Lincoln Eastern Bypass

Forecasting Report

October 2016

Produced By

Document Control Sheet

Project Title	Lincoln Eastern Bypass
Report Title	Forecasting Report
Revision	2 0
Status	Final
Control Date	14th October 2016

Record of Issue

Issue	Status	Author	Date	Check	Date	Authorised	Date
1 0	Draft	PS	03/10/16	PR	03/10/16	PR	03/10/16
2.0	Final	PS	14/10/16	PR	14/10/16	PR	14/10/16

Distribution

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1 Introduction

1.1 Introduction

Lincoln Eastern Bypass (LEB) is proposed as a 7.5km single carriageway road linking the existing A158 Northern Relief Road to the A15 Sleaford Road to the south, running through an area of predominantly arable farmland to the east of the city and the villages of Canwick and Bracebridge Heath, and to the west of the outlying villages of North Greetwell, Cherry Willingham, Washingborough and Branston.

The road is a key element of the Lincoln Integrated Transport Strategy (LITS) designed to provide much needed relief to the congested historic core of Lincoln and to permit a range of complementary policies, also identified in LITS, on traffic management and slow modes to be introduced to the city, thereby improving traffic and environmental conditions for a wide range of road users.

1.2 Background

Mouchel has been commissioned under the Lincolnshire County Council Technical Services Partnership to produce an updated set of models, forecasting and appraisal work in support of the Best and Final Offer Business Case for the Lincoln Eastern Bypass (LEB). The proposal is for a single carriage scheme providing a highway link between the A15 to the south east of the city and the A158 Northern Relief Road to the north east of the city.

The original modelling and appraisal was prepared by Jacobs to support the first Major Scheme Business Case (MSBC) submission for the scheme at Programme Entry stage. However a subsequent assessment by the Department for Transport (DfT) highlighted a number of substantive issues relating to the quality and suitability of the modelling work.

Mouchel addressed these issues to the satisfaction of the DfT and the scheme gained Funding Approval following submissions in 2011.

Following this a number of public inquiries related to DCO and SRO were conducted. Following this Mouchel embarked on the Final Funding Submission where updates from the public inquiry were included together with the latest assumptions on values of time and growth, together with some refinements to confirm and enhance the forecast quality of the model. The work reported here refers to and builds on this previous work.

The provision of LEB is to achieve three main objectives, these are as follows:

- **Objective 1:** To support the delivery of sustainable economic growth and the Growth Point agenda within the Lincoln Policy Area (LPA) through the provision of reliable and efficient transport infrastructure.

- **Objective 2:** To improve the attractiveness and liveability of central Lincoln for residents, workers and visitors by creating a safe, attractive and accessible environment through the removal of strategic through traffic (particularly HGVs).

- **Objective 3:** To reduce congestion, carbon emissions, improve air and noise quality within the LPA, especially in the Air Quality Management Area in central Lincoln, by the removal of strategic through traffic (particularly HGVs).

1.3 Report Structure

This report describes the processing employed to review the impacts of a range of changes relevant to the final funding submission. The following topics are covered in this report:

- Chapter 2. Forecast and Appraisal Requirements;
- Chapter 3. Overview of Forecasting Requirements;
- Chapter 4. Future Year Scenarios;
- Chapter 5. Future Year Strategies;
- Chapter 6. Future Year Travel Demands;
- Chapter 7. Fixed Model Outputs;
- Chapter 8. Variable Demand Model Outputs; and
- Chapter 9. Conclusions

2 Forecasting and Appraisal Requirements

2.1 Introduction

Forecasting the usage and performance of transport networks is a critical component in any transport appraisal. The principal purpose in the development of the future year traffic forecasts is to support the continuing Lincolnshire County Council (LCC) funding bid for the LEB scheme. This chapter describes the various requirements of the forecasting and appraisal process for LEB Improvements. These include the prediction of the future year travel demands and the assumptions relating to changes in the future year highway network.

The forecasting model has been developed in accordance with guidance provided by the DfT in the TAG series of documents. As the modelling for this project has commenced some time ago the provenance of the modelling system is anchored within the guidance of the day. The model has been updated on a proportionate basis to take account of the salient elements of guidance subsequent to the initial inception of the project to arrive at the current status.

2.2 Future Year Travel Demand Scenarios

The principal requirement of the traffic model was the provision of traffic forecasts for the LEB scheme for the Opening year (2018) and Design year (2033). Future travel demands at these dates take into account the existing traffic flows together with the effects of traffic growth and the additional traffic due to new development activity.

The growth in traffic derives largely from increased incomes and reducing household sizes, and economic activity. Increasing personal income combined with reducing household size leads to an increase in car availability and car usage. The growth in economic activities leads to a redistribution of traffic and increased levels of goods vehicle journeys.

New development of residential, retail and employment land-uses in the Lincoln area will also create further demand for travelling. These factors need to be taken into account in the prediction of future travel demands in the wider Lincoln area.

There are several development schemes which are in part dependent on LEB scheme. These will be excluded from the core scenario but presented separately as part of a dependent development test. In view of the content of the 2011 business case the mechanism for this has been based on proportionate analysis.

The actual assumptions adopted in the derivation of the future travel demands for the wider Lincoln area are documented in Chapter 4.

2.3 Future Year Highway Strategy

The future year traffic models must take into account the effects of other highway or traffic management schemes that are likely to be in place by the scheme's Opening and Design year. Information in relation to future highway/traffic management

schemes was provided by Lincolnshire CC. The actual highway and traffic management schemes that have been adopted in the future year traffic models are discussed in detail in Chapter 5.

2.4 Requirements for Scheme Appraisal

A cost-benefit assessment was required to estimate the value for money provided by the proposed scheme. The chosen tool for this part of the project was TUBA (Transport User Benefit Analysis), a computer program developed for the Department for Transport (DfT) to undertake the appraisal of highway schemes and multi-modal transport studies.

The accident benefits resulting from the introduction of a proposed highway scheme formed a significant part of the cost-benefit assessment. The TUBA software estimates the economic benefits of a scheme based on zone-to-zone travel costs and therefore it cannot take into account link based accident costs. The evaluation of the benefits due to changes in accident costs was therefore performed by COBALT software.

3 Overview of Forecasting Methodology

3.1 Introduction

This chapter highlights the main features of the model structure and presents an overview of the forecasting methodology that was adopted in the preparation of the Opening and Design year forecasts.

3.2 Base Year Model Overview

Model base Year – the base year has been developed for 2006. A present year comparison against 2015 survey data has also been conducted.

Software – The 2006 base year model has been developed using the PTV VISUM (Version 15.0.0) suite of programs. Demand modelling has been conducted using CUBE (Version 6.3).

Study Area – The study area covers the urban area of Lincoln and surrounding hinterland, and broadly aligns with the Lincoln Policy Area (LPA). The study area is shown in Figure 3-1 below.

Zoning System – A zoning system aggregates geographical areas into individual blocks and so reduces the amount of detail in the model. The zoning system designed for the GLTM comprises 178 zones, of which 143 are internal zones, within the study area, and 35 are external zones.

In order to represent traffic patterns to an adequate level of detail, the zoning system in Lincoln encompasses a number of smaller sized zones. Outside the study area the zoning system is much less detailed with a smaller number of larger zones defined around major travel routes into the Greater Lincoln area.

A detailed list of zoning system, relationship between the TEMPRO sectors and the zoning system used in the traffic model is presented in Appendix A.

Modelled Time Periods – Three time periods identified from the survey data were modelled in order to replicate different trip patterns during a typical weekday. The three time periods are shown below:

- AM Peak hour (08:00 – 09:00);
- PM Peak hour (17:00 – 18:00); and
- Average Inter-Peak hour (10:00 – 16:00).

Private Vehicle Classes - Three vehicle classes have been modelled, including:

- Cars (including motor-cycles);
- Light Goods Vehicles;

- Heavy Goods Vehicles (including OGV1, OGV2 and PSV).

Modelled Highway Network – Within the study area, the modelled network includes all 'A' and 'B' class roads and most minor roads. Within Lincoln, residential roads that act as distributor routes or 'rat-runs' have also been included in the model. The network has been coded in detail to reproduce the effects of traffic queues and delays on vehicle routing patterns.

Outside the study area, a coarse network of buffer links have been defined to include all major 'A' roads; from the A1 in the west to the A153 in the east, and from the M180 in the north to the A52 south. This ensures that long distance traffic is properly routed into and around the Greater Lincoln area.

Highway Matrix Development – The process of building demand matrices following a similar process as in the earlier version of the model. However, the latest approach was more detailed and based on a comprehensive review of available data sources and their application.

Following analysis of available survey data and other data sources, the principle task included construction of the observed trip matrices, largely from the Lincoln cordon survey, and development of complementary synthetic matrices to represent the unobserved demand components. The observed and synthetic matrices were merged to form the final base year model demand matrices.

Highway Model Calibration – The calibration of the Base Year traffic models was undertaken using a standard approach where the network was adjusted to ensure that the model realistically replicated routeing and vehicle speeds through the study area. Matrix estimation was incorporated in the model calibration process in order to obtain matrices based on the routeing patterns to which the network was calibrated.

Highway Model Validation – Network validation was undertaken to establish that the network structure was accurate and that characteristics of the network are suitably represented in the model. A number of range and logic checks were undertaken, including routeing checks. Assignment validation was then undertaken for traffic flows (links and turns) and journey times.

The development of the base year traffic model and its validation against observed traffic flows and journey times are fully documented in an updated Local Model Validation Report which was submitted as part of this Final Funding Submission.

3.3 Present Year Model

In view of the age of the data inherent in the 2006 model a present year comparison for 2015 has been undertaken. The objective of this exercise was to project the model forward to a known year for which comparative survey data is available.

TEMPRO 6.2 was used to facilitate the comparison. In view of changed trip rates over the time period this growth was tempered by observed reductions in trip

making. Three screenlines of relevance to the LEB were evaluated for each modelled time period. Comparisons were also made against journey time routes.

A report entitled Present Year Comparison was produced in August 2015. The model performed positively and whilst it did not adhere the WebTAG criteria implicit for base year models this is to be expected given the introduction of additional forecast inaccuracy over a lengthy time horizon. Despite this the model was sufficiently close across key screenlines. Hence the decision was chosen to pivot subsequent from a 2015 recalibration.

3.4 Forecast Model Overview

GLTM is designed to predict the results of transport interventions under different travel scenario assumptions about the future. GLTM has a 'single tier' or 'unified' modelling architecture, which means the model exists at one level of spatial detail throughout all processes. In this form, the demand model integrates with each of the individually validated assignment model components without modifications. This approach provides the benefits of consistency, but at the expense of high model run times.

'Strategies' refer to combinations of different transport interventions, which in broad terms encompass changes in capacity, e.g. new infrastructure, operating conditions, and prices. Strategies typically include a Reference Strategy, referred to as the Do-Minimum (DM), against which to test a scheme focused Strategy, referred to as the Do-Something (DS).

'Scenarios' refer to the level, distribution and structure of population, households, employment, and car ownership, which affect car availability, as well as general economic variables such as the level of GDP and fuel prices. Scenarios combine growth information from Development Logs and TEMPRO and typically include:

- Core Scenario;
- Pessimistic Scenario; and
- Optimistic Scenario.

There are certain network changes that are Scenario dependent and therefore also have to be defined by scenario. The assumptions adopted in defining these scenarios are described in Chapter 4 of this report.

Further sensitivity test forecasts were also completed in accordance with TAG Guidance. Adopting a proportionate approach these included two sensitivity tests that deal with both national uncertainty and development uncertainty. Additionally, following agreement with the DfT in late 2015 a simplified test on development considered dependent on the implementation of LEB was also undertaken.

The general structure of the model is shown in Figure 3-2, and it can be seen that the future year modelling falls clearly into two independent parts:

- **Unconstrained Forecast** - or 'background growth', including pure changes in demand (assuming constant transport costs) brought about by external changes, e.g. effects due to land use, income, car ownership etc; and

- **Constrained Forecast** - changes brought about by the transport system, including the result of supply side constraints.

