		Fora	
Início	Fim	W-E (1.1)	E-W (1.2)	N-S (1.3)	S-N (1.4)	W-E (1.5)	E-W (1.6)	W-E (2.1)	E-W (2.2)	N-S (2.3)	S-N (2.4)	W-E (2.5)	E-W (2.6)	N-S (A)	S-N (B)	W-E (3.1)	E-W (3.2)	N-S (3.3)	S-N (3.4)	W-E (3.5)	E-W (3.6)	W-E (3.7)	E-W (3.8)	N-S (3.9)	S-N (3.10)	N-S (C)	S-N (D)
7:30	7:45	10	18	7	24	0	0	10	14	22	29	11	19	3	5	23	3	10	11	14	6	28	25	5	14	3	1
7:45	8:00	12	35	10	9	0	0	16	26	21	30	27	37	3	0	34	20	10	16	18	3	51	31	4	5	3	0
8:00	8:15	25	20	39	59	24	32	21	35	26	57	45	48	4	2	8	12	19	8	17	12	54	24	7	12	1	2
8:15	8:30	32	24	45	45	41	15	19	27	39	57	32	49	1	2	7	13	22	9	14	9	61	26	6	8	1	1
8:30	8:45	33	30	41	64	38	28	20	47	76	52	29	56	4	2	6	15	17	10	18	11	86	34	6	11	1	1
8:45	9:00	29	24	57	66	28	36	23	37	57	59	57	64	1	1	12	70	23	11	38	20	74	38	13	19	2	1
9:00	9:15	45	28	68	73	37	42	29	20	61	47	62	66	3	0	26	92	30	25	33	19	84	59	14	20	4	1
9:15	9:30	19	35	27	48	30	27	22	27	61	35	29	49	2	0	22	51	25	23	42	13	60	44	17	26	3	1
9:30	9:45	42	28	36	61	32	29	25	19	57	41	24	37	2	5	28	31	25	20	33	22	77	34	19	18	1	1
9:45	10:00	20	23	16	40	17	15	18	29	63	55	22	43	4	0	25	39	26	11	37	26	51	47	29	26	1	1

		Posto1 - Entrada Oeste da Rua Morais Soares						Posto2 -Cruz. Rua Carlos Mardel com a Rua Morais Soares e com a Rua Francisco Sanches								Posto3 - Interseção Rua Edith Cavell com Rua Morais Soares com Rua Heróis de Quionga e Rua Cavaleiro de Oliveira											
		N		E		S		N		E		S		Fora		N		E		S		SW		W		Fora	
Início	Fim	W-E (1.1)	E-W (1.2)	N-S (1.3)	S-N (1.4)	W-E (1.5)	E-W (1.6)	W-E (2.1)	E-W (2.2)	N-S (2.3)	S-N (2.4)	W-E (2.5)	E-W (2.6)	N-S (A)	S-N (B)	W-E (3.1)	E-W (3.2)	N-S (3.3)	S-N (3.4)	W-E (3.5)	E-W (3.6)	W-E (3.7)	E-W (3.8)	N-S (3.9)	S-N (3.10)	N-S (C)	S-N (D)
12:00	12:15	45	25	39	59	24	32	35	36	74	45	45	52	2	1	35	60	37	26	32	31	57	46	31	37	3	3
12:15	12:30	40	24	45	45	41	15	37	23	64	49	54	31	3	2	27	67	31	30	37	32	48	58	20	12	3	1
12:30	12:45	33	22	41	64	38	28	51	20	63	62	59	47	2	3	44	69	28	33	42	36	61	56	19	15	1	5
12:45	13:00	29	24	57	66	28	36	48	41	25	29	79	68	4	1	56	42	26	41	36	33	51	75	27	12	4	3
13:00	13:15	45	28	68	73	37	42	36	48	31	39	91	63	1	3	39	57	26	30	46	45	56	56	24	26	3	3
13:15	13:30	32	20	38	60	39	36	50	63	25	29	50	54	1	1	56	57	36	47	66	36	66	44	29	22	2	6

		Posto1 - Entrada Oeste da Rua Morais Soares						Posto2 -Cruz. Rua Carlos Mardel com a Rua Morais Soares e com a Rua Francisco Sanches								Posto3 - Interseção Rua Edith Cavell com Rua Morais Soares com Rua Heróis de Quionga e Rua Cavaleiro de Oliveira											
		N		E		S		N		E		S		Fora		N		E		S		SW		W		Fora	
Início	Fim	W-E (1.1)	E-W (1.2)	N-S (1.3)	S-N (1.4)	W-E (1.5)	E-W (1.6)	W-E (2.1)	E-W (2.2)	N-S (2.3)	S-N (2.4)	W-E (2.5)	E-W (2.6)	N-S (A)	S-N (B)	W-E (3.1)	E-W (3.2)	N-S (3.3)	S-N (3.4)	W-E (3.5)	E-W (3.6)	W-E (3.7)	E-W (3.8)	N-S (3.9)	S-N (3.10)	N-S (C)	S-N (D)
16:30	16:45	37	19	32	26	22	18	24	23	42	29	24	25	4	4	81	73	38	21	22	73	25	64	20	39	4	1
16:45	17:00	50	21	31	40	44	18	30	34	73	85	27	44	2	2	85	70	39	25	27	80	34	78	15	28	4	3
17:00	17:15	44	15	62	41	23	11	33	25	67	107	67	54	2	0	58	64	35	43	39	58	47	67	27	36	4	2
17:15	17:30	37	34	69	66	45	28	25	32	39	90	68	56	4	2	55	56	29	30	48	51	46	71	8	33	4	2
17:30	17:45	47	20	81	46	52	20	29	25	71	93	78	63	0	2	62	65	29	33	49	55	41	78	20	18	2	2
17:45	18:00	36	26	46	36	53	29	22	23	70	92	64	48	3	1	64	86	38	32	36	53	43	83	22	16	0	1

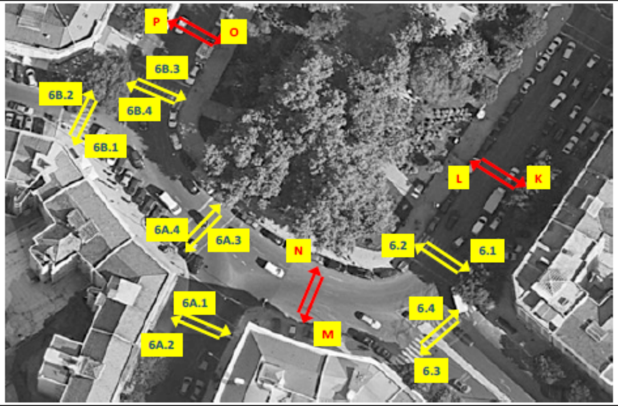




Posto4 - Rua Carvalho Araújo com Rua Morais Soares e com Calçada do Poço dos Mouros							
N		E		S		Fora	
W->E (4.1)	E->W (4.2)	N->S (4.3)	S->N (4.4)	W->E (4.5)	E->W (4.6)	N->S (E)	S->N (F)
8	22	9	24	8	14	2	1
10	66	19	33	17	20	0	2
15	49	16	53	13	24	1	0
16	45	20	47	10	33	0	0
17	48	27	55	16	36	0	0
13	45	35	64	19	54	0	0
16	37	29	47	23	54	0	0
20	63	18	52	13	41	0	0
25	83	43	46	15	65	0	0
7	59	10	23	14	18	0	0
Posto4 - Rua Carvalho Araújo com Rua Morais Soares e com Calçada do Poço dos Mouros							
N		E		S		Fora	
W->E (4.1)	E->W (4.2)	N->S (4.3)	S->N (4.4)	W->E (4.5)	E->W (4.6)	N->S (E)	S->N (F)
40	39	66	45	55	75	0	0
26	20	43	57	60	56	1	1
30	41	46	48	68	75	0	1
40	23	22	45	47	75	2	0
55	40	54	50	60	55	0	1
27	28	60	41	52	78	0	1
Posto4 - Rua Carvalho Araújo com Rua Morais Soares e com Calçada do Poço dos Mouros							
N		E		S		Fora	
W->E (4.1)	E->W (4.2)	N->S (4.3)	S->N (4.4)	W->E (4.5)	E->W (4.6)	N->S (E)	S->N (F)
25	31	32	54	39	42	8	3
27	36	49	64	54	48	11	2
11	18	89	56	51	48	3	2
29	20	62	46	76	54	3	1
16	50	74	46	76	51	0	0
12	30	75	45	70	56	0	0

Posto4A - Ent. da Rua Morais Soares com a Rua Carrilho Videira					
E		S		W	
N->S (4A.1)	S->N (4A.2)	W->E (4A.3)	E->W (4A.4)	N->S (H)	S->N (I)
2	9	8	16	4	9
5	14	14	18	9	9
9	13	5	14	9	3
12	26	5	15	3	9
16	30	7	18	8	5
18	24	18	26	7	11
14	27	11	35	7	11
20	28	15	47	9	15
12	15	24	54	13	19
23	21	20	45	19	19
Posto4A - Ent. da Rua Morais Soares com a Rua Carrilho Videira					
E		S		W	
N->S (4A.1)	S->N (4A.2)	W->E (4A.3)	E->W (4A.4)	N->S (H)	S->N (I)
33	21	38	50	14	12
26	22	32	33	22	21
38	24	32	43	16	19
23	26	47	28	25	19
27	38	35	36	19	24
26	22	33	43	28	18
Posto4A - Ent. da Rua Morais Soares com a Rua Carrilho Videira					
E		S		W	
N->S (4A.1)	S->N (4A.2)	W->E (4A.3)	E->W (4A.4)	N->S (H)	S->N (I)
28	24	23	18	12	20
30	17	20	25	14	16
33	22	26	20	12	12
24	28	25	23	11	15
26	19	35	21	15	28
32	39	59	34	17	12

Posto 5 - Rua Barão de Sabrosa com Rua António Gonçalves com Rua Morais Soares e com Praça Paiva Couceiro											
N		NE		E		S		W		Fora	
W->E (5.1)	E->W (5.2)	W->E (5.3)	E->W (5.4)	N->S (5.5)	S->N (5.6)	W->E (5.7)	E->W (5.8)	N->S (5.9)	S->N (5.10)	N->S (G)	S->N (H)
4	19	9	11	12	4	6	32	14	26	7	5
4	19	11	7	16	5	15	28	24	30	7	1
5	26	14	8	23	8	13	30	20	21	6	5
11	29	14	19	12	14	12	42	21	33	4	5
13	26	18	14	13	10	11	37	37	60	3	6
16	32	8	17	17	10	14	39	24	35	3	5
10	24	11	8	13	8	21	51	32	36	15	5
19	27	18	19	12	7	12	42	45	19	10	6
17	31	25	21	10	7	17	39	38	51	14	5
17	41	35	27	7	9	13	47	43	57	16	6
Posto 5 - Rua Barão de Sabrosa com Rua António Gonçalves com Rua Morais Soares e com Praça Paiva Couceiro											
N		NE		E		S		W		Fora	
W->E (5.1)	E->W (5.2)	W->E (5.3)	E->W (5.4)	N->S (5.5)	S->N (5.6)	W->E (5.7)	E->W (5.8)	N->S (5.9)	S->N (5.10)	N->S (G)	S->N (H)
16	20	14	11	13	14	30	39	48	27	13	7
21	15	18	11	8	9	25	26	30	22	3	12
16	18	14	16	7	6	35	37	34	22	12	4
12	16	12	9	11	11	36	46	33	29	15	11
13	23	9	9	14	7	27	49	31	43	26	14
25	17	11	8	8	6	32	44	26	32	20	21
Posto 5 - Rua Barão de Sabrosa com Rua António Gonçalves com Rua Morais Soares e com Praça Paiva Couceiro											
N		NE		E		S		W		Fora	
W->E (5.1)	E->W (5.2)	W->E (5.3)	E->W (5.4)	N->S (5.5)	S->N (5.6)	W->E (5.7)	E->W (5.8)	N->S (5.9)	S->N (5.10)	N->S (G)	S->N (H)
27	15	10	8	10	8	61	22	21	18	11	13
14	6	7	7	11	18	29	37	16	27	6	10
17	27	7	6	20	18	57	23	32	32	14	8
19	33	9	12	14	24	77	25	19	23	11	13
31	35	11	10	16	17	51	31	22	31	7	12
25	13	18	7	10	12	37	39	17	23	7	12



Block 1

Posto5A- Rua António Gonçalves com Rua Morais Soares e com Praça Paiva Couceiro							
N		E		S		Fora	
W→E (5A.1)	E→W (5A.2)	N→S (5A.3)	S→N (5A.4)	W→E (5A.5)	E→W (5A.6)	N→S (I)	S→N (J)
5	8	1	4	6	10	0	1
8	8	1	10	6	12	1	0
9	11	3	5	7	20	0	0
5	17	0	9	17	33	0	0
6	24	1	20	12	27	0	0
13	44	1	9	11	30	0	0
5	23	3	9	18	27	0	1
7	15	1	9	9	24	1	1
8	27	2	12	9	50	0	0
10	10	1	17	13	22	0	0

Posto6 - Praça Paiva Couceiro com Av. Mouzinho de Albuquerque					
N		E		Fora	
W→E (6.1)	E→W (6.2)	N→S (6.3)	S→N (6.4)	W→E (K)	E→W (L)
9	25	10	15	2	1
6	12	16	8	2	1
3	26	21	14	0	1
7	20	17	21	0	0
10	27	22	20	0	2
22	34	28	20	0	1
7	37	17	8	1	5
10	28	17	16	0	5
18	22	21	18	1	2
6	30	13	15	1	1

Posto6A - Praça Paiva Couceiro com Av. General Roçadas					
S		W		Fora	
N→S (6A.1)	S→N (6A.2)	W→E (6A.3)	E→W (6A.4)	N→S (M)	S→N (N)
14	20	2	3	3	3
15	20	6	4	3	3
24	38	7	4	1	2
18	25	4	6	0	0
23	13	6	4	1	0
29	19	5	0	2	2
24	29	3	1	1	1
14	18	2	1	2	2
17	20	6	7	1	1
22	15	4	3	0	0

Posto6B - Praça Paiva Couceiro com Rua Jacinto Nunes					
W		N		Fora	
W→E (6B.1)	E→W (6B.2)	N→S (6B.3)	S→N (6B.4)	W→E (O)	E→W (P)
18	27	1	5	0	0
49	22	2	9	0	0
49	40	0	7	0	0
33	41	1	6	0	0
57	40	2	14	0	0
49	43	4	14	0	0
46	37	2	9	0	0
68	40	3	14	0	0
56	50	5	12	0	0
42	38	3	9	0	0

Block 2

Posto5A- Rua António Gonçalves com Rua Morais Soares e com Praça Paiva Couceiro							
N		E		S		Fora	
W→E (5A.1)	E→W (5A.2)	N→S (5A.3)	S→N (5A.4)	W→E (5A.5)	E→W (5A.6)	N→S (I)	S→N (J)
7	10	8	7	21	16	0	0
2	7	8	2	16	13	0	0
3	6	1	2	5	16	0	0
5	10	10	5	9	12	0	1
5	9	5	4	7	10	0	1
4	6	3	3	10	13	0	0

Posto6 - Praça Paiva Couceiro com Av. Mouzinho de Albuquerque					
N		E		Fora	
W→E (6.1)	E→W (6.2)	N→S (6.3)	S→N (6.4)	W→E (K)	E→W (L)
19	22	23	21	0	1
21	20	12	17	1	0
21	24	20	17	0	1
21	26	17	24	1	1
10	25	11	28	0	0
15	32	12	18	3	2

Posto6A - Praça Paiva Couceiro com Av. General Roçadas					
S		W		Fora	
N→S (6A.1)	S→N (6A.2)	W→E (6A.3)	E→W (6A.4)	N→S (M)	S→N (N)
29	19	5	1	5	0
23	33	8	11	1	0
33	28	8	9	0	3
36	15	7	3	1	0
34	30	4	10	1	2
19	24	4	9	1	1

Posto6B - Praça Paiva Couceiro com Rua Jacinto Nunes					
W		N		Fora	
W→E (6B.1)	E→W (6B.2)	N→S (6B.3)	S→N (6B.4)	W→E (O)	E→W (P)
56	54	16	4	0	0
57	76	9	16	0	0
50	60	18	9	0	0
36	73	18	8	0	0
49	40	12	16	0	0
56	62	10	19	0	0

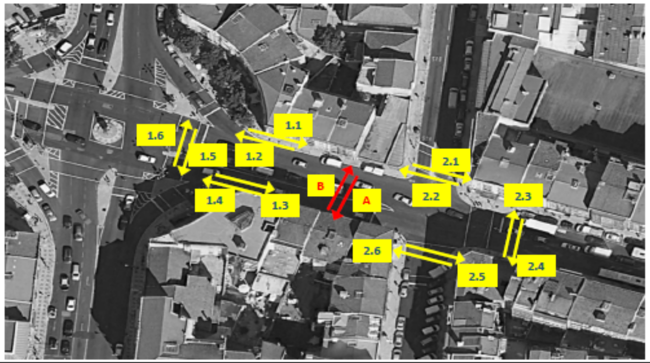
Block 3

Posto5A- Rua António Gonçalves com Rua Morais Soares e com Praça Paiva Couceiro							
N		E		S		Fora	
W→E (5A.1)	E→W (5A.2)	N→S (5A.3)	S→N (5A.4)	W→E (5A.5)	E→W (5A.6)	N→S (I)	S→N (J)
6	8	6	4	4	8	0	0
4	7	7	7	17	10	0	0
2	10	19	8	46	15	0	0
2	14	25	6	63	10	0	1
1	8	13	7	34	11	0	1
5	12	7	10	43	16	0	0

Posto6 - Praça Paiva Couceiro com Av. Mouzinho de Albuquerque					
N		E		Fora	
W→E (6.1)	E→W (6.2)	N→S (6.3)	S→N (6.4)	W→E (K)	E→W (L)
13	30	6	17	0	1
24	19	30	70	1	2
18	24	11	31	0	1
28	35	25	12	3	1
54	27	11	44	0	1
24	29	28	17	0	0

Posto6A - Praça Paiva Couceiro com Av. General Roçadas					
S		W		Fora	
N→S (6A.1)	S→N (6A.2)	W→E (6A.3)	E→W (6A.4)	N→S (M)	S→N (N)
16	15	7	6	0	0
14	22	13	6	1	0
18	15	12	11	1	0
42	46	9	17	1	3
33	56	9	18	1	4
33	80	12	20	1	3

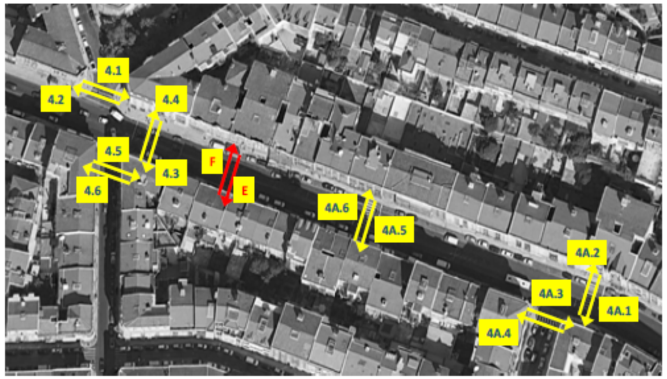
Posto6B - Praça Paiva Couceiro com Rua Jacinto Nunes					
W		N		Fora	
W→E (6B.1)	E→W (6B.2)	N→S (6B.3)	S→N (6B.4)	W→E (O)	E→W (P)
39	89	13	17	0	0
39	56	14	14	0	0
44	78	19	28	0	0
61	73	13	23	0	0
60	64	13	23	0	0
65	69	18	15	0	0



