

Project	M8 Motorway Glasgow Corridor	Originated	AC
Subject	Congestion Analysis Technical Note	Checked	LM
Date	20 July 2018	Reviewed	EB
Status	DRAFT – For information to Transport Scotland	Approved	EB
Reference		Revision	P00

1. Introduction

This technical note has been prepared for Transport Scotland in response to a request from the Glasgow Connectivity Commission regarding congestion monitoring on the M8 motorway. The operation of the M8 motorway through Glasgow is currently constantly monitored in real-time by Traffic Scotland through the Traffic Scotland National Control Centre and the network of automatic traffic detectors and CCTV cameras. The system allows for real-time responses to incidents including for example traffic accidents and peak hour congestion to be actioned quickly through the network of variable message signs and control signaling on motorway gantries.

To accompany the real-time monitoring, further datasets have been analysed to determine historic patterns in terms of traffic volumes, changes in journey times and speed data. Historic data from the TSNCC database has also been requested and although it was not immediately available for inclusion in this document, it is anticipated that it will be incorporated in a subsequent updated version.

The analysis of the traffic volumes, journey times and average speeds has focused on the section of the the M8 motorway between Junction 8 (Baillieston) and Junction 29 (St James), as shown in Figure 1.1 below.



Figure 1.1 – M8 Study Area (Junction 8 – Junction 29)

All available traffic data for this section of the M8 covering the period 2008 to 2017 inclusive has been analysed, which consisted of observed traffic count data obtained from Traffic Scotland and average journey time and speed information from INRIX roadway analytics. The analysis of this data included the identification of any trends that were evident with respect to traffic volumes, locations of flow breakdown (reduction from free-flow speed) and the resulting impact on journey times. The average speed data has been used to determine journey times between identified sections of the M8 corridor.

This Technical Note outlines the data that was collated for the M8 motorway between Junction 8 and Junction 29, the analysis that was undertaken and summarises the findings from the analysis of the raw data.

It should be noted that roadworks associated with the completion of the M8 between Newhouse and Baillieston (Junction 8) was in place between mid-February 2015 through to the end of April 2017. It should also be noted that the M74 Northern Extension that connects to the M8 at Junction 22 was opened late June 2011.

These infrastructure projects have had an impact on travel patterns and traffic volumes on the M8 at key points over time.

2. Defining the M8 Motorway Sections

In order to analyse the data and summarise the results the M8 motorway was split in to three sub-sections representing different operating characteristics and junction spacing. Each sub-section includes a number of key constraints, and assessing the sub-sections separately allows clearer examination and presentation of the data analysis to identify the key operational changes over time. The sub-sections that were considered are listed below and also shown in Figure 2.1, 2.2 and 2.3.

- Sub-section 1 – Glasgow East – M8 Junction 8 to M8 Junction 13
- Sub-section 2 – Glasgow Central – M8 Junction 13 to M8 Junction 15
- Sub-section 3 – Glasgow Central – M8 Junction 15 to M8 Junction 19
- Sub-section 4 – Glasgow Central – M8 Junction 19 to M8 Junction 22
- Sub-section 5 – Glasgow West – M8 Junction 22 to M8 Junction 29

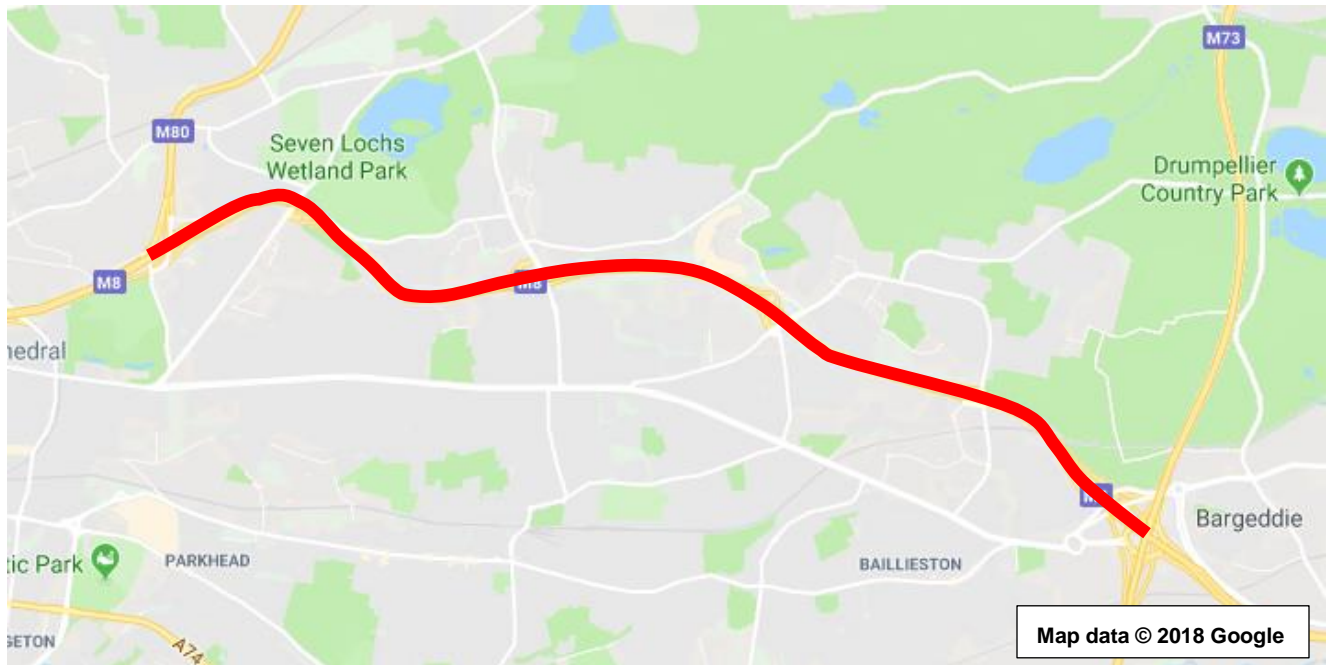


Figure 2.1 – M8 Sub-section 1 – Glasgow East – Junction 8 to Junction 13

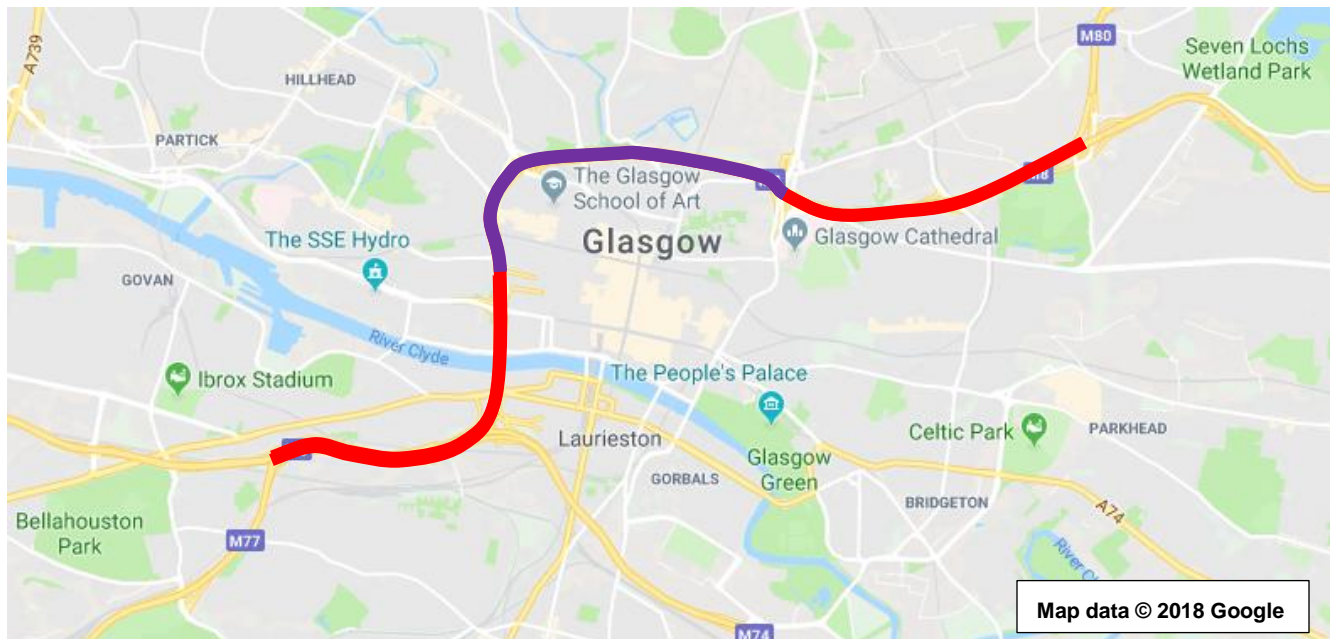


Figure 2.2 – M8 Sub-sections 2, 3 and 4 Glasgow Central – Junction 13 to Junction 15, Junction 15 to Junction 19 and Junction 19 to Junction 22

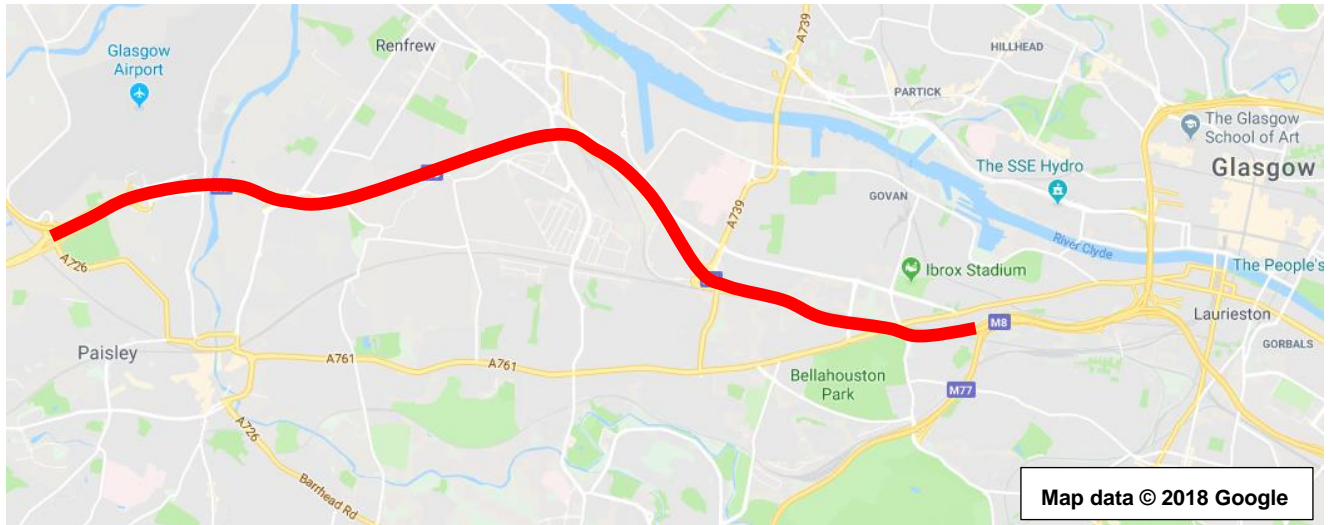


Figure 2.3 – M8 Sub-section Junction 22 to Junction 29

3. Data

3.1 Traffic Flow Data

Traffic flow data has been collated and analysed along the length of the M8 study area from Junction 8 to Junction 29 for the period from January 2008 to the end of December 2017. Eastbound and westbound traffic count data was obtained for each M8 motorway section between junctions, and for each merge and diverge slip road from Junction 8 to Junction 29. The Automatic Traffic Counters (ATCs) and a description of their locations are listed in Table 3.1 and 3.2 for the westbound and eastbound directions respectively. The specific locations of the counters are shown in Appendix A.

Table 3.1 – Name and Location of Counters Sourced (westbound)

Location	Counter ID	Location	Counter ID
J8	NTCPC001	J22 diverge slip	NTC00103
J9 merge slip	NTC00019	J22	NTC00102, JTC05278, NTC00108
J9 – J10	NTC00020	J22 merge slip	JTC00278, NTC00109
J10 diverge slip	NTCPC005	J23 diverge slip	NTC00111
J10 merge slip	NTC00027	J23 – J24	NTC00110
J10 – J11	NTC00028	J24 diverge slip	NTC00114
J11 diverge slip	NTCPC007	J24	NTC00113, NTC00117
J11 merge slip	NTC00033	J24 merge slip	NTC00118
J11 – J12	NTC00038	J24 – J25	NTC00120
J12 diverge slip	NTCPC009	J25 diverge slip	NTC00123
J12 merge slip	NTC00043	J25	NTC00122, 1371304, NTC00126
J12 – J13	NTC00046, NTC00047	J25 merge slip	NTC00127
J13 diverge slip	NTCPC011	J25 – J25A	NTC00129, NTC00131
J13 merge slip	NTC00051	J25A diverge slip	NTC00132
J13 – J14	NTC00052	J26 diverge slip	NTC00137, JTC05128

J14 merge slip	NTC00056	J26	NTC00136, NTCPC053
J14 – J15	NTC00060	J26 merge slip	NTC00140
J15 diverge slips	NTCPC018, NTCPC019	J26 – J27	NTC00144, NTC00146, JTC08190, NTC00148, NTC00150
J15	NTC00063	J27 diverge slip	NTCPC056
J15 merge slips	NTCPC021, NTC00064	J27	NTCPC057
J16 diverge slip	NTCPC026	J27 merge slip	NTC00152
J16 – J17	NTCPC027, NTC00084	J27 – J28	NTC00154
J17 diverge slip	NTCPC029	J28 diverge slip	NTC00157, NTCPC060, 1371405
J17	NTCPC030	J28	1371404
J17 merge slips	NTC00086, NTC00087	J28A diverge slip	NTCPC061
J18	NTC00089	J28A – J29	NTC00158
J19 diverge slip	NTC00093	J29 diverge slip	NTCPC062
J20 – J21	JTC00280	J29	NTCPC063
J21 – J22	NTC00100		

Table 3.2 – Name and Location of Counters Sourced (eastbound)

Location	Counter ID	Location	Counter ID
J29	NTCPC065, NTC00159	J19	NTC00092
J29 – J28A	NTCPC067	J19 merge slip	NTCPC041
J28A merge slip	NTCPC068	J19 – J18	NTC00090
J28A – J28	NTC00156, 1371402	J18 merge slip	NTCPC038
J28 merge slip	1371401, NTC00155	J17 merge slip	NTC00083
J28 – J27	NTC00153	J17 – J16	NTCPC028
J27 diverge slip	NTCPC058	J16 merge slip	NTC00071
J27	NTCPC059	J16 – J15	NTC00067
J27 merge slip	NTC00151	J15 diverge slip	NTCPC022, NTC00062
J27 – J26	NTC00149, NTC00147, NTC00145, NTC00143	J15	NTCPC023
J26 diverge slip	NTCPC054	J15 merge slip	NTCPC024, NTCPC025
J26	NTCPC055, NTC00134	J15 – J14	NTC00059
J26 merge slip	JTC05127, NTC00135	J14 diverge slip	NTCPC017
J25A merge slip	NTC00133	J14 – J13	NTC00058, NTC00054
J25A – J25	NTC00130, NTC00128	J13 diverge slip	NTCPC013
J25 diverge slip	NTC00125, NTCPC116	J13 merge slip	NTC00048
J25	NTC00124, 1371302	J13 – J12	NTC00900
J25 merge slip	NTC00747	J12 diverge slip	NTC00044
J25 – J24	NTC00121, NTC00119	J12 merge slip	NTC00041
J24 diverge slip	NTCPC051	J12 – J11	NTC00037
J24	NTCPC052, NTC00115	J11 diverge slip	NTC00035
J24 merge slip	NTC00116	J11 merge slip	NTC00032
J24 – J23	NTC00112, NTCPC049	J11 – J10	NTC00029
J23 merge slip	NTCPC050	J10	NTC00026
J22 diverge slip	NTCPC047, NTC00106	J10 merge slip	NTC00024
J22	NTCPC048, NTC00107	J10 – J9	NTC00021
J22 merge slip	NTC00104	J9 diverge slip	NTC01034

J22 – J21	NTCPC046	J8 diverge slip	NTC00016
J21 – J19	NTCPC043, NTCPC044, NTC00094	J8	NTC00011
J19 diverge slip	NTCPC118, NTCPC119, NTC00901. JTC00281		

The traffic flow data received provided a breakdown of average daily flow per month, as well as AM peak flow, and PM peak flow for each of the counter locations requested. The data was used to analyse the traffic profile for each part of each motorway section between the junctions, and to identify changes in traffic volumes over time in order to determine if for example traffic growth has led to changes in the operational performance of the M8.

3.2 Average Speed Data

Average speed information was obtained from INRIX through access to their online web portal application, which processes data in real-time, creating traffic speed information.

The INRIX web portal was interrogated to provide the average speed of vehicles over defined segments of the M8 motorway typically between 300-1000m in length. These short sections were combined to create corridors that matched the five sub-sections of the M8 motorway defined in Section 2.

Through the web portal, 24 hour 'congestion' plots have been derived for the M8 motorway in both directions between Junctions 8 and 29. The congestion plots indicate the percentage of free flow speed achieved over a 24 hour period for a user defined period of time, in this case the average across each of the years from 2014 to 2017. The lower the percentage of the free flow speed achieved, the more congested that section was with low average speeds in evidence. The congestion plots were compared year on year to determine whether there was any evidence of changes either spatially by location, or temporally by extending over more hourly time intervals.