The External Forecasting Model (EFM) produces production and attraction growth factors for each purpose for the scenario being tested, and applies them to the Calibrated Segmented Base matrices, yielding a set of 'Future Base' matrices which represent the change in demand for transport on the assumption of transport costs remaining fixed. The Forecast Model is used to predict the change to these Future Base matrices, as a result of changes in generalised cost arising both from transport strategies and from the level of demand predicted in the travel scenario.

Individual's demand for travel varies by person-type. Changes in the distribution of such person-types between the base and forecast year will have repercussions on total travel demand. There is therefore a need for an interface at the 'trip generation' stage with external 'planning' data to reflect the scenario assumptions. This is the role of the EFM which combines the UK forecasts available through the TEMPRO software and local development planning data.

Given a basic demand forecast for any chosen scenario, the function of the Forecast Model is to predict the effects of a strategy. This model is postulated on the basis that any changes in the transport system can be represented by changes in the components of generalised cost (journey time, distance etc) between specific zones at specific times. Changes to capacity are deduced in the model via an appropriate modification of the supply side relationship in the assignment models (Supply Model).

After each change in generalised costs, the Demand Model is rerun and the output 'loaded' into the Supply Model where changes in generalised cost are recalculated, until convergence is reached. The final estimates can then be passed to the appraisal process.

For convenience in preparing the Forecast Model, and providing early indications of LEB performance, the highway assignment element of the Forecast Model was initially used without running the Demand Model, referred to as the Fixed Demand forecasts. These forecasts provided an opportunity to engage the DfT in advance of the actual TAG compliant forecasts including the Demand and Supply model looping, referred to as the Variable Demand forecasts. Fixed and Variable Demand forecasts were prepared for Do-Minimum and Do-Something Strategies and are both reported in this Forecasting Report.

3.5 Forecast Model Stages

The forecasting process comprised the following main stages:

- define future year travel Scenarios;
- define future year intervention Strategies;
- undertake Fixed Matrix DM and DS forecasting ;
- undertake Variable Matrix DM and DS forecasting ; and
- Reporting of Model Outputs.

Each of these stages is described in the following chapters.

Figure 3-1 – Lincoln Study Area

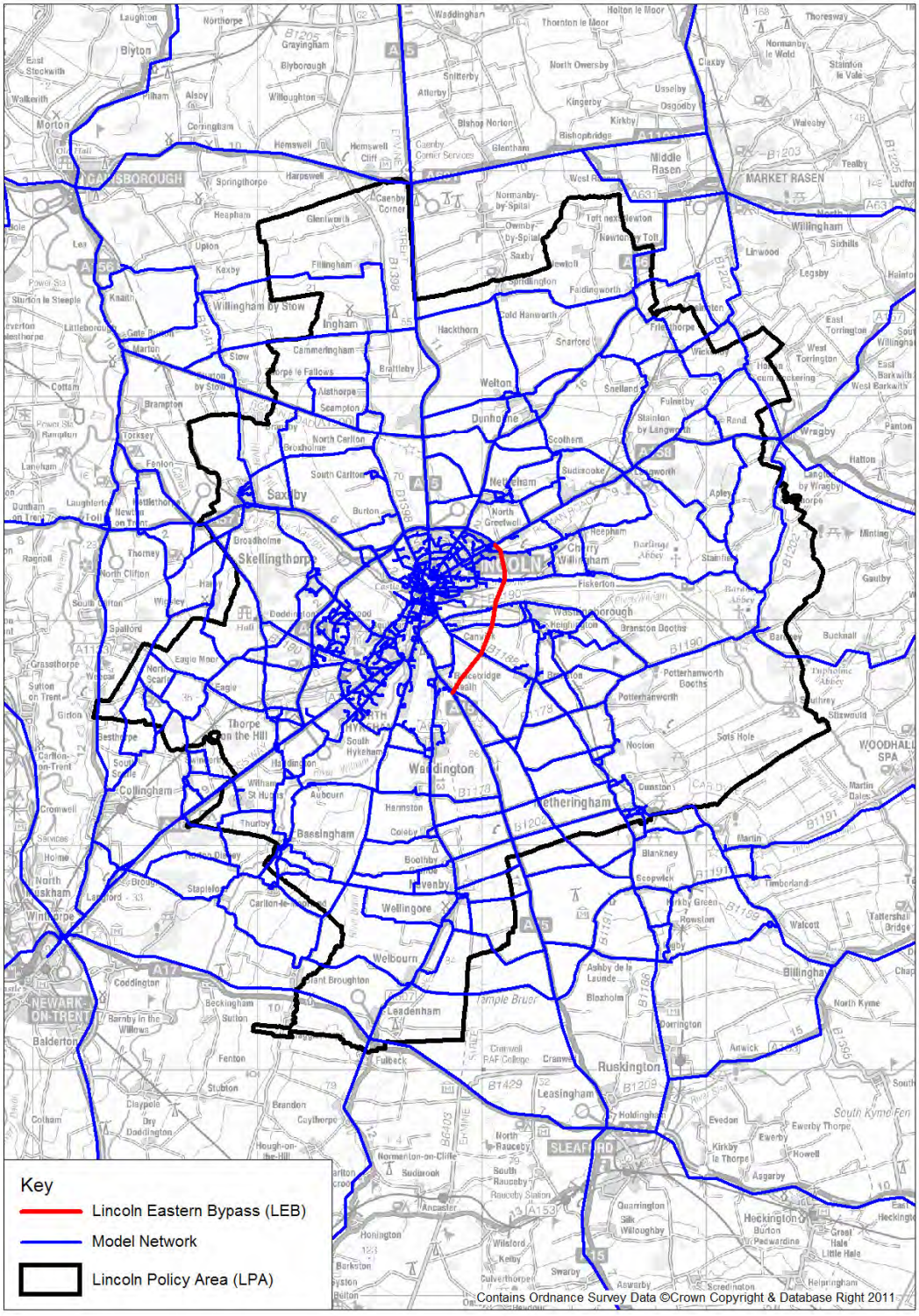
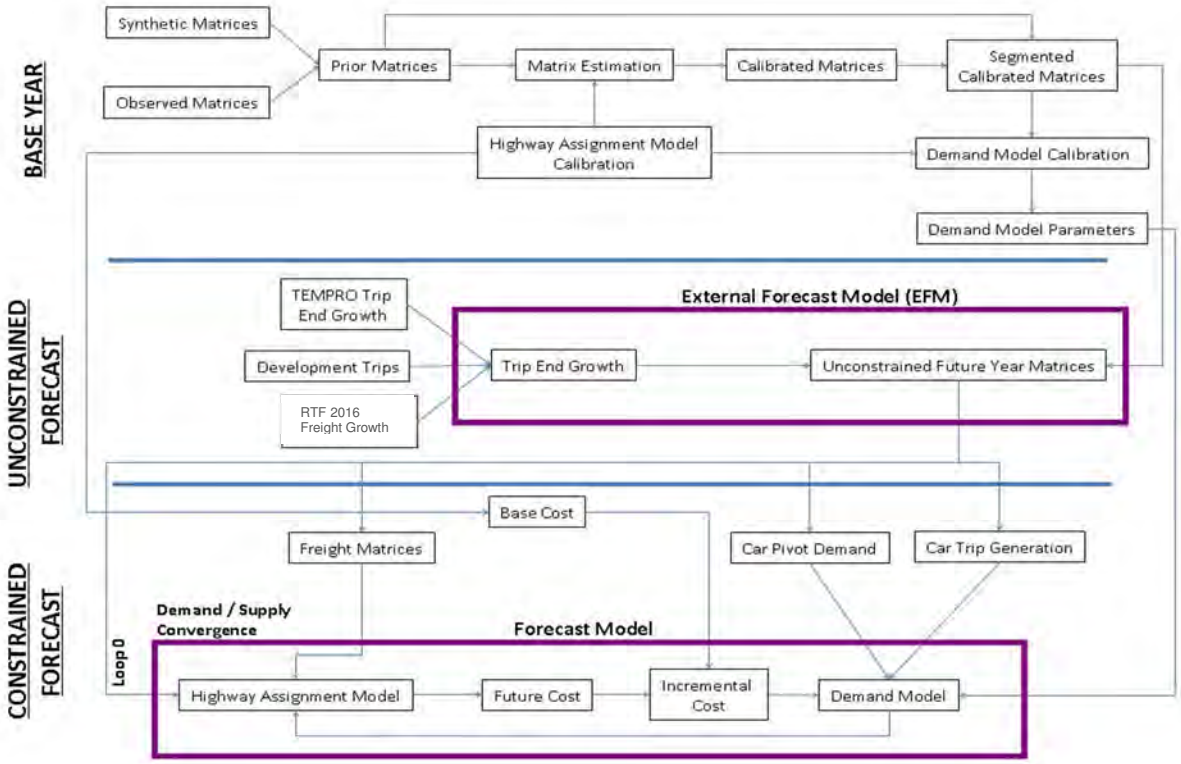


Figure 3-2 – Lincoln Study Area



4 Future Year Scenarios

4.1 Introduction

This chapter presents the assumptions adopted in the derivation of the future year forecasts for the scheme's Opening and Design years. Assumptions relating to future developments are outlined in the Development Uncertainty Log used in developing the alternative scenarios in accordance with the Department's guidance included in the Web TAG Unit M4 (November2014).

Other assumptions relating to highway network improvements and to travel cost parameters are also discussed in this chapter.

4.2 Uncertainty Log

A robust set of assumptions relating to land use and future developments within the Lincoln Policy Area were generated as part of the forecasting process for the traffic modelling programme. The land use forecasting assumptions were based on two broad key land use types, these were:

- Employment – Measured by site area (hectares); and
- Housing – Measured by number of dwellings.

A detailed development log was generated to collate all developments built, proposed or planned for the Lincoln Policy Area covering the period from 2006 through to the opening year (2018) and the future year (2033). The key developments included within the development log are detailed within Table 4-1 and include the primary development areas, individual development locations and other significant sites.

As part of the input to the development log all housing data was classified according to the broad type of residential development. The employment data was given by total site area in hectares and where sufficient detail was not available a factor was used to calculate the actual Gross Floor Area (GFA). In these instances it was recognised that total development area would not accurately represent the actual gross floor area of the site, therefore a factor of 0.35 was applied to generate a more robust representation of the development.

The specific details relating to each development were collated from the respective Transport Assessment or from the technical knowledge of Lincolnshire CC Transportation Group.

Each development detailed within the development log was assessed against the following scale:

- 90-100% = Certain/Nr Certain;
- 70-90% = More than Likely;
- 50-70% = Reasonably Foreseeable; and
- Less than 50% Certain.

Table 4-2 details the uncertainty assessment for each development within the log.

4.3 Scenario Definition

Advice provided in the Department's series of TAG documents highlights the fact that studies should test a 'core' scenario and in addition alternative scenarios should also be developed to account for future uncertainty. In response to those requirements, three scenario options were developed for forecasting, as listed below:

- Pessimistic;
- Core (or 'Most Likely' scenario); and
- Optimistic.

Each scenario option included variants of development and highway network schemes to reflect the future possibilities. Figure 4-1 outlines the assumptions feeding into the three scenarios.

Figure 4-2 present the network options for three scenarios.

The scenario generated for each development is outlined in Table 4-3.

4.4 Development Assumptions

4.4.1 North East Quadrant (NEQ)

The North East Quadrant is located adjacent to the northern section of the LEB. The site is a mixed employment and housing development split over two phases and is a key building block linked to the Lincoln's growth aspirations. The site currently has planning permission for 500 dwellings, with 150 permitted prior to the opening of the LEB. The full development, comprising a total of 2,000 residential dwellings and 5 hectares of employment land, is included in the draft Local Plan up to 2036 and is dependent on the LEB. The development has been assessed as having a 'more than likely' chance of development. However, as the majority of this scheme is dependent on the construction of the LEB, only the 150 permitted dwellings have been included in the Core and Optimistic scenarios. The remainder of the development has been included in the Development test only. Details are included in Table 4-4 and 4-5.

4.4.2 South East Quadrant (SEQ)

The South East Quadrant is a mixed use development located on the south eastern edge of the Lincoln Eastern Bypass.. The development is also included in the draft Local Plan.The SEQ proposals include 3,500 residential dwellings plus 7 hectares of employment land within the plan period up to 2036. The development has been assessed as having a 'more than likely' chance of development. However, as this development is also dependent on the delivery of the LEB it has been included in the Development test only. Details are included in Table 4-6 and 4-7.