CONTAGENS PEÕES DIA 12.DEZ.2019		Posto1 - Entrada Oeste da Rua Morais Soares					
		N		E		S	
Início	Fim	W→E (1.1)	E→W (1.2)	N→S (1.3)	S→N (1.4)	W→E (1.5)	E→W (1.6)
7:30	7:45	5	15	7	24	14	11
7:45	8:00	17	27	8	7	11	18
8:00	8:15	14	30	17	9	12	29
8:15	8:30	11	29	20	21	18	23
8:30	8:45	16	21	33	21	18	22
8:45	9:00	15	44	25	14	12	51
9:00	9:15	24	32	37	27	26	59
9:15	9:30	23	19	26	17	30	27
9:30	9:45	20	15	24	20	18	12
9:45	10:00	31	22	25	19	27	25
		Posto1 - Entrada Oeste da Rua Morais Soares					
		N		E		S	
Início	Fim	W→E (1.1)	E→W (1.2)	N→S (1.3)	S→N (1.4)	W→E (1.5)	E→W (1.6)
12:00	12:15	24	20	49	41	27	15
12:15	12:30	35	23	35	40	33	44
12:30	12:45	37	7	30	38	26	7
12:45	13:00	28	29	49	75	34	25
13:00	13:15	39	28	58	52	55	24
13:15	13:30	36	23	62	35	53	16
		Posto1 - Entrada Oeste da Rua Morais Soares					
		N		E		S	
Início	Fim	W→E (1.1)	E→W (1.2)	N→S (1.3)	S→N (1.4)	W→E (1.5)	E→W (1.6)
16:30	16:45	32	15	34	24	24	18
16:45	17:00	42	22	31	42	56	18
17:00	17:15	25	22	53	38	26	17
17:15	17:30	37	24	58	53	33	29
17:30	17:45	26	21	58	64	39	30
17:45	18:00	45	33	49	49	58	37

CONTAGENS PEÕES DIA 12.DEZ.2019		Posto2 - Cruz. Rua Carlos Mardel com a Rua Morais Soares e com a Rua Francisco Sanches							
		N		E		S		Fora	
Início	Fim	W→E (2.1)	E→W (2.2)	N→S (2.3)	S→N (2.4)	W→E (2.5)	E→W (2.6)	N→S (A)	S→N (B)
7:30	7:45	4	14	16	19	10	20	4	6
7:45	8:00	12	21	17	24	7	14	2	0
8:00	8:15	11	33	53	38	13	13	4	4
8:15	8:30	13	27	52	31	20	16	0	1
8:30	8:45	12	23	45	59	27	17	1	0
8:45	9:00	15	31	56	44	29	17	1	4
9:00	9:15	18	22	44	51	29	30	2	4
9:15	9:30	18	20	64	69	25	18	1	2
9:30	9:45	11	18	51	45	18	30	2	5
9:45	10:00	24	27	43	61	19	13	2	0
		Posto2 - Cruz. Rua Carlos Mardel com a Rua Morais Soares e com a Rua Francisco Sanches							
		N		E		S		Fora	
Início	Fim	W→E (2.1)	E→W (2.2)	N→S (2.3)	S→N (2.4)	W→E (2.5)	E→W (2.6)	N→S (A)	S→N (B)
12:00	12:15	35	36	84	45	45	52	2	1
12:15	12:30	27	26	64	49	24	31	3	2
12:30	12:45	26	18	86	55	32	53	4	0
12:45	13:00	25	29	48	51	36	73	0	1
13:00	13:15	34	31	52	80	47	42	1	0
13:15	13:30	25	29	60	63	51	36	3	2
		Posto2 - Cruz. Rua Carlos Mardel com a Rua Morais Soares e com a Rua Francisco Sanches							
		N		E		S		Fora	
Início	Fim	W→E (2.1)	E→W (2.2)	N→S (2.3)	S→N (2.4)	W→E (2.5)	E→W (2.6)	N→S (A)	S→N (B)
16:30	16:45	25	16	44	39	23	23	8	4
16:45	17:00	41	32	54	69	22	36	0	1
17:00	17:15	41	38	49	61	67	43	1	0
17:15	17:30	24	30	53	63	62	48	1	1
17:30	17:45	23	26	55	72	70	79	1	4
17:45	18:00	30	29	67	90	70	48	3	1

CONTAGENS PEÕES DIA 12.DEZ.2019		Posto3 - Interseção Rua Edith Cavell com Rua Morais Soares com Rua Heróis de Quionga e Rua Cavaleiro de Oliveira											
		N		E		S		SW		W		Fora	
Início	Fim	W→E (3.1)	E→W (3.2)	N→S (3.3)	S→N (3.4)	W→E (3.5)	E→W (3.6)	W→E (3.7)	E→W (3.8)	N→S (3.9)	S→N (3.10)	N→S (C)	S→N (D)
7:30	7:45	2	5	6	9	10	19	3	21	4	13	0	3
7:45	8:00	8	16	10	4	12	34	6	35	6	22	4	5
8:00	8:15	7	14	6	8	11	31	16	34	6	20	2	2
8:15	8:30	12	11	9	12	15	44	14	37	7	27	2	1
8:30	8:45	19	29	14	17	19	60	15	54	14	21	4	3
8:45	9:00	16	29	11	18	27	58	16	59	8	30	1	2
9:00	9:15	25	42	18	16	14	68	22	57	13	21	1	3
9:15	9:30	16	46	20	13	24	62	19	46	20	15	4	7
9:30	9:45	12	33	19	20	27	57	18	34	16	29	1	2
9:45	10:00	18	17	29	18	35	61	23	46	14	14	1	3
		Posto3 - Interseção Rua Edith Cavell com Rua Morais Soares com Rua Heróis de Quionga e Rua Cavaleiro de Oliveira											
		N		E		S		SW		W		Fora	
Início	Fim	W→E (3.1)	E→W (3.2)	N→S (3.3)	S→N (3.4)	W→E (3.5)	E→W (3.6)	W→E (3.7)	E→W (3.8)	N→S (3.9)	S→N (3.10)	N→S (C)	S→N (D)
12:00	12:15	38	25	35	33	43	42	24	43	17	21	4	2
12:15	12:30	35	29	18	20	44	52	35	47	22	22	3	1
12:30	12:45	30	31	15	9	43	34	63	51	20	18	1	10
12:45	13:00	27	28	10	22	37	39	37	67	20	23	2	5
13:00	13:15	36	22	19	11	36	36	39	62	18	22	4	3
13:15	13:30	15	28	17	7	17	27	21	39	19	9	1	0
		Posto3 - Interseção Rua Edith Cavell com Rua Morais Soares com Rua Heróis de Quionga e Rua Cavaleiro de Oliveira											
		N		E		S		SW		W		Fora	
Início	Fim	W→E (3.1)	E→W (3.2)	N→S (3.3)	S→N (3.4)	W→E (3.5)	E→W (3.6)	W→E (3.7)	E→W (3.8)	N→S (3.9)	S→N (3.10)	N→S (C)	S→N (D)
16:30	16:45	47	38	17	24	41	71	49	87	21	41	3	0
16:45	17:00	46	39	18	17	39	52	60	76	19	31	3	0
17:00	17:15	55	48	30	21	35	47	46	50	21	23	2	4
17:15	17:30	30	36	13	27	41	49	51	61	24	23	4	2
17:30	17:45	57	34	20	29	56	42	72	70	38	23	4	3
17:45	18:00	52	38	36	21	44	37	61	49	23	16	0	2



Posto4 - Rua Carvalho Araújo com Rua Morais Soares e com Calçada do Poço dos Mouros							
N		E		S		Fora	
W->E (4.1)	E->W (4.2)	N->S (4.3)	S->N (4.4)	W->E (4.5)	E->W (4.6)	N->S (E)	S->N (F)
9	22	6	30	11	11	6	8
12	46	18	38	16	26	10	4
12	34	13	38	13	25	5	0
19	45	15	44	17	25	4	2
21	47	41	15	26	28	5	0
12	32	33	61	24	36	0	3
11	39	32	52	23	34	1	1
15	49	40	47	23	45	2	1
20	64	45	30	33	43	5	5
9	46	63	28	37	33	3	1

Posto4A - Ent. da Rua Morais Soares com a Rua Carrilho Videira					
E		S		W	
N->S (4A.1)	S->N (4A.2)	W->E (4A.3)	E->W (4A.4)	N->S (H)	S->N (I)
7	10	8	13	3	10
10	15	12	16	4	6
12	22	14	16	2	13
10	22	9	26	3	11
14	37	14	21	2	4
15	28	10	19	5	9
17	33	14	40	13	6
18	36	27	46	9	17
19	17	23	41	17	19
17	13	26	44	15	21

Posto 5 - Rua Barão de Sabrosa com Rua António Gonçalves com Rua Morais Soares e com Praça Paiva Couceiro											
N		NE		E		S		W		Fora	
W->E (5.1)	E->W (5.2)	W->E (5.3)	E->W (5.4)	N->S (5.5)	S->N (5.6)	W->E (5.7)	E->W (5.8)	N->S (5.9)	S->N (5.10)	N->S (G)	S->N (H)
6	10	13	6	10	3	8	17	11	24	11	4
7	13	13	10	19	8	15	32	30	34	15	3
9	23	11	11	11	4	18	38	17	27	8	2
8	28	16	18	21	10	11	44	30	26	7	5
10	21	8	14	16	9	18	44	33	45	10	7
9	34	14	16	22	13	30	55	24	49	11	3
13	22	8	14	10	9	20	43	25	44	14	4
15	25	10	15	8	7	14	34	35	25	10	6
18	31	7	18	19	18	23	45	36	47	14	8
19	20	12	12	12	8	20	49	43	45	6	16

Posto4 - Rua Carvalho Araújo com Rua Morais Soares e com Calçada do Poço dos Mouros							
N		E		S		Fora	
W->E (4.1)	E->W (4.2)	N->S (4.3)	S->N (4.4)	W->E (4.5)	E->W (4.6)	N->S (E)	S->N (F)
39	46	38	46	61	47	1	3
22	27	80	99	66	65	6	5
34	33	57	35	59	50	0	0
32	26	46	38	48	45	7	1
51	50	51	32	53	68	2	2
28	25	37	37	55	66	7	3

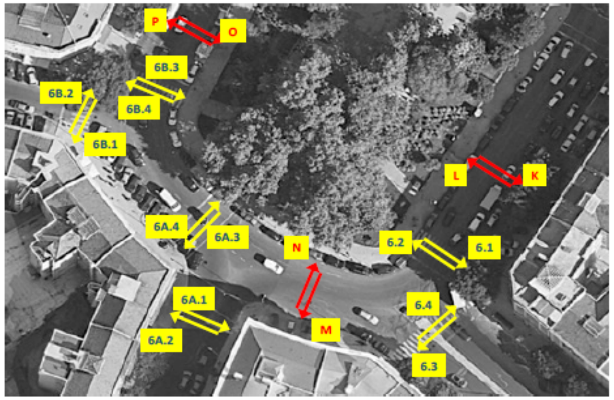
Posto4A - Ent. da Rua Morais Soares com a Rua Carrilho Videira					
E		S		W	
N->S (4A.1)	S->N (4A.2)	W->E (4A.3)	E->W (4A.4)	N->S (H)	S->N (I)
28	23	33	47	17	12
29	25	35	43	28	27
21	32	43	40	23	21
25	31	50	37	20	22
24	25	40	46	13	30
19	19	29	32	13	23

Posto 5 - Rua Barão de Sabrosa com Rua António Gonçalves com Rua Morais Soares e com Praça Paiva Couceiro											
N		NE		E		S		W		Fora	
W->E (5.1)	E->W (5.2)	W->E (5.3)	E->W (5.4)	N->S (5.5)	S->N (5.6)	W->E (5.7)	E->W (5.8)	N->S (5.9)	S->N (5.10)	N->S (G)	S->N (H)
23	12	13	6	10	4	37	40	39	39	11	11
16	15	10	7	4	10	26	38	25	30	11	8
20	16	13	6	7	14	25	30	29	32	11	6
11	10	8	5	6	13	37	30	23	34	13	7
11	21	10	10	9	2	29	42	24	41	15	19
20	14	9	6	7	7	25	33	24	32	14	24

Posto4 - Rua Carvalho Araújo com Rua Morais Soares e com Calçada do Poço dos Mouros							
N		E		S		Fora	
W->E (4.1)	E->W (4.2)	N->S (4.3)	S->N (4.4)	W->E (4.5)	E->W (4.6)	N->S (E)	S->N (F)
23	25	38	39	54	45	10	2
22	27	60	66	74	53	8	3
16	20	73	59	68	54	2	2
25	20	53	47	57	64	10	1
19	41	54	44	60	49	11	12
15	30	28	34	56	35	0	0

Posto4A - Ent. da Rua Morais Soares com a Rua Carrilho Videira					
E		S		W	
N->S (4A.1)	S->N (4A.2)	W->E (4A.3)	E->W (4A.4)	N->S (H)	S->N (I)
23	19	32	28	17	16
21	25	43	27	20	19
33	30	52	34	16	22
29	29	43	32	10	16
26	25	46	38	19	18
33	29	49	34	17	15

Posto 5 - Rua Barão de Sabrosa com Rua António Gonçalves com Rua Morais Soares e com Praça Paiva Couceiro											
N		NE		E		S		W		Fora	
W->E (5.1)	E->W (5.2)	W->E (5.3)	E->W (5.4)	N->S (5.5)	S->N (5.6)	W->E (5.7)	E->W (5.8)	N->S (5.9)	S->N (5.10)	N->S (G)	S->N (H)
28	16	13	9	8	10	43	24	23	25	13	11
10	7	8	7	12	15	31	31	12	21	7	10
16	20	8	16	5	14	28	36	27	37	14	8
19	22	10	8	10	14	42	39	25	30	8	11
31	28	15	10	13	12	42	22	24	34	10	12
25	17	17	8	11	17	39	27	19	22	7	10



Posto5A - Rua António Gonçalves com Rua Morais Soares e com Praça Paiva Couceiro							
N		E		S		Fora	
W->E (5A.1)	E->W (5A.2)	N->S (5A.3)	S->N (5A.4)	W->E (5A.5)	E->W (5A.6)	N->S (J)	S->N (I)
5	10	1	5	8	9	0	1
9	11	1	10	5	13	1	0
6	12	3	6	8	25	0	0
6	16	0	7	13	32	0	0
8	27	1	14	9	31	0	0
15	32	1	8	16	29	0	0
5	29	2	10	15	20	0	1
7	15	1	9	9	24	1	1
8	19	2	9	11	36	0	0
10	11	1	15	11	23	0	0

Posto6 - Praça Paiva Couceiro com Av. Mouzinho de Albuquerque					
N		E		Fora	
W->E (6.1)	E->W (6.2)	N->S (6.3)	S->N (6.4)	W->E (K)	E->W (L)
7	9	15	10	0	0
11	19	19	14	1	3
10	20	27	22	0	2
11	27	18	14	0	1
9	29	13	18	0	1
22	31	26	14	1	3
17	35	25	20	0	2
13	26	16	11	1	0
14	31	16	12	1	3
6	24	18	17	0	2

Posto6A - Praça Paiva Couceiro com Av. General Roçadas					
S		W		Fora	
N->S (6A.1)	S->N (6A.2)	W->E (6A.3)	E->W (6A.4)	N->S (M)	S->N (N)
11	21	2	3	0	3
15	24	7	6	0	2
27	28	7	4	1	3
19	19	7	3	0	1
24	18	2	3	1	1
29	19	5	0	2	2
21	33	5	6	1	0
13	18	1	2	1	1
15	20	5	2	3	1
22	15	4	3	0	0

Posto6B - Praça Paiva Couceiro com Rua Jacinto Nunes					
W		N		Fora	
W->E (6B.1)	E->W (6B.2)	N->S (6B.3)	S->N (6B.4)	W->E (O)	E->W (P)
21	19	1	6	0	0
31	22	2	7	0	0
34	22	0	6	0	0
32	45	1	6	0	0
40	54	1	9	0	0
45	42	4	13	0	0
46	37	2	9	0	0
53	42	2	8	0	0
45	35	5	11	0	0
54	46	3	10	0	0

Posto5A - Rua António Gonçalves com Rua Morais Soares e com Praça Paiva Couceiro							
N		E		S		Fora	
W->E (5A.1)	E->W (5A.2)	N->S (5A.3)	S->N (5A.4)	W->E (5A.5)	E->W (5A.6)	N->S (J)	S->N (I)
8	10	7	5	15	16	0	0
4	5	5	5	11	28	0	0
4	9	2	3	5	22	0	0
5	10	7	4	12	11	0	1
3	5	3	5	11	17	0	0
6	8	3	4	11	12	0	0

Posto6 - Praça Paiva Couceiro com Av. Mouzinho de Albuquerque					
N		E		Fora	
W->E (6.1)	E->W (6.2)	N->S (6.3)	S->N (6.4)	W->E (K)	E->W (L)
23	26	20	16	2	4
18	25	9	20	0	4
17	20	9	13	0	3
33	28	10	28	1	1
24	25	15	19	1	2
21	34	10	25	0	3

Posto6A - Praça Paiva Couceiro com Av. General Roçadas					
S		W		Fora	
N->S (6A.1)	S->N (6A.2)	W->E (6A.3)	E->W (6A.4)	N->S (M)	S->N (N)
29	20	4	1	5	0
27	26	6	8	2	0
28	42	9	7	0	3
31	19	5	3	1	0
33	22	4	8	1	2
23	45	5	8	1	2

Posto6B - Praça Paiva Couceiro com Rua Jacinto Nunes					
W		N		Fora	
W->E (6B.1)	E->W (6B.2)	N->S (6B.3)	S->N (6B.4)	W->E (O)	E->W (P)
54	61	14	4	0	0
40	60	12	13	0	0
35	56	15	12	0	0
54	51	15	16	0	0
53	39	11	11	0	0
58	53	12	18	0	0

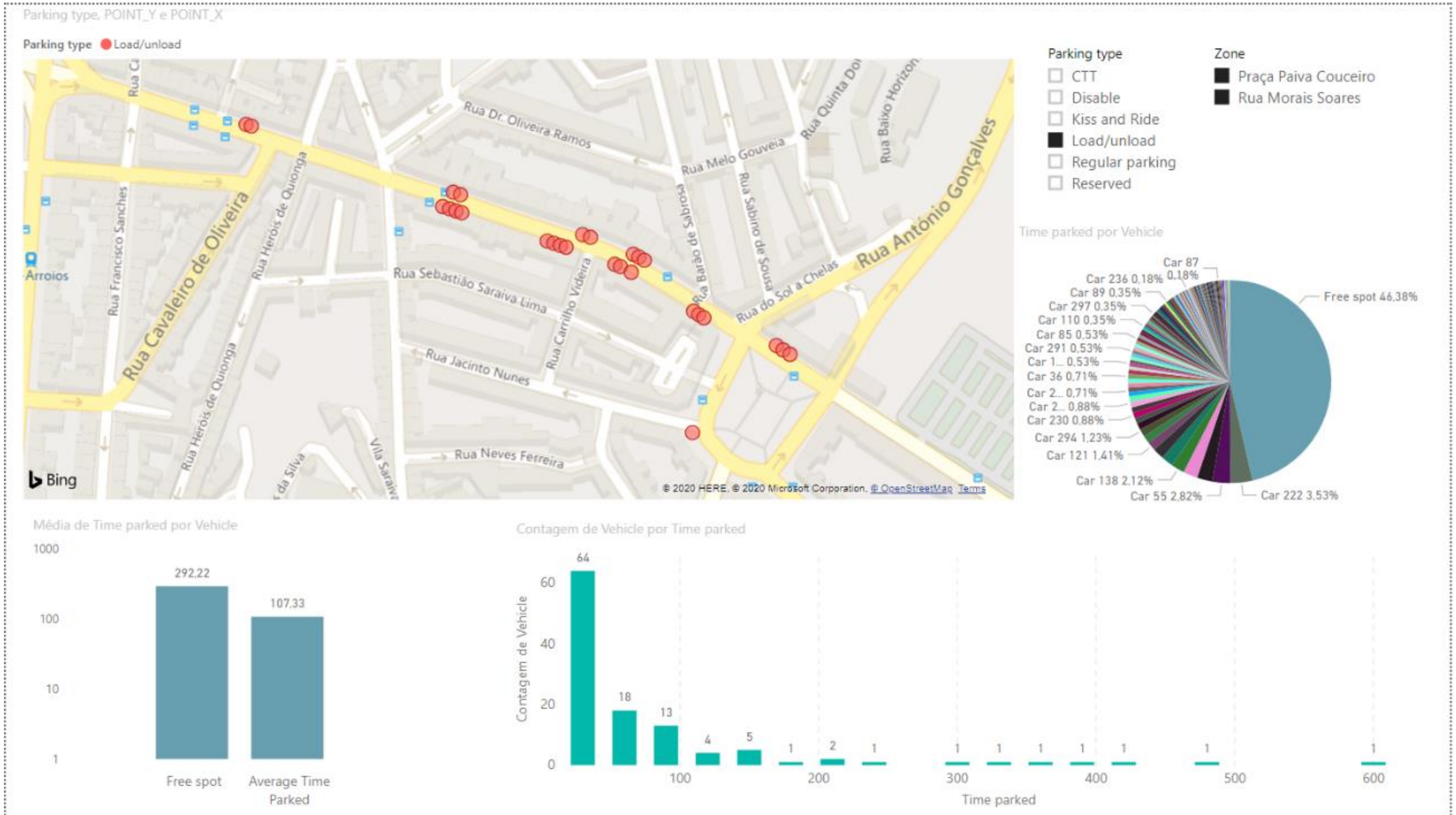
Posto5A - Rua António Gonçalves com Rua Morais Soares e com Praça Paiva Couceiro							
N		E		S		Fora	
W->E (5A.1)	E->W (5A.2)	N->S (5A.3)	S->N (5A.4)	W->E (5A.5)	E->W (5A.6)	N->S (J)	S->N (I)
5	9	4	6	6	12	0	0
3	7	7	9	12	8	0	0
5	18	4	6	14	24	1	0
3	20	9	9	27	17	0	0
2	10	10	9	26	13	0	1
6	15	5	7	31	17	0	0