Note that currently the data is only available from January 2014 onwards and that there were some instances of missing data for individual INRIX segments that make up the M8 sub-sections. Where data was missing it has been noted in the analysis section of this Technical Note.

3.3 Journey Time Data

The INRIX average speed data is also able to provide journey time information. Using the same defined M8 sub-sections, journey times from the INRIX database were extracted for analysis.

Journey times for each sub-section were calculated on an hourly basis to allow an average daily profile to be created for each year. Journey times during the peak periods and changes in journey times over time were then identified from the results. In addition, analysis was undertaken to derive the average journey time for each month from January 2014 up to and including December 2017 to determine if there were any journey time trends specific to a particular month.

As with the average speed data, information on journey times is only currently available from January 2014, and there were some instances of missing data. Where data was missing it has been noted in the analysis section of this Technical Note.

4. M8 Traffic Volumes Analysis

This Section presents the analysis of historic traffic volumes in order to identify any particular trends in traffic growth over time. The following tables compare the change in Annual Average Daily Traffic (AADT) volumes from

January 2008 through to December 2017, and the percentage change that has occurred from the previous year and from 2008.

For this analysis a representative ATC location for each sub-section (previously outlined in Section 2) was selected based on a comparative analysis of adjacent counters and local knowledge. The representative counter locations were those that also had as complete a set of data as possible for the analysis. Diagrams of the full set of ATC site locations are shown in Appendix A and their recorded AADT flows are provided in Appendix B.

4.1 M8 Westbound Direction

4.1.1 Glasgow East (Junctions 8 to 13)

Table 4.1 demonstrates that in the Glasgow East sub-section there has been a reduction of over 20% in AADT from 2008 to 2017. Given this level of reduction, it is likely that levels of congestion will be less significant at present than it was in 2008. Examining flow year on year it appears that the largest change occurred between 2011 and 2012, both over 8%, which is most likely attributed to the M74 Extension being opened, attracting traffic off this section of the M8.

Table 4.1 - Westbound Traffic Flows at Counter NTC00020

Year	Annual Average Daily Traffic Flow (AADT)	Percentage Change from Previous Year	Percentage Change from Base Year (2008)
2008	57,395	-	-
2009	58,356	1.67%	1.67%
2010	57,826	-0.91%	0.75%
2011	53,019	-8.31%	-7.62%
2012	48,442	-8.63%	-15.60%
2013	48,160	-0.58%	-16.09%
2014	48,387	0.47%	-15.69%
2015	48,118	-0.56%	-16.16%
2016	46,629	-3.10%	-18.76%
2017	44,225	-5.16%	-22.95%

4.1.2 Glasgow Central (Junctions 13 to 15)

Table 4.2 shows that there has been a slight decrease in traffic flows between Junctions 13 and 15 westbound, towards Glasgow City Centre. No individual year witnessed a significant change in AADT, with relatively small increases and decreases occurring through the 10 year period. It is not expected that this level of change will have impacted congestion levels on this section of the M8 motorway significantly in the past 10 years.

Table 4.2 - Westbound Traffic Flows at Counter NTC00052

Year	Annual Average Daily Traffic Flow (AADT)	Percentage Change from Previous Year	Percentage Change from Base Year (2008)
2008	57,709	-	-
2009	59,160	2.51%	2.51%
2010	57,819	-2.27%	0.19%
2011	56,218	-2.77%	-2.58%
2012	55,518	-1.25%	-3.80%

2013	55,655	0.25%	-3.56%
2014	56,151	0.89%	-2.70%
2015	54,726	-2.54%	-5.17%
2016	54,305	-0.77%	-5.90%
2017	55,061	1.39%	-4.59%

4.1.3 Glasgow Central (Junctions 15 to 19)

Unfortunately, there was a lack of reliable data between Junction 15 and Junction 19 travelling westbound on the M8 motorway. None of the traffic counters in this section appear to have complete coverage across all of the available traffic lanes on the mainline M8 carriageway. However, accurate counts were available at Junction 15, on the two merges at Junction 15 and on the diverge at Junction 16. Therefore, a count on the M8 mainline between Junction 16 and Junction 17 was determined by adding the two merge counts to the Junction 15 mainline count and subtracting the count on the Junction 16 diverge.

Table 4.3 shows the calculated AADT flows using the above method and shows slight variations occurring between years, with both increases and decreases evident. The notable exception is the decrease of approximately 7% in 2011, which accounts for the majority of the overall 8% decrease in traffic flow observed from 2008 to 2017.

Table 4.3 - Westbound Traffic Flows at Counter NTC00089

Year	Annual Average Daily Traffic Flow (AADT)	Percentage Change from Previous Year	Percentage Change from Base Year (2008)
2008	71,556	-	-
2009	72,186	0.88%	0.88%
2010	71,493	-0.96%	-0.09%
2011	66,744	-6.64%	-6.72%
2012	65,018	-2.59%	-9.14%
2013	65,665	1.00%	-8.23%
2014	66,599	1.42%	-6.93%
2015	65,583	-1.53%	-8.35%
2016	64,243	-2.04%	-10.22%
2017	65,605	2.12%	-8.32%

4.1.4 Glasgow Central (Junctions 19 to 22)

Table 4.4 shows that for traffic travelling westbound between Junctions 19 and 22, overall traffic levels have reduced from 2008 to 2017, with the largest decreases evident in 2011 and 2012 and exhibiting a similar pattern to the other sections due to the impact of the M74 Extension opening. The overall reduction between 2008 and 2017 of approximately 8% is likely to have reduced the congestion levels slightly.

Table 4.4 - Westbound Traffic Flows at Counter NTC00100

Year	Annual Average Daily Traffic Flow (AADT)	Percentage Change from Previous Year	Percentage Change from Base Year (2008)
2008	71,451	-	-
2009	71,548	0.14%	0.14%
2010	71,385	-0.23%	-0.09%

2011	65,709	-7.95%	-8.04%
2012	62,535	-4.83%	-12.48%
2013	62,644	0.17%	-12.33%
2014	63,638	1.59%	-10.93%
2015	64,928	2.03%	-9.13%
2016	66,211	1.98%	-7.33%
2017	65,970	-0.36%	-7.67%

4.1.5 Glasgow West (Junctions 22 to 29)

Table 4.5 shows that there has been a constant and relatively significant increase in traffic levels between Junction 22 and Junction 29 from 2011 to 2017, which again is driven by the M74 Extension with the traffic attracted on to the M74 route rejoining the M8 along this section. This has led to a 22% increase in traffic levels on this section between 2008 and 2017, and is consistent with the equivalent decrease observed on the Glasgow East sub-section (Table 4.1). This is likely to have had a noticeable impact on congestion.

Table 4.5 - Westbound Traffic Flows at Counter NTC00126

Year	Annual Average Daily Traffic Flow (AADT)	Percentage Change from Previous Year	Percentage Change from Base Year (2008)
2008	52,009	-	-
2009	50,403	-3.09%	-3.09%
2010	51,033	1.25%	-1.88%
2011	53,626	5.08%	3.11%
2012	55,815	4.08%	7.32%
2013	58,170	4.22%	11.85%
2014	59,241	1.84%	13.91%
2015	61,269	3.42%	17.81%
2016	63,118	3.02%	21.36%
2017	63,371	0.40%	21.85%

Table 4.6 shows a similar pattern of growth overall to that shown in Table 4.5 with traffic flows having increased over the past ten years by approximately 18% from 2008 to 2017. Again, this is likely to have had a noticeable impact on the level of congestion in this area of the M8.

Table 4.6 - Westbound Traffic Flows at Counter NTC00154

Year	Annual Average Daily Traffic Flow (AADT)	Percentage Change from Previous Year	Percentage Change from Base Year (2008)
2008	47,957	-	-
2009	48,029	0.15%	0.15%
2010	47,642	-0.81%	-0.66%
2011	48,255	1.29%	0.62%
2012	48,554	0.62%	1.25%
2013	47,896	-1.35%	-0.13%
2014	50,218	4.85%	4.71%
2015	53,638	6.81%	11.85%
2016	55,708	3.86%	16.16%
2017	56,545	1.50%	17.91%

4.2 M8 Eastbound Direction

4.2.1 Glasgow West (Junctions 29 to 22)

For eastbound traffic travelling from west of Junction 27, Table 4.7 shows that flows have increased gradually every year since 2011. Between 2008 and 2017 this equates to an overall increase in traffic levels of approximately 15%, and is consistent with the growth on this section travelling in the westbound direction (Table 4.6). This level of growth is likely to have increased congestion levels on this section of motorway.

Table 4.7 - Eastbound Traffic Flows at Counter NTC00153

Year	Annual Average Daily Traffic Flow (AADT)	Percentage Change from Previous Year	Percentage Change from Base Year (2008)
2008	55,080		
2009	54,568	-0.93%	-0.93%
2010	54,011	-1.02%	-1.94%
2011	54,975	1.79%	-0.19%
2012	55,203	0.41%	0.22%
2013	56,940	3.15%	3.38%
2014	58,153	2.13%	5.58%
2015	60,075	3.31%	9.07%
2016	62,240	3.60%	13.00%
2017	63,112	1.40%	14.58%

Table 4.8 shows that for eastbound traffic on this M8 sub-section the overall growth in traffic has been relatively significant with an increase of approximately 34% (approximately 16,000 vehicles per day) from 2008 to 2017. It is likely this will have had a significant impact on congestion.

Table 4.8 - Eastbound Traffic Flows at Counter NTC00119

Year	Annual Average Daily Traffic Flow (AADT)	Percentage Change from Previous Year	Percentage Change from Base Year (2008)
2008	49,057		
2009	48,452	-1.23%	-1.23%
2010	48,264	-0.39%	-1.62%
2011	52,991	9.79%	8.02%
2012	57,731	8.95%	17.68%
2013	60,534	4.85%	23.40%
2014	61,769	2.04%	25.91%
2015	63,069	2.10%	28.56%
2016	64,644	2.50%	31.78%
2017	65,795	1.78%	34.12%

4.2.2 Glasgow Central (Junctions 22 to 19)

For eastbound traffic between Junction 22 and Junction 19, Table 4.9 shows there has been minor variations in the AADT year on year, with an overall increase of less than 3% observed between 2008 and 2017. It is not expected that this level of increase in traffic would significantly impact congestion levels.

Table 4.9 - Eastbound Traffic Flows at Counter NTCPC046

Year	Annual Average Daily Traffic Flow (AADT)	Percentage Change from Previous Year	Percentage Change from Base Year (2008)
2008	41,915	-	-
2009	41,213	-1.68%	-1.68%
2010	41,603	0.95%	-0.74%
2011	41,191	-0.99%	-1.73%
2012	40,857	-0.81%	-2.52%
2013	41,593	1.80%	-0.77%
2014	41,273	-0.77%	-1.53%
2015	41,779	1.23%	-0.32%
2016	42,168	0.93%	0.60%
2017	43,087	2.18%	2.80%

4.2.3 Glasgow Central (Junctions 19 to 15)

As Table 4.10 shows traffic volumes have fluctuated on this section over the last ten years. After a period of reduction largely in 2011 and 2012, likely to be linked to the opening of the M74 Extension, volumes have gradually increased from 2013 to 2016, with a slight reduction occurring in 2017. The net impact is that the traffic volumes in 2017 were approximately 6% lower than 2008, and this may have reduced congestion slightly.

Table 4.10 - Eastbound Traffic Flows at Counter NTC00090

Year	Annual Average Daily Traffic Flow (AADT)	Percentage Change from Previous Year	Percentage Change from Base Year (2008)
2008	56,616	-	-
2009	56,920	0.54%	0.54%
2010	55,778	-2.01%	-1.48%
2011	52,013	-6.75%	-8.13%
2012	47,572	-8.54%	-15.98%
2013	50,185	5.49%	-11.36%
2014	50,720	1.07%	-10.41%
2015	52,773	4.05%	-6.79%
2016	54,040	2.40%	-4.55%
2017	53,178	-1.60%	-6.07%

4.2.4 Glasgow Central (Junctions 15 to 13)

Table 4.11 shows that eastbound traffic on the M8 motorway between Junction 15 and Junction 13 experienced a significant reduction in traffic flows in 2011 and 2012, although since then the volumes have remained relatively constant. The overall reduction in daily traffic flow from 2008 to 2017 is approximately 22%.

Table 4.11 - Eastbound Traffic Flows at Counter NTC00054

Year	Annual Average Daily Traffic Flow (AADT)	Percentage Change from Previous Year	Percentage Change from Base Year (2008)
2008	57,524	-	-
2009	58,434	1.58%	1.58%
2010	58,216	-0.37%	1.20%
2011	52,416	-9.96%	-8.88%
2012	45,668	-12.87%	-20.61%
2013	45,763	0.21%	-20.45%
2014	45,942	0.39%	-20.13%
2015	46,163	0.48%	-19.75%
2016	45,623	-1.17%	-20.69%
2017	44,683	-2.06%	-22.32%

4.2.5 Glasgow East (Junctions 13 to 8)

In the eastbound direction Table 4.12 shows that for this sub-section there has been a relatively significant reduction in traffic flows of approximately 20% from 2008 to 2017. Again the largest decreases occurred in 2011 and 2012, with reductions of approximately 9% and 12% observed. It is likely that, with this reduction in the number of vehicles, congestion will be less significant at present than it was in 2008.

Table 4.12 - Eastbound Traffic Flows at Counter NTC00029

Year	Annual Average Daily Traffic Flow (AADT)	Percentage Change from Previous Year	Percentage Change from Base Year (2008)
2008	57,243	-	-
2009	57,549	0.53%	0.53%
2010	57,147	-0.70%	-0.17%
2011	52,050	-8.92%	-9.07%
2012	45,553	-12.48%	-20.42%
2013	46,403	1.87%	-18.94%
2014	47,377	2.10%	-17.24%
2015	48,185	1.71%	-15.82%
2016	46,865	-2.74%	-18.13%
2017	45,547	-2.81%	-20.43%

5. Congestion Plot Analysis

In this section, the 'congestion' plots extracted from the INRIX database that show the percentage of the average free flow speed recorded along the pre-defined M8 motorway sub-sections over a 24 hour profile are presented. The plots are based on the calculated average speed over each calendar year from 2014 to 2017 inclusive.

The plots show graphically the aggregate motorway operating conditions for each year with the low percentage free-flow speed areas (highlighted in orange and red colours) indicating a deterioration in the operational performance (congestion) caused by incidents including accidents, maintenance and high volumes of traffic. It should be noted that the plots relate to the mainline carriageway of the M8 motorway between the junctions.

In the plots, the hour of day is shown on the x-axis, the distance (junction location) along the M8 on the y-axis and the direction of travel indicated by the black arrow on the right hand side. The coloured key ranges from green for average speeds at free-flow speed level, through to orange and red where average speeds are significantly lower than the free-flow speed levels.

5.1 M8 Westbound Direction

Figure 5.1 shows the combined congestion plot for the M8 in the westbound direction of travel from Junction 8 at the eastern end to Junction 29 at the western end.

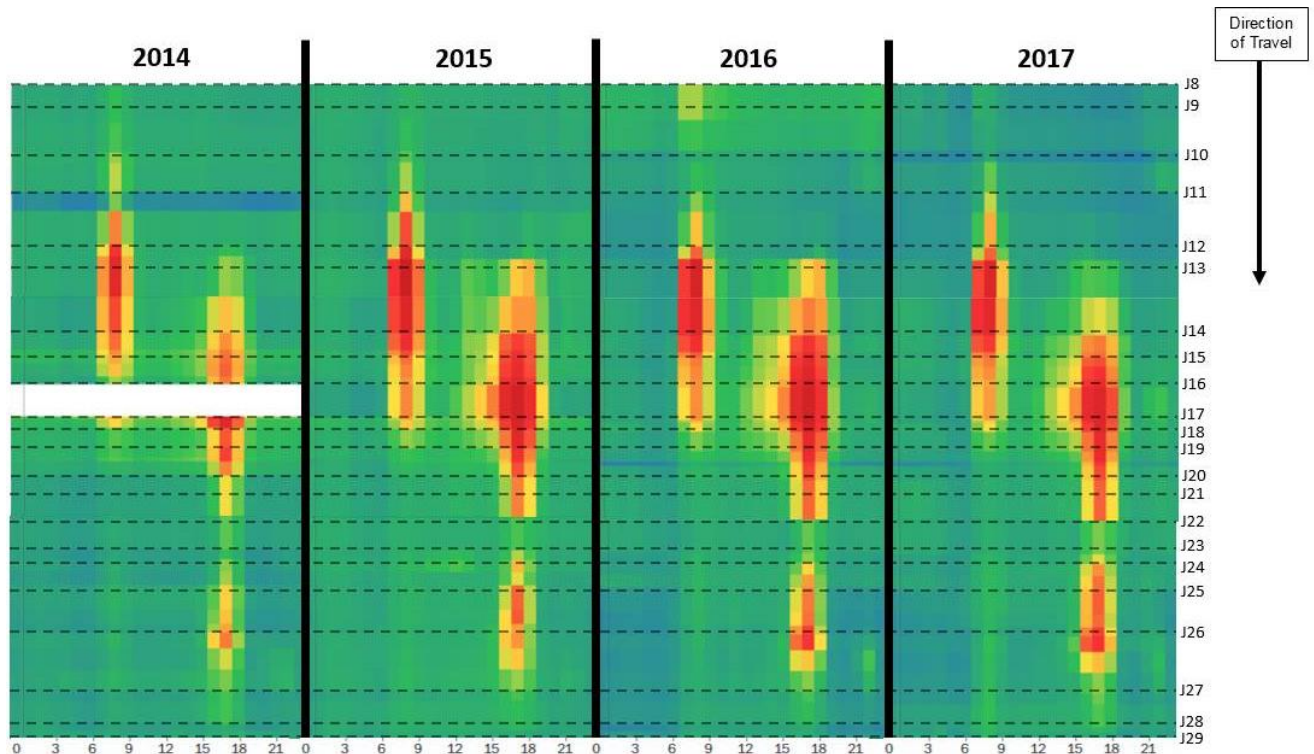


Figure 5.1 – Glasgow Congestion Plots – Junction 8 to Junction 29 (westbound traffic)

Comparing the INRIX 'congestion' plots with the traffic flow data in Section 4, yearly changes in AADTs varied between -5% and +7%, showing that traffic flows have remained fairly constant over the past four years. The most significant increases in AADTs occurred between Junction 22 and Junction 29, and as Figure 5.1 shows this section has exhibited gradual reductions in average speeds between 2014 and 2017. The pattern for the remainder of the M8 has remained relatively unchanged between 2014 and 2017.