4.4.3 Western Growth Corridor (WGC)

The Western Growth Corridor is a mixed use development to the west of Lincoln. The development proposals include 3,200 residential dwelling, plus 11 hectares of employment land, with in the plan period up to 2036. The development has been assessed as having a 'more than likely' chance of development. Therefore the development has been added to the Core and Optimistic scenarios. Details are included in Table 4-8 and 4-9.

4.4.4 South West Quadrant (SWQ)

The South West Quadrant is a mixed use development located to the south west of Lincoln. The development proposals include 1,600 residential dwellings, plus 5 hectares of employment land, within the plan period up to 2036. The development has been assessed as having a 'more than likely' chance of development. Therefore the development has been added to the Core and Optimistic scenarios. Details are included in Table 4-10 and 4-11.

4.4.5 Remaining Developments

The forthcoming Local Plan includes a number of sites which are allocated primarily for residential development. The information in the Local Plan has been reviewed to identify sites with a capacity of over 100 dwellings and which were considered close enough to the scheme to be impacted on. The residential developments included in the development log are summarised in Table 4-1. Several of these developments are currently under construction and are thus classified as 'near certain'. These developments are included in the Pessimistic, Core and Optimistic scenarios. The remaining developments have been assessed as 'more than likely' and have been included in the Core and Optimistic scenarios.

In addition to the residential development the outstanding elements of phases 1 and 2 Teal Park employment development have been included in the development log. This development has planning permission and has been assessed of having a 'near certain' chance of development. It is included in the Pessimistic, Core and Optimistic scenarios. This is detailed in Table 4-12.

The proposed Local Plan considers the period up to 2036 whereas the Design Year of the LEB is 2033. The full quantum of development included in the Local Plan is thus not expected to be complete by the 2033 design year. As a result a factor of 0.75 has been applied to the trip generation of the developments included in the

Design year only to account for elements that would not be occupied until after 2033. The full quantum of development has been included in the Optimistic scenario.

4.5 Development Trip Generation

Trip generation numbers for the NEQ, SEQ, SWQ and WGC developments have been taken from the latest information provided by the relevant scheme promotor.

For the remaining developments trip rates were calculated using the TRICS software package. The TRICS software package is a database of observed arrivals and departures for a variety of sites and land use types across the UK, and is used to estimate trip generation for proposed developments. All developments contained within the development log were classified into the TRICS land uses and their respective trip rates generated using the TRICS software. All housing was classified as privately owned households. The different land uses within the employment were treated separately and then combined to generate a total number of trips arriving/leaving at each site. The trip rates for each element of the development log is summarised in Table 4-13 below.

4.6 Sensitivity Tests

In accordance with advice provided in TAG Unit M4 sensitivity tests were developed to test the uncertainty regarding future growth.

This relies on the proportion of base year demand added to the demand from the core scenario.

Section 4.2 provides the guidelines on how to derive the test demands as described below:

- *for 1 year after the base year, proportion p of base year demand added to the core scenario;*
- *for 36 or more years after the base year, proportion 6*p of base year demand added to the core scenario;*
- *between 1 and 36 years after the base year, the proportion of base year demand should rise from p to 6*p in proportion with the square root of the years. (So, for example, 16 years after the base year the proportion is 4*p).*

  For highway demand at the national level, the value of p is 2.5%, reflecting uncertainty around annual forecasts from the National Transport Model (NTM), based on the macro-economic variables that influence the main drivers of travel demand.

Hence the high and low alternatives are presented below as:

- Low Growth: 1 - 2.5% * √(Future Year – Base Year); and
- High Growth: 1 + 2.5% * √(Future Year – Base Year)

The resulting growth factors that were applied to the Core scenario matrices are presented in Table 4.14.

4.7 Future Cost Parameters

The formulation of the generalised cost was based on the latest values of time and operating costs provided in the TAG databook of November 2015. Tables 4-15 presents the cost parameters adopted for this study for the Base year, the opening and the design year respectively.

Generalised Cost = Time + (PPK / PPM) x Distance

Where:

PPK = Distance related cost in pence per Kilometre
PPM = Time related cost in pence per minute

Table 4-1 – Developments included within the Development Log

Development Name	Description	Development / Network Change	Land Use Type
NEQ	2,000 residential dwellings + 5 hectares B1 / B2 / B8 employment development	Development	Employment/ Housing
SEQ	3,500 residential dwellings + 7 hectares B1 / B2 / B8 employment development	Development	Employment/ Housing
WGC	3,200 residential dwellings + 11 hectares B1 / B2 / B8 employment development	Development	Employment/ Housing
SWQ	1,600 residential dwellings + 5 hectares B1 / B2 / B8 employment development	Development	Employment/ Housing
Teal Park	Phase 1/2: B1, B2, B8, hotel/PH, restaurant, trade counters, showrooms, leisure.	Development	Employment
Clasketgate one-way	Highway improvement scheme,	Network Change	Network Change
Beaumont Fee one-way	Highway improvement scheme	Network Change	Network Change
High Street environment improvement	Highway improvement scheme	Network Change	Network Change
Wigford way single carriageway	Highway improvement scheme	Network Change	Network Change
East West Link Phase 1/2/3	Highway improvement scheme	Network Change	Network Change
Land to North of Station Road, Waddington (former Brick Pits site)	163 residential dwellings	Development	Housing
Mill Lane / Newark Road, North Hykeham	228 residential dwellings	Development	Housing
LF 2/3 Land off Wolsey Way	328 residential dwellings	Development	Housing
Former Lincoln Castings Site A, Plot 1, Station Road, North Hykeham	310 residential dwellings	Development	Housing
Former Cegb Power Station, Spa Road, Lincoln, LN2 5TB	300 residential dwellings	Development	Housing
Former Main Hospital Complex, St Anne's Road, Lincoln	126 residential dwellings	Development	Housing
Land North of Ermine West	250 residential dwellings	Development	Housing
Land to rear of 283-335 Newark Road	150 residential dwellings	Development	Housing

Development Name	Description	Development / Network Change	Land Use Type
St John's former hospital, bracebridge heath,	176 residential dwellings	Development	Housing
Land South of Bracebridge Heath	241 residential dwellings	Development	Housing
Land at Silver Street, Branston	198 residential dwellings	Development	Housing
Land East of Thornton Way, Cherry Willingham	200 residential dwellings	Development	Housing
Land at Rudgard Avenue, Cherry Willingham	133 residential dwellings	Development	Housing
Land West of Grantham Road, Waddington	187 residential dwellings	Development	Housing
Grantham Road, Waddington	142 residential dwellings	Development	Housing
Land east of Canterbury Drive, Washingborough	185 residential dwellings	Development	Housing

Table 4-2 – Planning Assumptions Uncertainty Log

Name	Description	Development / Network Change	Current Planning Status	Land Use Type	Size (ha)	Size (units)	Site Open Date	Certainty Log
NEQ	2,000 residential dwellings + 5 hectares B1 / B2 / B8 employment development	Development	Included in Proposed Local Plan – dependent on LEB	Employment/ Housing	82.94	2,000	2018	More than Likely
SEQ	3,500 residential dwellings + 7 hectares B1 / B2 / B8 employment development	Development	Included in Proposed Local Plan – dependent on LEB	Employment/ Housing	463.46	3,500	2033	More than Likely
WGC	3,200 residential dwellings + 11 hectares B1 / B2 / B8 employment development	Development	Included in Proposed Local Plan	Employment/ Housing	390.70	3,200	2033	More than Likely
SWQ	1,600 residential dwellings + 5 hectares B1 / B2 / B8 employment development	Development	Included in Proposed Local Plan	Employment/ Housing	133.52	1,600	2033	More than Likely
Teal Park	Phase 1/2: B1, B2, B8, hotel/PH, restaurant, trade counters, showrooms, leisure.	Development	Under Construction	Employment	36		2018	Near Certain
Land to North of Station Road, Waddington (former Brick Pits site)	163 residential dwellings	Development	Under Construction	Housing	13.3	162	2018	Near Certain
Mill Lane / Newark Road, North Hykeham	228 residential dwellings	Development	Under Construction	Housing	33.97	228	2018	Near Certain
LF 2/3 Land off Wolsey Way	328 residential dwellings	Development	Under Construction	Housing	16.41	328	2018	Near Certain

Name	Description	Development / Network Change	Current Planning Status	Land Use Type	Size (ha)	Size (units)	Site Open Date	Certainty Log
Former Lincoln Castings Site A, Plot 1, Station Road, North Hykeham	310 residential dwellings	Development	Under Construction	Housing	10.44	310	2018	Near Certain
Former Cegb Power Station, Spa Road, Lincoln, LN2 5TB	300 residential dwellings	Development	Included in Proposed Local Plan	Housing	5.71	300	2033	More than Likely
Former Main Hospital Complex, St Anne's Road, Lincoln	126 residential dwellings	Development	Included in Proposed Local Plan	Housing	4.2	126	2033	More than Likely
Land North of Ermine West	250 residential dwellings	Development	Included in Proposed Local Plan	Housing	13.52	250	2033	More than Likely
Land to rear of 283-335 Newark Road	150 residential dwellings	Development	Included in Proposed Local Plan	Housing	1.14	150	2033	More than Likely
St John's former hospital, bracebridge heath,	176 residential dwellings	Development	Included in Proposed Local Plan	Housing	6.93	176	2033	More than Likely
Land South of Bracebridge Heath	241 residential dwellings	Development	Included in Proposed Local Plan	Housing	13.46	241	2033	More than Likely
Land at Silver Street, Branston	198 residential dwellings	Development	Included in Proposed Local Plan	Housing	10.93	198	2033	More than Likely
Land East of Thornton Way, Cherry Willingham	200 residential dwellings	Development	Included in Proposed Local Plan	Housing	8.87	200	2033	More than Likely
Land at Rudgard Avenue, Cherry Willingham	133 residential dwellings	Development	Included in Proposed Local Plan	Housing	5.93	133	2033	More than Likely
Land West of Grantham Road, Waddington	187 residential dwellings	Development	Included in Proposed Local Plan	Housing	6.22	187	2033	More than Likely

Name	Description	Development / Network Change	Current Planning Status	Land Use Type	Size (ha)	Size (units)	Site Open Date	Certainty Log
Grantham Road, Waddington	142 residential dwellings	Development	Included in Proposed Local Plan	Housing	9.39	142	2033	More than Likely
Land east of Canterbury Drive, Washingborough	185 residential dwellings	Development	Included in Proposed Local Plan	Housing	8.28	185	2033	More than Likely

Table 4-3 – Development Scenarios

Development Title	UEA	Land Use Type	Site Open Date	LEB Do Min/ LEB	Pessimistic Scenario	Core Scenario	Optimistic Scenario	Development Scenario
NEQ Phase 1	CL818	Employment/ Housing	2018	LEB	Pessimistic	Core	Optimistic	Development
NEQ Phase 2	CL818	Employment/ Housing	2033	LEB				Development
SEQ	CL428	Employment/ Housing	2033	LEB				Development
WGC	CL819	Employment/ Housing	2033	Do Minimum		Core	Optimistic	Development
SWQ	CL4668	Employment/ Housing	2033	Do Minimum		Core	Optimistic	Development
Teal Park	E1	Employment	2018	Do Minimum	Pessimistic	Core	Optimistic	Development
Land to North of Station Road, Waddington (former Brick Pits site)	CL1068	Housing	2018	Do Minimum	Pessimistic	Core	Optimistic	Development