Posto6 - Praça Paiva Couceiro com Av. Mouzinho de Albuquerque					
N		E		Fora	
W->E (6.1)	E->W (6.2)	N->S (6.3)	S->N (6.4)	W->E (K)	E->W (L)
19	23	6	19	0	1
20	20	21	51	1	2
23	21	11	25	0	1
32	26	28	17	3	2
39	19	10	31	0	1
27	24	25	23	0	0

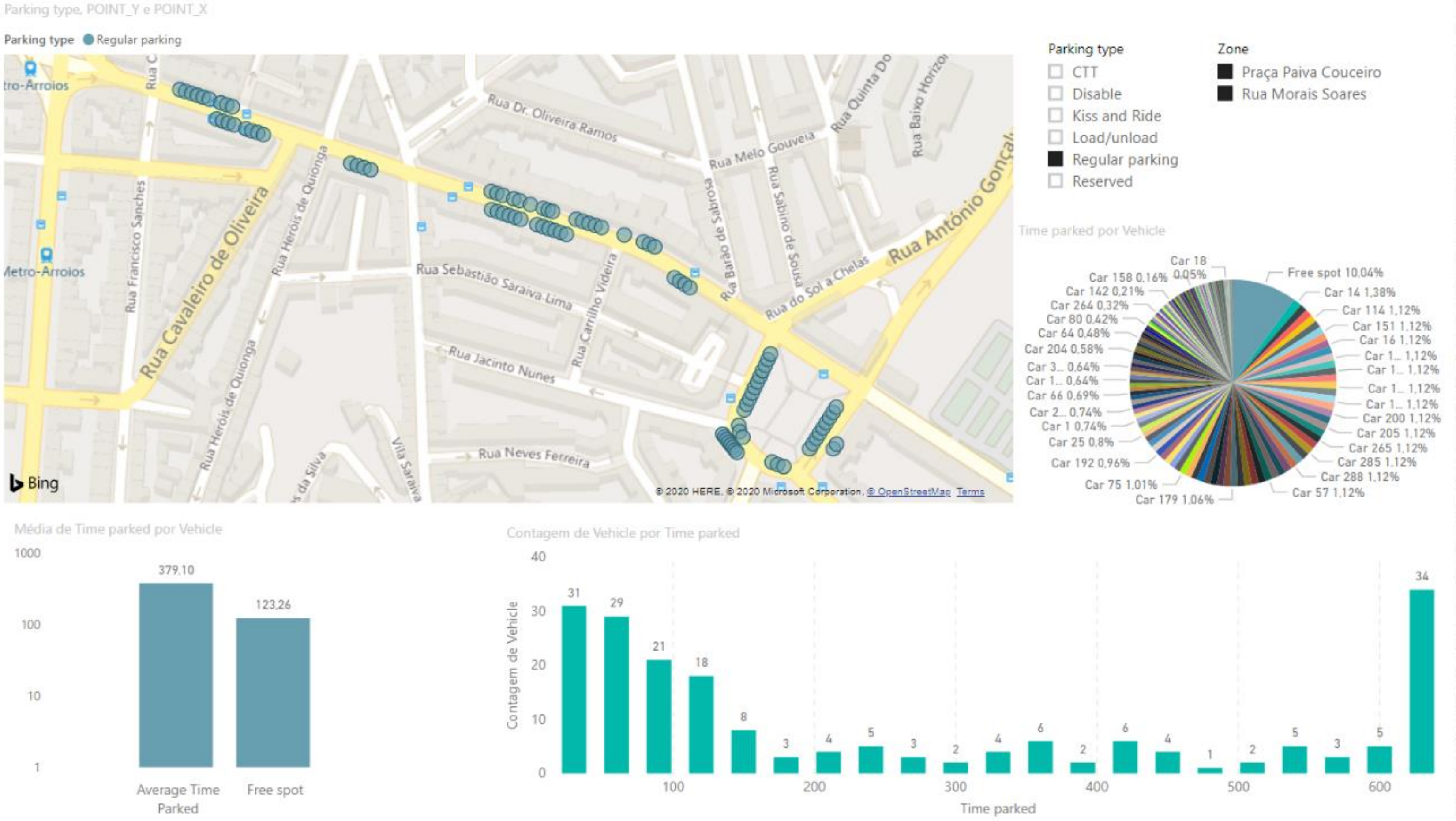
Posto6A - Praça Paiva Couceiro com Av. General Roçadas					
S		W		Fora	
N->S (6A.1)	S->N (6A.2)	W->E (6A.3)	E->W (6A.4)	N->S (M)	S->N (N)
16	15	7	6	0	0
16	15	12	6	0	0
21	22	10	8	1	0
30	34	8	12	1	3
17	20	1	4	0	0
16	21	3	5	0	0

Posto6B - Praça Paiva Couceiro com Rua Jacinto Nunes					
W		N		Fora	
W->E (6B.1)	E->W (6B.2)	N->S (6B.3)	S->N (6B.4)	W->E (O)	E->W (P)
48	66	19	15	0	0
44	61	16	14	0	0
42	55	15	24	0	0
59	64	14	22	0	0
54	56	16	23	0	0
64	59	13	20	0	0