Note that there is missing data between Junction 15 and Junction 19 for 2014 and appears in the plot as the blank segment.

5.1.1 Sub-section 1 – Glasgow East – M8 Junction 8 to M8 Junction 13

Figures 5.2 to 5.5 below show the congestion plot analysis for the Glasgow East section from 2014 through to 2017 respectively.

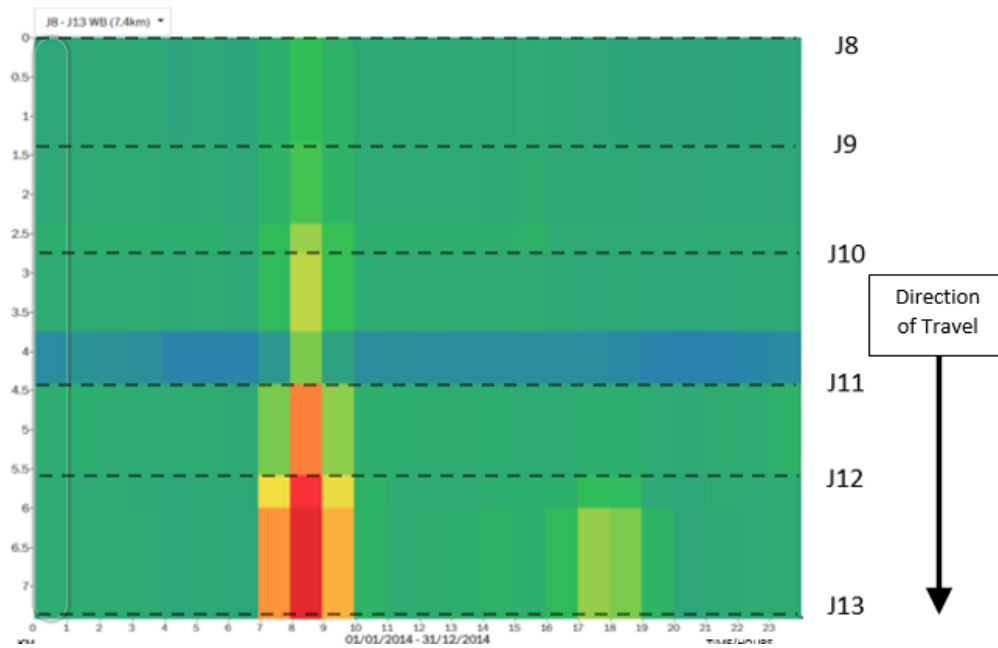


Figure 5.2 – Glasgow East 2014 Congestion Plots – Junction 8 to Junction 13 (westbound traffic)

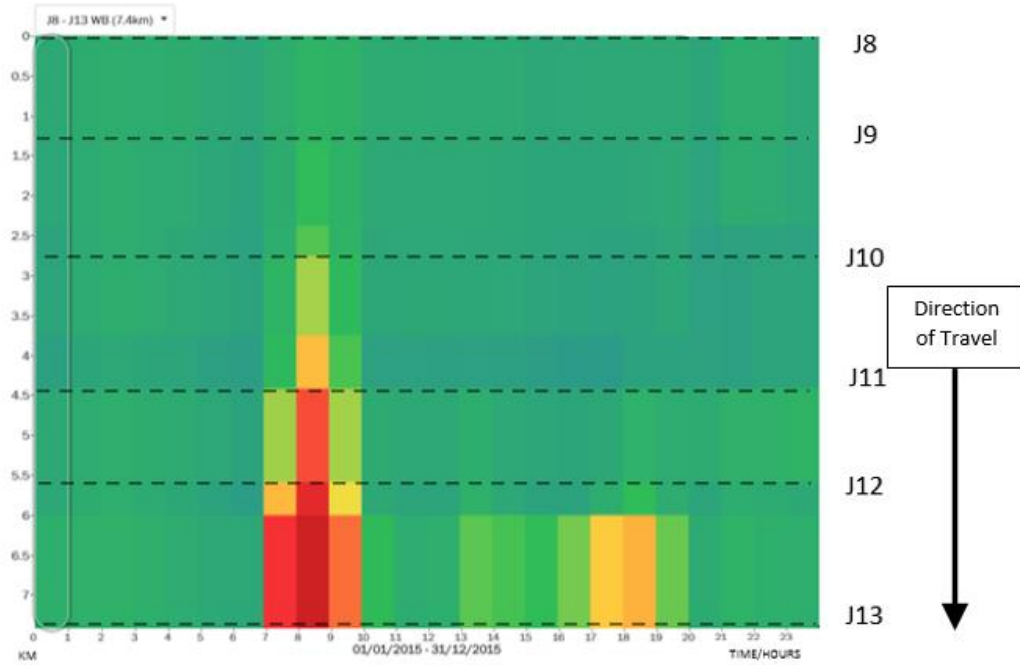


Figure 5.3 – Glasgow East 2015 Congestion Plots – Junction 8 to Junction 13 (westbound traffic)

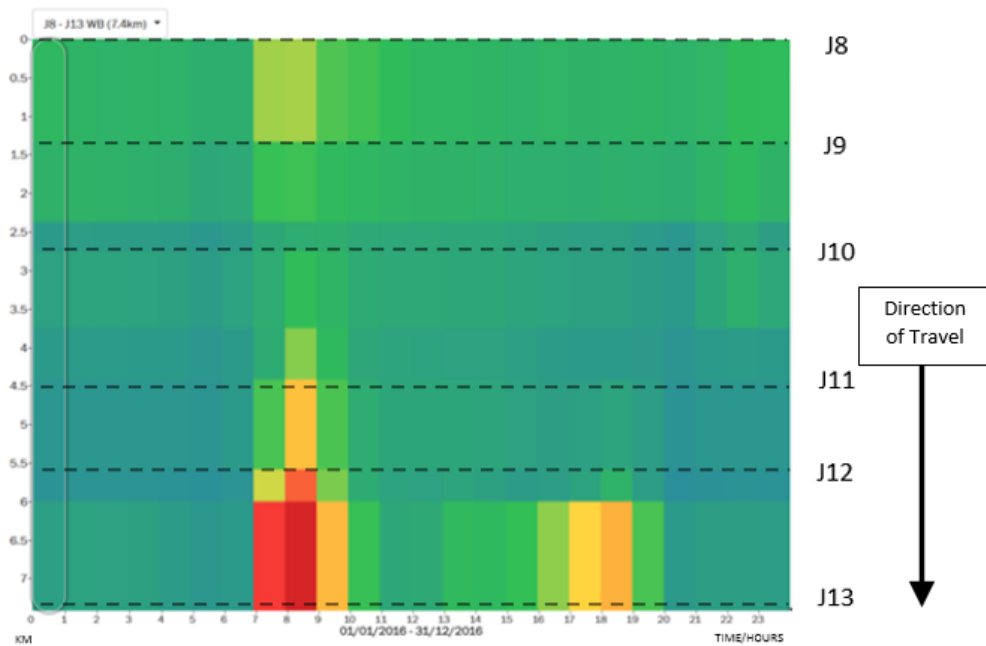


Figure 5.4 – Glasgow East 2016 Congestion Plots – Junction 8 to Junction 13 (westbound traffic)

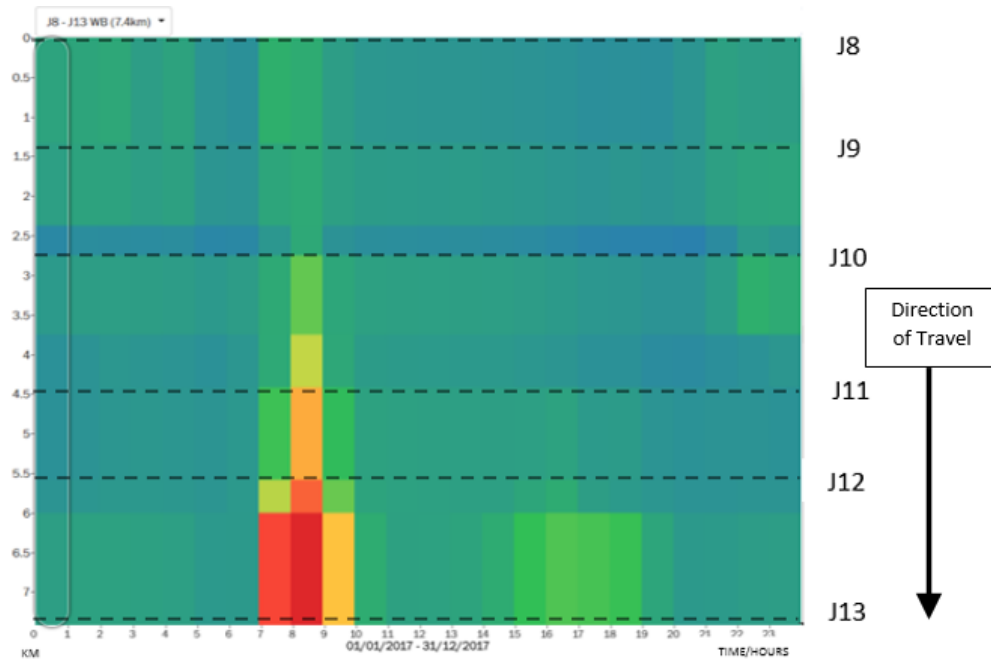


Figure 5.5 – Glasgow East 2017 Congestion Plots – Junction 8 to Junction 13 (westbound traffic)

For westbound traffic, the pattern across all years is very similar with significantly low speeds occurring on the approach to and at Junction 13 (M80), which consistently occurs during the AM peak period between 07:00hrs and 10:00hrs.

During the PM peak period the operational performance of the M8 remains relatively high, with only a small reduction in average speeds between Junction 8 and Junction 13. Although in both 2015 and 2016 there is evidence of lower speeds occurring from 17:00-19:00hrs. This is likely related to the construction roadworks associated with the M8 Newhouse to Baillieston project.

5.1.2 Sub-sections 2, 3 and 4 – Glasgow Central – M8 Junction 13 to M8 Junction 22

5.1.3 Figures 5.6 to 5.9 below show the congestion plot analysis for the Glasgow Central section from 2014 through to 2017 respectively.

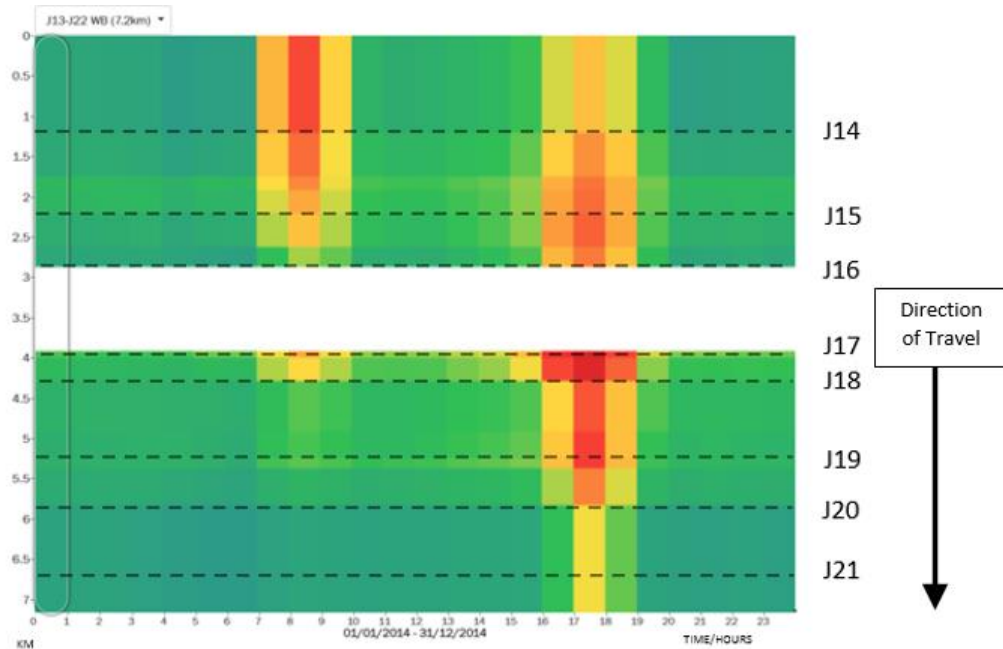


Figure 5.6 – Glasgow Central 2014 Congestion Plots – Junction 13 to Junction 22 (westbound traffic)

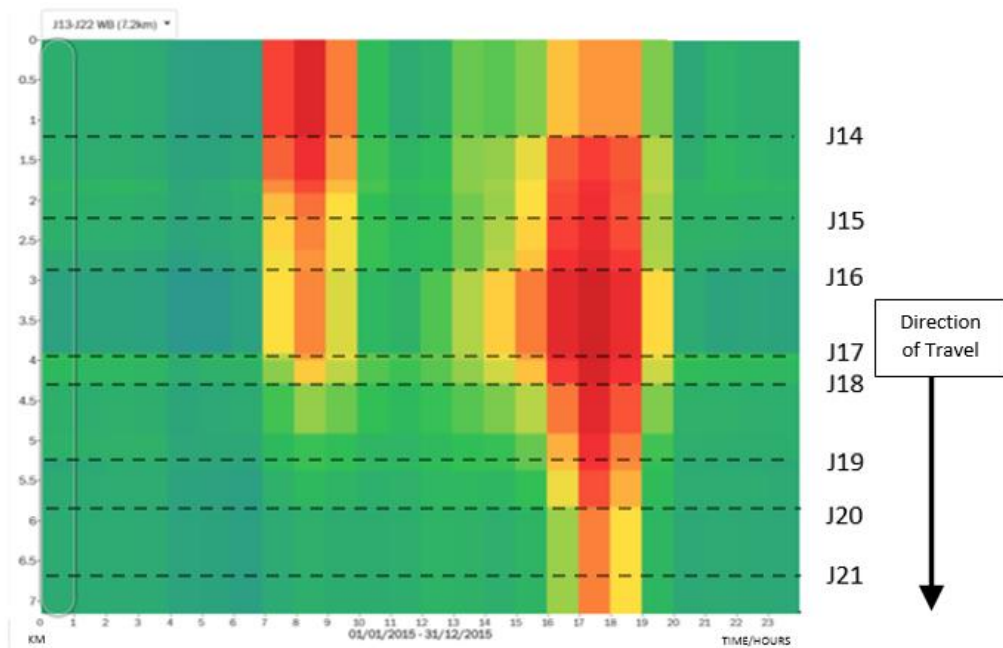


Figure 5.7 – Glasgow Central 2015 Congestion Plots – Junction 13 to Junction 22 (westbound traffic)

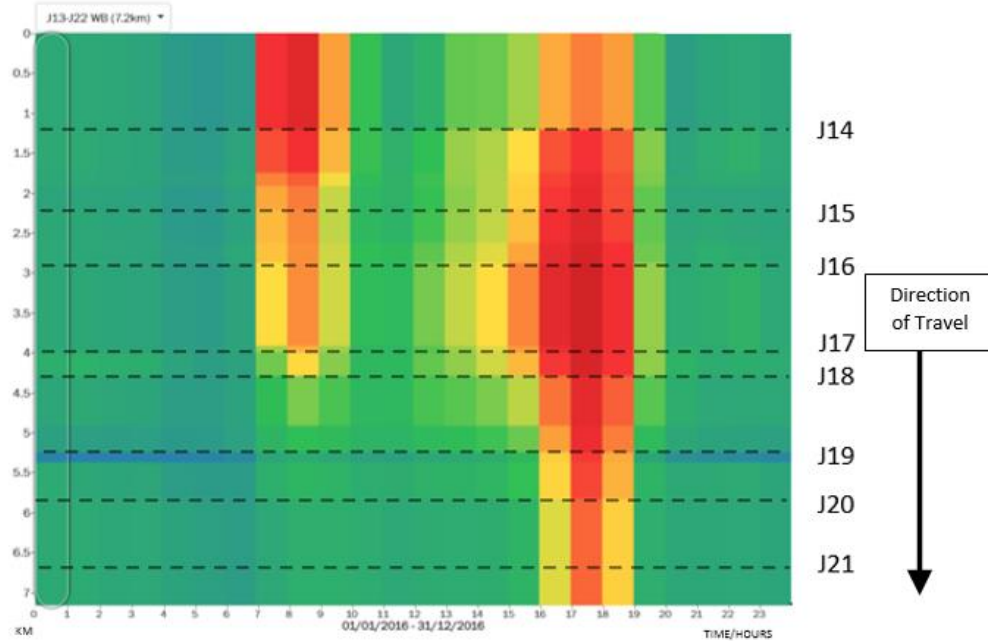


Figure 5.8 – Glasgow Central 2016 Congestion Plots – Junction 13 to Junction 22 (westbound traffic)