Development Title	UEA	Land Use Type	Site Open Date	LEB Do Min/ LEB	Pessimistic Scenario	Core Scenario	Optimistic Scenario	Development Scenario
Mill Lane / Newark Road, North Hykeham	CL1113	Housing	2018	Do Minimum	Pessimistic	Core	Optimistic	Development
LF 2/3 Land off Wolsey Way	CL1687	Housing	2018	Do Minimum	Pessimistic	Core	Optimistic	Development
Former Lincoln Castings Site A, Plot 1, Station Road, North Hykeham	CL2098	Housing	2018	Do Minimum	Pessimistic	Core	Optimistic	Development
Former Cegb Power Station, Spa Road, Lincoln, LN2 5TB	CL525	Housing	2033	Do Minimum		Core	Optimistic	Development
Former Main Hospital Complex, St Anne's Road, Lincoln	CL526	Housing	2033	Do Minimum		Core	Optimistic	Development
Land North of Ermine West	CL532	Housing	2033	Do Minimum		Core	Optimistic	Development
Land to rear of 283-335 Newark Road	CL704	Housing	2033	Do Minimum		Core	Optimistic	Development
St John's former hospital, Bracebridge Heath,	CL248	Housing	2033	Do Minimum		Core	Optimistic	Development
Land South of Bracebridge Heath	CL415	Housing	2033	Do Minimum		Core	Optimistic	Development
Land at Silver Street, Branston	CL418	Housing	2033	Do Minimum		Core	Optimistic	Development
Land East of Thornton Way, Cherry Willingham	CL1181	Housing	2033	Do Minimum		Core	Optimistic	Development

Development Title	UEA	Land Use Type	Site Open Date	LEB Do Min/ LEB	Pessimistic Scenario	Core Scenario	Optimistic Scenario	Development Scenario
Land at Rudgard Avenue, Cherry Willingham	CL1179	Housing	2033	Do Minimum		Core	Optimistic	Development
Land West of Grantham Road, Waddington	CL1061	Housing	2033	Do Minimum		Core	Optimistic	Development
Grantham Road, Waddington	CL4496	Housing	2033	Do Minimum		Core	Optimistic	Development
Land east of Canterbury Drive, Washingborough	CL4469	Housing	2033	Do Minimum		Core	Optimistic	Development

Table 4-4 – NEQ Household Assumptions

Forecast Year	Scenario – Housing Units			
	Pessimistic	Core	Optimistic	Development
2018	150	150	150	150
2033	150	150	150	2,000

Table 4-5 – NEQ Employment Assumptions

Forecast Year	Total Site Area (Ha)	Scenario – Site Area Developed			
		Pessimistic	Core	Optimistic	Development
2018	5	-	-	-	-
2033	5	-	-	-	5

Table 4-6 – SEQ Household Assumptions

Forecast Year	Scenario – Housing Units			
	Pessimistic	Core	Optimistic	Development
2018	-	-	-	-
2033	-	-	-	3,500

Table 4-7 – SEQ Employment Assumptions

Forecast Year	Total Site Area (Ha)	Scenario – Employment Areas (Ha)			
		Pessimistic	Core	Optimistic	Development
2018	7	-	-	-	-
2033	7	-	-	-	7

Table 4-8 – WGC Household Assumptions

Forecast Year	Scenario – Housing Units			
	Pessimistic	Core	Optimistic	Development
2018	-	-	-	-
2033	-	2,400	3,200	3,200

Table 4-9 – WGC Employment Assumptions

Forecast Year	Total Site Area (Ha)	Scenario – Employment Areas (Ha)			
		Pessimistic	Core	Optimistic	Development
2018	4	-	-	-	-
2033	4	-	3	4	4

Table 4-10 – SWQ Household Assumptions

Forecast Year	Scenario – Housing Units			
	Pessimistic	Core	Optimistic	Development
2018	-	-	-	-
2033	-	1,200	1,600	1,600

Table 4-11 – SWQ Employment Assumptions

Forecast Year	Total Site Area (Ha)	Scenario – Employment Areas (Ha)			
		Pessimistic	Core	Optimistic	Development
2018	5	-	-	-	-
2033	5	-	3.75	5	5

Table 4-12 – Teal Park Employment Assumptions

Forecast Year	Scenario – Employment Areas (Total GFA)		
	Total Site Area (Ha)	Total GFA (m^2)	All Scenarios
2018	4.2	41,940	Phase 1/2: B1, B2, B8 (Siemens) 21140sqm, 6500sqm hotel, public house, restaurant, 14300 sqm trade counters, showrooms, leisure.

Table 4-13 – TRICS Generated Trip Rates

Development	Land Classification	Unit	AM		IP		PM	
			In	Out	In	Out	In	Out
Teal Park	B1	trip/100 sqm	1.703	0.302	0.589	0.654	0.202	1.323
	B2	trip/100 sqm	0.888	0.413	0.557	0.573	0.227	0.730
	B8	trip/100 sqm	0.083	0.056	0.040	0.041	0.010	0.058
	06 A - Hotel	trip/room	0.127	0.209	0.092	0.097	0.158	0.098
	Trade Show Rooms	trip/100 sqm	1.58	0.78	-	-	6.19	3.6
	Leisure	trip/100 sqm	0.74	0.74	-	-	2.85	2.1
	Public House	trip/100 sqm	1.99	2.69	-	-	6.19	3.6
Residential Developments	C3 Residential	trip/dwell	0.157	0.427	0.194	0.186	0.393	0.237

Table 4-14 – Sensitivity Tests – Growth Factors

Future Year	Percentage Adjustment Factor	Low Adjustment (% of base demand)	High Adjustment (% of base demand)
2018	7.9	0.913	1.087
2033	13	0.87	1.130

Table 4-15 – General Cost Parameters – Present Year and Forecasting Year

Vehicle Type	Purpose	2015		2018		2033	
		ppm	ppk	ppm	ppk	ppm	ppk
Car	Work	21.25	46.25	22.51	46.82	30.07	55.44
Car	Commute	20.96	13.56	22.21	13.15	29.67	13.42
Car	Other	13.54	6.51	14.32	6.00	18.94	5.57
LGV	All	18.25	6.51	19.20	6.00	24.75	5.57
HGV	All	45.76	12.91	48.40	12.46	64.15	11.94

Figure 4-1 – Demand Scenarios

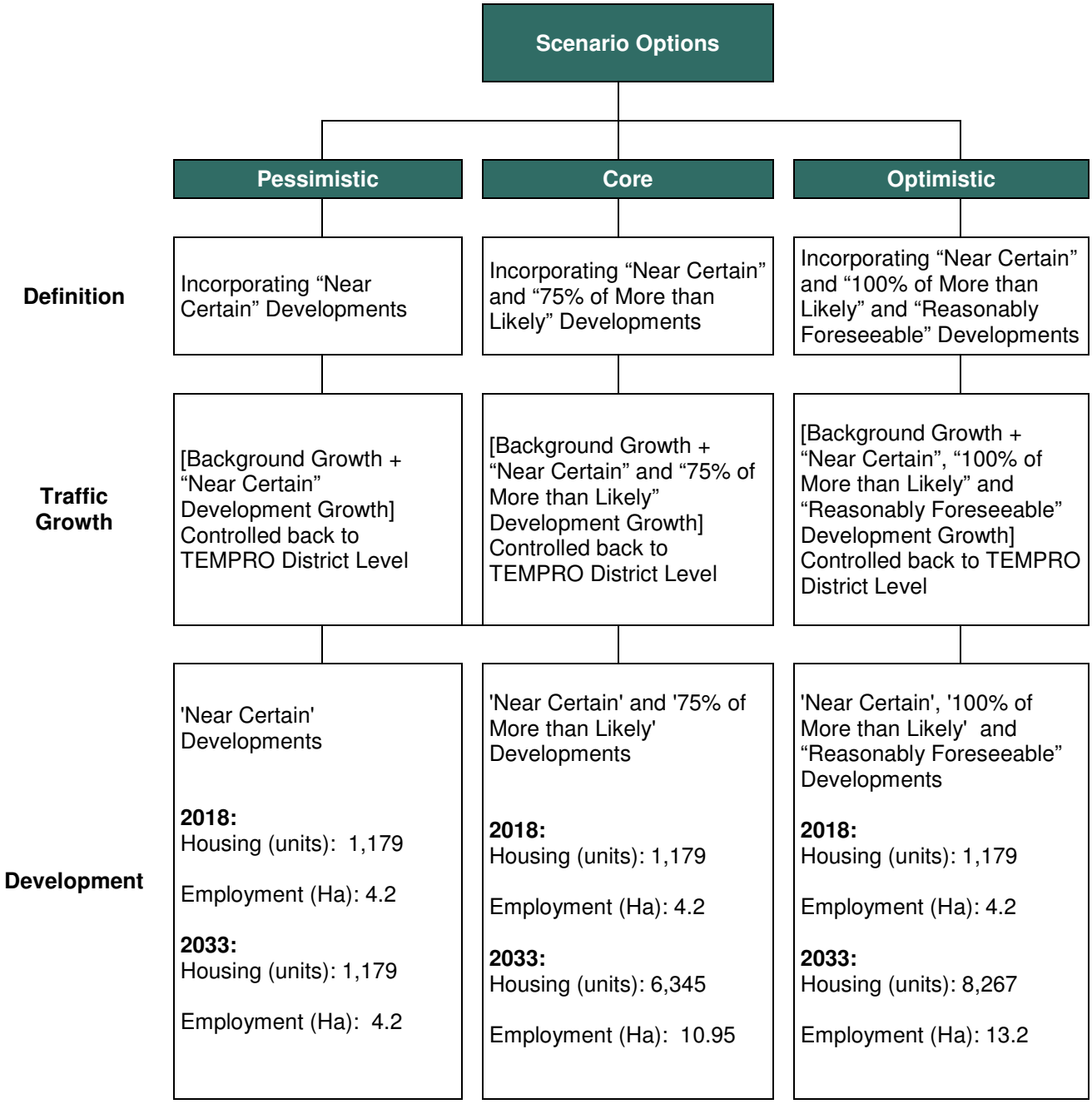
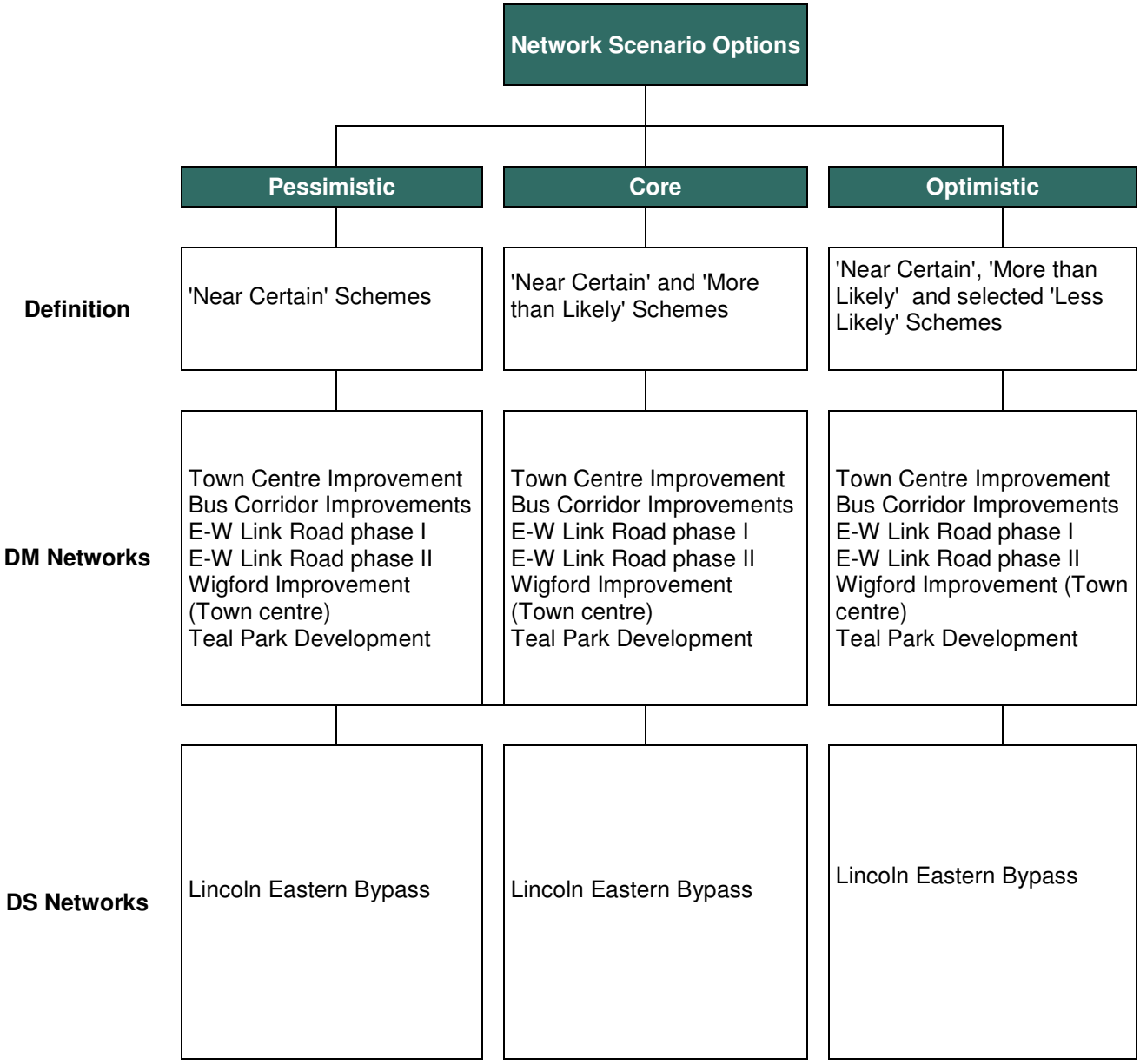


Figure 4-2 – Network Scenarios



5 Future Year Strategies

5.1 Introduction

This chapter of the report describes the development of the future year highway network models. These include the initial Do-Minimum (or Without-Intervention case) networks and subsequent Do-Something (or With-Intervention case) networks for both Opening (2018) and Design (2033) Year.