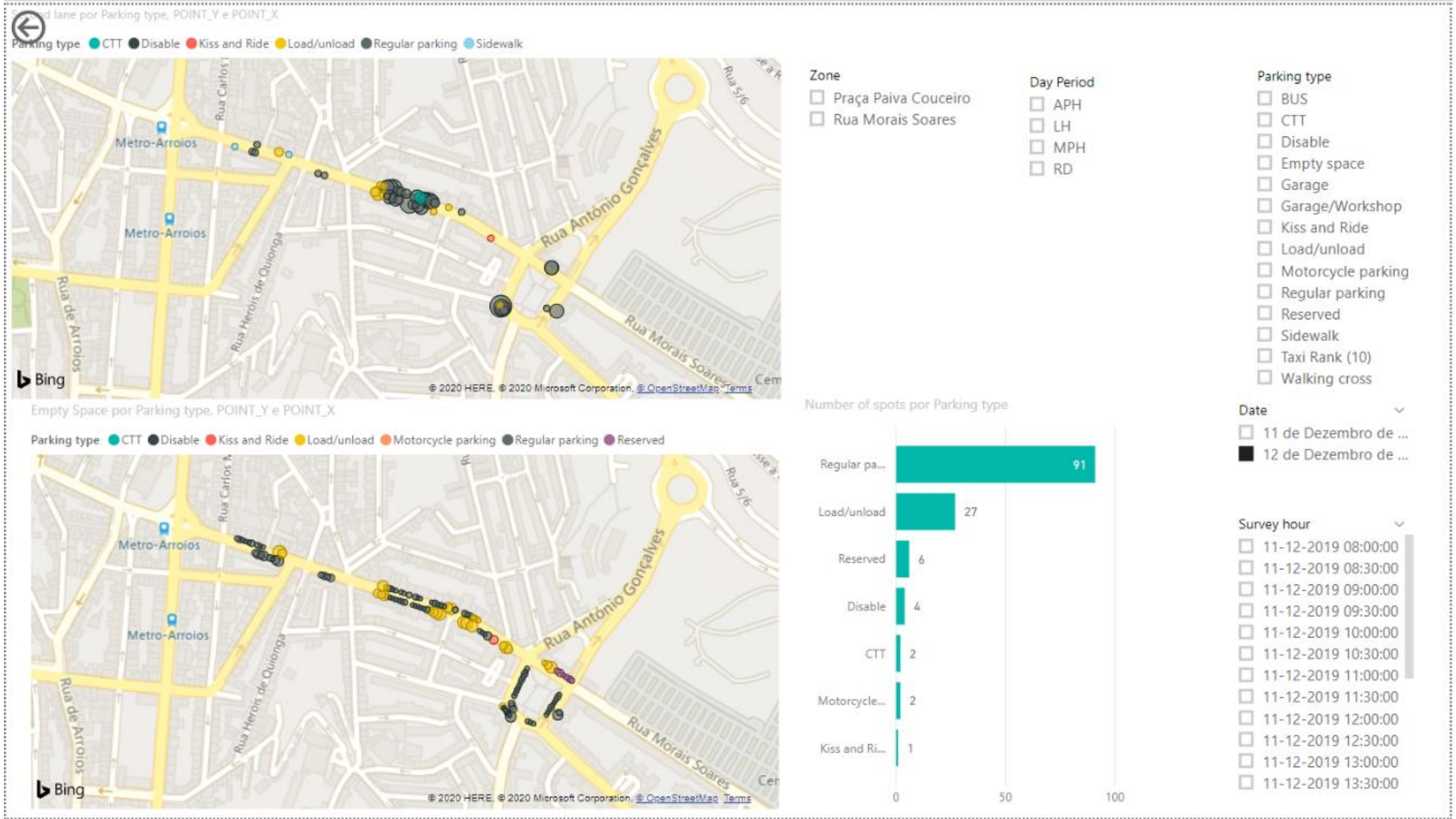
8.2.6 Parking rotation



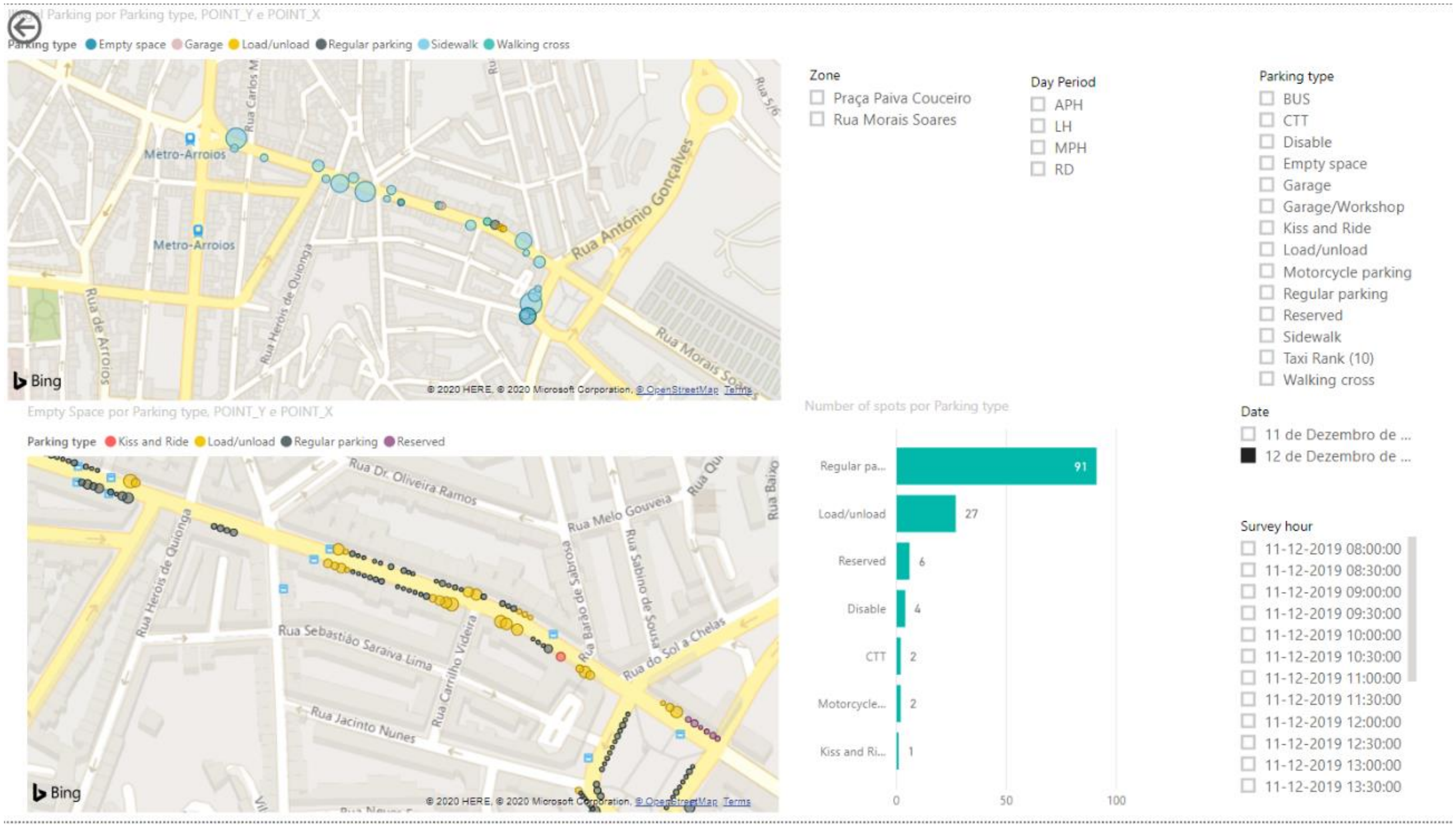
Load/unload parking characterization



Regular parking characterization



Second lane parking occurrences

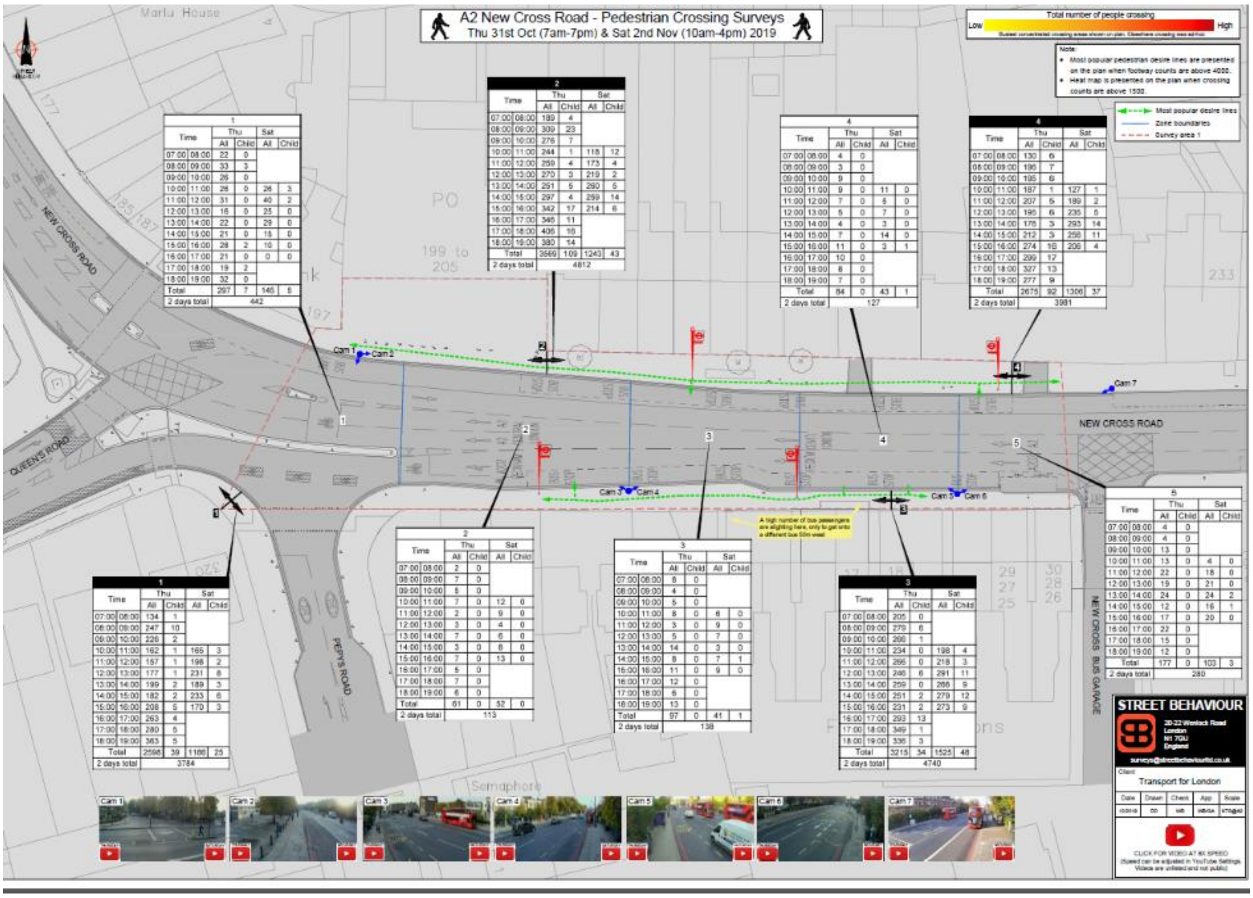


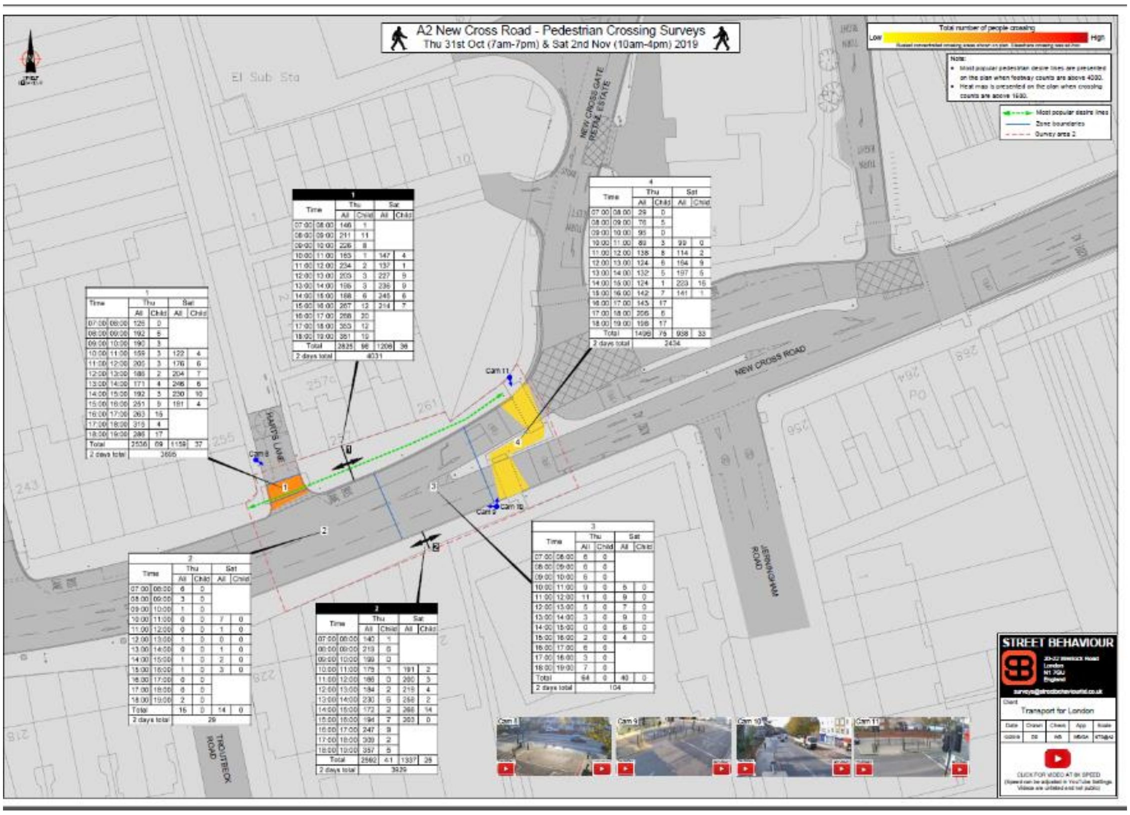
Illegal parking occurrences

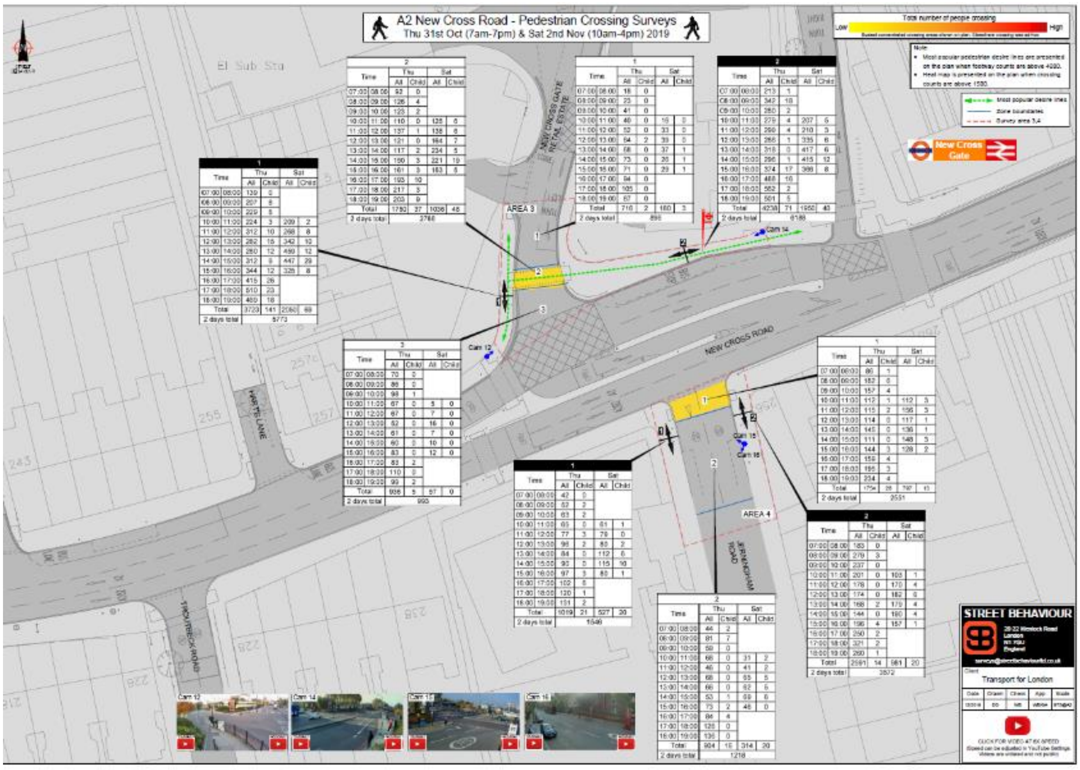
8.3 London

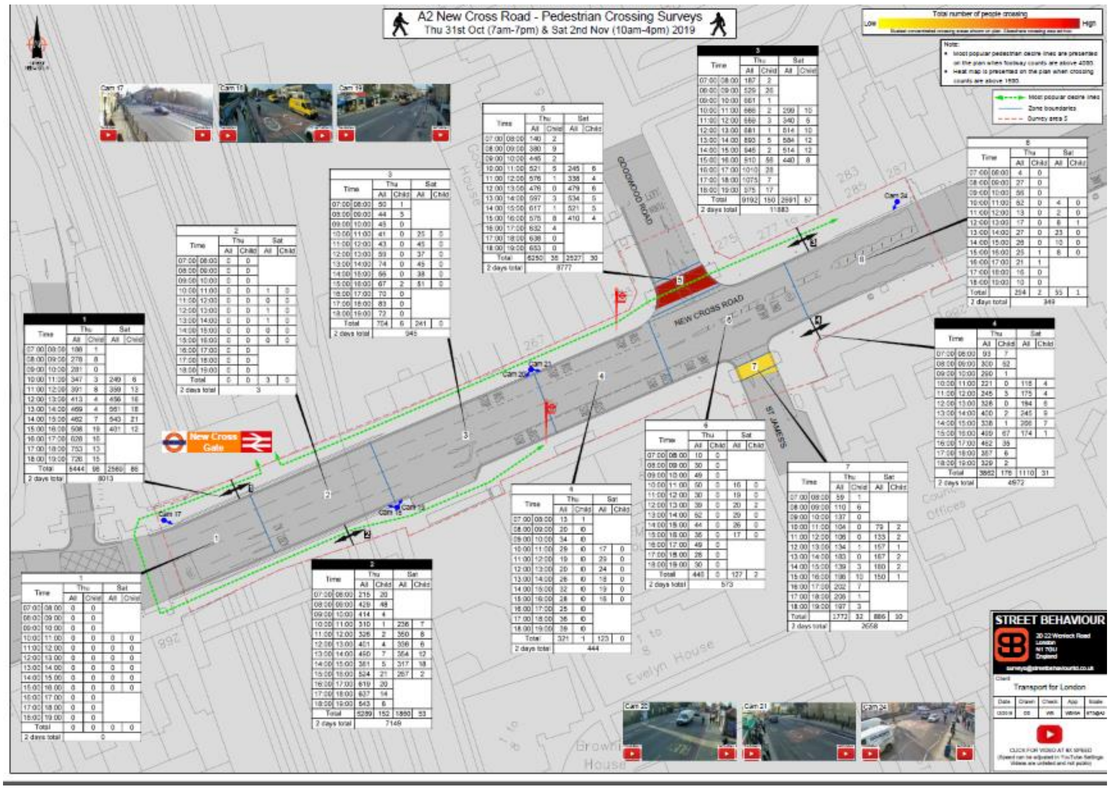
8.3.1 Pedestrian Crossings

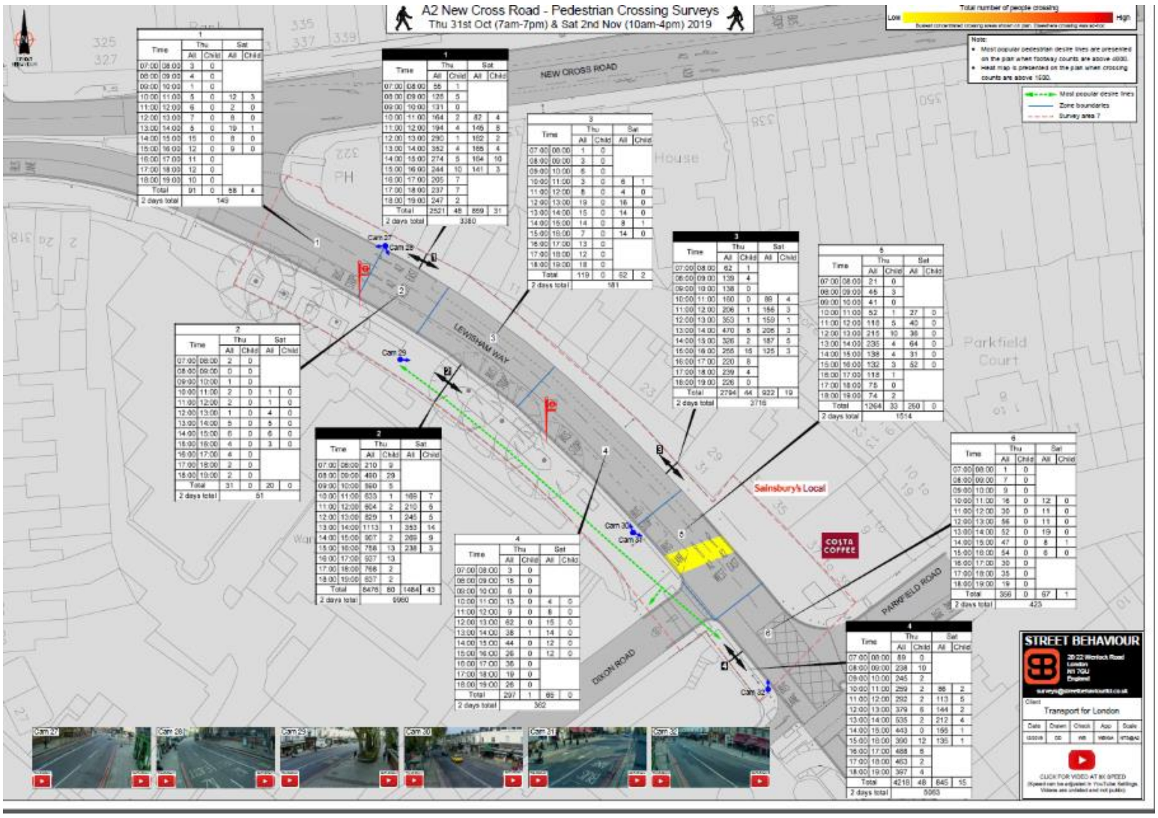
Informal crossing surveys were carried out along the New Cross study area. The trends are analysed in Chapter 5.2.1 of the main report under pedestrian severance. The expanded data from each site can be seen below.

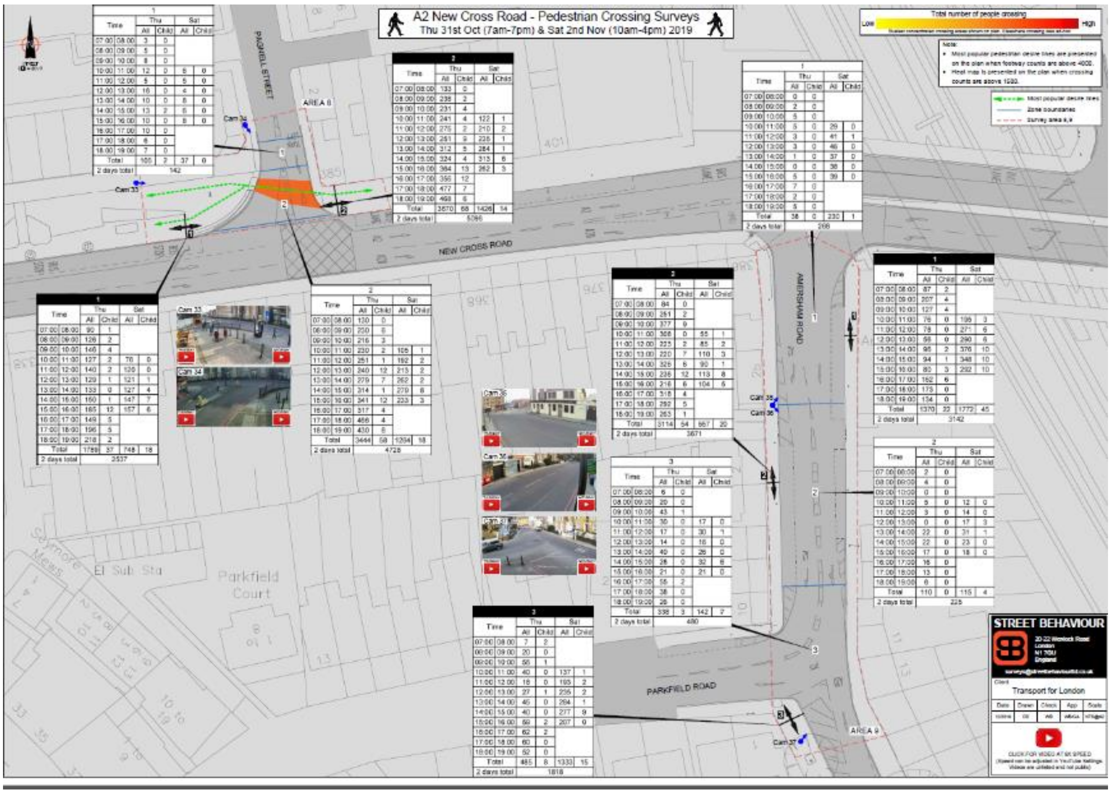


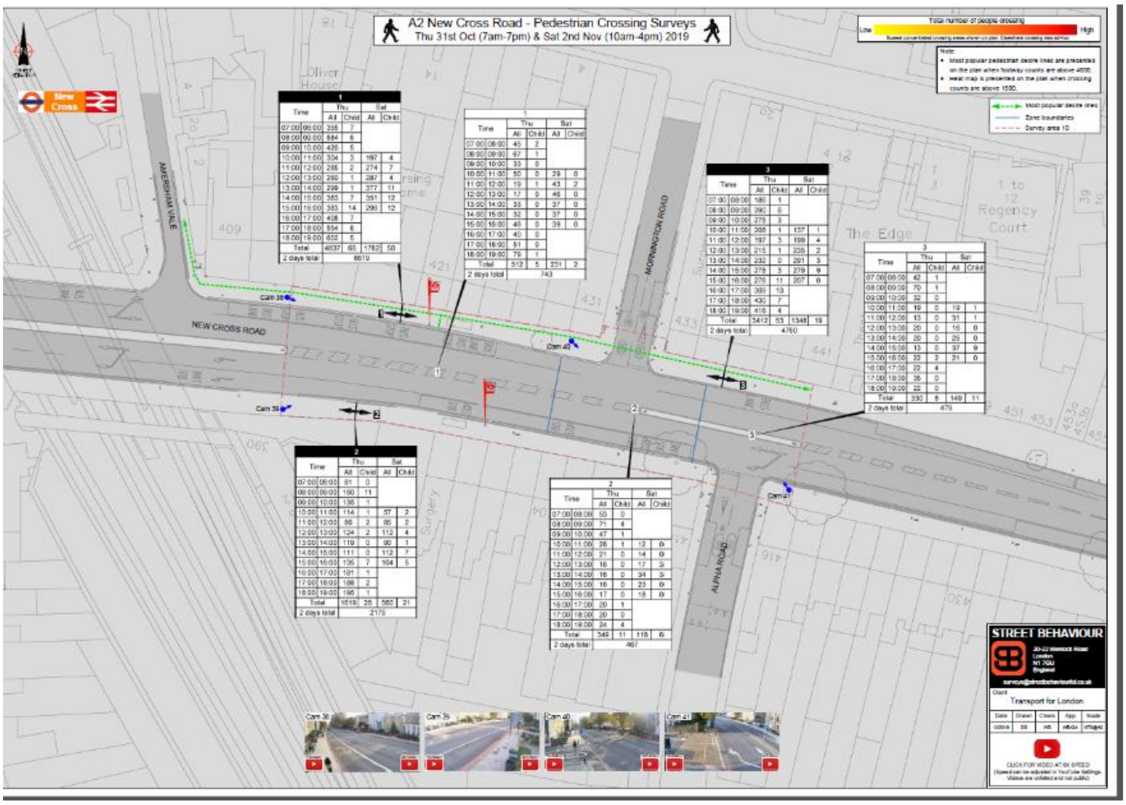

A2 New Cross Road - Pedestrian Crossing Surveys
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
Total number of people crossing
Low
High
NEW CROSS ROAD
NEW CROSS GATE RETAIL ESTATE
HARTS LANE
JERNINGHAM ROAD
TROUTBECK ROAD
El Sub Sta
STREET BEHAVIOUR
Transport for London

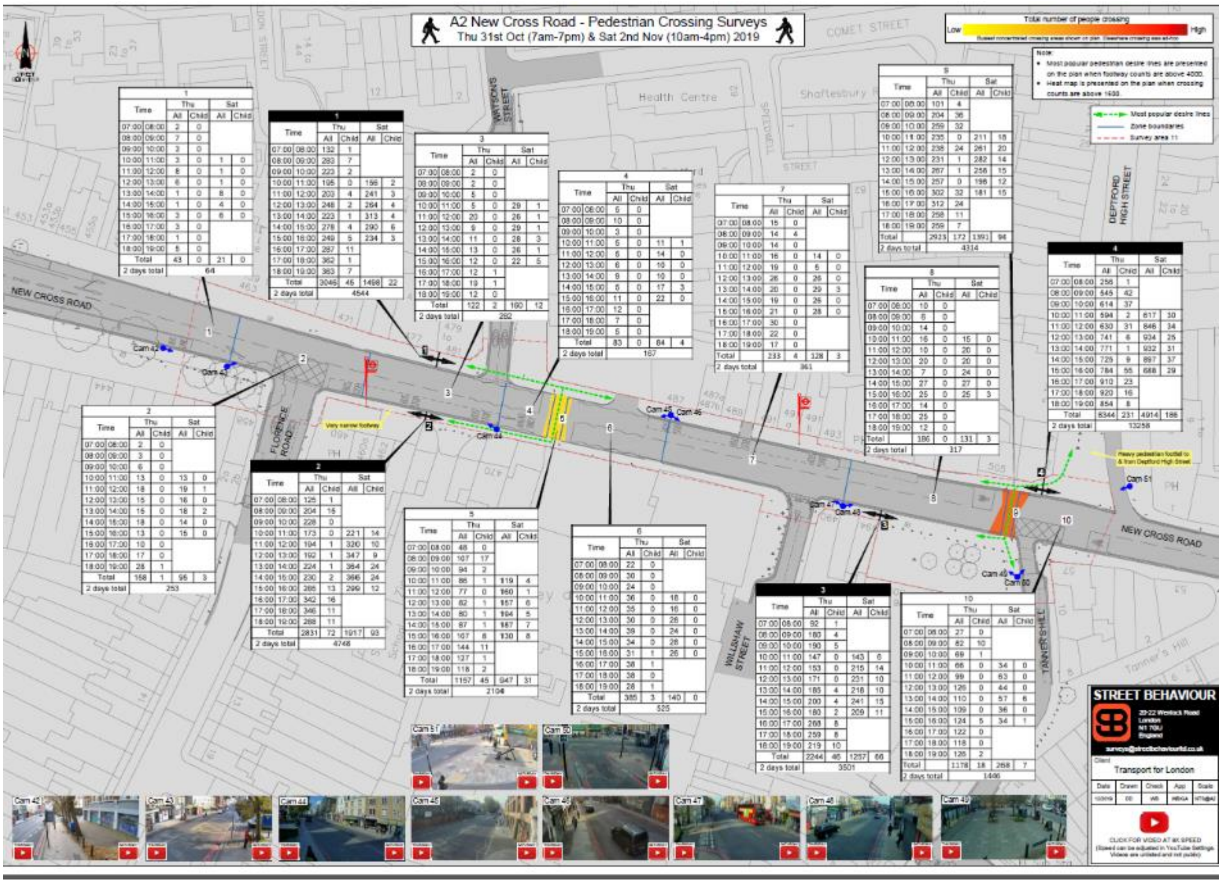

A2 New Cross Road - Pedestrian Crossing Surveys
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
Total number of people crossing
Low
High
New Cross Gate
NEW CROSS ROAD
NEW CROSS GATE RETAIL ESTATE
HARTS LANE
JERNINGHAM ROAD
TROUTBECK ROAD
AREA 3
AREA 4
El Sub Sta
STREET BEHAVIOUR
Transport for London


A2 New Cross Road - Pedestrian Crossing Surveys
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
NEW CROSS ROAD
STREET BEHAVIOUR
Transport for London


A2 New Cross Road - Pedestrian Crossing Surveys
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
NEW CROSS ROAD
LEWISHAM WAY
Sainsbury's Local
COSTA COFFEE
STREET BEHAVIOUR
Transport for London


A2 New Cross Road - Pedestrian Crossing Surveys
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
NEW CROSS ROAD
AMERSHAM ROAD
PARKFIELD ROAD
STREET BEHAVIOUR
Transport for London


A2 New Cross Road - Pedestrian Crossing Surveys
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
New Cross
NEW CROSS ROAD
AMERSHAM VALE
MORNINGTON ROAD
ALPHA ROAD
STREET BEHAVIOUR
Transport for London