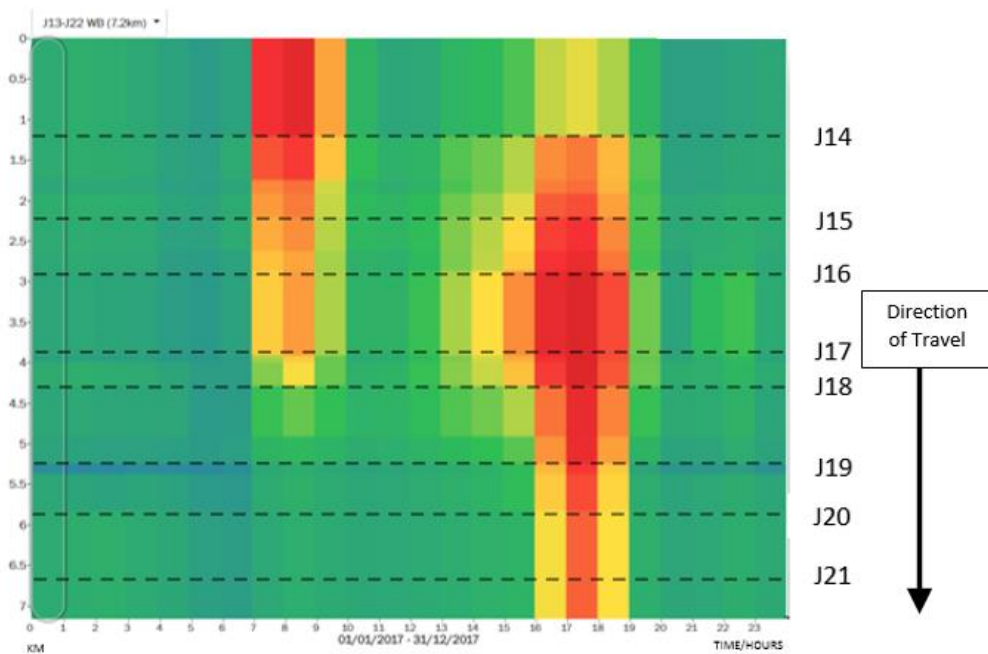


Figure 5.9 – Glasgow Central 2017 Congestion Plots – Junction 13 to Junction 22 (westbound traffic)

The pattern is very similar across all years, with significant reduction in speeds in the AM peak period between 07:00 and 10:00 from J13 through to J19. In PM peak period, with the exception of 2014, reduced speeds start to occur from 14:00 at around Junction 18 and expand to affect the section from Junction 15 through to J22 over the period from 16:00 to 19:00.

5.1.4 Sub-section 5 – Glasgow West – M8 Junction 22 to M8 Junction 29

Figures 5.10 to 5.13 below show the congestion plot analysis for the Glasgow West section from 2014 through to 2017 respectively.

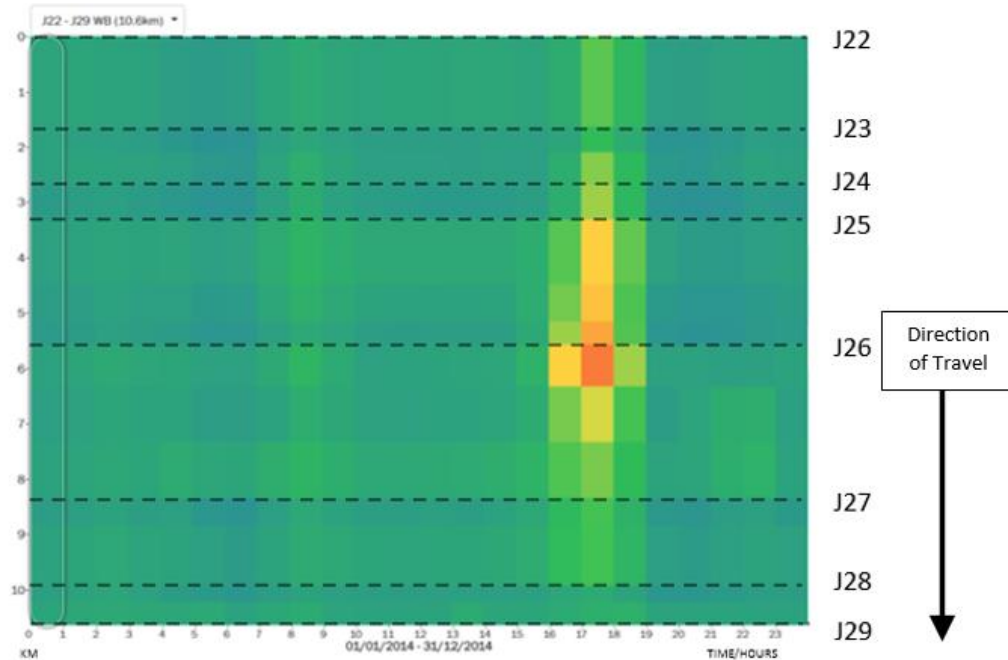


Figure 5.10 – Glasgow West 2014 Congestion Plots – Junction 22 to Junction 29 (westbound traffic)

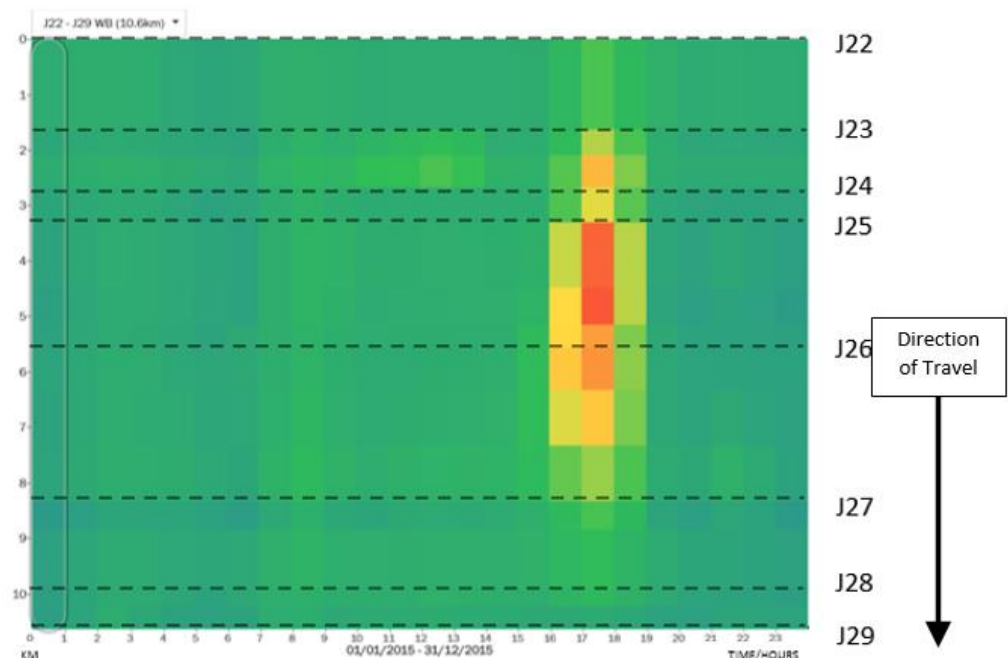


Figure 5.11 – Glasgow West 2015 Congestion Plots – Junction 22 to Junction 29 (westbound traffic)

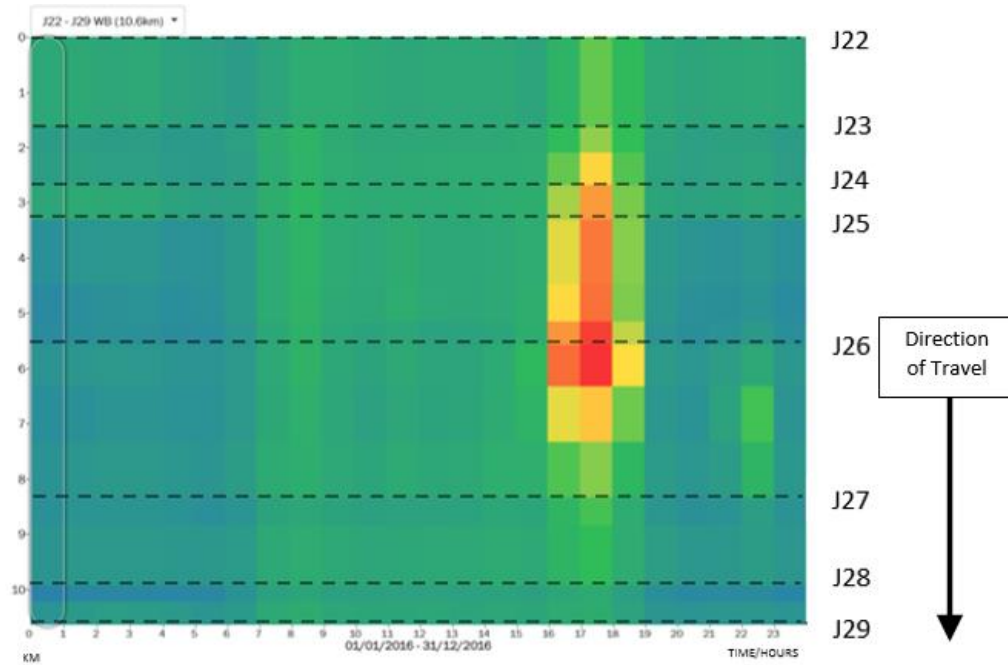


Figure 5.12 – Glasgow West 2016 Congestion Plots – Junction 22 to Junction 29 (westbound traffic)

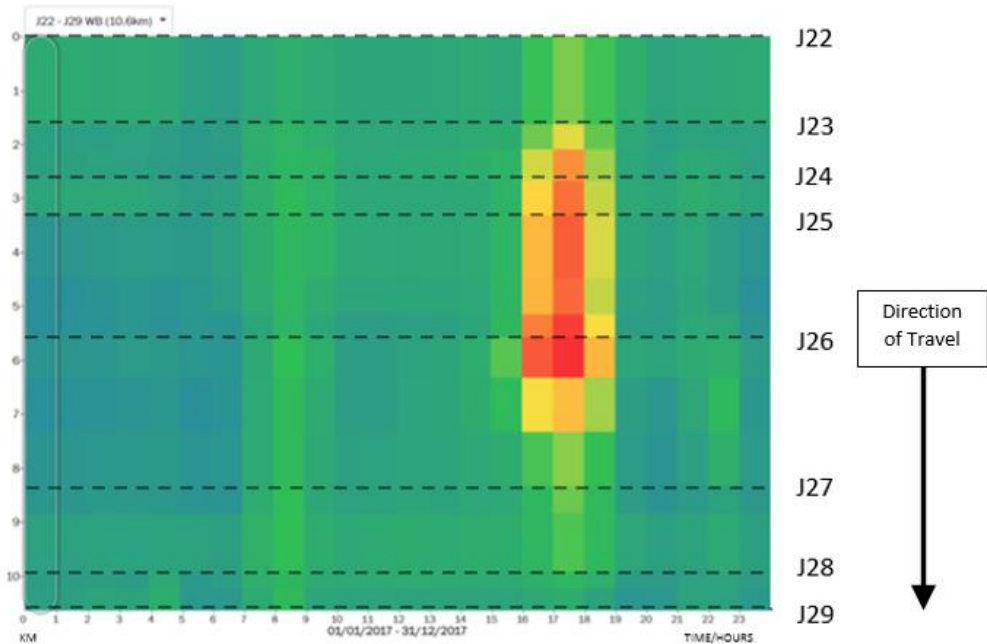


Figure 5.13 – Glasgow West 2017 Congestion Plots – Junction 22 to Junction 29 (westbound traffic)

During the AM peak period the operational performance of the M8 remains high, with speeds at or close to free-flow speeds. In the PM peak period, between Junction 22 and Junction 29, vehicle speeds are reduced on approach to and through Junction 26 and propagate upstream through to Junction 25 and Junction 24. The plots also provide some evidence that average speeds have gradually reduced between 2014 and 2017 on this section between 16:00-19:00hrs.

5.2 M8 Eastbound Direction

Figure 5.14 shows the combined congestion plot for the M8 in the eastbound direction of travel from Junction 29 at the western end to Junction 8 at the eastern end.

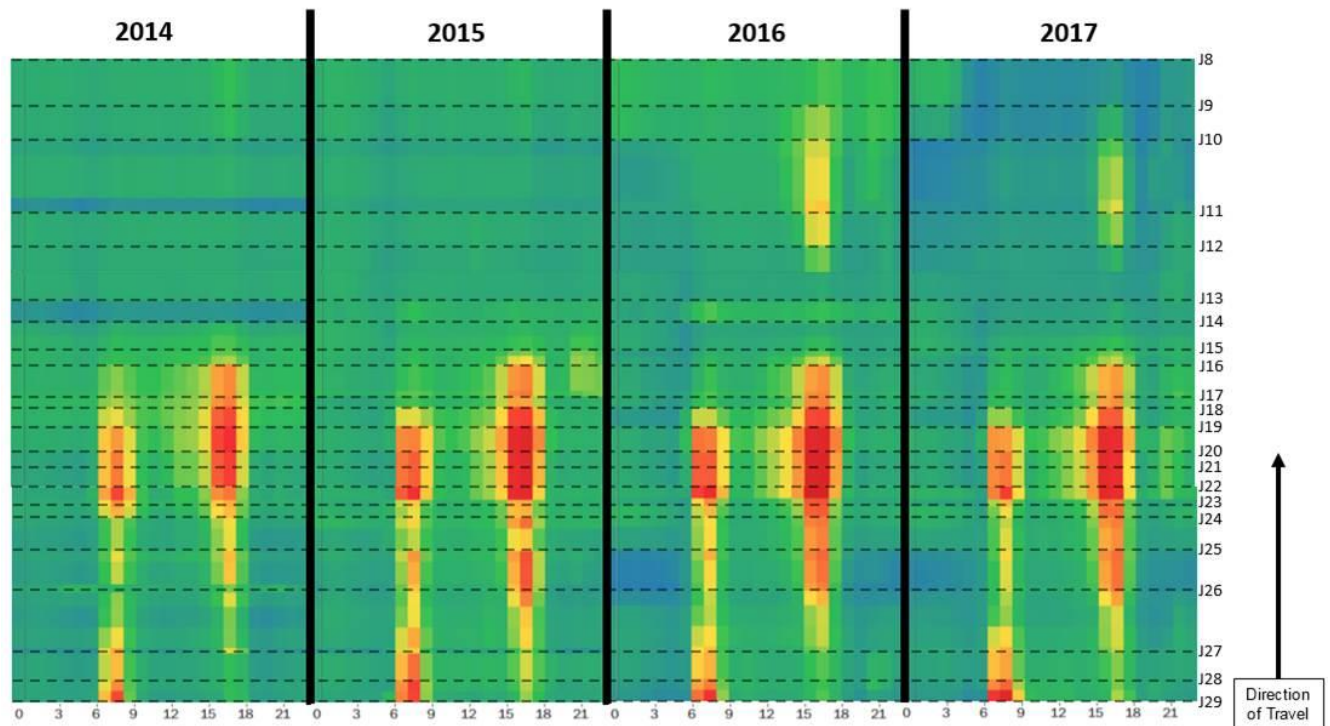


Figure 5.14 - Glasgow Congestion Plots – Junction 29 to Junction 8 (eastbound traffic)

The traffic flow data in Section 4, indicated that there are yearly changes in AADTs between -3% and +4% in the eastbound direction. These values are comparable with the INRIX 'congestion' plots, which display a similar pattern and remain relatively constant between 2014 and 2017. The most significant increases in AADTs occurred between Junction 29 and Junction 22, at around 3%-4% for 2015 and 2016. This is shown in Figure 5.14 as the average speeds have gradually reduced from the 2014 levels in both the AM and PM peak periods over this section of the M8.

The slight reduction in speeds that has occurred between Junction 12 and Junction 10 for the PM peak period in 2016 and 2017 look to be atypical as the AADT flows on this section have decreased slightly.

5.2.1 Sub-section 3 – Glasgow West – M8 Junction 29 to M8 Junction 22

Figures 5.15 to 5.18 below show the congestion plot analysis for the Glasgow West section from 2014 through to 2017 respectively.