These future year networks were developed from the base year networks by coding in proposed highway improvement schemes, based on the information obtained from LCC.

In summary, the two networks considered in this report are:

1. Do-Minimum (DM) – The validated base Lincoln road network 2006, plus DM schemes coded.

2. Do-Something (DS) – The DM networks plus Lincoln Eastern By-pass.

The following section explains this network development process.

5.2 Do-Minimum Networks

5.2.1 Major DM highway scheme

The following changes have been made to the validated base networks

- Two-way flow Clasketgate B1308 from Broadgate A15 to West Parade is changed to one-way flow Westbound only. The extra space is reserved for parking.

- Two-way flow Beaumont Fee from West Parade to A57 is changed to one-way flow Southbound only.

- Bus priority corridor along High Street (from A15 roundabout St Catherines to Portland St) plus a number of changes in number of lane and parking slots.

- Changes in road layout along Wigford Way (High St to A57) to become a single carriageway.

- East West Link (phase 1 and 2): the scheme involves changes with new link from High St to A15 including few new roundabout signalized junctions, closure of High Street section from Tentercroft to A57 St Mary.

The DM network is included as Figure 5.1.

5.3 Do-Something Networks

5.3.1 Lincoln Eastern Bypass

The LEB (DS) network combines the Do Minimum network and the Preferred LEB single carriageway option (including any of its associated junctions). This route, shown in , is summarised below:

- Start Point – junction of A158 Wragby Road E/Bunkers Hill/Western bypass
- End Point – junction of A15 Sleaford Road
- Carriageway Type – Single carriageway TD9
- Carriageway Characteristics – 3.65 wide, 1m hard strip, 2.5m grass verge
- Length – 7.6km
- Junctions at – Greetwell Road; B1190 Washingborough Road; B1188 Lincoln Road
- Junction Type – 'at-grade' roundabouts
- Speed Limit on mainline carriageway and junction approaches – 50mph
- Speed Limit on side roads approaching LEB junction – 30mph

5.4 Network Checks

There are several checks with the networks. These include

- Checks on the distance;
- Checks on capacity of link and turns;
- Checks on free flow speed and speed limit; and
- Select link analyses on DM and DS network (with pure TEMRPO growth atrices)

These checks are carried out to ensure the forecasting network is fit-for-purpose.

Figure 5-1 – DM networks

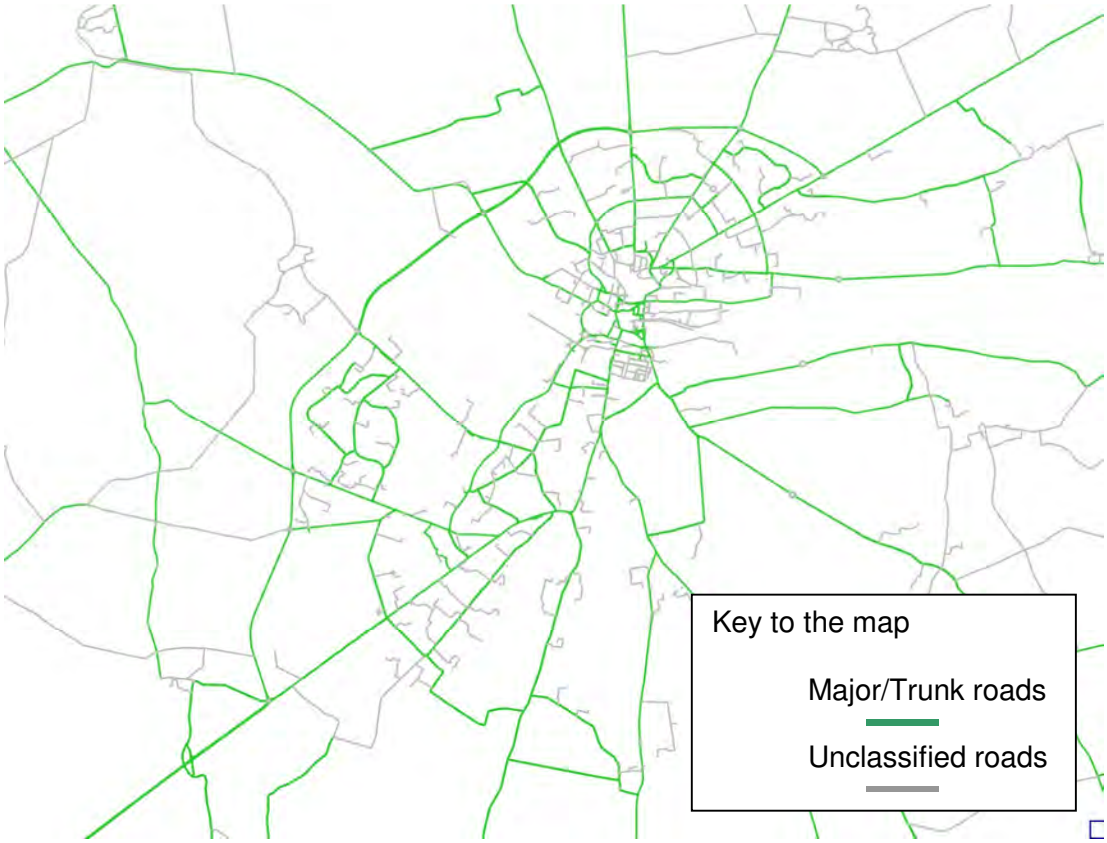
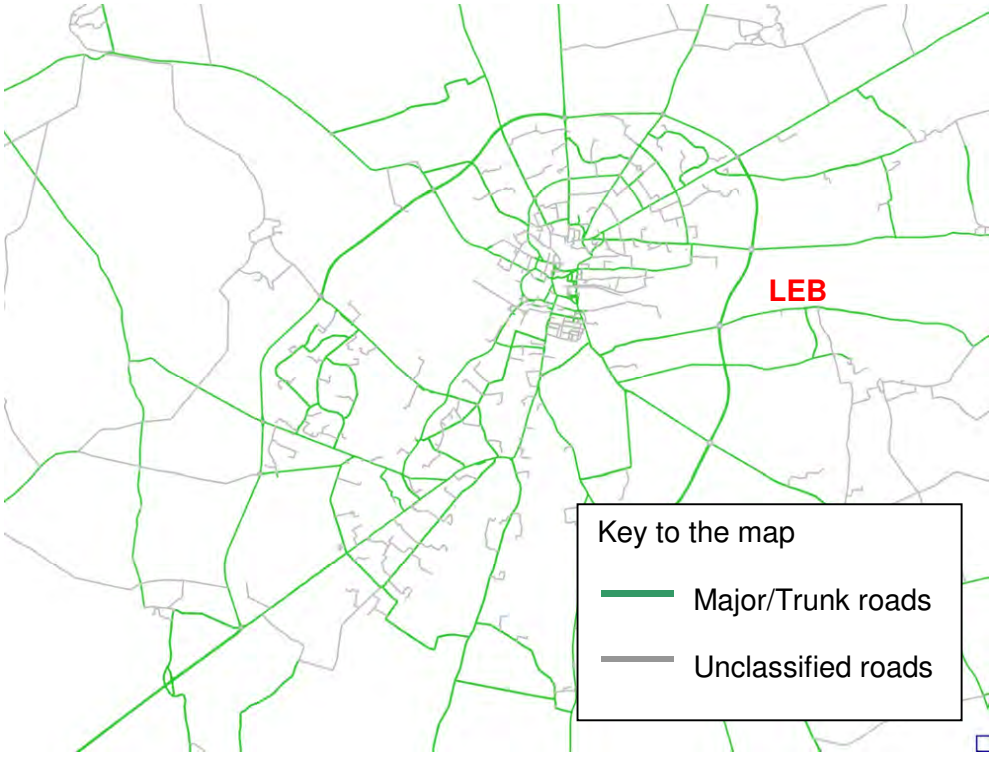


Figure 5-2 – LEB Do-Something Network



6 Future Year Travel Demands

6.1 Introduction

Detailed guidance on the forecasting process using transport models and the derivation of future year travel demands using growth factors is given in TAG unit M4.

Figure 3.2 above provides a summary of the Forecasting Process and shows the Base Model Calibration and External Forecasting Model (EFM). The processes involved in creating the Forecast model output matrices are discussed in this section. This follows distinct stages of:

- calibrate the base matrices and produce the Calibrated Segmented Matrices;
- build Development Matrices;
- control to TEMPRO; and
- output the Future Calibrated Segmented Matrices.

6.2 Matrix Segmentation

Matrix processing is undertaken at a level of traveller segmentation that allows correlation to land use to be maintained and different characteristics of travellers to be forecast. The segmentation is derived from the Prior Matrices, which are built from observed and synthetic data and include the following traveller segmentation.

Table 6-1 – Modelled Journey Purposes

Trip Purpose	Segment		Modelled Approach
	Short name	Long name	
1	HBW	Home Based Work	PA
2	HBO	Home Based Other	PA
3	HBEB	Home Based Employers Business	PA
4	NHBEB	Non Home Based Employers Business	OD
5	NHBO	Non Home Based Employers Business	OD
6	LGV	Light Goods Vehicle	OD
7	OGV	Other Goods Vehicles	OD

Table 6-2 – Modelled Hours

Period	Description	Timing	Modelled Approach
1	AM pre-peak	0700-0759	Expansion from peak hour based on 2006 data
2	AM peak	0800-0859	Peak hour assignment & demand model
3	AM post-peak	0900-0959	Expansion from peak hour based on 2006 data
4	Inter Peak	1000-1559	Average hour assignment & demand model
5	PM pre-peak	1600-1659	Expansion from peak hour based on 2006 data

6	PM peak	1700-1759	Peak hour assignment & demand model
7	PM post-peak	1800-1859	Expansion from peak hour based on 2006 data
8	Off Peak	1900-0659	Expansion from inter peak based on 2006 data

The purposes and direction are aggregated to the following Flow Groups, or User Classes, for use in the Highway Assignment Model (HAM).

Table 6-3 – Assignment User Classes

Class	Description	Composition
1	Commute	HBW
2	Other	HBE, HBO, NHBO
3	Employers Business	EB, NHBEB
4	LGV	LGV
5	OGV	OGV

6.3 Future Year Matrix Development

Base matrix calibration uses the Flow Group aggregated matrices as the starting Prior Matrices for each of the three one hour assignment periods, indicated above. This process is documented in the Local Model Validation Report (LMVR) and includes the use of Matrix Estimation (ME). The ME process applies changes to specific cells within the Prior Matrices to produce the Calibrated Matrices. The ME output Calibrated Matrices represent the start of the preparation of future year travel matrices.

Following the completion of the ME process the ME change factors are applied back to the fully segmented Prior Matrices to produce the 2006 Base Calibrated Segmented Matrices.