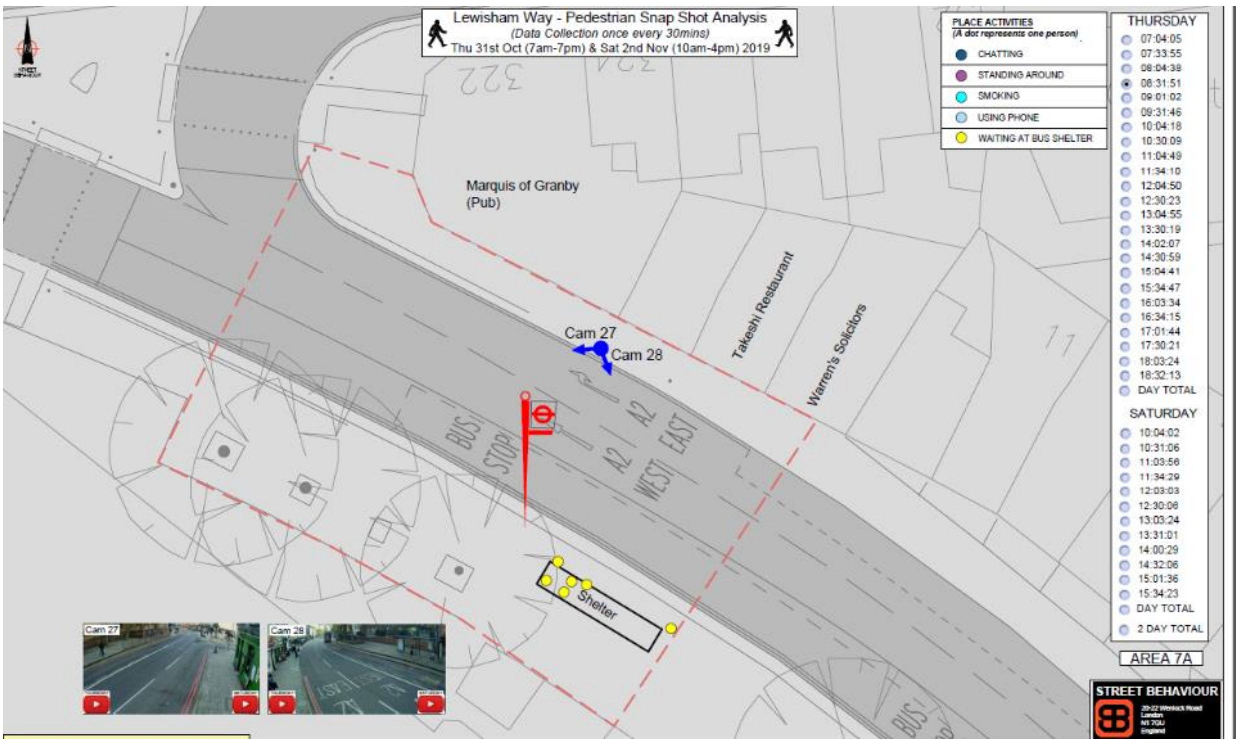


8.3.2 Place User Activity

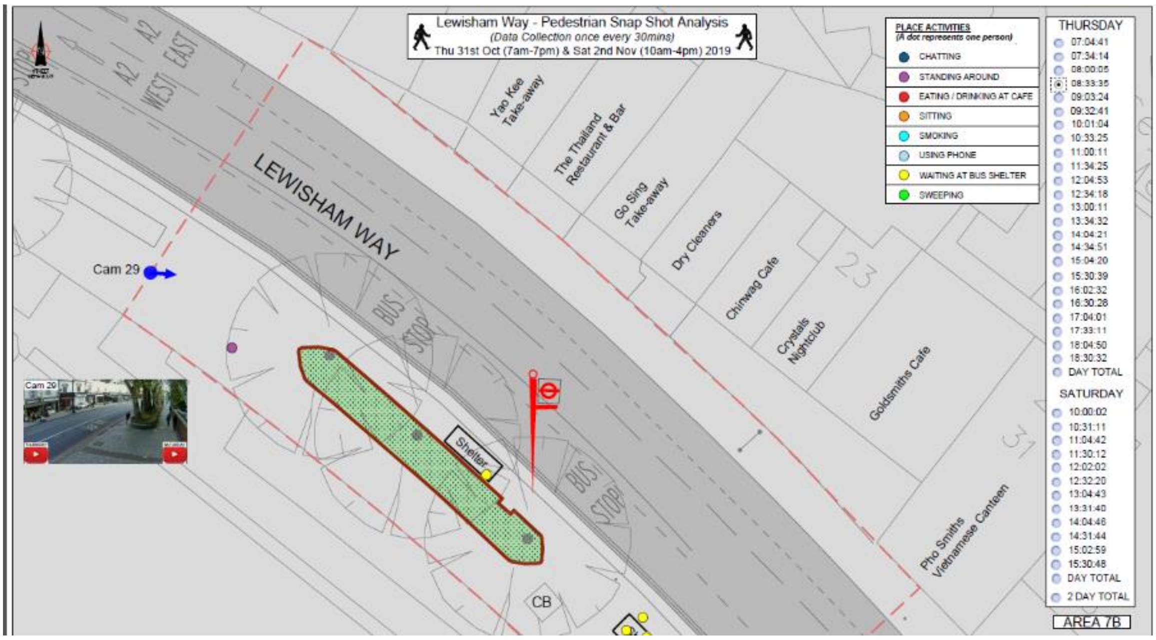
Place user surveys were carried out at selected areas of the New Cross study area. These areas were selected based on the adjacent land use and expected footway demand to further understand pedestrian movement. The data below expands on that analysed in Chapter 5 in the main report.

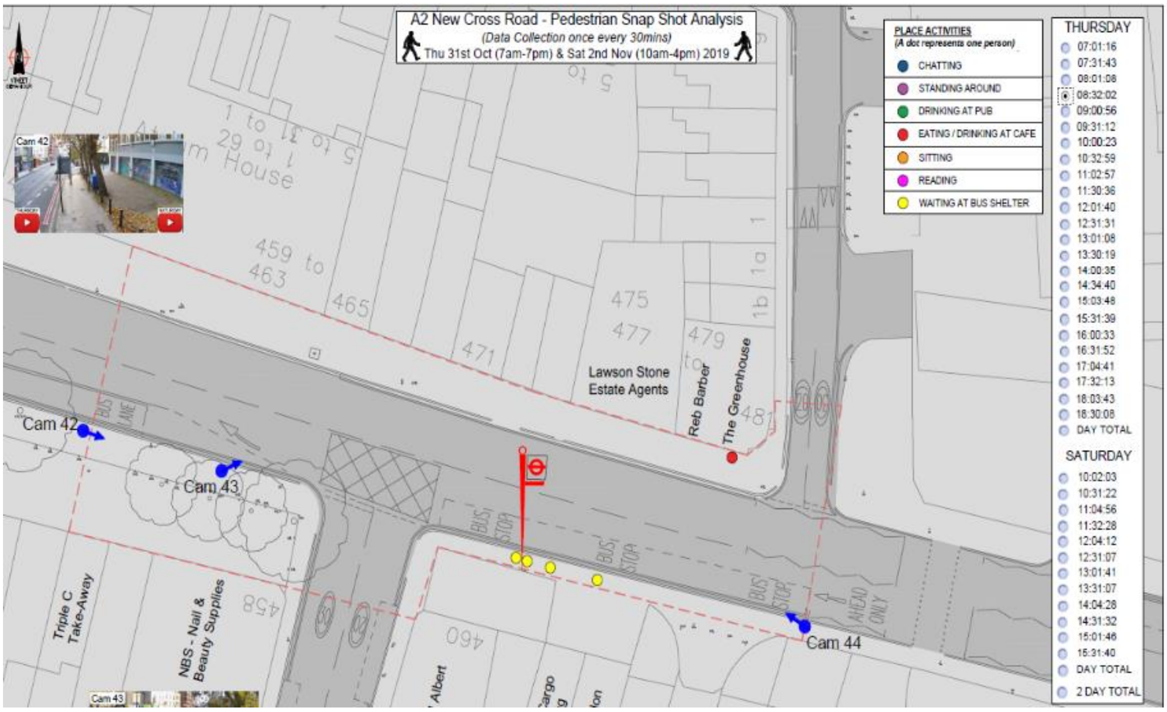
08:30

New Cross Road / New Cross Gate - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
New Cross Gate
NEW CROSS ROAD
Cam 17
Cam 18
THURSDAY
SATURDAY
DAY TOTAL
AREA 5

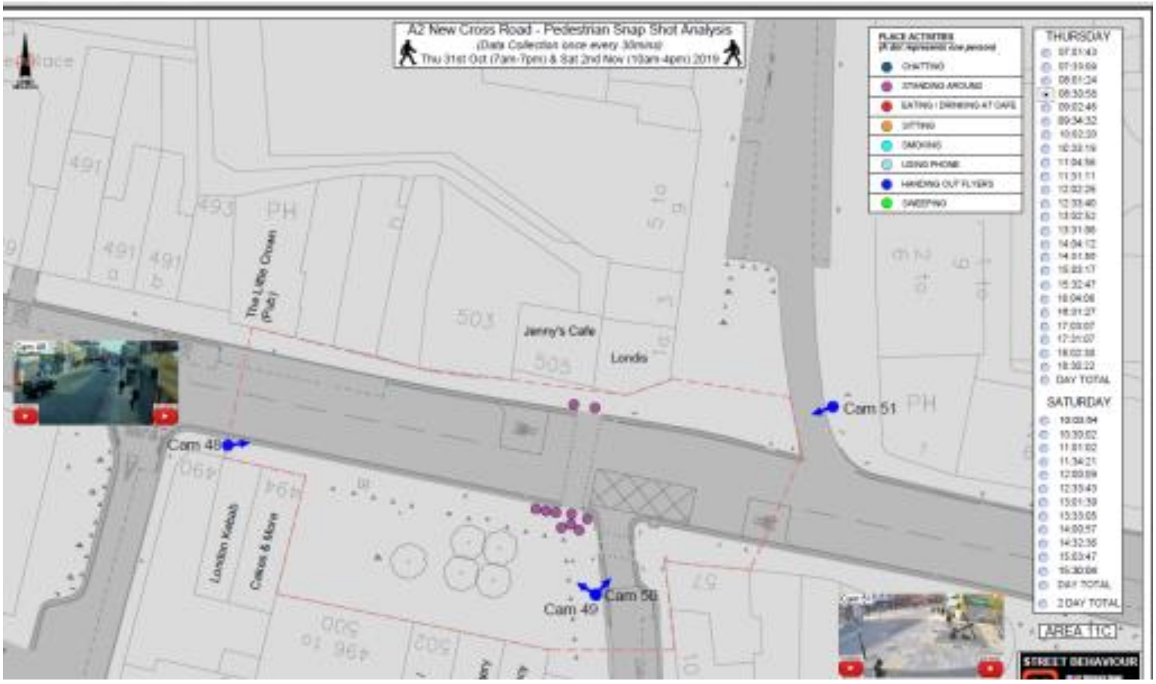


Lewisham Way - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
(A dot represents one person)
CHATTING
STANDING AROUND
SMOKING
USING PHONE
WAITING AT BUS SHELTER
THURSDAY
07:04:05
07:33:55
08:04:38
08:31:51
09:01:02
09:31:46
10:04:18
10:30:09
11:04:49
11:34:10
12:04:50
12:30:23
13:04:55
13:30:19
14:02:07
14:30:59
15:04:41
15:34:47
16:03:34
16:34:15
17:01:44
17:30:21
18:03:24
18:32:13
DAY TOTAL
SATURDAY
10:04:02
10:31:06
11:03:56
11:34:29
12:03:03
12:30:06
13:03:24
13:31:01
14:00:29
14:32:06
15:01:36
15:34:23
DAY TOTAL
2 DAY TOTAL
AREA 7A
Marquis of Granby (Pub)
Takeshi Restaurant
Warren's Solicitors
Cam 27
Cam 28
BUS STOP
A2
A2 WEST EAST
Shelter
STREET BEHAVIOUR


Lewisham Way - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
(A dot represents one person)
CHATTING
STANDING AROUND
EATING / DRINKING AT CAFE
SITTING
SMOKING
USING PHONE
WAITING AT BUS SHELTER
SWEEPING
THURSDAY
07:04:41
07:34:14
08:00:05
08:33:35
09:03:24
09:32:41
10:01:04
10:33:25
11:00:11
11:34:25
12:04:53
12:34:18
13:00:11
13:34:32
14:04:21
14:34:51
15:04:20
15:30:39
16:02:32
16:30:28
17:04:01
17:33:11
18:04:50
18:30:32
DAY TOTAL
SATURDAY
10:00:02
10:31:11
11:04:42
11:30:12
12:02:02
12:32:20
13:04:43
13:31:40
14:04:46
14:31:44
15:02:59
15:30:48
DAY TOTAL
2 DAY TOTAL
AREA 7B
LEWISHAM WAY
A2
WEST
EAST
Cam 29
Yao Kee Take-away
The Thailand Restaurant & Bar
Go Sing Take-away
Dry Cleaners
Chinwag Cafe
Crystals Nightclub
Goldsmiths Cafe
Pho Smiths Vietnamese Canteen
BUS STOP
Shelter
CB

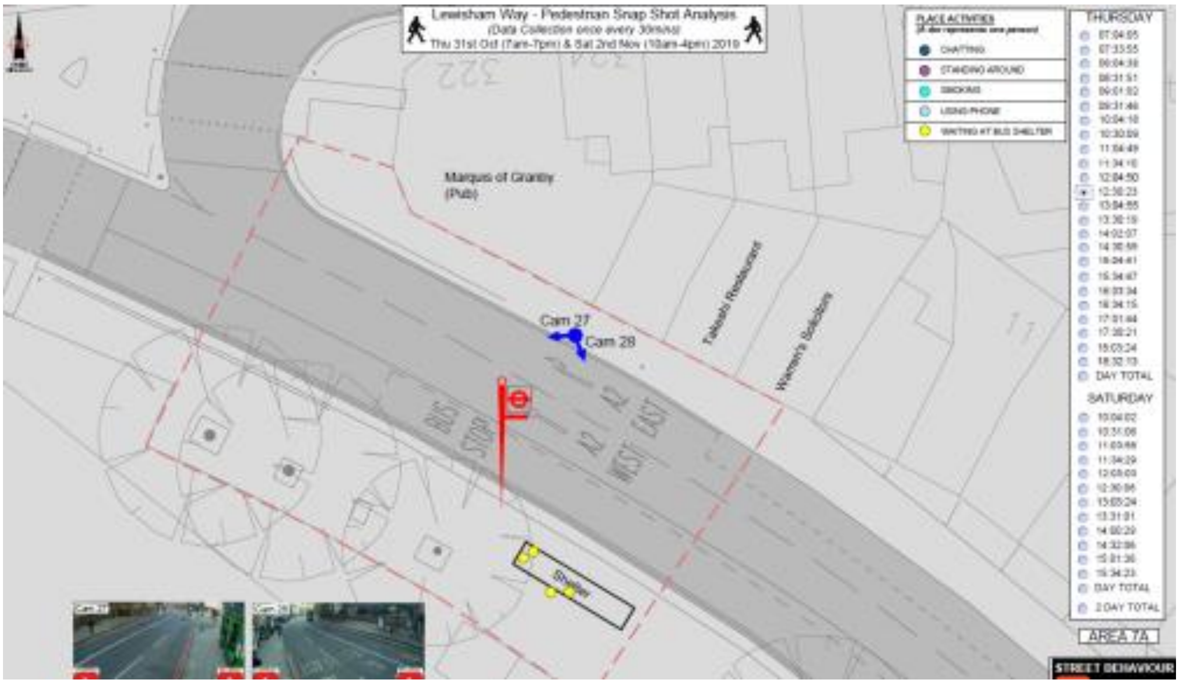

A2 New Cross Road - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
(A dot represents one person)
CHATTING
STANDING AROUND
DRINKING AT PUB
EATING / DRINKING AT CAFE
SITTING
READING
WAITING AT BUS SHELTER
THURSDAY
07:01:16
07:31:43
08:01:08
08:32:02
09:00:56
09:31:12
10:00:23
10:32:59
11:02:57
11:30:36
12:01:40
12:31:31
13:01:08
13:30:19
14:00:35
14:34:40
15:03:48
15:31:39
16:00:33
16:31:52
17:04:41
17:32:13
18:03:43
18:30:08
DAY TOTAL
SATURDAY
10:02:03
10:31:22
11:04:56
11:32:28
12:04:12
12:31:07
13:01:41
13:31:07
14:04:28
14:31:32
15:01:46
15:31:40
DAY TOTAL
2 DAY TOTAL
Cam 42
Cam 43
Cam 44
Lawson Stone Estate Agents
Reb Barber
The Greenhouse
Triple C Take-Away
NBS - Nail & Beauty Supplies
BUS STOP
AHEAD ONLY

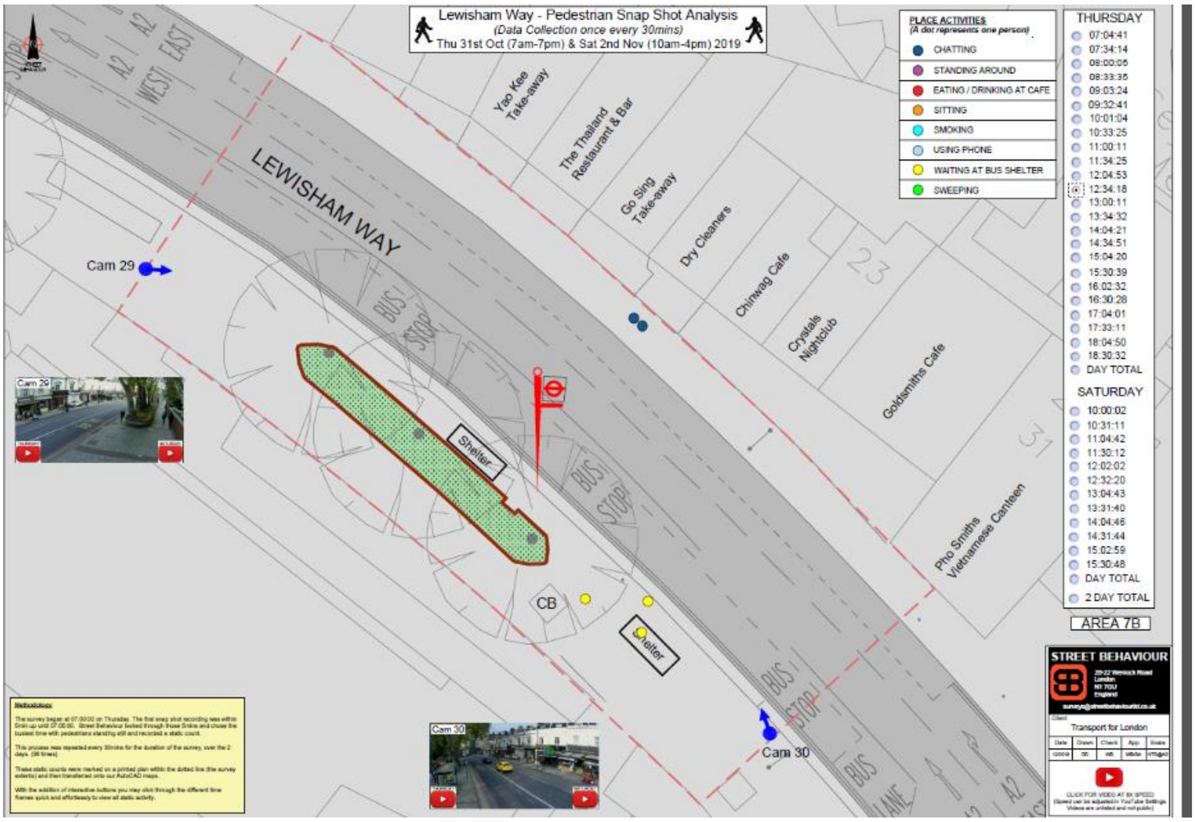

A2 New Cross Road - Pedestrian Snap Shot Analysis
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
THURSDAY
DAY TOTAL
SATURDAY
2 DAY TOTAL
AREA 11B
STREET BEHAVIOUR
Theatre Place
New Development
NEW CROSS ROAD
Cam 45
Cam 46
Cam 47
Yoga Institute
The Little Crown (Pub)
Sharon Grocery Food Store


A2 New Cross Road - Pedestrian Snap Shot Analysis
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
THURSDAY
DAY TOTAL
SATURDAY
2 DAY TOTAL
AREA 11C
STREET BEHAVIOUR
The Little Crown (Pub)
Jenny's Cafe
Londis
Cam 48
Cam 49
Cam 50
Cam 51
London Kebab