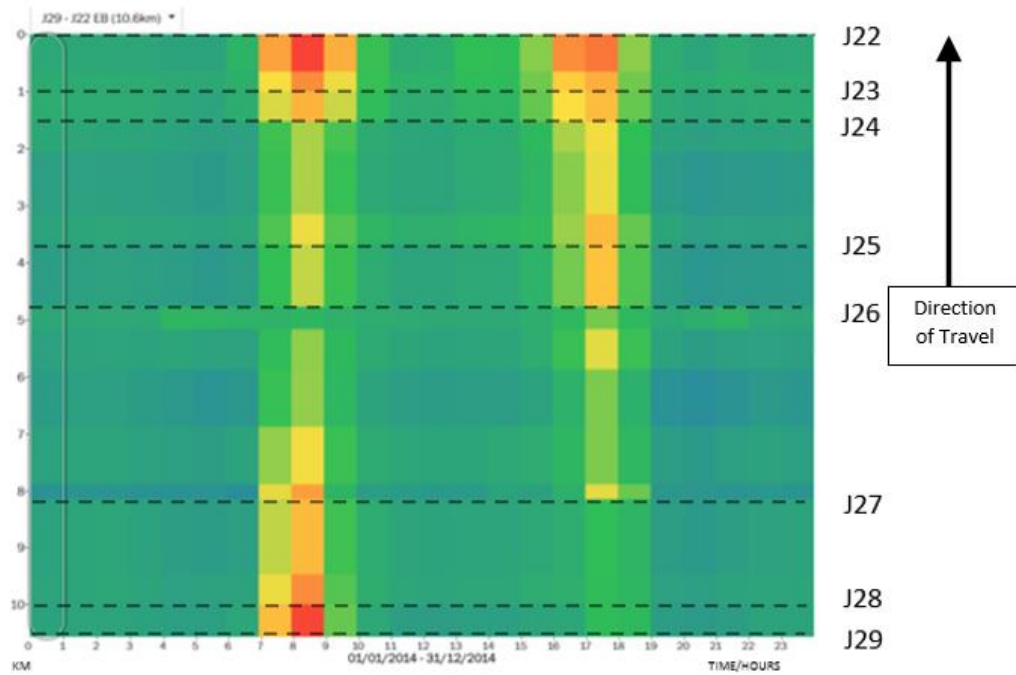


Figure 5.15 - Glasgow West 2014 Congestion Plots – Junction 29 to Junction 22 (eastbound traffic)

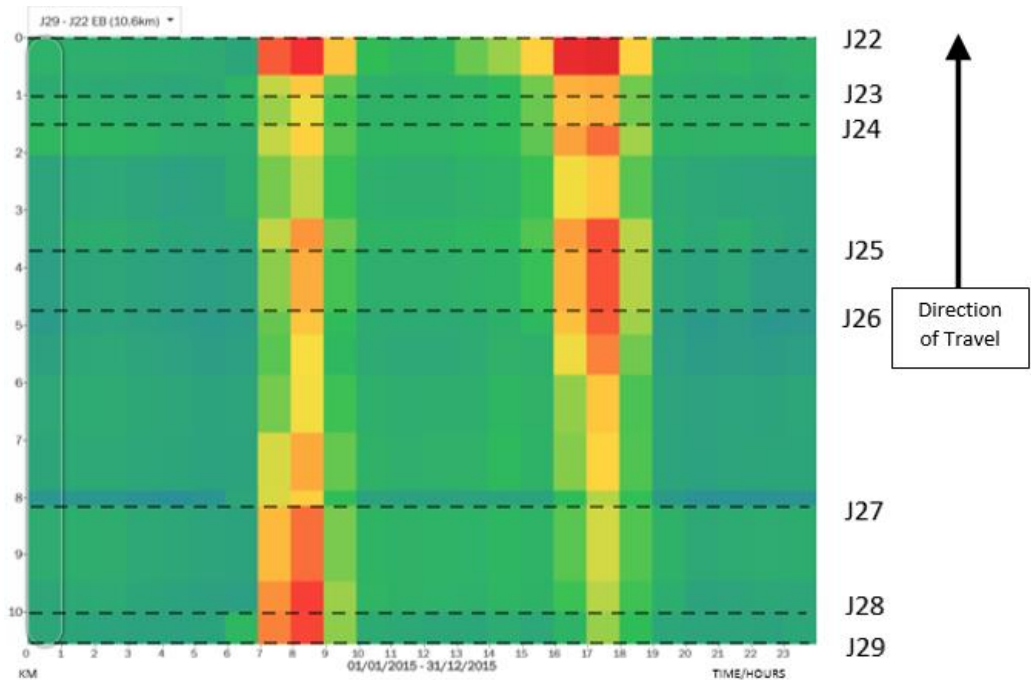


Figure 5.16 - Glasgow West 2015 Congestion Plots – Junction 29 to Junction 22 (eastbound traffic)

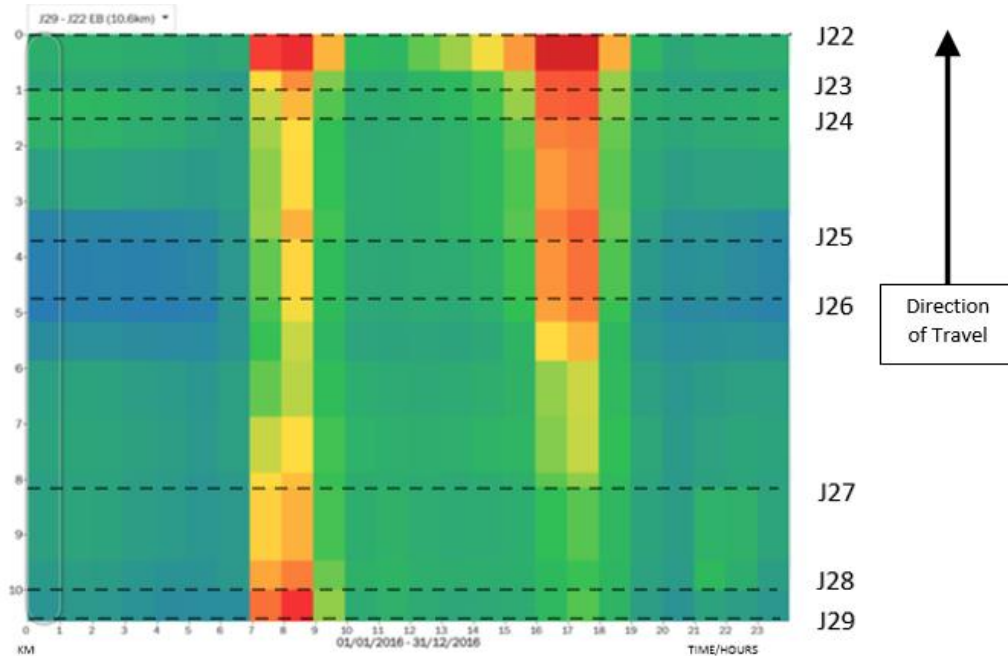


Figure 5.17 - Glasgow West 2016 Congestion Plots – Junction 29 to Junction 22 (eastbound traffic)

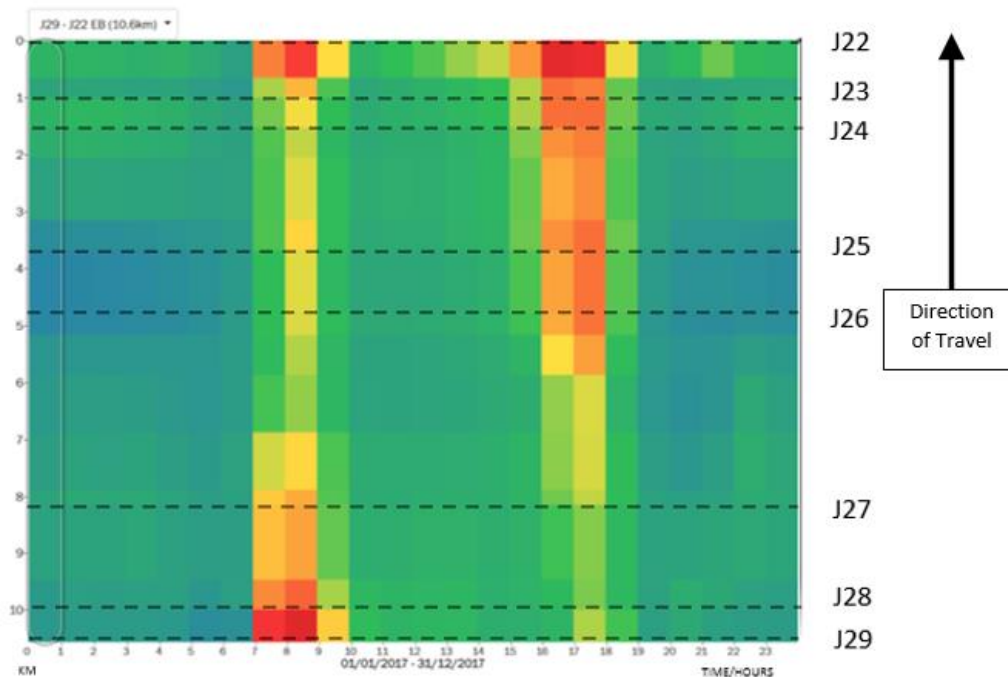


Figure 5.18 - Glasgow West 2017 Congestion Plots – Junction 29 to Junction 22 (eastbound traffic)

Travelling eastbound there is similar pattern of average speeds during the AM Peak period across all four years from 2014 to 2017. During the PM Peak period the average speeds have gradually reduced over time, and the affected section has expanded to cover the section from Junction 26 to Junction 22 particularly in 2016 and 2017.

5.2.2 Sub-section 2, 3 and 4 – Glasgow Central – M8 Junction 22 to M8 Junction 13

Figures 5.19 to 5.22 below show the congestion plot analysis for the Glasgow Central section from 2014 through to 2017 respectively.

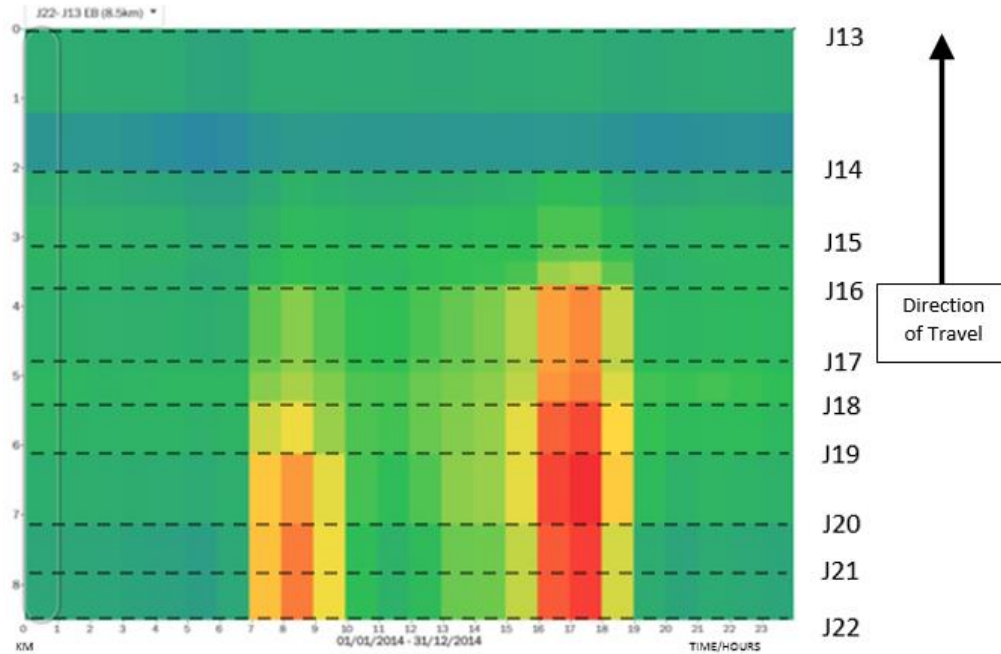


Figure 5.19 - Glasgow Central 2014 Congestion Plots – Junction 22 to Junction 13 (eastbound traffic)

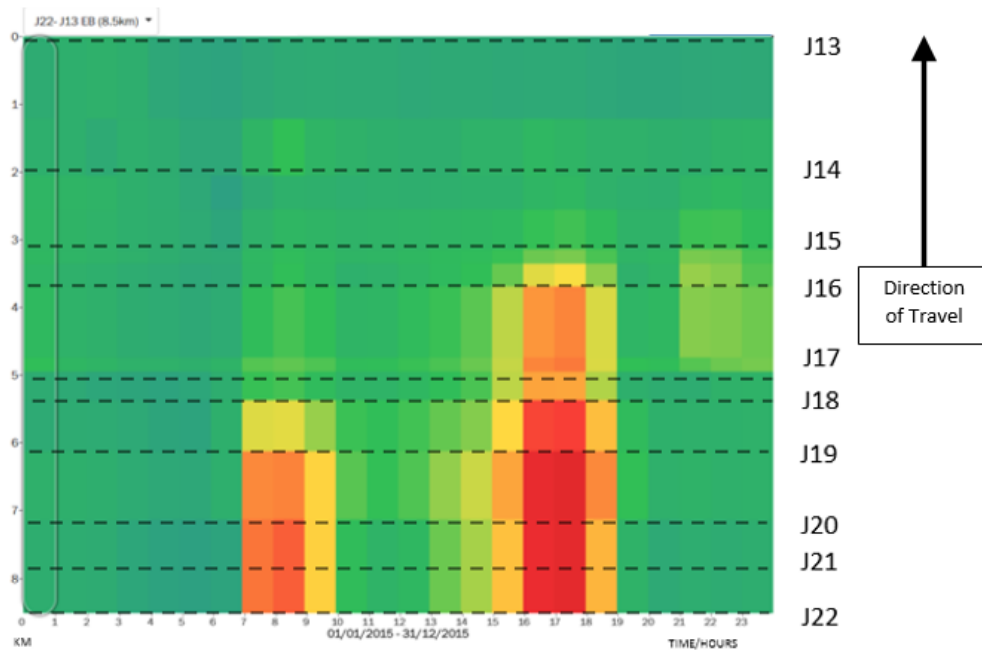


Figure 5.20 - Glasgow Central 2015 Congestion Plots – Junction 22 to Junction 13 (eastbound traffic)

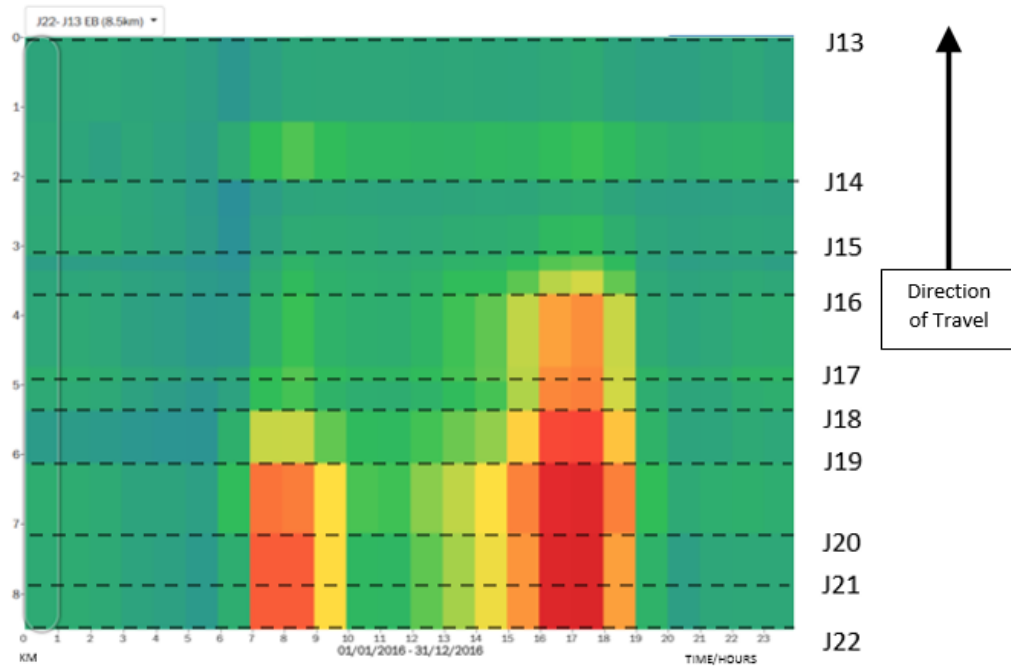


Figure 5.21 - Glasgow Central 2016 Congestion Plots – Junction 22 to Junction 13 (eastbound traffic)

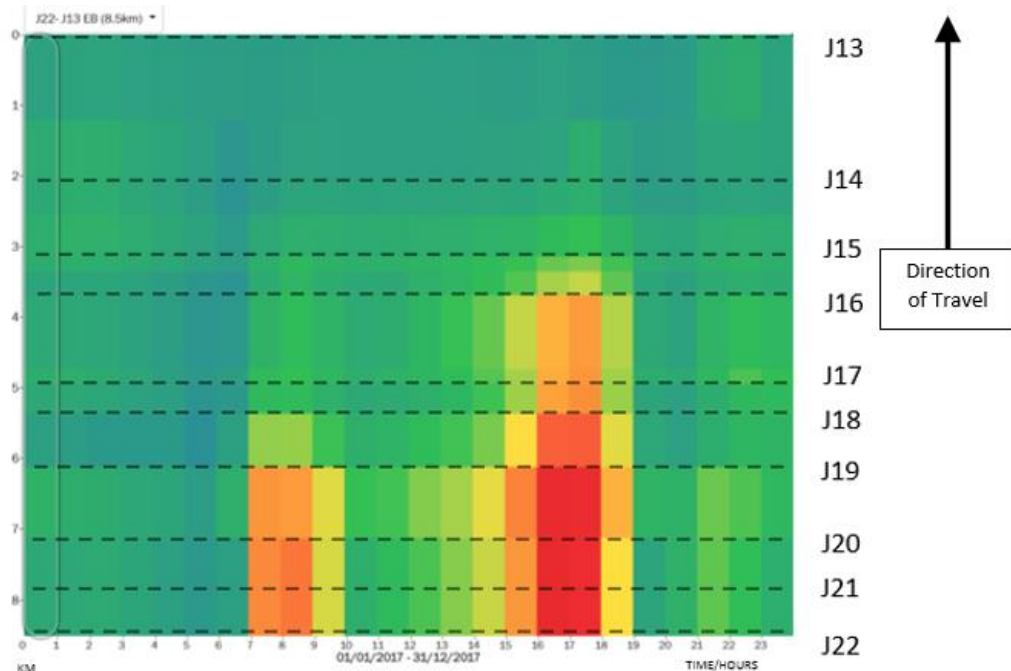


Figure 5.22 - Glasgow Central 2017 Congestion Plots – Junction 22 to Junction 13 (eastbound traffic)

In the AM peak period between 07:00-09:00hrs, there is evidence that average speeds have reduced slightly on the section from Junction 22 through to Junction 19 between 2014 and 2017.