The assignment process also includes converting between the Person units of travel held in the Prior Matrices to Vehicle units required for the HAM. This involves using Traveller Occupancy developed from observed and synthetic data to the full level of segmentation.

Using occupancy at this level of detail helps ensure that matrix accuracy can be largely maintained during the transition between Person and Vehicle units.

6.4 Development Matrices

The next stage in preparing the future matrices was to convert the Uncertainty Log information into the Development Matrices. The Uncertainty Log provides development information for the three peak assignment periods by Vehicle. As discussed previously there are two future years of 2016 and 2031, and four main travel Scenarios including:

Table 6-4 – Development Site Vehicle Trip Totals by Location, Year, Certainty

Description	Land Use	Units/Ha	Year	Certainty	Scenario	Vehicle Trips						
						AM Orig	AM Dest	IP Orig	IP Dest	PM Orig	PM Dest	Zone
Former Cegb Power Station, Spa Road	Residential	300	2018	MTL	Core	64	24	28	29	36	59	20
LF 2/3 Land off Wolsey Way	Residential	328	2018	NC	Core	140	51	61	64	78	129	9
Land to N of Station Road, Waddington	Residential	163	2018	NC	Core	70	26	30	32	39	64	87
Lincoln Castings Site A, N Hykeham	Residential	310	2018	NC	Core	132	49	58	60	73	122	91
Mill Lane / Newark Road, N Hykeham	Residential	228	2018	NC	Core	97	36	42	44	54	90	92
			SUM	NC	Core	440	162	191	200	244	404	
Land North of Ermine West	Residential	250	2033	MTL	Core	53	20	23	24	30	49	4
Former Main Hospital Complex, Lincoln	Residential	126	2033	MTL	Core	27	10	12	12	15	25	16
Land to rear of 283-335 Newark Road	Residential	150	2033	MTL	Core	32	12	14	15	18	29	73
Land E of Canterbury Drive, Washboro'	Residential	185	2033	MTL	Core	39	15	17	18	22	36	78
Land at Silver Street, Branston	Residential	198	2033	MTL	Core	42	16	18	19	23	39	80
Land South of Bracebridge Heath	Residential	241	2033	MTL	Core	51	19	22	23	29	47	84
Grantham Road, Waddington	Residential	142	2033	MTL	Core	30	11	13	14	17	28	86
Land W. of Grantham Rd, Waddington	Residential	187	2033	MTL	Core	40	15	17	18	22	37	88
SWQ (Grange Farm)	Mixed-Use	1600	2033	MTL	Core	600	293	261	335	334	551	92
Land E. of Thornton Way, Cherry W	Residential	200	2033	MTL	Core	43	16	19	19	24	39	105
Land at Rudgard Avenue, Cherry W	Residential	133	2033	MTL	Core	28	10	12	13	16	26	105
NEQ Residential	Residential	150	2033	MTL	Core	59	16	25	26	29	51	156
WGC Residential	Residential	3200	2033	MTL	Core	1113	334	448	462	489	832	162
WGC Employment	Employment	4ha	2033	MTL	Core	135	307	146	148	299	156	162
			SUM	MTL	Core	2294	1091	1049	1147	1365	1946	

- Core Scenario;
- TEMPRO 7 scenario
- Pessimistic; and
- Optimistic

Table 6.4 provides a summary of the trips for each Scenario and Year and includes whether the development is part of the Urban Expansion Areas (UEAs) or not.

The next stage was to add the zone number associated with each development and identify the different types of land use within the development. Two principle types of land were included in the Uncertainty Log of:

- E – Employment; and
- R – Residential.

The development in / out trips needed converting to full traveller segmentation so the Development Matrices could be merged with the Base Calibrated Segmented Matrices. This involved applying the Purpose, occupancy and trip distribution from the identified constituent zone in the case of a smaller scale development and for the Growth Areas previously identified in Chapter 4 an appropriate trip length distribution was also applied to the target trip ends.

6.5 TEMPRO Growth Factors

The second source of traffic growth was extracted from the Trip End Model PROgram (TEMPRO) software. TEMPRO provides projections of growth over time for use in local and regional transport models. Based on the outputs provided by the Department's National Trip End Model (NTEM), it presents projections of growth in planning data, car ownership, and resulting growth in trip-making by different modes under a constant cost assumption.

TEMPRO includes travel by vehicles owned by households but does not include freight vehicles. Forecasts of freight traffic (available by region, road type and vehicle class) were provided by the National Transport Model (NTM).

The TEMPRO 6.2 dataset was used to forecast growth at local zone level as part of the Core model. This ensures consistency with previous modelling. The growth in each local traffic zone was adjusted to allow for new developments and was ultimately controlled to the TEMPRO target growth total at district level.

A sensitivity test with TEMPRO 7 has also been conducted. As the geographical definitions of this dataset differ significantly from that of earlier datasets a proportionate approach to adopt the growth has been adopted with rounding of areal definitions to fit the current zone system. The analysis associated with this approach is presented later in the document.

In all cases TEMPRO factors have been developed from 2015 onwards. The growth associated with 2006 through 2015 has already been reported through the Present Year comparison report. For completeness the matrix data are also included within this document.

Growth factors for cars have been applied for the periods 2015-2018 and 2015-2033, for the assignment hours:

Growth factors were obtained for the four different levels of Geographic Area available in TEMPRO (Region, County, Local Authority, and TEMPRO Zone), forming 32 sectors which include all the traffic model zones. A breakdown of these sectors by TEMPRO Geographic Area (from high to low level) is provided below:

- Regional Level: 3 sectors including East Of England, South East, London, North East, North West, York & Humber, East Midlands, South West, West Midlands, Wales;

- County Level: 2 sectors including North East Lincolnshire, North Lincolnshire, East Riding Of Yorkshire, City Of Kingston Upon Hull;

- Districts level: 4 sectors including Bassetlaw, Newark And Sherwood, East Lindsey, Boston, City Of Nottingham, Broxtowe, Gedling, Ashfield, Mansfield, Derbyshire County, South Kesteven, Melton, Rushcliffe, South Holland;

- TEMPRO Zones level: 22 sectors including Lincoln (main), Birchwood, North Kesteven (rural), Lincoln (part of) 32UE1, Metheringham, Skellingthorpe, Waddington, Sleaford, Heighington/Washingborough, Ruskington, Bracebridge Heath, Woodhall Spa (part of), Branston, Heckington, West Lindsey, Lincoln (part of) 32UH1, Gainsborough, Welton/Dunholme, Saxilby, Cherry Willingham/Reepham, Nettleham, Market Rasen.

Table 6.5 below shows the description of the TEMPRO zones and the corresponding districts. Table 6.6 below shows the description of the districts. Growth factors extracted from TEMPRO are presented in Appendix B.

6.6 Application of TEMPRO Growth

Applying TEMPRO growth used a two stage process which involved firstly constraining development growth at TEMPRO zone level and by purpose and time period, and then constraining to the TEMPRO by District growth and by time period.

The Development Matrices, which only include developments in the Lincoln District, had previously been added to the 2006 Base Calibrated Segmented Matrices. As the matrices are existent in OD form and the PA process (for HBW) is synthesized by the application of out and back factors on a cell be cell basis the growth has also been applied

The Base Calibrated Segmented Matrices were also allocated to the TEMPRO zone level and the TEMPRO growth applied to provide another estimate of future year trip ends. If the Base + Development trip ends were greater than the Base + TEMPRO growth trip ends then the Base + Development trip ends were used. If the Base + Development trip ends were lower than the Base + TEMPRO growth trip ends then the Base + TEMPRO growth trip ends were used. The Base * TEMPRO growth trip ends was mostly used as the development growth could be largely accommodated within the TEMPRO growth.

The GLTM operates using an approach which merges OD matrices by purpose to generate daily (PA) matrices for home based purposes. Non home based matrices are retained as OD. These growths were then applied to the Base Calibrated Segmented Matrices and a Furness procedure was used to growth the matrix. This process controlled the overall matrix total to the Production trip end total for HB trips and an average of the Origin and Destination trip end totals for NHB purposes.

The second stage in this process was to aggregate the 2015 PYV to the District sector level and, now using an OD format and aggregated above purpose but retaining Time Period, apply the Origin and Destination TEMPRO district trip end growth. This process controlled the overall matrix total to an average of the Origin and Destination trip end estimates and provided the ultimate future year growth targets. These trip ends were then applied back to the matrices created during the first stage to ensure District sector growth was controlled to TEMPRO

The headlines of the matrices created within the demand build are included in Table 6.7 and Appendix C.

6.7 LGV and HGV Growth Factors

Growth factors for Light and Heavy goods vehicles were obtained from the 'Road Traffic Forecasts (RTF) 2013' document which can be found on the Department's website. The forecasts are produced by the ITEA division of the DfT using the National Transport Model (NTM). The NTM provides detailed growth factors at regional level. It is consistent with TEMRPO 6.2. A sensitivity test is conducted with TEMPRO 7 and RTF 2015.

The NTM is a multi-modal model of land-based transport in Great Britain. This provides a systematic means of comparing the national consequences of alternative national transport policies or widely-applied local transport policies, against a range of background scenarios which take into account the major factors affecting future patterns of travel. Although the NTM is essentially a passenger transport model, freight road traffic is modelled for the purpose of assessing the impact of freight vehicles on congestion.

Heavy goods vehicle traffic growth is modelled using the Great Britain Freight Model (GBFM) which takes base year data from 2004 on international and domestic freight movements for 15 different commodities. The model then grows the traffic over time by modelling the effect of changes in macroeconomic variables and also changes in

generalised cost. Light goods vehicle traffic is projected by a separate time series model relating LGV kilometres in a given year to the levels of GDP and fuel price.

The growth figures are central forecasts and represent percentage changes on base year values. Growth from 2006 to 2015 has already been covered in the PYV. Based on the need to forecast consistently with TEMPRO 6.2 this has been constructed

Goods vehicle growth was applied at a regional level as outlined in TAG. These growth factors are presented in detail in Table 6.12 below, with the relevant region, East Midlands, in bold.

Table 6-5 – TEMPRO Zones and Districts

Description	TEMPRO sector	District	Region
Lincoln(main)	1	1	EM
Birchwood	2	1	EM
North Kesteven (rural)	3	2	EM
Lincoln(part of) 32UE1	4	2	EM
Metheringham	5	2	EM
Skellingthorpe	6	2	EM
Waddington	7	2	EM
Sleaford	8	2	EM
Heighington/ Washingborough	9	2	EM
Ruskington	10	2	EM
Bracebridge Heath	11	2	EM
Woodhall Spa(part of)	12	2	EM
Branston	13	2	EM
Heckington	14	2	EM
West Lindsey (rural)	15	3	EM
Lincoln(part of) 32UH1	16	3	EM
Gainsborough	17	3	EM
Welton/ Dunholme	18	3	EM
Saxilby	19	3	EM
Cherry Willingham/ Reepham	20	3	EM
Nettleham	21	3	EM
Market Rasen	22	3	EM
Bassetlaw, Newark And Sherwood	23	4	EM
East Lindsey, Boston	24	5	EM
East Of England, South East, London, East Midlands (Part)	25	6	UK
North East Lincolnshire	26	7	YH
North East, North West, York & Humber (Part)	27	8	UK

Description	TEMPRO sector	District	Region
North Lincolnshire, East Riding Of Yorkshire, City Of Kingston Upon Hull	28	9	YH
City Of Nottingham, Broxtowe, Gedling, Ashfield, Mansfield, Derbyshire County	29	10	EM
South Kesteven, Melton, Rushcliffe, South Holland	30	11	EM
South West, West Midlands, Wales	31	12	UK

Table 6-6 – District Sectors

District	Description
1	Lincoln
2	North Kesteven
3	West Linsey
4	Bassetlaw, Newark And Sherwood
5	East Lindsey, Boston
6	East Of England, South East, London, East Midlands (Part)
7	North East Lincolnshire
8	North East, North West, York & Humber (Part)
9	North Lincolnshire, East Riding Of Yorkshire, City Of Kingston Upon Hull
10	City Of Nottingham, Broxtowe, Gedling, Ashfield, Mansfield, Derbyshire County
11	South Kesteven, Melton, Rushcliffe, South Holland
12	South West, West Midlands, Wales