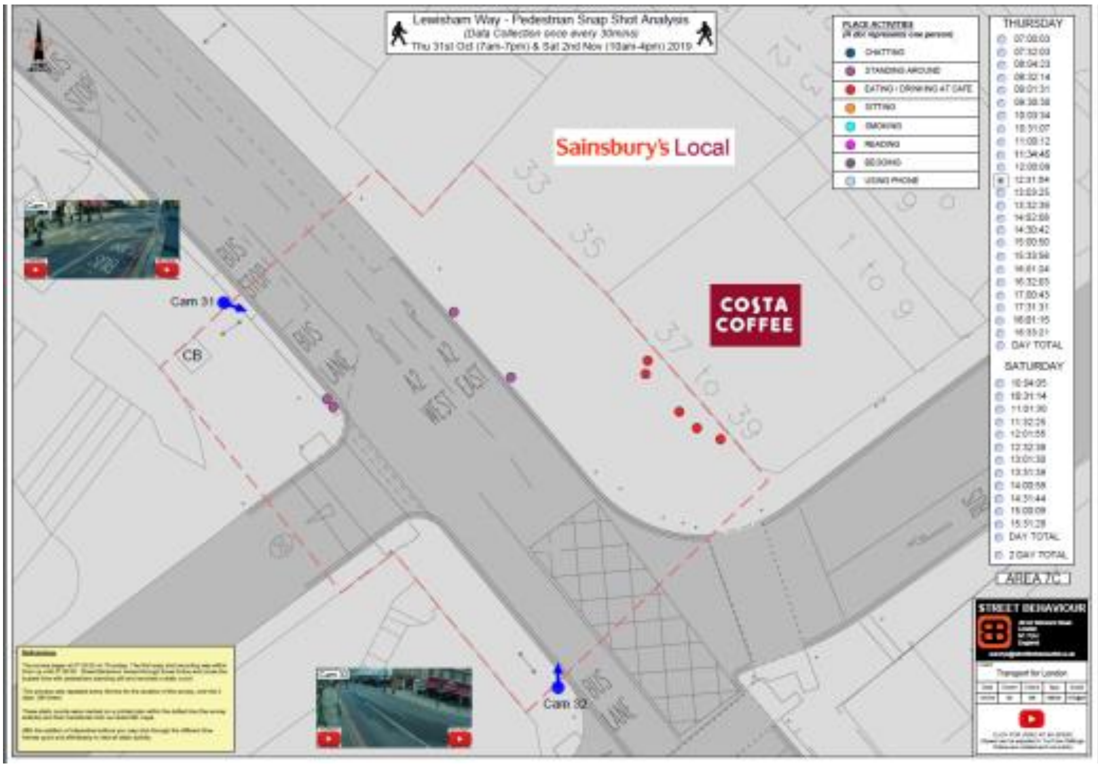
12:30


New Cross Road / New Cross Gate - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
THURSDAY
DAY TOTAL
SATURDAY
DAY TOTAL
2 DAY TOTAL
New Cross Gate
NEW CROSS ROAD
Cam 17
Cam 18
AREA 5

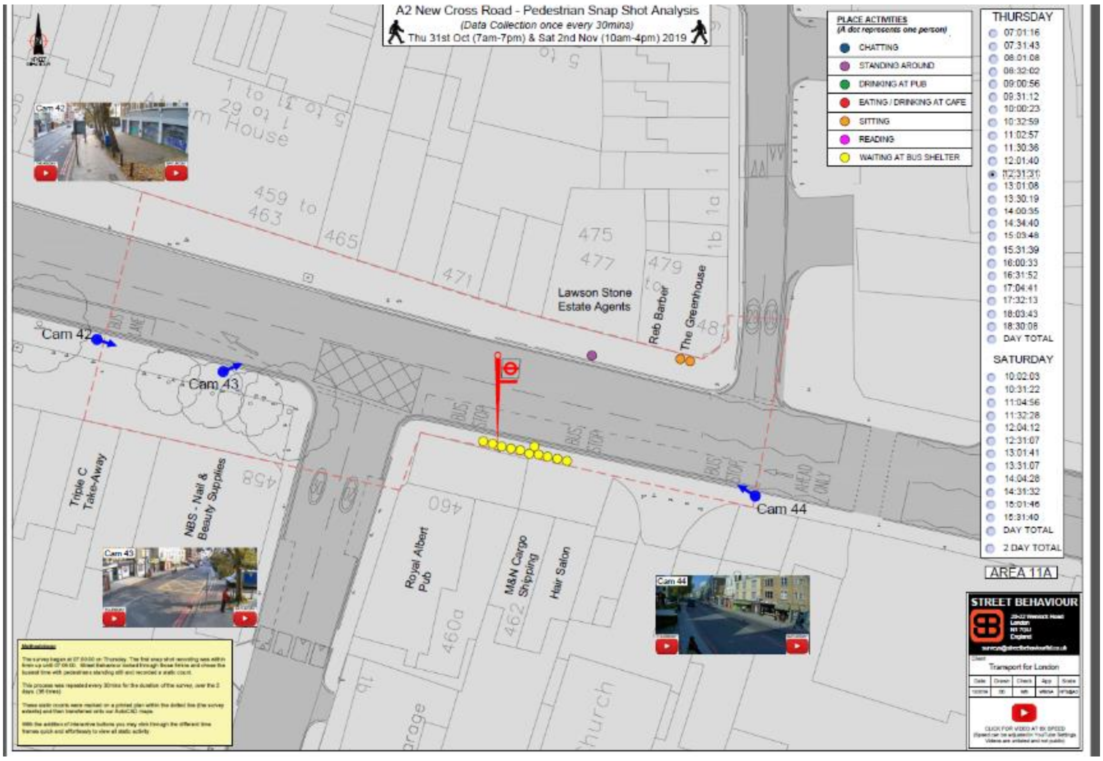

Lewisham Way - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
THURSDAY
DAY TOTAL
SATURDAY
DAY TOTAL
2 DAY TOTAL
Marquis of Granby
(Pub)
Cam 27
Cam 28
BUS STOP
A2
A2 WEST EAST
Shelter
AREA 7A
STREET BEHAVIOUR



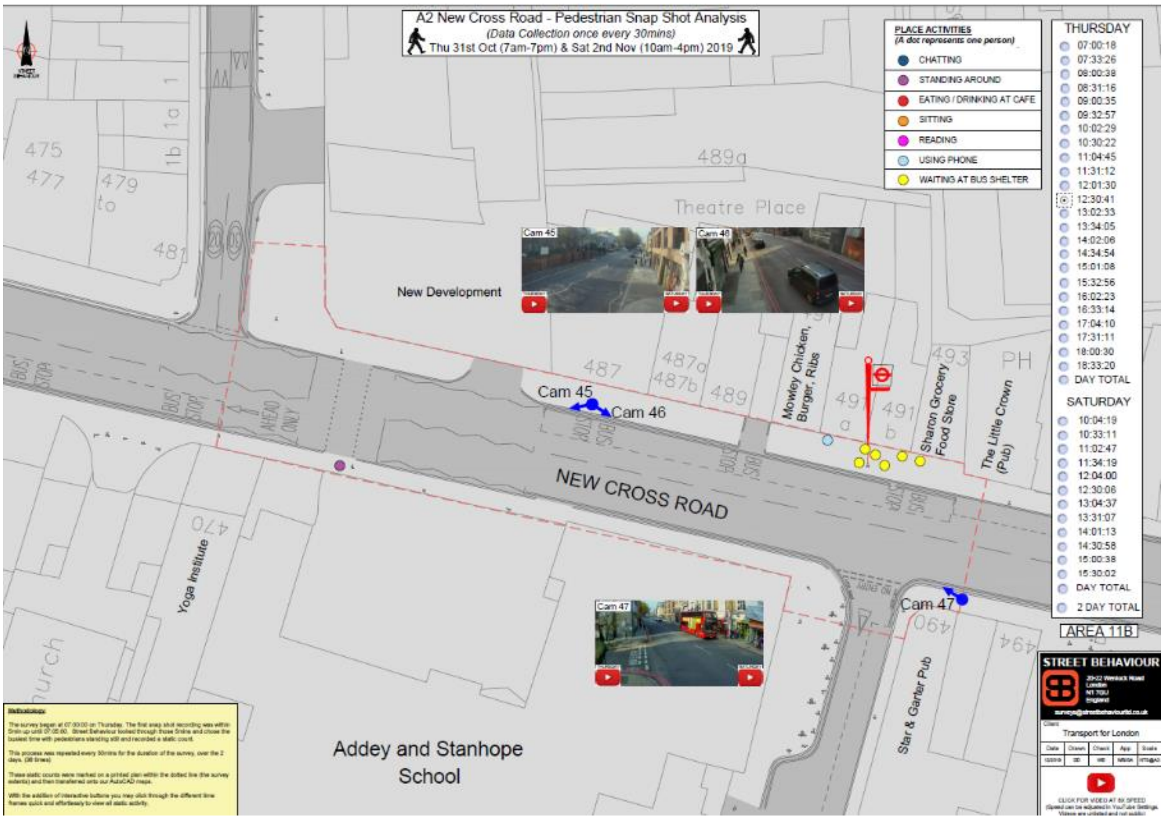
Lewisham Way - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
(A dot represents one person)
CHATTING
STANDING AROUND
EATING / DRINKING AT CAFE
SITTING
SMOKING
USING PHONE
WAITING AT BUS SHELTER
SWEEPING
THURSDAY
DAY TOTAL
SATURDAY
DAY TOTAL
2 DAY TOTAL
AREA 7B
STREET BEHAVIOUR
Transport for London
LEWISHAM WAY
Yao Kee Take-away
The Thailand Restaurant & Bar
Go Sing Take-away
Dry Cleaners
Chinwag Cafe
Crystals Nightclub
Goldsmiths Cafe
Pho Smiths Vietnamese Canteen
Cam 29
Cam 30
Shelter
CB
BUS STOP
BUS LANE
A2 WEST EAST



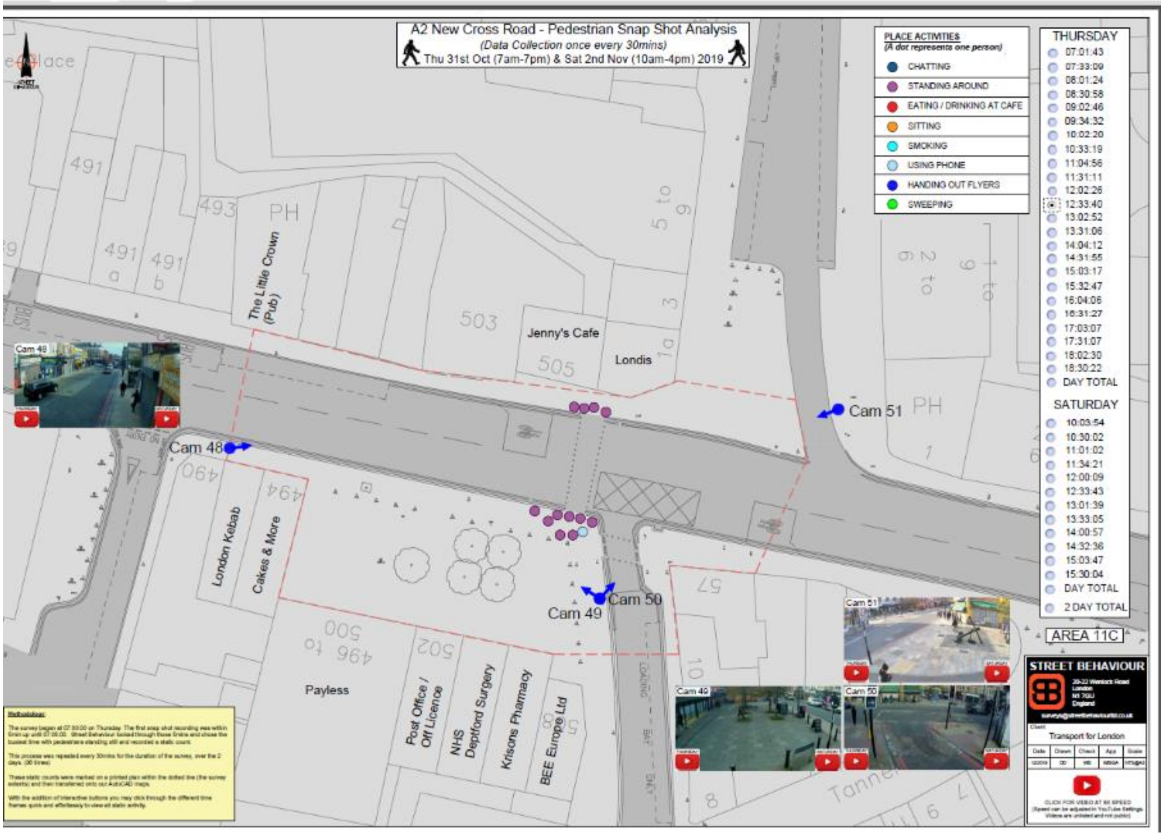
Lewisham Way - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
THURSDAY
DAY TOTAL
SATURDAY
DAY TOTAL
2 DAY TOTAL
AREA 7C
STREET BEHAVIOUR
Transport for London
Sainsbury's Local
COSTA COFFEE
Cam 31
Cam 32
CB
BUS STOP
BUS LANE
A2 WEST EAST



A2 New Cross Road - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
(A dot represents one person)
CHATTING
STANDING AROUND
DRINKING AT PUB
EATING / DRINKING AT CAFE
SITTING
READING
WAITING AT BUS SHELTER
THURSDAY
SATURDAY
DAY TOTAL
2 DAY TOTAL
AREA 11A
STREET BEHAVIOUR
Transport for London
Cam 42
Cam 43
Cam 44
Lawson Stone Estate Agents
Reb Barber
The Greenhouse
Triple C Take-Away
NBS - Nail & Beauty Supplies
Royal Albert Pub
M&N Cargo Shipping
Hair Salon



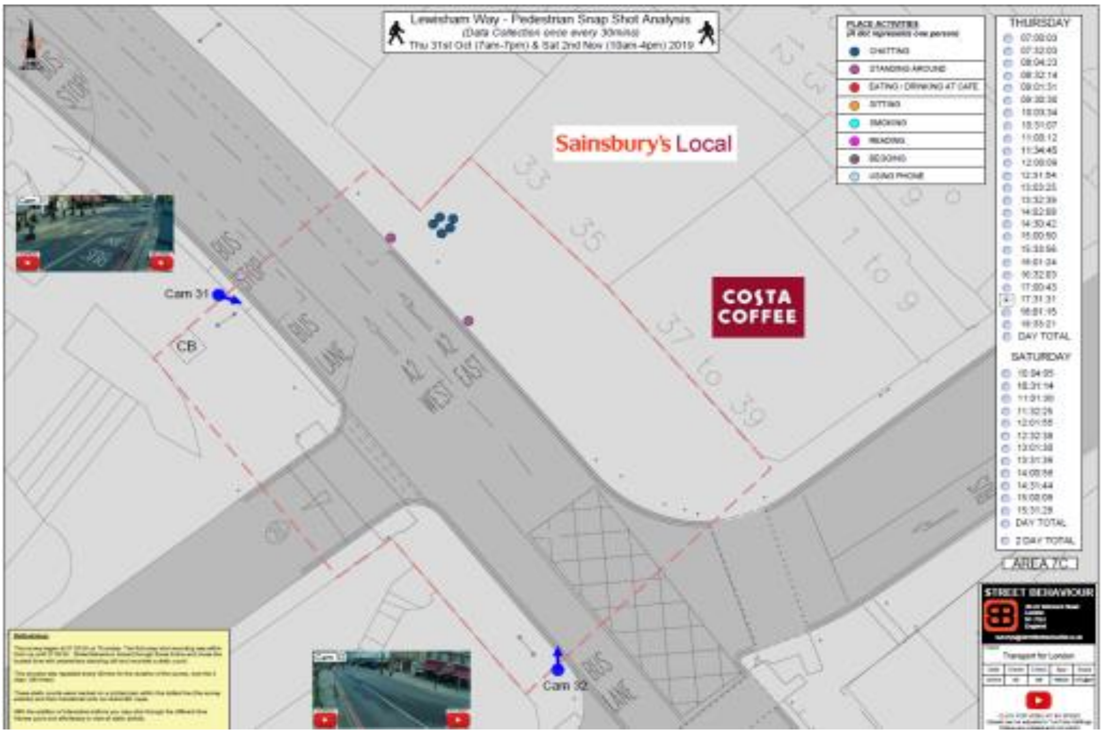
A2 New Cross Road - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
(A dot represents one person)
CHATTING
STANDING AROUND
EATING / DRINKING AT CAFE
SITTING
READING
USING PHONE
WAITING AT BUS SHELTER
THURSDAY
SATURDAY
DAY TOTAL
2 DAY TOTAL
AREA 11B
STREET BEHAVIOUR
Transport for London
Theatre Place
New Development
Cam 45
Cam 46
Cam 47
Mowley Chicken, Burger, Ribs
Sharon Grocery Food Store
The Little Crown (Pub)
NEW CROSS ROAD
Yoga Institute
Star & Garter Pub
Addey and Stanhope School