During the PM peak period the operational performance of the M8 is significantly decreased between Junction 22 and Junction 16 with low average speeds occurring from 16:00hrs through to 18:00hrs.. There is some indication that since 2014 speeds have also reduced slightly in the adjacent hours between 14:00hrs and 16:00hrs, and to a lesser extent 18:00hrs to 19:00hrs.

5.2.3 Sub-section 1 – Glasgow East – M8 Junction 13 to M8 Junction 8

Figures 5.23 to 5.26 below show the congestion plot analysis for the Glasgow East section from 2014 through to 2017 respectively.

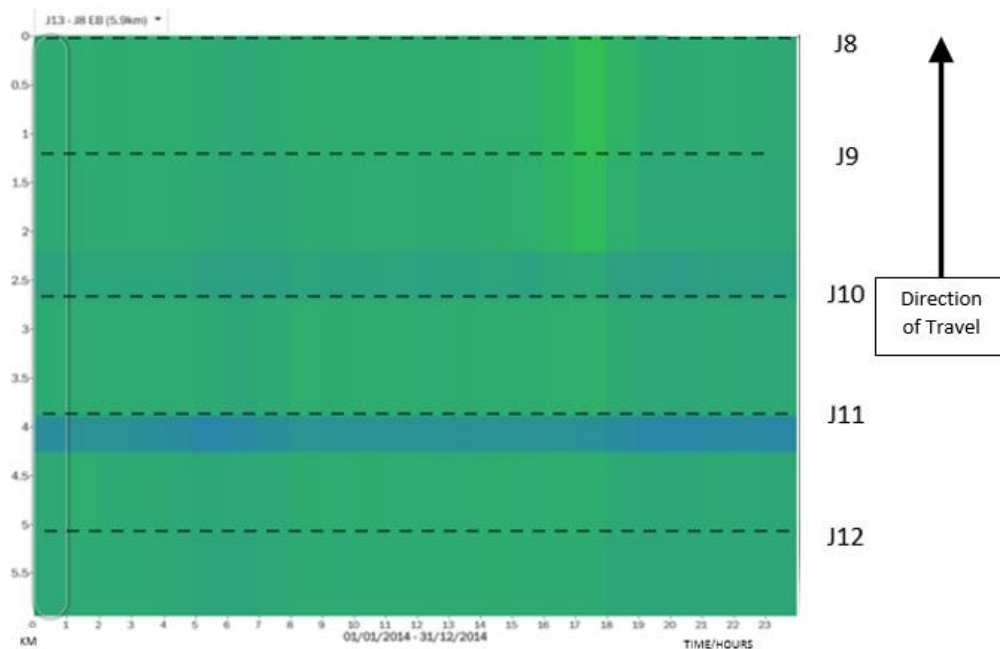


Figure 5.23 - Glasgow East 2014 Congestion Plots – Junction 13 to Junction 8 (eastbound traffic)

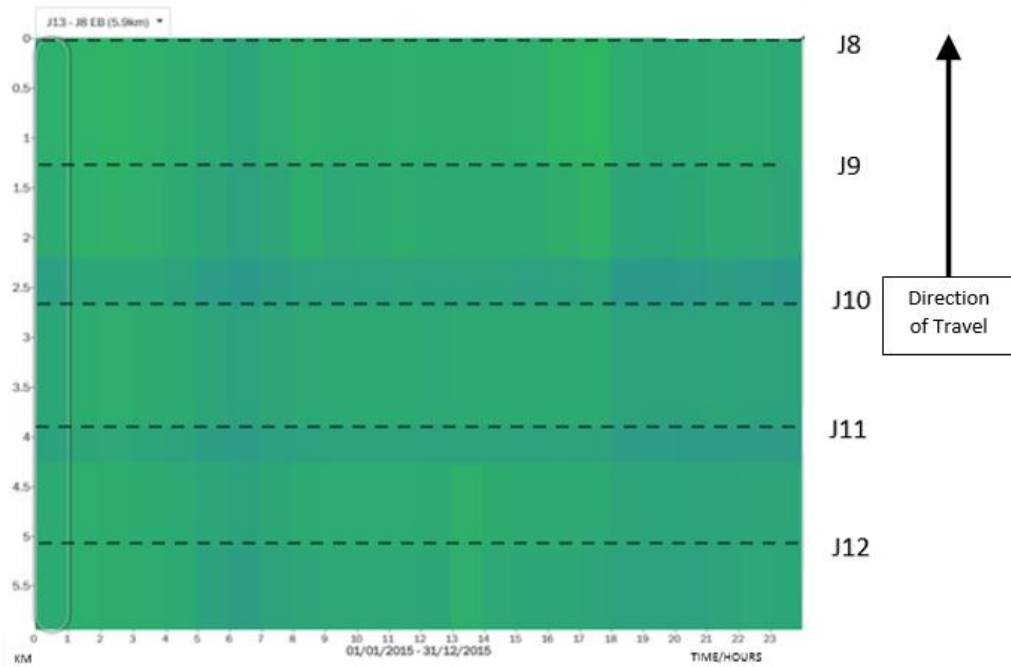


Figure 5.24 - Glasgow East 2015 Congestion Plots – Junction 13 to Junction 8 (eastbound traffic)

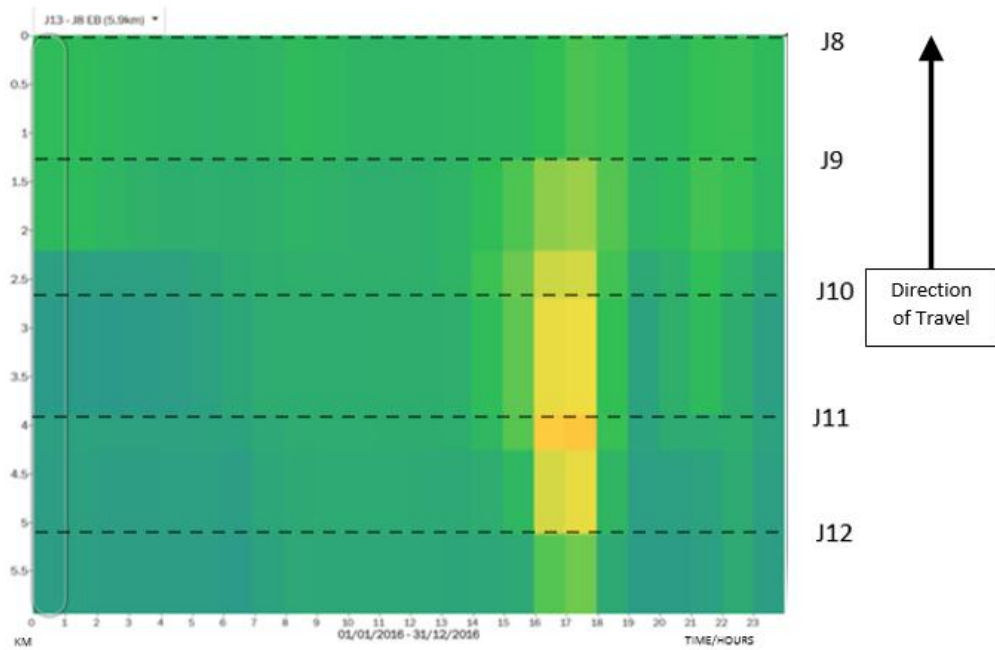


Figure 5.25 - Glasgow East 2016 Congestion Plots – Junction 13 to Junction 8 (eastbound traffic)

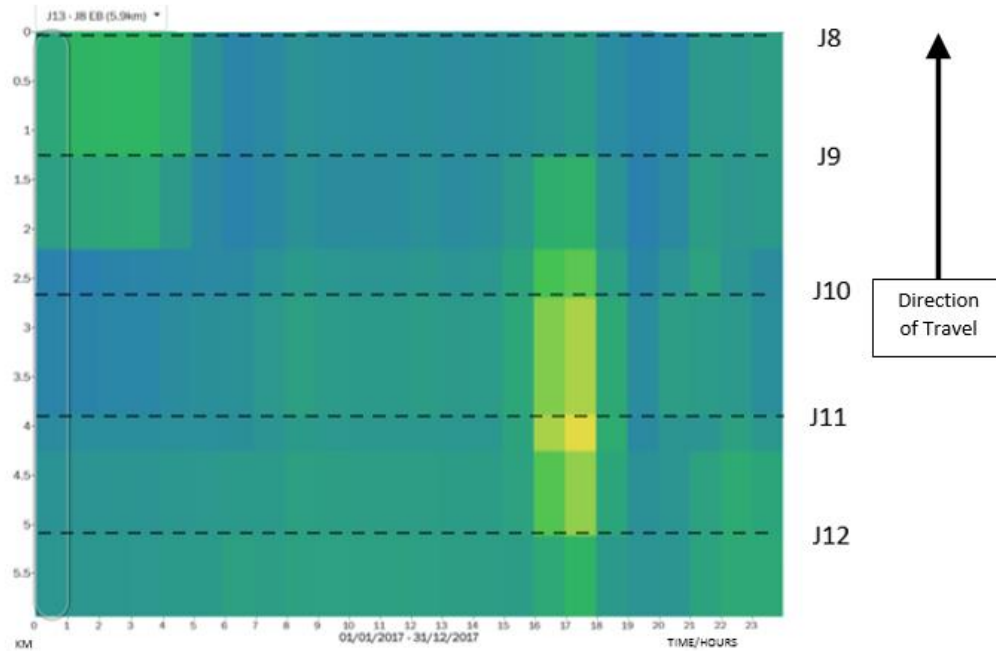


Figure 5.26 - Glasgow East 2017 Congestion Plots – Junction 13 to Junction 8 (eastbound traffic)

During both the AM and PM peak periods the operational performance of this section of the M8 remains relatively high, with only a small reduction in average speeds evident in 2016 and 2017.

6. Journey Time Analysis

In this section, the journey time analysis extracted from the INRIX web portal is presented. Average journey times over the year have been analysed for each hour over a 24 hour period, to derive the daily profile for each year.

6.1 M8 Westbound Direction

6.1.1 Glasgow East (Junctions 8 to 13)

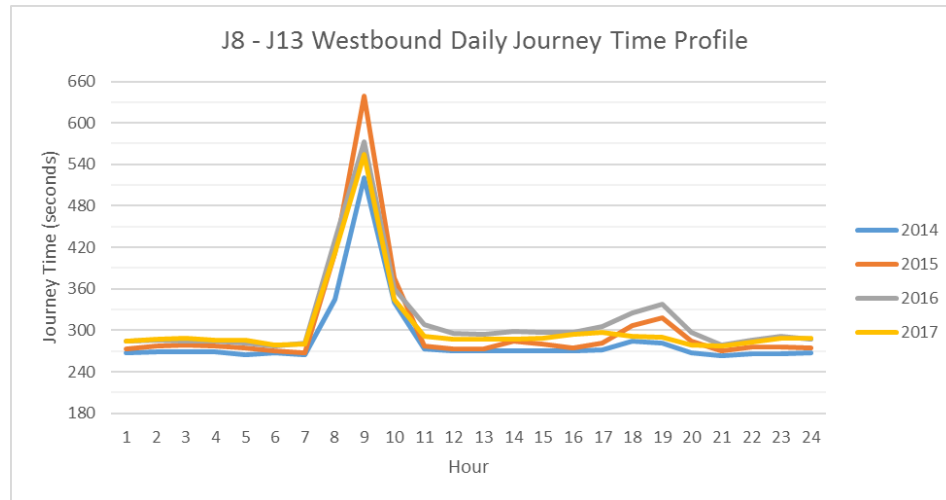


Figure 6.1 - Daily Journey Time Profile for Westbound Traffic between Junction 8 and 13

Figure 6.1 shows a consistent pattern of journey times in each of the four years. The journey times increase significantly in the AM peak period between 07:00hrs and 10:00hrs, as traffic travelling westbound on the M8 is impacted by the high volumes joining from the M80. The pattern over the remainder of the day is consistent across the years, with slight increases evident in the PM peak in 2015 and 2016 that are consistent with the small reductions in average speed shown in Figures 5.3 and 5.4.

6.1.2 Glasgow Central (Junctions 13 to 15)

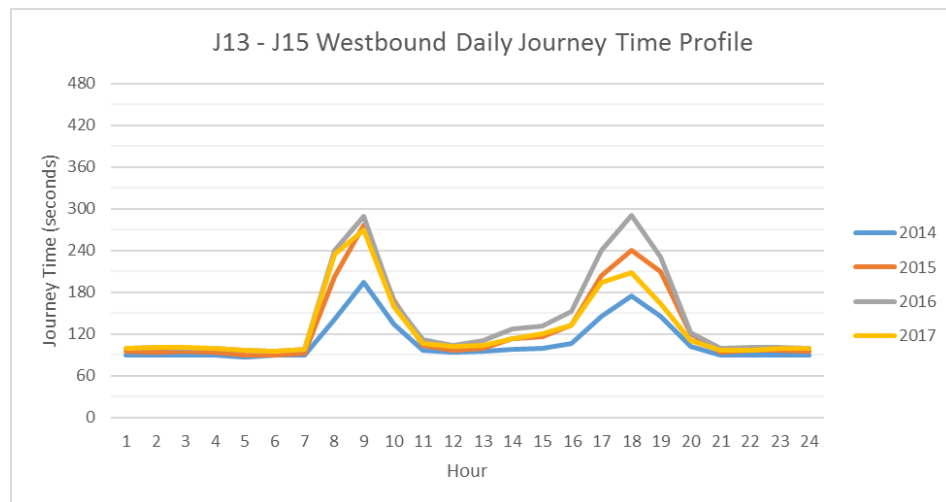


Figure 6.2 - Daily Journey Time Profile for Westbound Traffic between Junction 13 and 15

Figure 6.2 shows that this section of the M8 exhibits a consistent increase in journey times during both the AM and PM peak periods. The figure shows that in the AM there appears to have been a consistent increase in journey times over the 2014 level, with the PM peak period exhibiting a more varied pattern in terms of the changes over time. There is also some evidence that the PM peak period has extending over a longer duration compared

to the 2014 journey times, with journey times starting to increase earlier in 2015, 2016 and 2017 from around 14:00hrs compared to the 2014 profile.

6.1.3 Glasgow Central (Junctions 15 to 19)

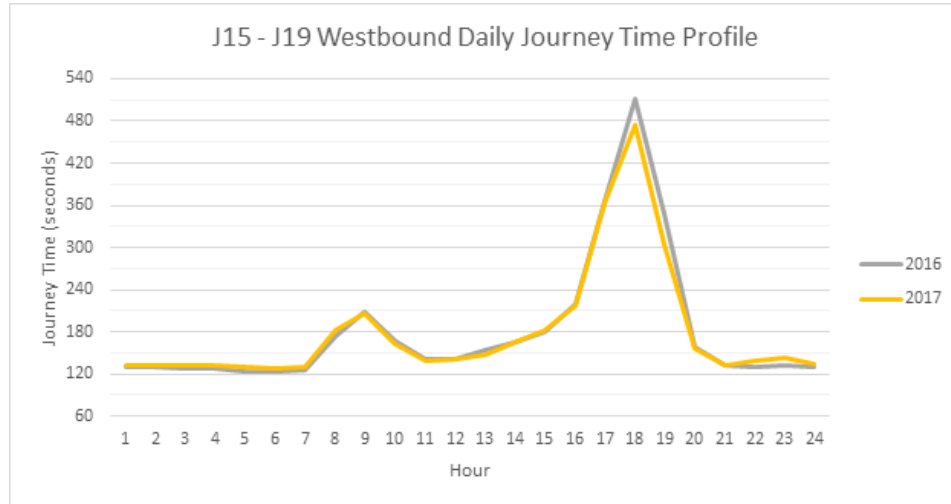


Figure 6.3 - Daily Journey Time Profile for Westbound Traffic between Junction 15 and 19

As there was missing data from January 2014 through to October 2015 it was not possible to calculate an average daily journey time profile for 2014 and 2015. Figure 6.3 is therefore limited to 2016 and 2017 data, and both years exhibit a very similar pattern in terms of journey times with significant increases evident during the PM peak period from 16:00hrs to 19:00hrs.