Table 6-7 – 24 Hour Person Trips by Purpose

Total	Format	2015	2018	2033
HBW	PA	161,915	164,050	169,363
HBE	PA	55,321	56,293	60,608
HBO	PA	179,060	186,886	214,264
HBB	PA	27,438	28,012	29,949
NHBO	OD	356,661	362,956	380,351
NHBEB	OD	39,256	39,632	40,134
SUM		819,651	837,828	894,669

Table 6-8 – NTM 2013 LGV and HGV Growth

Region	Growth Index			
	2015 - 2018		2015 - 2031	
	LGV	HGV	LGV	HGV
EM	1.08147	1.02069	1.50497	1.13023
EAST	1.08139	1.04760	1.51250	1.19459
LON	1.08361	1.01503	1.49003	1.11856
NE	1.09593	1.00314	1.52332	1.00524
NW	1.07996	1.03229	1.50884	1.10249
SE	1.08722	1.01374	1.51018	1.15783
SW	1.08824	1.02400	1.50731	1.12102
WALES	1.09022	1.04306	1.53059	1.07535
WM	1.08680	1.03617	1.51646	1.15307
YH	1.08852	1.02000	1.52024	1.13249

Table 6-9 – Assignment Matrices plus Development Matrices by Time Period – Core

Category		2006	2015	2018	2033	% Difference		
						2006->2015	2015->2018	2018->2033
AM Peak								
1	Commute	26,646	27,577	28,116	29,674	3.49%	1.95%	5.54%
2	Other	17,176	19,014	19,788	22,592	10.70%	4.07%	14.17%
3	Emp Bus.	5,534	5,663	5,770	6,075	2.33%	1.89%	5.28%
4	LGV	7,849	9,047	9,818	13,662	15.28%	8.52%	39.16%
5	HGV	2,758	2,563	2,611	2,874	-7.07%	1.88%	10.06%
Total		**59,963**	**63,865**	**66,103**	**74,877**	6.51%	3.50%	13.27%
Development Trips			551	1,041	4,426	-	-	-
Background Trips			63,314	65,062	70,451	-	2.76%	8.28%
Inter Peak								
1	Commute	6,424	6,640	6,762	7,080	3.36%	1.83%	4.70%
2	Other	32,402	36,331	37,669	43,203	12.13%	3.68%	14.69%
3	Emp Bus.	4,800	4,930	5,022	5,289	2.71%	1.87%	5.32%
4	LGV	7,330	8,452	9,163	12,751	15.31%	8.42%	39.16%
5	HGV	3,948	3,666	3,736	4,118	-7.14%	1.89%	10.22%
Total		**54,904**	**60,019**	**62,351**	**72,441**	9.32%	3.89%	16.18%
Development Trips			384	742	2,938	-	-	-
Background Trips			59,635	61,609	69,503	-	3.31%	12.81%
PM Peak								
1	Commute	21,662	22,498	22,987	24,432	3.86%	2.17%	6.29%
2	Other	21,581	23,660	24,491	27,510	9.63%	3.51%	12.33%
3	Emp Bus.	5,343	5,496	5,606	5,932	2.86%	1.99%	5.83%
4	LGV	7,523	8,673	9,410	13,094	15.28%	8.49%	39.16%
5	HGV	1,999	1,859	1,894	2,083	-6.99%	1.88%	9.95%
Total		**58,108**	**62,186**	64,387	73,051	7.02%	3.54%	13.46%
Development Trips		0	598	1,002	4,313	-	-	-
Background Trips			61,588	63,385	68,738	-	2.92%	8.45%
Daily								
1	Commute	184,343	190,965	194,473	205,103	3.59%	1.84%	5.47%
2	Other	328,292	365,782	377,864	430,634	11.42%	3.30%	13.97%
3	Emp Bus.	63,703	65,393	66,568	70,167	2.65%	1.80%	5.41%
4	LGV	93,634	107,952	117,081	162,922	15.29%	8.46%	39.15%
5	HGV	40,039	37,195	37,894	41,736	-7.10%	1.88%	10.14%
Total		**710,011**	**767,287**	**793,881**	**910,562**	**7.02%**	**3.33%**	**13.13%**
Development Trips			5,920	7,176	34,204	-	-	-
Background Trips			761,367	786,705	876,358	-	3.33%	11.40%

6.8 Sensitivity Test Inputs

Variants around the core scenario have been developed as follows

- TEMPRO7
- Low Growth; and
- High Growth

6.8.1 TEMPRO 7

A TEMPRO 7 test was conducted. To apply the closest level of detail of TEMPRO 7 to a study area would require a review and re-specification of detailed zoning to reconcile boundary issues. This was not possible for the current study and a proportionate approach was taken. TEMPRO was aggregated to Local Authority area level rather the zone level. This aggregation generalises the growth more than a refined application however the correct high level target Growth factors are included in Appendix D. RTF 15 values were included in this test. They are referenced in Table 6.10

Table 6-10 – RTF 2015 Growth Factors

Region	Growth Index			
	2015 - 2018		2015 - 2031	
	LGV	HGV	LGV	HGV
EM	1.1687	1.0184	1.5997	1.1274
EAST	1.1686	1.0471	1.5984	1.2068
LON	1.1624	1.0116	1.5713	1.1056
NE	1.1691	1.0133	1.5994	1.1119
NW	1.1682	1.0192	1.5975	1.1280
SE	1.1683	1.0528	1.5984	1.2132
SW	1.1686	1.0119	1.6004	1.1094
WALES	1.1709	1.0171	1.6062	1.1239
WM	1.1674	1.0198	1.5976	1.1320
YH	1.1663	1.0189	1.5955	1.1315

The resultant matrices are included in Table 6.11 below.

Table 6-11 – Assignment Matrices plus Development Matrices by Time Period – TEMPRO 7

Category		2006	2015	2018	2033	% Difference		
						2006->2015	2015->2018	2018->2033
AM Peak								
1	Commute	26,646	27,577	27,540	29,750	3.49%	-0.13%	8.03%
2	Other	17,176	19,014	19,537	22,446	10.70%	2.75%	14.89%
3	Emp Bus.	5,534	5,663	5,732	6,210	2.33%	1.21%	8.35%
4	LGV	7,849	9,047	9,786	13,394	15.28%	8.16%	36.87%
5	HGV	2,758	2,563	2,628	2,917	-7.07%	2.52%	11.02%
Total		**59,963**	**63,865**	**65,223**	**74,717**	**6.51%**	**2.13%**	**14.56%**
Development Trips			551	689	3,384	-		
Background Trips			63,314	64,534	71,333	-	1.93%	10.54%
Inter Peak								
1	Commute	6,424	6,640	6,606	7,052	3.36%	-0.51%	6.74%
2	Other	32,402	36,331	37,155	42,382	12.13%	2.27%	14.07%
3	Emp Bus.	4,800	4,930	4,962	5,353	2.71%	0.65%	7.88%
4	LGV	7,330	8,452	9,142	12,513	15.31%	8.17%	36.88%
5	HGV	3,948	3,666	3,759	4,175	-7.14%	2.52%	11.06%
Total		**54,904**	**60,019**	**61,624**	**71,475**	**9.32%**	**2.67%**	**15.99%**
Development Trips			384	448	2,196	-	-	-
Background Trips			59,635	61,176	69,279	-	2.58%	13.25%
PM Peak								
1	Commute	21,662	22,498	22,521	24,261	3.86%	0.10%	7.73%
2	Other	21,581	23,660	24,151	27,247	9.63%	2.08%	12.82%
3	Emp Bus.	5,343	5,496	5,555	6,010	2.86%	1.07%	8.19%
4	LGV	7,523	8,673	9,381	12,840	15.28%	8.16%	36.87%
5	HGV	1,999	1,859	1,906	2,116	-6.99%	2.52%	11.01%
Total		**58,108**	**62,186**	**63,514**	**72,473**	**7.02%**	**2.14%**	**14.11%**
Development Trips			598	743	3,311	-	-	-
Background Trips			61,588	62,771	69,162	-	1.92%	10.18%
Daily								
1	Commute	184,343	190,965	190,704	205,250	3.59%	-0.14%	7.63%
2	Other	328,292	365,782	374,208	426,414	11.42%	2.30%	13.95%
3	Emp Bus.	63,703	65,393	65,979	71,306	2.65%	0.90%	8.07%
4	LGV	93,634	107,952	116,767	159,821	15.29%	8.17%	36.87%
5	HGV	40,039	37,195	38,133	42,345	-7.10%	2.52%	11.05%
Total		**710,011**	**767,287**	**785,791**	**905,137**	**8.07%**	**2.41%**	**15.19%**
Development Trips			5,920	7,176	34,204	-	-	-
Background Trips			761,367	778,615	870,933	-	2.27%	11.86%

6.8.2 *High and Low Growth Matrices*

The Core matrices were further globally factored to the represent national uncertainty as referenced in WebATG unit M4:

The process has been developed using the following guidance

- for 1 year after the base year, proportion p of base year demand added to the core scenario;
- for 36 or more years after the base year, proportion 6*p of base year demand added to the core scenario;
- between 1 and 36 years after the base year, the proportion of base year demand should rise from p to 6*p in proportion with the square root of the years.

The factors from 2015 to 2018 and 2033 are ±4.3% and ±10.6% respectively.

As well including national growth variation the same tests also included pessimistic development growth for the low test and optimistic development growth for the high growth test. maximum development. Development trips are input according to the assumptions outlined in Chapter 4 where pessimistic developments are scaled back and or removed and optimistic developments are advanced. The respective TEMPRO growth target (low or high) is maintained in each case.

Table 6-12 – Low Growth & Pessimistic Development

Category		2006	2015	2018	2033	% Difference		
						2006->2015	2015->2018	2018->2033
AM Peak								
1	Commute	26,646	27,577	26,958	26,685	3.49%	-2.25%	-1.01%
2	Other	17,176	19,014	18,971	20,531	10.70%	-0.23%	8.22%
3	Emp Bus.	5,534	5,663	5,529	5,467	2.33%	-2.36%	-1.13%
4	LGV	7,849	9,047	9,393	12,213	15.28%	3.82%	30.03%
5	HGV	2,758	2,563	2,498	2,570	-7.07%	-2.52%	2.85%
Total		**59,963**	**63,865**	**63,349**	**67,465**	**6.51%**	**-0.81%**	**6.50%**
Development Trips			551	954	2,882	-		
Background Trips			63,314	62,395	64,582	-	-1.45%	3.51%
Inter Peak								
1	Commute	6,424	6,640	6,481	6,385	3.36%	-2.39%	-1.49%
2	Other	32,402	36,331	36,175	38,833	12.13%	-0.43%	7.35%
3	Emp Bus.	4,800	4,930	4,811	4,760	2.71%	-2.41%	-1.06%
4	LGV	7,330	8,452	8,766	11,399	15.31%	3.72%	30.03%
5	HGV	3,948	3,666	3,574	3,681	-7.14%	-2.52%	2.99%

Category		2006	2015	2018	2033	% Difference		
						2006->2015	2015->2018	2018->2033
Total		**54,904**	**60,019**	**59,808**	**65,059**	**9.32%**	**-0.35%**	**8.78%**
Development Trips			384	685	1,937	-	-	-
Background Trips			59,635	59,123	63,122	-	-0.86%	6.76%
PM Peak								
1	Commute	21,662	22,498	22,061	22,010	3.86%	-1.94%	-0.23%
2	Other	21,581	23,660	23,560	24,964	9.63%	-0.42%	5.96%
3	Emp Bus.	5,343	5,496	5,373	5,338	2.86%	-2.25%	-0.63%
4	LGV	7,523	8,673	9,002	11,705	15.28%	3.80%	30.03%
5	HGV	1,999	1,859	1,812	1,862	-6.99%	-2.53%	2.75%
Total		**58,108**	**62,186**	**61,808**	**65,880**	**7.02%**	**-0.61%**	**6.59%**
Development Trips		0	598	907	2,761	-	-	-
Background Trips			61,588	60,901	63,119	-	-1.12%	3.64%
Daily								
1	Commute	184,343	190,965	186,819	185,239	3.59%	-2.17%	-0.85%
2	Other	328,292	365,782	364,325	390,603	11.42%	-0.40%	7.21%
3	Emp Bus.	63,703	65,393	63,853	63,233	2.65%	-2.35%	-0.97%
4	LGV	93,634	107,952	112,016	145,652	15.29%	3.76%	30.03%
5	HGV	40,039	37,195	36,257	37,319	-7.10%	-2.52%	2.93%
Total		**710,011**	**767,287**	**763,270**	**822,046**	**8.07%**	**-0.52%**	**7.70%**
Development Trips			5,920	9,999	29,393	-	-	-
Background Trips			761,367	753,271	792,654	-	-1.06%	5.23%