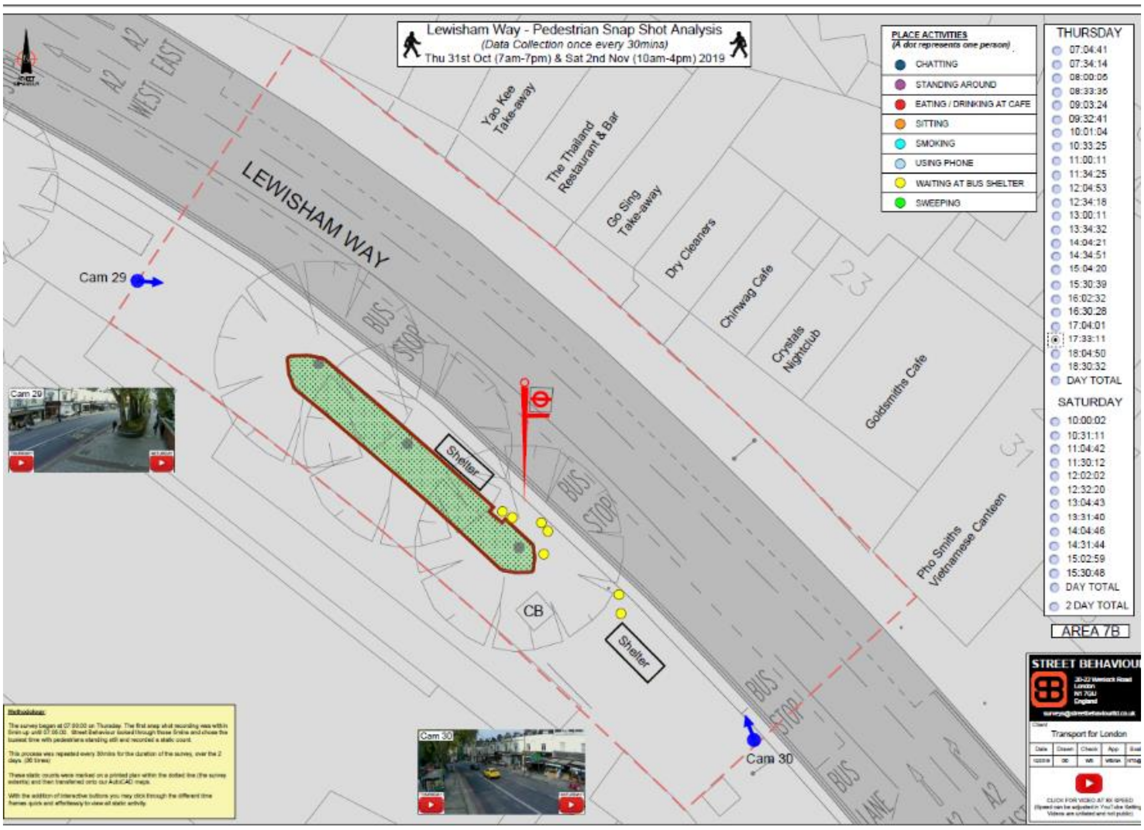


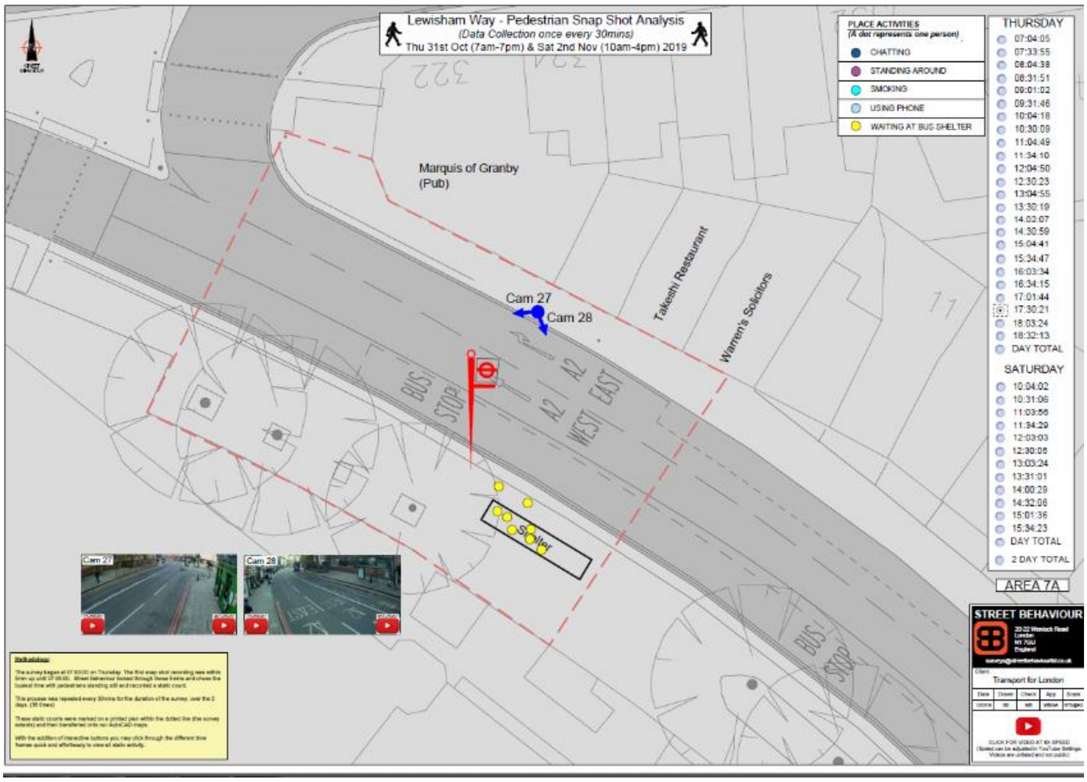
A2 New Cross Road - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
(A dot represents one person)
CHATTING
STANDING AROUND
EATING / DRINKING AT CAFE
SITTING
SMOKING
USING PHONE
HANDING OUT FLYERS
SWEEPING
THURSDAY
07:01:43
07:33:09
08:01:24
08:30:58
09:02:46
09:34:32
10:02:20
10:33:19
11:04:56
11:31:11
12:02:26
12:33:40
13:02:52
13:31:06
14:04:12
14:31:55
15:03:17
15:32:47
16:04:06
16:31:27
17:03:07
17:31:07
18:02:30
18:30:22
DAY TOTAL
SATURDAY
10:03:54
10:30:02
11:01:02
11:34:21
12:00:09
12:33:43
13:01:39
13:33:05
14:00:57
14:32:36
15:03:47
15:30:04
DAY TOTAL
2 DAY TOTAL
AREA 11C
STREET BEHAVIOUR
Transport for London
Cam 48
Cam 49
Cam 50
Cam 51
The Little Crown (Pub)
Jenny's Cafe
Londis
London Kebab
Cakes & More
Payless
Post Office / Off Licence
NHS Deptford Surgery
Krisons Pharmacy
BEE Europe Ltd

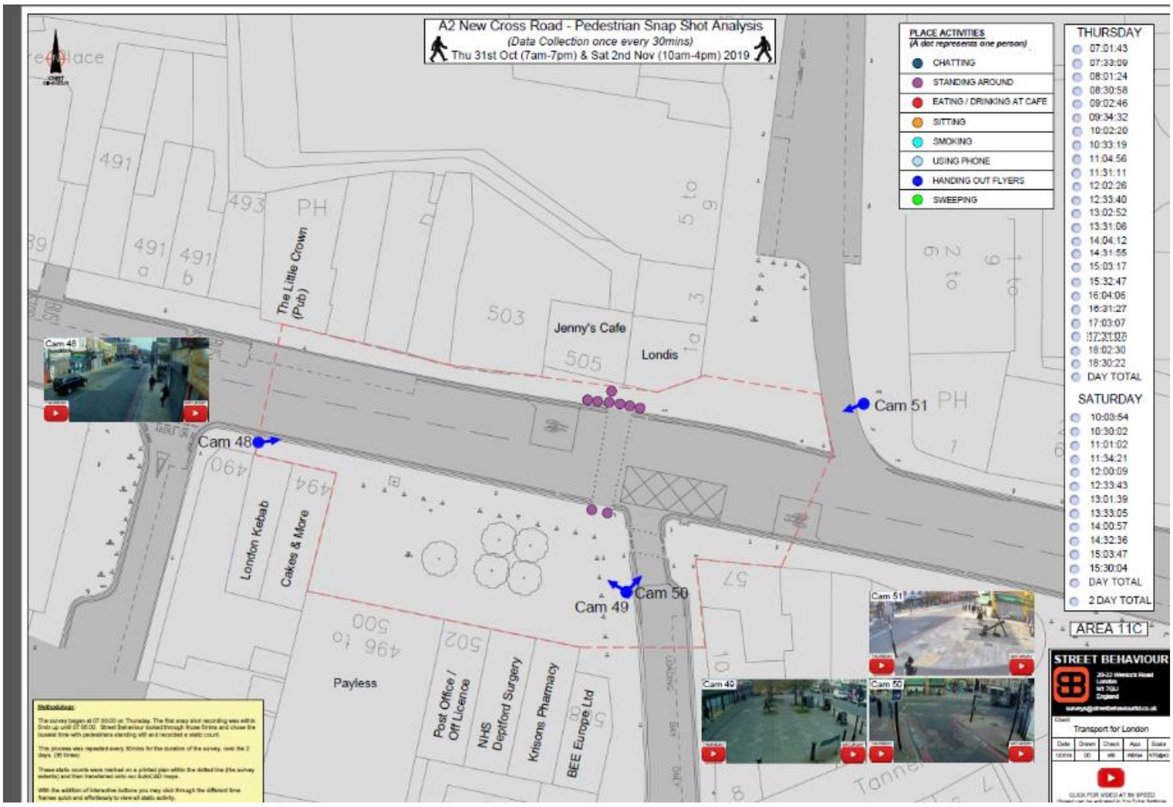
17:30

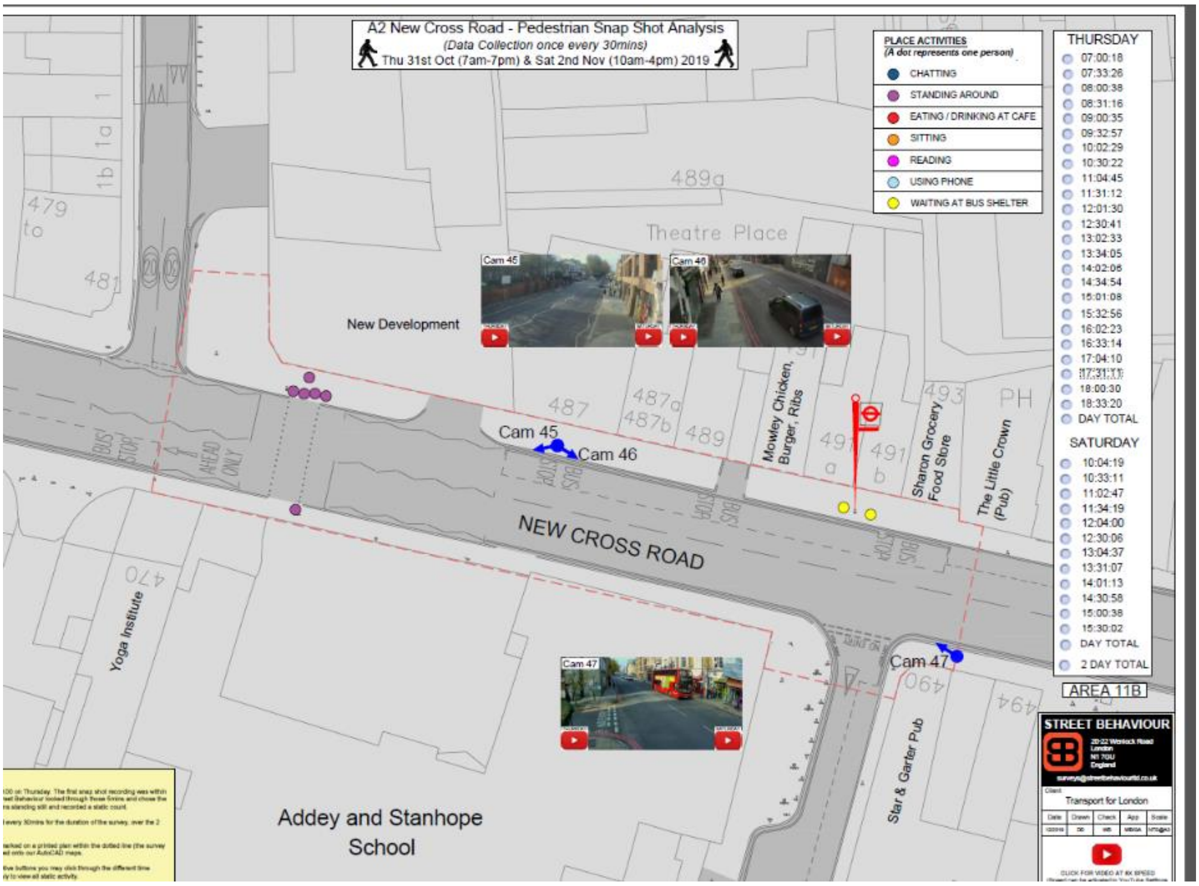

(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
(A dot represents one person)
CHATTING
STANDING AROUND
SMOKING
BEGGING
USING PHONE
HANDING OUT FLYERS
SITTING
THURSDAY
07:02:07
07:31:11
08:00:07
08:34:53
09:00:44
09:34:29
10:02:24
10:30:17
11:00:50
11:30:06
12:01:02
12:32:31
13:04:46
13:30:51
14:02:56
14:34:01
15:01:26
15:32:47
16:02:44
16:30:33
17:02:43
17:30:06
18:34:16
DAY TOTAL
SATURDAY
10:02:28
10:30:15
11:01:52
11:31:59
12:02:20
12:31:46
13:00:40
13:32:01
14:04:32
14:31:40
No static count
15:31:04
DAY TOTAL
2 DAY TOTAL
AREA 5
New Cross Gate
NEW CROSS ROAD
Cam 17
Cam 18
A202
Cam 17
Cam 18
STREET BEHAVIOUR
Transport for London

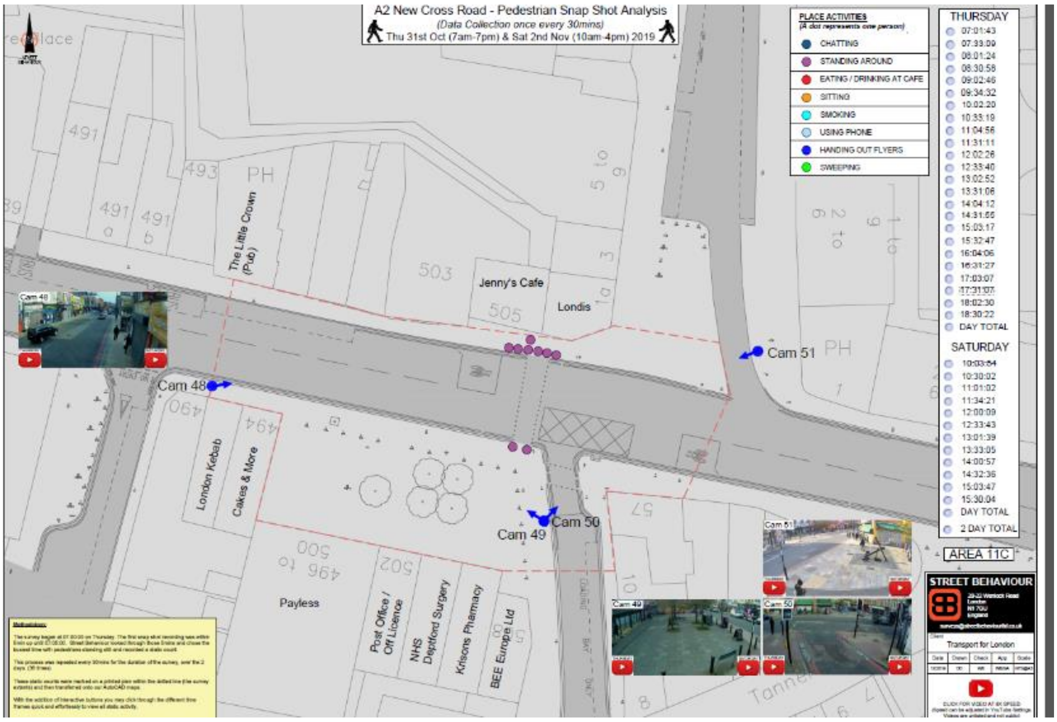

Lewisham Way - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
THURSDAY
DAY TOTAL
SATURDAY
DAY TOTAL
2 DAY TOTAL
AREA 7C
Sainsbury's Local
COSTA COFFEE
Cam 31
Cam 32
CB
BUS STOP
BUS LANE
A2
STREET BEHAVIOUR


Lewisham Way - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
(A dot represents one person)
CHATTING
STANDING AROUND
EATING / DRINKING AT CAFE
SITTING
SMOKING
USING PHONE
WAITING AT BUS SHELTER
SWEEPING
THURSDAY
07:04:41
07:34:14
08:00:05
08:33:35
09:03:24
09:32:41
10:01:04
10:33:25
11:00:11
11:34:25
12:04:53
12:34:18
13:00:11
13:34:32
14:04:21
14:34:51
15:04:20
15:30:39
16:02:32
16:30:28
17:04:01
17:33:11
18:04:50
18:30:32
DAY TOTAL
SATURDAY
10:00:02
10:31:11
11:04:42
11:30:12
12:02:02
12:32:20
13:04:43
13:31:40
14:04:46
14:31:44
15:02:59
15:30:48
DAY TOTAL
2 DAY TOTAL
AREA 7B
STREET BEHAVIOUR
Transport for London
A2 WEST EAST
LEWISHAM WAY
Yao Kee Take-away
The Thailand Restaurant & Bar
Go Sing Take-away
Dry Cleaners
Chinwag Cafe
Crystals Nightclub
Goldsmiths Cafe
Pho Smiths Vietnamese Canteen
Cam 29
Cam 30
BUS STOP
Shelter
CB
BUS LANE


Lewisham Way - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
(A dot represents one person)
CHATTING
STANDING AROUND
SMOKING
USING PHONE
WAITING AT BUS SHELTER
THURSDAY
07:04:05
07:33:55
08:04:38
08:31:51
09:01:02
09:31:46
10:04:18
10:30:09
11:04:49
11:34:10
12:04:50
12:30:23
13:04:55
13:30:19
14:02:07
14:30:59
15:04:41
15:34:47
16:03:34
16:34:15
17:01:44
17:30:21
18:03:24
18:32:13
DAY TOTAL
SATURDAY
10:04:02
10:31:06
11:03:56
11:34:29
12:03:03
12:30:06
13:03:24
13:31:01
14:00:29
14:32:06
15:01:36
15:34:23
DAY TOTAL
2 DAY TOTAL
AREA 7A
STREET BEHAVIOUR
Transport for London
Marquis of Granby (Pub)
Takeshi Restaurant
Warren's Solicitors
Cam 27
Cam 28
BUS STOP
A2 WEST EAST
Shelter


A2 New Cross Road - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
(A dot represents one person)
CHATTING
STANDING AROUND
EATING / DRINKING AT CAFE
SITTING
SMOKING
USING PHONE
HANDING OUT FLYERS
SWEEPING
THURSDAY
07:01:43
07:33:09
08:01:24
08:30:58
09:02:46
09:34:32
10:02:20
10:33:19
11:04:56
11:31:11
12:02:26
12:33:40
13:02:52
13:31:06
14:04:12
14:31:55
15:03:17
15:32:47
16:04:06
16:31:27
17:03:07
18:02:30
18:30:22
DAY TOTAL
SATURDAY
10:03:54
10:30:02
11:01:02
11:34:21
12:00:09
12:33:43
13:01:39
13:33:05
14:00:57
14:32:36
15:03:47
15:30:04
DAY TOTAL
2 DAY TOTAL
AREA 11C
STREET BEHAVIOUR
Transport for London
The Little Crown (Pub)
Jenny's Cafe
Londis
Cam 48
Cam 49
Cam 50
Cam 51
London Kebab
Cakes & More
Payless
Post Office / Off Licence
NHS Deptford Surgery
Kinsons Pharmacy
BEE Europe Ltd

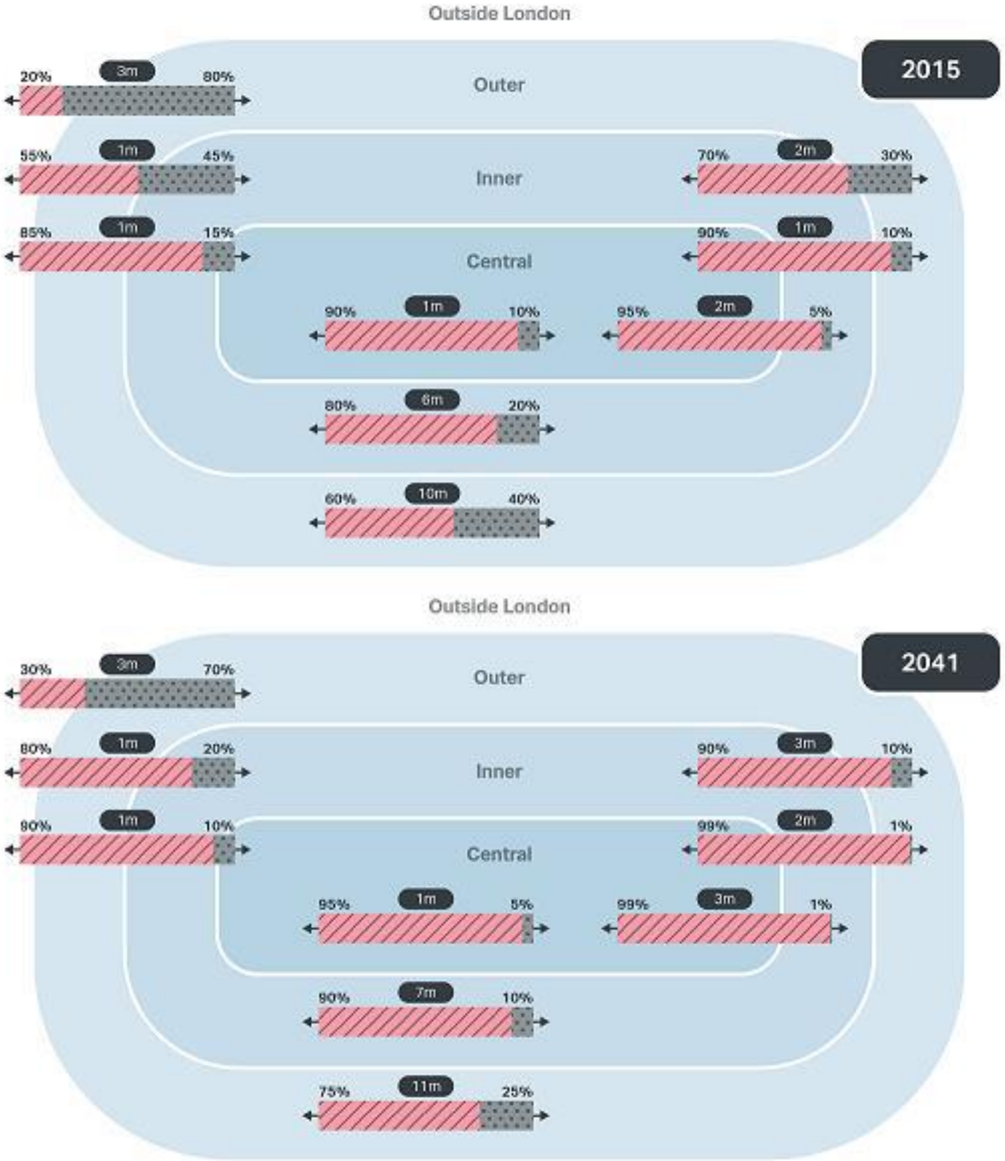

A2 New Cross Road - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
(A dot represents one person)
CHATTING
STANDING AROUND
EATING / DRINKING AT CAFE
SITTING
READING
USING PHONE
WAITING AT BUS SHELTER
THURSDAY
07:00:18
07:33:26
08:00:38
08:31:16
09:00:35
09:32:57
10:02:29
10:30:22
11:04:45
11:31:12
12:01:30
12:30:41
13:02:33
13:34:05
14:02:06
14:34:54
15:01:08
15:32:56
16:02:23
16:33:14
17:04:10
18:00:30
18:33:20
DAY TOTAL
SATURDAY
10:04:19
10:33:11
11:02:47
11:34:19
12:04:00
12:30:06
13:04:37
13:31:07
14:01:13
14:30:58
15:00:38
15:30:02
DAY TOTAL
2 DAY TOTAL
AREA 11B
STREET BEHAVIOUR
Transport for London
Theatre Place
New Development
Cam 45
Cam 46
Cam 47
NEW CROSS ROAD
Mowley Chicken, Burger, Ribs
Sharon Grocery Food Store
The Little Crown (Pub)
Yoga Institute
Star & Garter Pub
Addey and Stanhope School