6.1.4 Glasgow Central (Junctions 19 to 22)

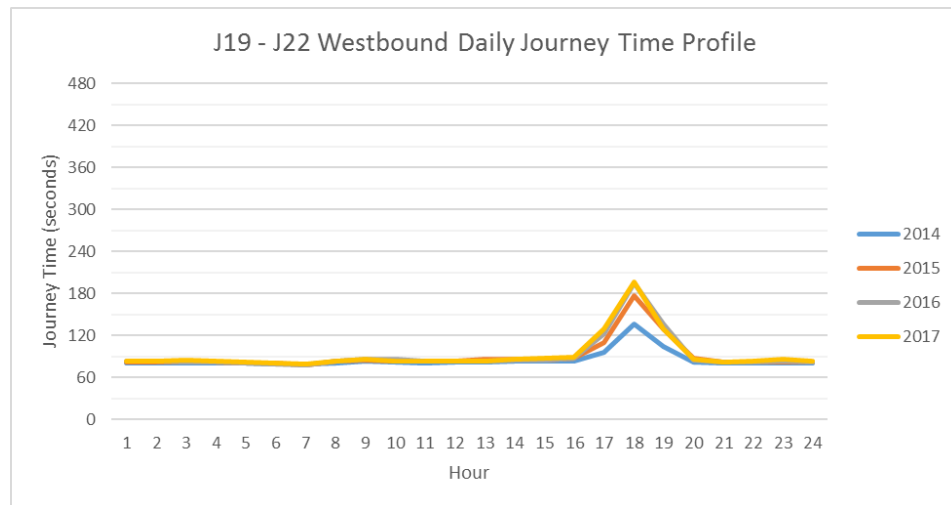


Figure 6.4 - Daily Journey Time Profile for Westbound Traffic between Junction 19 and 22

Figure 6.4 shows that between Junction 19 and Junction 22 journey times increase significantly during the PM peak period, with all years exhibiting a very similar pattern. The figure indicates that there has been a notable

increase in journey times in 2015, 2016 and 2017 compared to 2014 and is consistent with the reduction in average speeds indicating reduced operational performance.

6.1.5 Glasgow West (Junctions 22 to 29)

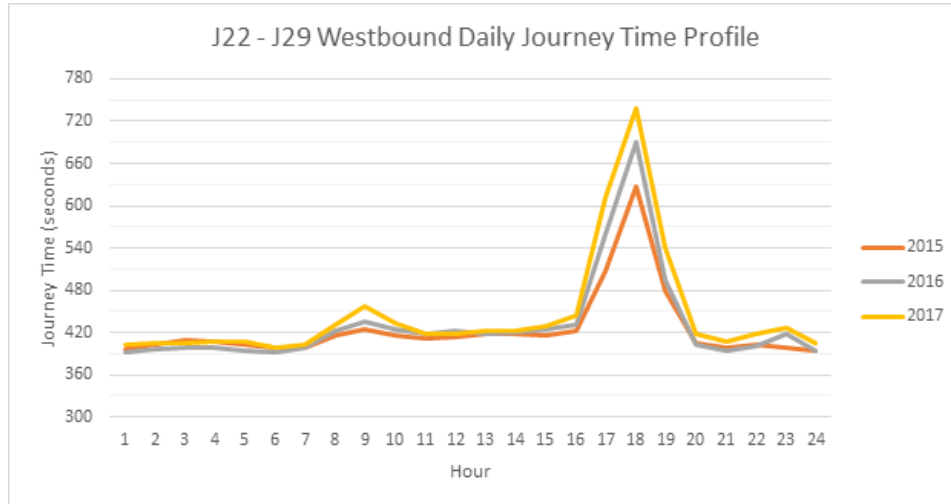


Figure 6.5 - Daily Journey Time Profile for Westbound Traffic between Junction 22 and 29

As there was data missing for 10 out of 12 months in 2014 it was not possible to calculate an average daily journey time profile for 2014. Figure 6.5 therefore does not include 2014. The journey time pattern for this section shows significant journey time increases on this section during the PM peak, and also shows a consistent increase year on year from 2015 to 2017.

6.2 M8 Eastbound Direction

6.2.1 Glasgow West (Junctions 29 to 22)

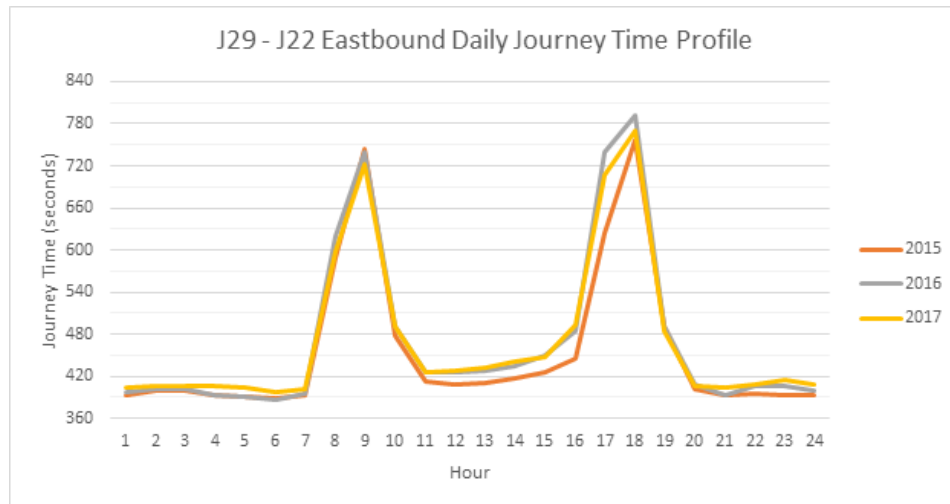


Figure 6.6 - Daily Journey Time Profile for Eastbound Traffic between Junction 29 and 22

As there was data missing for 10 out of 12 months in 2014 it was not possible to calculate an average daily journey time profile for 2014. Figure 6.6 therefore does not include 2014. For travel in the eastbound direction the figure shows increased journey times in both the AM and PM peak periods, with no significant increases in journey times occurring between years evident. Although not as significant as other sub-sections of the M8, there is some indication that the evening peak has spread with journey times increasing slightly earlier in the day.

6.2.2 Glasgow Central (Junctions 22 to 19)

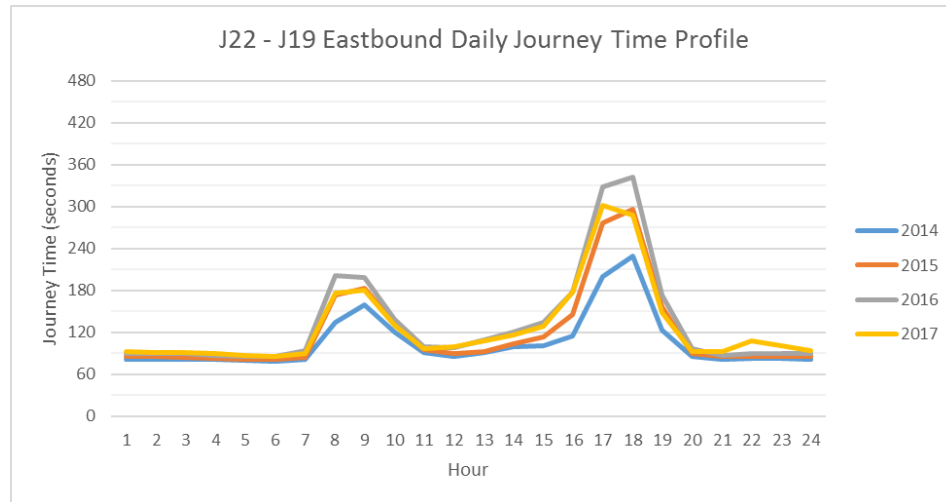


Figure 6.7 - Daily Journey Time Profile for Eastbound Traffic between Junction 22 and 19

Figure 6.7 shows increased journey times during both the AM and PM peak periods on this section of the M8 in the eastbound direction of travel. The figure also shows evidence that over time the journey times particularly during the PM peak have increased compared to the 2014 journey times. The profile also shows some evidence that the duration of the PM peak has expanded slightly, with journey times starting to increase earlier in the day.

6.2.3 Glasgow Central (Junctions 19 to 15)

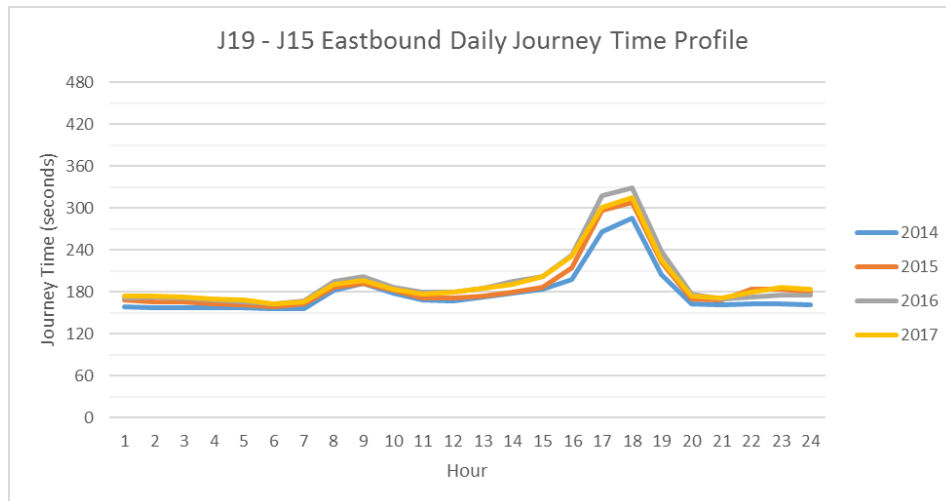


Figure 6.8 - Daily Journey Time Profile for Eastbound Traffic between Junction 19 and 15

Figure 6.8 shows that on this section of the M8 motorway journey times increase significantly during the PM peak period, with only a slight increase evident during the AM peak period. There is some evidence that journey times have increased over 2014 levels, although there is a degree of variation as journey times increase in both 2015 and 2016 and then reduce slightly in 2017.

6.2.4 Glasgow Central (Junctions 15 to 13)

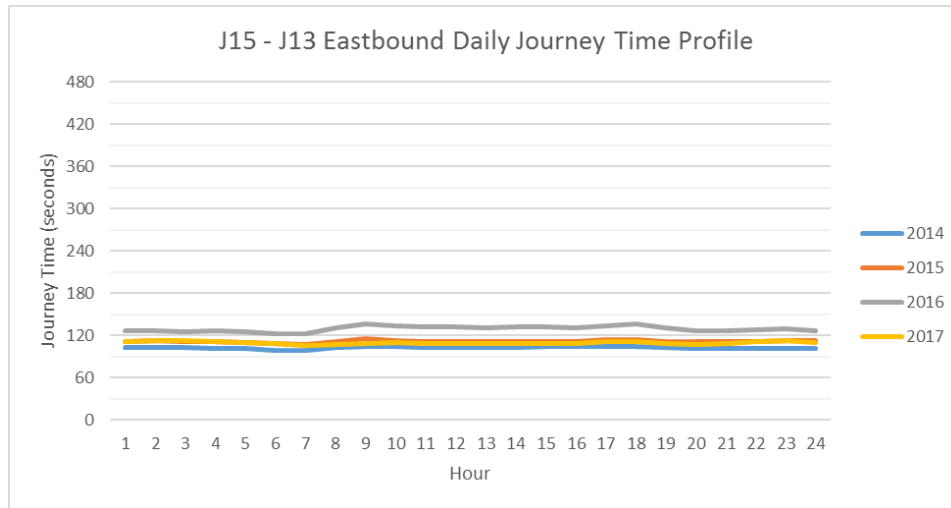


Figure 6.9 - Daily Journey Time Profile for Eastbound Traffic between Junction 15 and 13

Figure 6.9 shows very little variation in the journey time profile throughout the day on this section of the M8, with no evidence of a significant increase occurring over time between 2014 and 2017.

6.2.5 Glasgow East (Junctions 13 to 8)

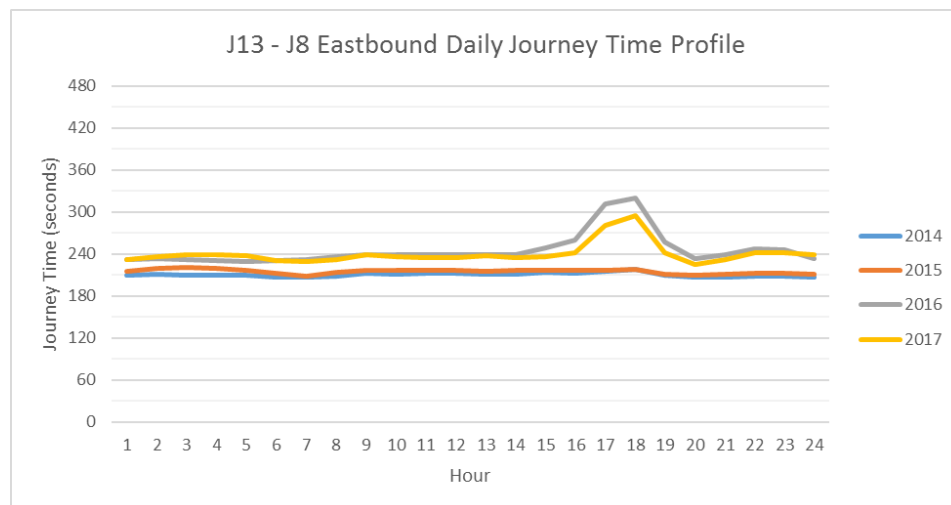


Figure 6.10 - Daily Journey Time Profile for Eastbound Traffic between Junction 13 and 8

Figure 6.10 shows that there has been an increase in journey times throughout the day in 2016 and 2017 compared to the previous two years. In addition, there is evidence of a distinct increase during the PM peak period occurred in 2016 and 2017, that was not present in the two previous years of 2014 and 2015.

7. Summary

7.1 M8 Westbound Direction

Traffic flows from the east of Glasgow, between Junctions 8 and 13 on the M8, have reduced significantly over the past ten years, with 12,000 fewer vehicles per day travelling in 2017 than 2008, a reduction of over 20%. This is primarily due to the impact of the M74 Extension, which opened in 2011, however there has also been a slight reduction in traffic volumes in the period post-2011. This pattern is reversed when examining traffic volumes at the western end of the corridor to the west of the city centre. Between Junctions 22 and 29 there has been an increase in traffic in the range between 17-22%. Traffic volumes in the central of the M8 from Junctions 13 to Junction 22, have remained relatively static between 2008 and 2017.

The 'congestion' plot analysis shows that most substantial reduction in average speed appears to be around Junctions 25 and 26 to the west of Glasgow City Centre during the PM peak period. In addition, the 'congestion' plots also indicate that there has been a clear decrease in average speeds from Junction 12 through to Junction 19 between 07:00hrs and 10:00hrs between 2015 and 2017. During the PM peak, between 16:00hrs and 19:00hrs, the lowest average speeds occur between Junction 14 and Junction 22.

The above pattern is supported by the journey time profile data, which indicates large increases in journey times between 07:00hrs and 10:00hrs between Junctions 8 and 15. There have also been notable increases in the journey times in the PM peak period from Junction 13 through to Junction 29, indicating a peak hour around 17:00-18:00hrs. Elsewhere along the route, since 2014 there has been few instances of increased journey times occurring between 2014 and 2017.

Considering all three indicators it can be determined that congestion levels for westbound traffic on the M8 has changed in the past ten years. The data indicates that congestion has eased to the east where there has been a reduction in traffic, but increased to the west where traffic flow and journey times have shown increases. There is no evidence to suggest a major change has occurred in the central city centre section, although due to the pronounced increases in journey times and reduced speeds in the peak periods, significant levels of congestion occur now and have done since prior to 2008. The length of time that peak conditions occur in the PM is also increasing.

7.2 M8 Eastbound Direction

Traffic patterns for eastbound traffic follow a largely similar trend to that of westbound traffic. Between Junctions 13 and 8 there has been a substantial decrease in traffic flow (12,000 vehicles per day or 20%) between 2008 and 2017. However, this is reversed between Junction 29 and Junction 22 where there has been a large increase in traffic flow (over 16,000 vehicles per day, or approximately 34%). The opening of the M74 extension is likely to be the major contributor to these changes. In the Glasgow Central sub-section, traffic flow changes are less significant in volume and more variable year to year, often increasing one year before reducing the next.

Similarly, the 'congestion' plots indicate no large change in average speeds from 2014 outside of the peak periods. The most pronounced changes in average speed occur around Junctions 26 and 25 to the west of Glasgow City Centre, and Junctions 12 and 10 to the east. There is a clear AM peak between 07:00hrs and 10:00hrs, with the plots indicating a reduction in speed from Junction 29 to Junction 17 in the city centre. There is also evidence that the PM peak period is extending, with increased levels of congestion from 15:00hrs through to 19:00hrs.

This is supported by the journey time daily profile data that indicates increased journey times in the AM peak period from Junction 29 through to Junction 19, with a peak hour at 08:00-09:00hrs. The pattern in the afternoon suggests that delays are experienced from Junction 29 through to Junction 15, and to a lesser extent from Junction 13 to Junction 8. Journey times show greater variation from 2014 to 2017 but have largely returned to their 2014 levels, although an increase to the west of the city is still apparent.

Considering all three indicators there is evidence that congestion levels for eastbound traffic on the M8 has also changed over time. The data indicates that congestion has eased at the eastern end, although there is some evidence that the during PM peak this section of the route has exhibited a slight reduction in average speeds in 2016 and 2017. At the western end the indication is that congestion has increased where traffic flows and journey times have shown increases. In a similar pattern to the westbound direction, in the central section there is no evidence to suggest a major change has occurred, although due to the pronounced increases in journey times and reduced speeds in the peak periods, significant levels of congestion occur now and have done since prior to 2008. Again, the length of time that peak conditions occur in the PM is also increasing.



Appendix A. Counter Locations



Figure A.1 – Counter Locations East

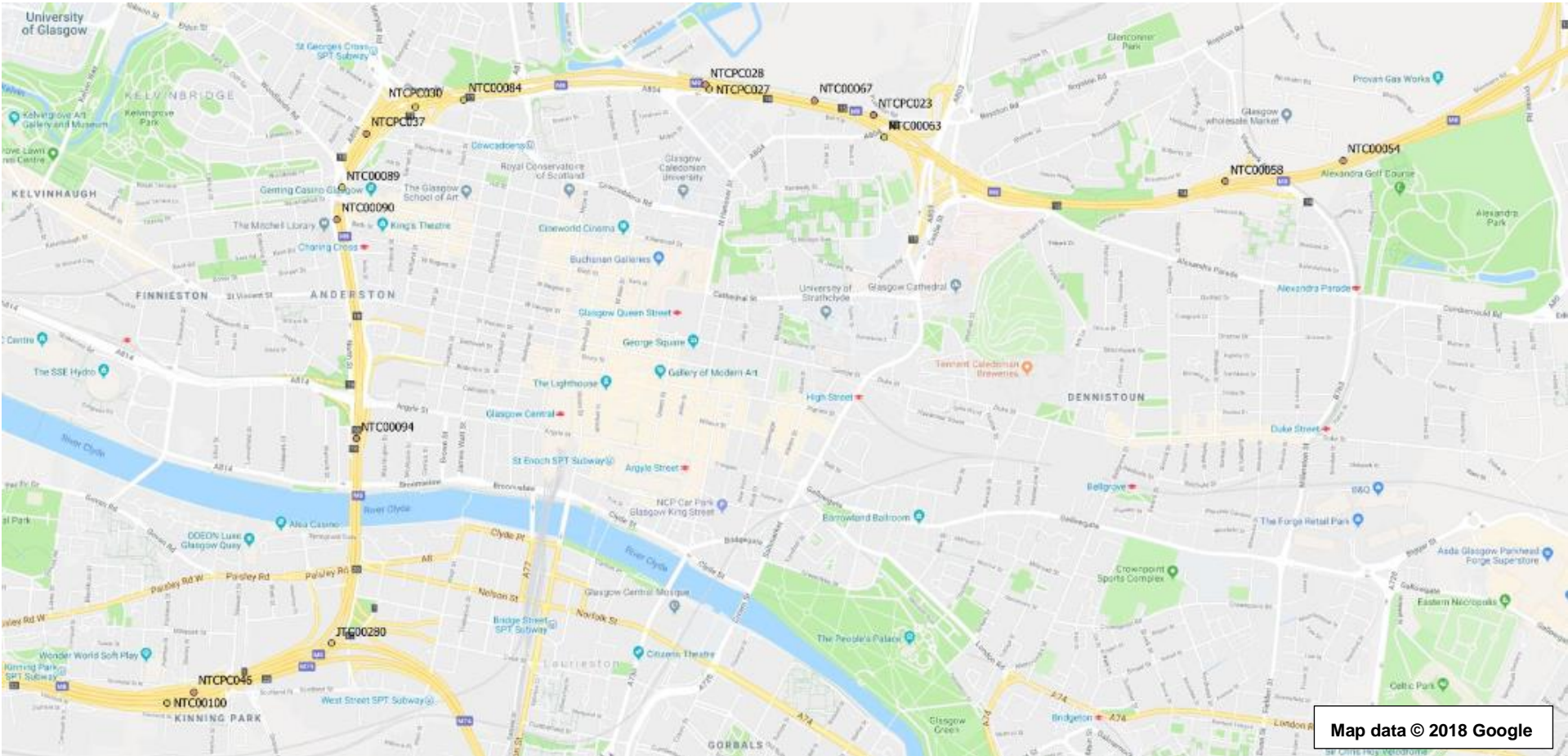


Figure A.2 – Counter Locations Central

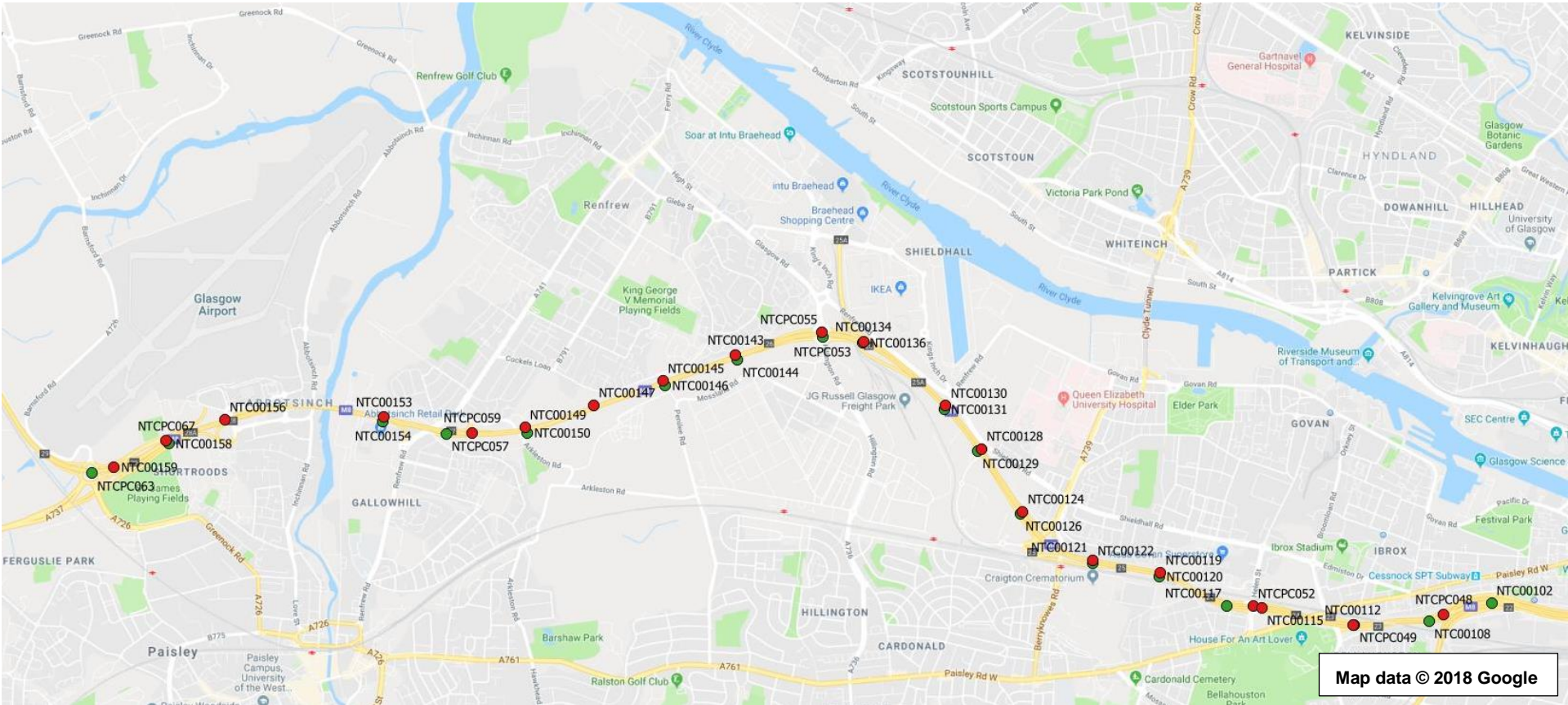


Figure A.3 – Counter Locations West



Appendix B. Counter AADTs

Table B.1 – Counter AADTs (westbound)

Counter	Location	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NTCPC001	Before junction 8 merge slip	27,750	26,287	27,441	25,495	23,373	23,424	23,957	24,731	19,125	10,380
NTC00020	Between junction 9 and 10	57,395	58,356	57,826	53,019	48,442	48,160	48,387	48,118	46,629	44,225
NTC00028	Between junction 10 and 11	55,489	55,958	56,644	51,633	46,407	46,298	46,444	46,470	44,520	43,697
NTC00038	Between junction 11 and 12	57,072	57,930	57,448	52,523	47,694	47,577	47,757	47,635	55,285	45,522
NTC00046	Between junction 12 and 13	51,050	51,510	51,732	47,006	42,808	42,516	42,275	41,968	40,738	39,982
NTC00047	Between junction 12 and 13	4,498	4,170	4,165	4,312	3,949	4,143	4,330	4,339	4,145	4,196
NTC00052	Between junction 13 and 14	57,709	59,160	57,819	56,218	55,518	55,655	56,151	54,726	54,305	55,061
NTC00060	Between junction 14 and 15	14,340	14,057	13,926	12,427	10,589	10,691	10,999	12,010	12,626	11,540
NTC00063	Middle of junction 15	67,227	67,736	66,995	62,949	60,524	61,447	61,996	60,765	59,677	61,644
NTCPC021	1 st merge slip at junction 15	9,144	9,142	8,864	8,379	9,377	9,096	9,522	9,724	9,896	10,118
NTC00064	2 nd merge slip at junction 15	5,239	5,373	5,153	5,037	5,051	5,222	5,244	5,272	5,306	5,176
NTCPC026	Junction 16 diverge slip	10,054	10,065	9,519	9,621	9,934	10,100	10,163	10,178	10,636	11,333



Counter	Location	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NTCPC027	Just after junction 16 diverge slip	40,564	46,466	44,880	43,558	42,823	43,822	43,419	42,751	42,295	42,702
NTC00084	Just before junction 17 diverge slip	12,161	11,986	11,473	10,632	10,675	10,029	7,760	7,404	7,390	7,703
NTCPC030	After both junction 17 diverge slips	27,397	26,814	26,048	24,270	20,935	20,786	18,153	18,855	19,401	19,632
NTC00089	Before junction 19 diverge slips	14,044	14,359	13,991	14,173	14,230	14,514	14,507	14,634	14,756	14,532
JTC00280	Between junction 20 and 21	62,690	71,831	68,914	68,017	63,489	64,315	64,088	65,681	64,186	60,467
NTC00100	Between junction 21 and 22	71,451	71,548	71,385	65,709	62,535	62,644	63,638	64,928	66,211	65,970
NTC00102	Just after junction 22 diverge slip	47,797	48,848	49,719	34,656	32,965	33,425	34,141	35,111	35,910	35,649
NTC00108	Just before junction 22 merge slip	32,286	41,552	41,208	35,330	33,320	33,819	34,354	35,194	36,218	35,760
NTC00110	Just after junction 23 diverge slip	51,397	0	0	59,511	64,181	67,042	59,850	0	0	0
NTC00113	Just after junction 24 diverge slip	46,589	47,483	46,367	43,826	48,282	50,821	53,138	61,902	63,519	65,508
NTC00117	Just before junction 24 merge slip	47,289	47,314	47,176	51,835	56,241	54,816	55,422	61,493	65,103	66,103
NTC00120	Between junction 24 and 25	59,229	56,761	54,600	52,703	65,322	68,209	65,634	70,953	74,050	74,886



Counter	Location	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NTC00122	Just after junction 25 diverge slip	37,680	51,749	51,030	53,376	55,666	58,030	42,559	60,997	63,903	64,270
NTC00126	Just before junction 25 merge slip	52,009	50,403	51,033	53,626	55,815	58,170	59,241	61,269	63,118	63,371
NTC00129	Between junction 25 and 25A	22,451	65,144	64,214	66,944	67,852	70,636	72,538	74,319	77,124	78,340
NTC00131	Between junction 25 and 25A, after NTC00129	62,527	62,999	62,116	64,489	65,371	68,178	69,959	71,649	74,242	75,390
NTC00136	Just after junction 26 diverge slip	43,183	42,837	42,252	43,583	44,241	45,896	47,090	47,272	48,551	49,371
NTCPC053	Middle of junction 26	47,380	44,510	45,324	46,636	46,557	49,122	50,615	52,028	52,670	54,107
NTC00144	Between junction 26 and 27	43,484	58,741	57,495	58,055	57,029	59,744	60,920	62,570	65,065	66,773
NTC00146	Between junction 26 and 27, after NTC00144	60,188	58,833	57,757	58,690	58,336	61,189	62,622	64,125	66,483	66,615
NTC00148	Between junction 26 and 27, after NTC00146	60,345	58,958	57,936	58,991	58,475	61,347	62,770	63,736	66,518	66,832
NTC00150	Between junction 26 and 27, after NTC00148	58,049	60,375	59,228	58,571	58,511	61,236	60,709	62,218	45,085	36,947
NTCPC057	Middle of junction 27	48,837	48,422	48,143	47,966	48,247	50,651	51,179	53,644	55,646	57,935



Counter	Location	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NTC00154	Between junction 27 and 28	47,957	48,029	47,642	48,255	48,554	47,896	50,218	53,638	55,708	56,545
NTC00158	Just after junction 28A diverge slip	24,863	24,513	24,780	25,207	24,292	26,076	21,184	27,816	28,976	29,375
NTCPC063	Middle of junction 29	17,768	17,857	18,180	18,674	18,323	19,278	16,895	20,659	21,530	21,815

Table B.2 – Counter AADTs (eastbound)

Counter	Location	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NTC00159	Middle of junction 29	17,193	17,282	17,624	18,295	18,513	19,253	19,237	20,191	21,045	21,411
NTCPC067	Between junction 29 and junction 28A	0	23,533	23,942	25,018	23,718	25,647	26,062	27,431	28,462	29,204
NTC00156	Between junction 28A and 28	37,225	44,733	44,675	44,708	44,799	47,422	46,133	49,608	51,227	52,087
NTC00153	Between junction 28 and 27	55,080	54,568	54,011	54,975	55,203	56,940	58,153	60,075	62,240	63,112
NTCPC059	Middle of junction 27	47,672	46,526	46,650	47,388	45,723	49,961	50,595	52,628	54,420	56,016
NTC00149	Between junction 27 and 26	57,672	57,524	57,146	56,536	57,513	60,392	61,090	63,395	65,270	64,397
NTC00147	Between junction 27 and 26, after NTC00149	58,570	56,804	57,108	58,571	58,229	61,215	62,515	64,106	65,998	66,208
NTC00145	Between junction 27	58,988	57,406	57,494	58,979	58,828	61,810	63,109	64,632	66,599	67,193

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	and 26, after NTC00147										
NTC00143	Between junction 27 and 26, after NTC00145	57,742	56,526	57,149	58,504	58,044	61,430	60,921	62,685	65,058	67,052
NTCPC055	Middle of junction 26	44,540	45,126	45,141	44,014	20,109	0	0	0	0	0
NTC00134	Just before junction 26 merge slip	44,628	45,512	45,383	46,806	47,215	50,146	51,080	51,670	53,193	54,536
NTC00130	Between junction 25A and 25	43,159	42,930	42,359	44,606	45,727	48,295	48,782	50,570	52,011	53,020
NTC00128	Between junction 25A and 25, after NTC00130	59,703	60,234	59,606	62,597	64,690	67,963	69,071	69,456	72,888	74,710
NTC00124	Just after junction 25 diverge slip	44,323	47,470	47,319	51,275	54,778	57,131	57,158	59,501	60,352	62,332
NTC00121	Between junction 25 and 24	29,509	48,231	47,979	52,104	57,391	60,396	61,752	63,201	64,908	66,091
NTC00119	Between junction 25 and 24, after NTC00121	49,057	48,452	48,264	52,991	57,731	60,534	61,769	63,069	64,644	65,795
NTCPC052	Middle of junction 24	39,871	39,455	39,878	45,108	50,609	53,508	54,799	54,070	56,865	58,345
NTC00115	Middle of junction 24	39,942	34,555	34,498	42,706	50,227	52,987	53,886	55,551	57,472	58,428
NTC00112	Just before junction 23 merge slip	16,028	15,302	15,683	23,825	28,843	31,217	32,749	34,198	34,161	36,027



NTCPC049	Just before junction 23 merge slip	29,636	30,546	30,240	29,594	28,970	29,493	30,183	31,375	30,429	31,270
NTCPC048	Just after junction 22 diverge slip	34,899	34,765	34,705	33,451	32,006	32,466	32,720	33,253	33,583	33,630
NTC00107	Middle of junction 22	34,083	34,363	34,805	33,653	32,121	32,549	32,789	33,312	33,641	33,764
NTCPC046	Between junction 21 and 20	41,915	41,213	41,603	41,191	40,857	41,593	41,273	41,779	42,168	43,087
NTC00094	Just before junction 19	4,502	0	0	0	9,693	7,739	7,639	8,579	11,957	11,324
NTC00092	Middle of junction 19	0	0	46,800	44,480	42,387	43,525	44,342	45,898	46,840	46,728
NTC00090	Between junction 19 and 18	56,616	56,920	55,778	52,013	47,572	50,185	50,720	52,773	54,040	53,178
NTCPC037	Just before junction 18 merge slip	56,308	54,882	54,590	52,427	46,337	46,271	48,453	52,202	53,978	52,101
NTCPC028	Between junction 17 and 16	66,321	70,756	69,474	65,748	61,250	62,768	63,589	64,057	65,411	64,481
NTC00067	Between junction 16 and 15	81,121	84,004	82,154	77,485	73,137	73,801	73,348	77,000	78,650	77,660

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Appendix C.