A2 New Cross Road - Pedestrian Snap Shot Analysis
(Data Collection once every 30mins)
Thu 31st Oct (7am-7pm) & Sat 2nd Nov (10am-4pm) 2019
PLACE ACTIVITIES
(A dot represents one person)
CHATTING
STANDING AROUND
EATING / DRINKING AT CAFE
SITTING
SMOKING
USING PHONE
HANDING OUT FLYERS
SWEEPING
THURSDAY
07:01:43
07:33:09
08:01:24
08:30:58
09:02:46
09:34:32
10:02:20
10:33:19
11:04:56
11:31:11
12:02:26
12:33:40
13:02:52
13:31:06
14:04:12
14:31:55
15:03:17
15:32:47
16:04:06
16:31:27
17:03:07
17:31:07
18:02:30
18:30:22
DAY TOTAL
SATURDAY
10:03:54
10:30:02
11:01:02
11:34:21
12:00:09
12:33:43
13:01:39
13:33:05
14:00:57
14:32:36
15:03:47
15:30:04
DAY TOTAL
2 DAY TOTAL
AREA 11C
STREET BEHAVIOUR
Transport for London
The Little Crown (Pub)
Jenny's Cafe
Londis
London Kebab
Cakes & More
Payless
Post Office / Off Licence
NHS Deptford Surgery
Krisons Pharmacy
BEE Europe Ltd
Cam 48
Cam 49
Cam 50
Cam 51
PH
491
493
503
505

8.3.3 Policy Context- Relevant policy documents

a) MTS Mode Share Targets for Inner & Outer London



b) Vision Zero Action Plan

The Vision Zero Action Plan is a plan to 2023/24 that focuses on intelligence-led action to reduce risk on our streets, as part of the overall ambition to eliminate deaths and serious injuries on the whole transport network. It is based on three principles:

1. A fundamental conviction that loss of life and serious injuries are not acceptable nor inevitable

2. Requires reducing the dominance of motor vehicles and the targeting of road danger at source

3. Ensuring road danger reduction is a common priority central to all transport schemes.

The plan contains actions to deliver: Safe Speeds, Safe Streets, Safe Vehicles and Safe Behaviours. It also outlines proposals to consider reducing the speed limit along the A2 to 20mph by 2024.

c) Freight and Servicing Action Plan

London's Freight and Servicing Action Plan sets actions to support safe, clean and efficient freight operations. Actions outlined in the plan relevant to the A2 corridor include:

Action 2

We will improve streets to accommodate safe freight movement by:

a. Reducing conflict between goods vehicles and people walking, cycling and riding motorcycles through the Safer Junctions programme, and ensuring new schemes reduce danger through the Healthy Streets Check for Designers

b. Working with FORS to encourage wider use of, and adherence to, Construction Logistics Plans through a three-day training course for construction logistics planners and developers, increasing workshop attendance by 100 per cent in 2020

c. From 2019, facilitating planning workshops for development site stakeholders, to better spread guidance in the new Temporary Traffic Management Handbook

Action 10

We will encourage the mode shift from road to water and rail by:

a. Working with the Thames and London Waterways Forum, the Port of London Authority and the Canal River Trust to protect wharves, promote freight by water, and setting up a new waterways working group

b. Working with river and canal-facing boroughs and industry groups to promote toolkits and measures to encourage freight by water

c. Working with Network Rail and rail freight operators to optimise capacity on the existing network for freight and passenger services, taking advantage of opportunities to grow light and bulk freight on rail from 2019

d. Including wharves, railheads and Construction Consolidation Centres into a Freight Infrastructure in London Toolkit by spring 2019

e. Working with rail freight stakeholders, the GLA and The Mayor to encourage Government to progress national rail freight schemes so those rail services not directly serving London have more direct routing options to their final destination, freeing up more capacity for rail freight and passenger services

Action 13

We will promote consolidation as one of a combination of measures that support safe, clean and efficient freight by:

a. Completing the demonstrator projects and sharing results by mid-2019

b. Continuing with further pilots to refine the most efficient consolidation models

c. Promoting and upscaling proven successful consolidation models, such as collective procurement

d) Walking Action Plan

The 2018 Walking Action Plan sets out measures to improve the walking experience in Inner London:

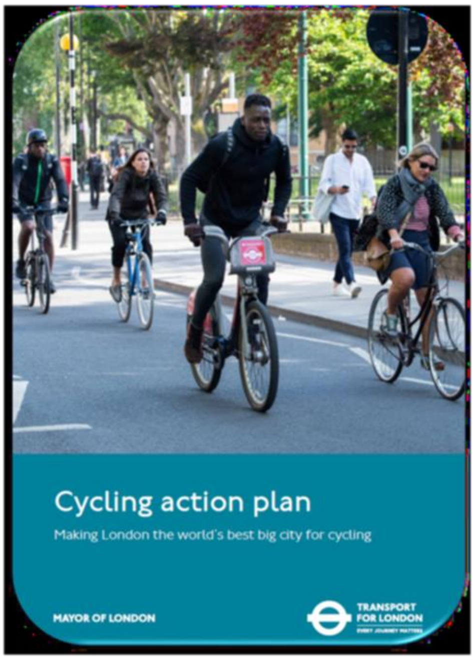
- Creating opportunities for new walking trips, particularly to and from town centres
- Improving walking access to local high streets and services
- Improving walking access to key transport hubs and strategic interchanges
- Improving interchange between Inner London bus services and walking trips
- Targeting Inner London trips to school, reducing car use and increasing walking

The plan includes a target to increase the number of walking trips by more than one million per day by 2024 from 6.4 million to 7.5 million with actions to achieve this of transforming London's streets to reshape the landscape for walking and supporting pedestrian movement through the management and operation of London's road network.

e) Cycling Action Plan

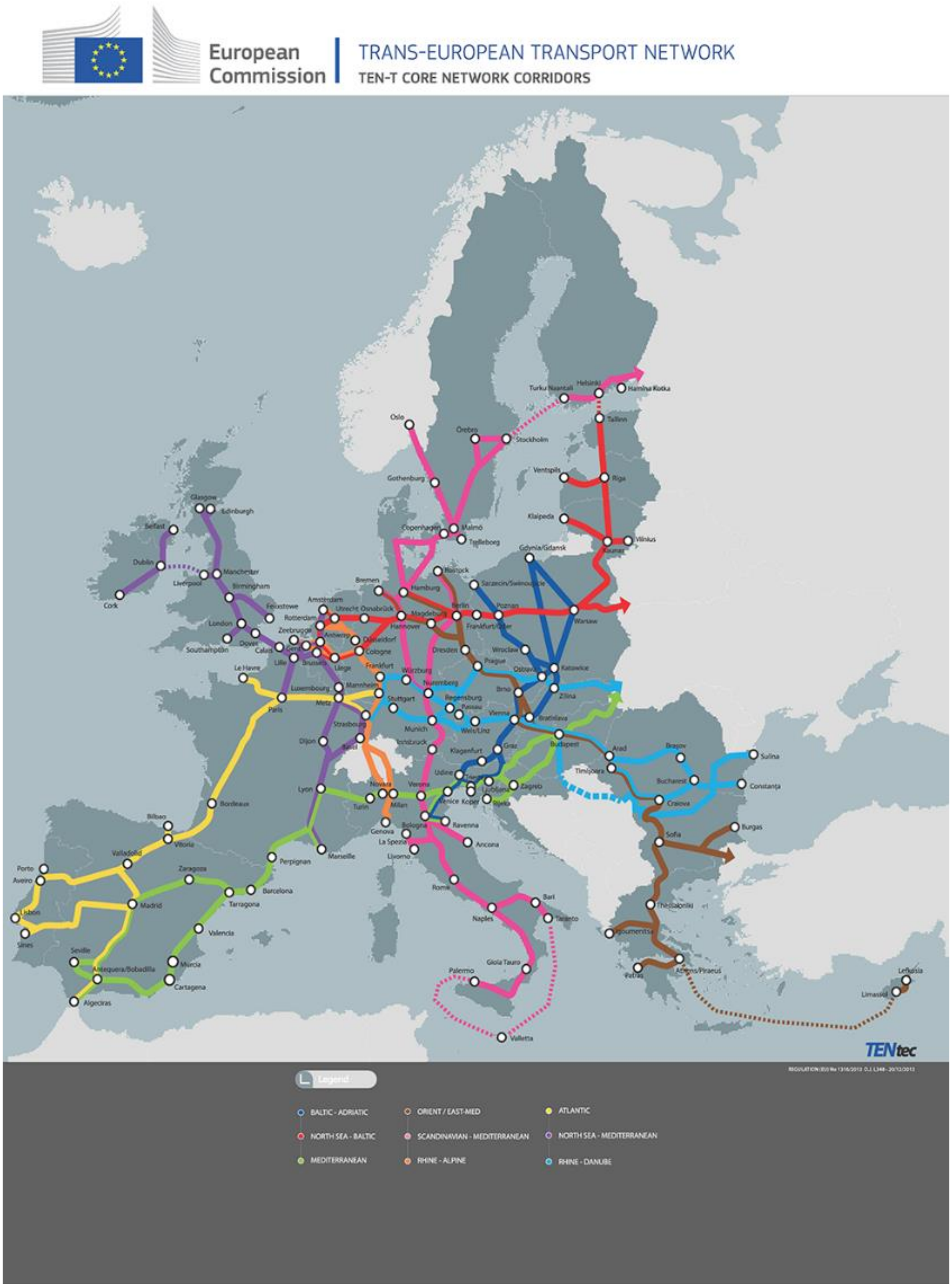
The MTS states TfL and boroughs will deliver a London-wide strategic cycle network, with new, high quality, safe routes and improved infrastructure to tackle barriers to cycling both for shorter and longer trips.

There is a target of 70% of Londoners to live within 400 metres of the strategic cycle network by 2041. An interim target to expand the London- wide cycle network to reach 28% of Londoners by 2024.



TfL's Strategic Cycle Analysis (June 2017) prioritised new cycle connections by current and future cycle demand, as well as population and employment growth. This process identified 25 top potential cycling future routes which will deliver the MTS and Healthy Streets Approach Outcomes, of which New Cross Road is one.

8.3.4 Trans- European Network (TEN-T)



8.4 Constanta

Constanta- Abstract of the Air Emission assessment						
Pollutant type	**Road Police**	**ROMSTAL**	**CORA**	**KAUFLAND**	**ROMSTAL**	**General comments**
	27.04.2018 – 25.05.2018	***26.05.2018 – 05.06.2018***	***06.06.2018 – 11.06.2018***	***13.06.2018 – 26.06.2018***	***14.08.2018 – 24.08.2018***	
CO Admissible limit 10 mg/mc	Recorded values are way below the admissible limit of 10 mg/mc (max. 0,717 mg/mc)	Recorded values are way below the admissible limit of 10 mg/mc (max. 0,717 mg/mc)	Recorded values are way below the admissible limit of 10 mg/mc (max. 0,717 mg/mc)	Recorded values are way below the admissible limit of 10 mg/mc (max. 0,717 mg/mc)	No data recorded	For all recorded locations the values are way below the admissible limit of 10 mg/mc (max. 0,717 mg/mc)
CO_2	The average recoded value is 464,04 ppm. The values are similar for all recorded days and time period.	The average recoded value is 419,76 ppm. The values are similar for all recorded days and time period.	The average recoded value is 439,58 ppm. The values are similar for all recorded days and time period.	The average recoded value is 352,78 ppm. The values are similar for all recorded days and time period.	The average recoded value is 423,80 ppm. The values are similar for all recorded days and time period.	The average recorded values vary between 352,78 ppm and 464,04 ppm The smallest value was recorded on the site located the farthest from the

						Boulevard compared to the others.
NO_2 Maximum admissible level of 200 µg/mc/ hour 40 µg/mc (limit value for people health)	Recorded values are below the admissible limit of 200 µg/mc/hour. There were some hourly exceeding values 40 µg/mc (limit value for people health). The exceeding was registered between 18:00 – 00:00 o'clock (3rd and 4th of May) and between 16:00 – 21:00 (25th of May) There were no exceeding recordings	Recorded values are below the admissible limit of 200 µg/mc/hour. There were some hourly exceeding values 40 µg/mc (limit value for people health). There were no exceeding recordings of the daily average values	Recorded values are below the admissible limit of 200 µg/mc/hour. There were some hourly exceeding values 40 µg/mc (limit value for people health). There were no exceeding recordings of the daily average values	Recorded values are below the admissible limit of 200 µg/mc/hour. There were some hourly exceeding values 40 µg/mc (limit value for people health). The exceeding was registered between 7:30 – 11:00 and 20.00 – 23.30. There were no exceeding recordings of the daily average values.	Recorded values are below the admissible limit of 200 µg/mc/hour. There were some hourly exceeding values 40 µg/mc (limit value for people health). The exceeding was registered between 7:30 – 11:00 and 20.00 – 23.30. There were no exceeding recordings of the daily average values.	Even though the daily average recorded values are smaller than the admissible limit of 200 µg/mc/hour, there were frequent recordings of exceeding values 40 µg/mc (limit value for people health).

	of the daily average values.					
NOx 30 µg/mc (critical annual level for the protection of the greenery)	There were frequent recordings exceeding the hourly and maximum hourly admissible values (30 µg/mc – critical annual level for the protection of the greenery), respectively hourly values of 113,198 µg/mc; 116,85 µg/mc; 100,41 µg/mc; 106,67 µg/mc; 151,50 µg/mc etc. There were also recordings of exceeding the average	There were frequent recordings exceeding the hourly and maximum hourly admissible values (30 µg/mc – critical annual level for the protection of the greenery), respectively hourly values of 120,18 µg/mc; 134,56 µg/mc; 129,61 µg/mc; 106,16 µg/mc; 109,60 µg/mc etc., and average daily values of 43,13 µg/mc; 53,05 µg/mc;	There were frequent recordings exceeding the hourly and maximum hourly admissible values (30 µg/mc – critical annual level for the protection of the greenery), respectively hourly values of 67,59 µg/mc; 58,79 µg/mc; 48,17 µg/mc; 41,29 µg/mc; 57,09 µg/mc etc., and average daily values of 35,36 µg/mc; 35,49 µg/mc;	There were frequent recordings exceeding the hourly and maximum hourly admissible values (30 µg/mc – critical annual level for the protection of the greenery), respectively hourly values of 78,29 µg/mc; 74,13 µg/mc; 84,65 µg/mc; 92,27 µg/mc; 94,98 µg/mc; 102,32 µg/mc; 136,57 µg/mc etc.	All the registered hourly values exceed the limit of 30 µg/mc, the critical annual level for the protection of the greenery.	For all of the locations the registered hourly values and daily average, the values exceed the limit of 30 µg/mc, the critical annual level for the protection of the greenery.

	daily values (34,25 µg/mc; 42,57 µg/mc;32,91 µg/mc; 34,92 µg/mc and 36,71 µg/mc). As well as the **NO_2** emissions, the exceeding values were registered between 18:00 – 00:00 o'clock (3rd and 4th of May) and between 16:00 – 21:00 (25th of May).	44,59 µg/mc; 53,39 µg/mc. We cannot identify a peak time for exceeding values, these being recorded during the entire day, especially higher during 6:00 – 15:30 o'clock period.	36,76 µg/mc. We cannot identify a peak time for the exceeding values; these being recorded during the entire day.	There were also registered some small exceeding at the average daily values (31,12 µg/mc; 31,28 µg/mc; 34,21 µg/mc; 35,40 µg/mc; 45,38 µg/mc).		
PM 2,5 Admissible level 25 µg/mc	The registered values are in general under the admissible annual level of 25 µg/mc.	The registered values are in general under the admissible annual level of 25 µg/mc.	The registered values are in general under the admissible annual level of 25 µg/mc.	The registered values are in general under the admissible annual level of 25 µg/mc.	The registered values are in general under the admissible annual level of 25 µg/mc.	On all locations the registered values are in general under the admissible annual level of 25 µg/mc, only

						some minor exceeding was recorded.
PM 10 Maximum admissible level of 50 µg/mc/ 24 hour	In general, the registered values are under the maximum admissible level of 50 µg/mc/24 h. For some days though there were some significant exceeding recorded for the hourly values (121,60 µg/mc; 100,50 µg/mc; 82,26 µg/mc; 79,14 µg/mc; 270,30 µg/mc etc.).	In general, the registered values are under the maximum admissible level of 50 µg/mc/24 h. For some days though there were some significant exceeding recorded for the hourly values (151,40 µg/mc; 81,82 µg/mc; 81,05 µg/mc; 78,74 µg/mc; 78,29 µg/mc; 77,10 µg/mc etc.).	In general, the registered values are under the maximum admissible level of 50 µg/mc/24 h. For some days though there were some significant exceeding recorded for the hourly values (81,35 µg/mc; 52,76 µg/mc; 68,18 µg/mc).	In general, the registered values are under the maximum admissible level of 50 µg/mc/24 h. For some days though there were some minor exceeding recorded for the hourly values (82,19 µg/mc; 84,22 µg/mc; 103,30 µg/mc; 133,40 µg/mc; 70,09 µg/mc; 90,13 µg/mc).	In general, the registered values are under the maximum admissible level of 50 µg/mc/24 h. For some days though there were some minor exceeding recorded for the hourly values of 59,92 µg/mc, 63,81 µg/mc, 74,1 µg/mc, 87,53 µg/mc.	For all the locations the registered values are in general under the maximum admissible level of 50 µg/mc/24 h.

SO_2 Maximum admissible level 350 µg/mc/hour, 125 µg/ mc/ 24 ore 20 µg/mc (critical level for the protection of the greenery per year)	All the recorded values are much lower than the maximum admissible level, respectively 350 µg/mc/hour, 125 µg/mc/24 hour and 20 µg/mc (critical level for the protection of the greenery per year). The hourly values recorded are inside the 4,5 - 19,68 µg/mc interval.	All the recorded values are much lower than the maximum admissible level, respectively 350 µg/mc/hour, 125 µg/mc/24 hour and 20 µg/mc (critical level for the protection of the greenery per year). The hourly recorded values are within the 6 -19 µg/mc interval.	All the recorded values are much lower than the maximum admissible level, respectively 350 µg/mc/hour, 125 µg/mc/24 hour and 20 µg/mc (critical level for the protection of the greenery per year).	All the recorded values are much lower than the maximum admissible level, respectively 350 µg/mc/hour, 125 µg/mc/24 hour and 20 µg/mc (critical level for the protection of the greenery per year). The hourly recorded values are within the 6 -19 µg/mc interval.	No data recorded.	On all the locations, all the recorded values are much lower than the maximum admissible level, respectively 350 µg/mc/hour, 125 µg/mc/24 hour and 20 µg/mc (critical level for the protection of the greenery per year). The hourly recorded values are within the 6 -19 µg/mc interval.