Table 6-13 – High Growth & Optimistic Development

Category		2006	2015	2018	2033	% Difference		
						2006->2015	2015->2018	2018->2033
AM Peak								
1	Commute	26,646	27,577	29,322	32,803	3.49%	6.33%	11.87%
2	Other	17,176	19,014	20,588	24,831	10.70%	8.27%	20.61%
3	Emp Bus.	5,534	5,663	6,018	6,716	2.33%	6.27%	11.59%
4	LGV	7,849	9,047	10,243	15,111	15.28%	13.22%	47.53%
5	HGV	2,758	2,563	2,724	3,179	-7.07%	6.29%	16.68%
Total		**59,963**	**63,865**	**68,895**	**82,640**	**6.51%**	**7.88%**	**19.95%**
Development Trips			551	1,085	5,661	-		
Background Trips			63,314	67,810	76,978	-	7.10%	13.52%
Inter Peak								
1	Commute	6,424	6,640	7,051	7,821	3.36%	6.19%	10.92%
2	Other	32,402	36,331	39,251	47,772	12.13%	8.04%	21.71%
3	Emp Bus.	4,800	4,930	5,238	5,847	2.71%	6.24%	11.64%

Category		2006	2015	2018	2033	% Difference		
						2006->2015	2015->2018	2018->2033
4	LGV	7,330	8,452	9,560	14,103	15.31%	13.11%	47.53%
5	HGV	3,948	3,666	3,898	4,554	-7.14%	6.30%	16.85%
Total		**54,904**	**60,019**	**64,997**	**80,097**	**9.32%**	**8.29%**	**23.23%**
Development Trips			384	771	3,739	-	-	-
Background Trips			59,635	64,226	76,358	-	7.70%	18.89%
PM Peak								
1	Commute	21,662	22,498	23,935	26,845	3.86%	6.39%	12.16%
2	Other	21,581	23,660	25,485	30,295	9.63%	7.71%	18.87%
3	Emp Bus.	5,343	5,496	5,846	6,557	2.86%	6.36%	12.16%
4	LGV	7,523	8,673	9,817	14,483	15.28%	13.19%	47.53%
5	HGV	1,999	1,859	1,976	2,303	-6.99%	6.29%	16.56%
Total		**58,108**	**62,186**	**67,058**	**80,483**	**7.02%**	**7.84%**	**20.02%**
Development Trips		0	598	1,049	5,532	-	-	-
Background Trips			61,588	66,009	74,950	-	7.18%	13.55%
Daily								
1	Commute	184,343	190,965	203,026	226,894	3.59%	6.32%	11.76%
2	Other	328,292	365,782	395,086	478,034	11.42%	8.01%	20.99%
3	Emp Bus.	63,703	65,393	69,500	77,672	2.65%	6.28%	11.76%
4	LGV	93,634	107,952	122,154	180,210	15.29%	13.16%	47.53%
5	HGV	40,039	37,195	39,538	46,170	-7.10%	6.30%	16.77%
Total		**710,011**	**767,287**	**829,304**	**1,008,979**	**8.07%**	**8.08%**	**21.67%**
Development Trips			5,920	11,368	57,631	-	-	-
Background Trips			761,367	817,935	951,348	-	7.43%	16.31%

6.8.3 *Dependent development*

It was agreed that a proportionate approach to dependent development would be taken at a meeting with DfT[1] whereby fixed land use, excluding dependent development could be used. This is effectively the core test.

Existing planning restrictions require that the NEQ site is limited to 150 units in advance of LEB and SEQ is not commenced. Traffic conditions in the DM do not permit any additional development to this. The DM and DS are therefore assessed on the same basis by assuming that the LEB dependent development is absent.

[1] LEB Update Meeting, 2nd November 2015.

7 Core Scenario Outputs

7.1 Introduction

This section provides a summary of the model outputs used to assess the DM and DS Strategy performance when combined with the various travel Scenarios. It also contains details of key model statistics that are later used in the appraisal process.

7.2 Model Convergence

Convergence is the measure used to determine model stability during the assignment process. A suitably converged model can be expected to produce consistent outputs with minimal model noise. A total of 30 iterations were run to gain a statistically significant sample of convergence data.

The following convergence criteria are recommended in DMRB:

- Duality Gap less than 1% - this expresses the difference between the current estimates of the costs associated with trips through the modelled network against the theoretical costs if all traffic were to use the minimum cost route associated with their journey. It measures how far modelled flows differ from the desired equilibrium.
- Average absolute difference less than 1 – this is the number of routes that deviate from each other based on the impedances of the assignment.
- Relative average absolute difference less than 5% - this is the percentage of routes that deviate from each other based on the impedances of the assignment.

The criteria adopted in VISUM to replicate these stringent requirements are identified below.

- Percentage of turns with a change of less than 0.2GEH between assignments. (Target 98%)
- Percentage of turns with a change of less than 0.2GEH between assignment and ICA (junction capacity /delay calculation) (Target 95%)
- Percentage of turns with relative difference of less than 0.01GEH in delays between assignment and ICA. (Target 95%)
- Percentage of links with a change of less 0.2GEH between assignments (Target 98%)
- Percentage of links with relative difference of less than 0.01 in travel time between assignments (Target 95%)
- Gap value. % change in generalised costs (Target 0.1^{-5})

Details of the model performance are included in Appendix E.

The statistics show that all three models for each time period reached convergence within between 14 and 173 iterations assignment iterations. These ensure that both fixed demand and variable demand forecasting outputs are consistent and sufficiently stable.

Demand / Supply convergence is described in the Variable Demand Model report. The model is deemed converged when a %GAP of less 0.1 is achieved.

7.3 Tabular and Graphical Highway Network Summary Statistics

The following summary highway network tabular and graphical information is provided:

1. total number of assigned trips;
2. total network travelled distance as vehicle kilometres;
3. total network travelled time as vehicle hours; and
4. average network speeds.

Modelled flows and link travel times in the vicinity of the LEB scheme, comparing the DM and the DS, are also plotted against a simple network background. Plots of the AADT flow difference between the DM and DS are also provided to further indicate the impact of the scheme. Tables and plots of forecast flows for key parts of the highway network within the study area are also appended.

7.4 Scenarios Reported

The following scenarios are reported

- Core scenario (TEMPRO V6.2) with non-dependent developments

7.5 Core Scenario

7.5.1 LEB Performance

LEB flow volumes are demonstrated over the route length in Table 7.1. AADT flows are developed using the expansion factors referenced earlier in the reporting. Section 2, representing the bridged crossing of the River Witham, is the busiest section,

Table 7-1 – LEB Core Flows – Fixed Demand.

Section	Forecast Two Way AADT Flows		
	2018	2033	Growth over Forecast Period
Section 1a	17,615	19,645	12%
Section 1b	16,703	19,966	20%
Section 2	21,170	24,420	15%
Section 3	15,225	18,298	20%
Section 4	16,227	19,367	19%

7.5.2 Traffic Relief

Traffic relief is demonstrated by the River Witham screenline indicated in Figure 7.1 and Table 7.2 below.

Figure 7-1 – Witham Screenline – Fixed Demand

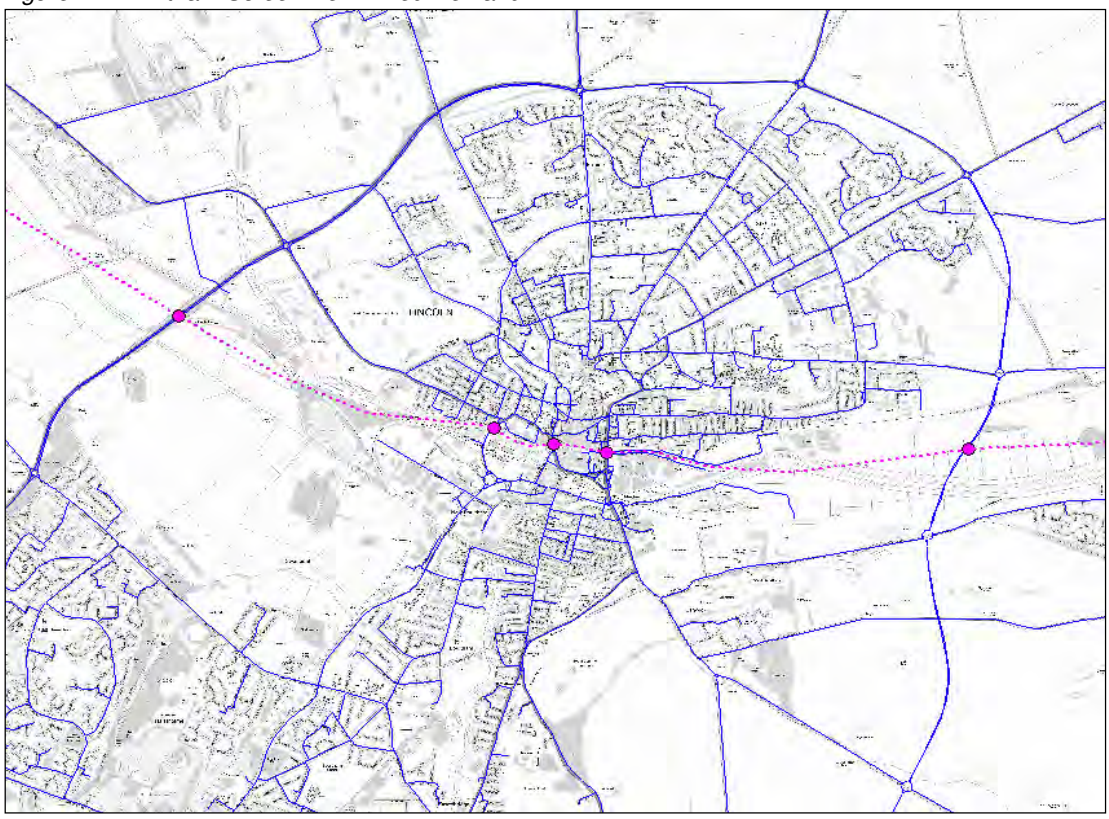


Table 7-2 – LEB Traffic Relief – Fixed Demand

Part of Cordon	2006	2015	2018 DM	2018 DS	2033 DM	2033 DS
AADT Flows						
A46	31,670	32,884	35,524	33,617	37,316	35,021
City Centre - Brayford Way	20,949	24,168	27,619	23,671	31,082	27,040
City Centre - Wigford Way	13,303	14,066	13,316	12,725	13,452	14,551
City Centre - A15 Broadgate	38,968	42,218	39,783	31,181	40,143	34,921
LEB Section 2	0	0	0	22,674	0	27,253
SUM	104,890	113,336	116,242	123,868	121,993	138,787

Flow Change						
A46		4%	8%	-5%	11%	-6%
City Centre - Brayford Way		15%	14%	-14%	31%	-13%
City Centre - Wigford Way		6%	-5%	-4%	6%	8%
City Centre - A15 Broadgate		8%	-6%	-22%	29%	-13%
LEB Section 2		-	-	-	-	-
SUM		8%	3%	7%	-2%	14%

Traffic volumes increase between 2006 and 2018 DM across the screenline. On opening of LEB the greatest relief is afforded to A15 Broadgate and Brayford Way. Traffic in 2033 DM compared to 2018 DM is raised on A46 and Brayford Way but relatively static on other routes which are already at capacity. The 2033 DS option affords relief to Brayford Way and Broadgate. Both DS scenarios see increased overall traffic as strategic movements are encouraged into the core of the model area to take advantage of free flow network capacity.

7.5.3 Network Performance

Travel time and distance are reported in Figures 7.1 and 7.2. Speeds are shown in Figure 7.3. Traffic patterns show declining speed across the modelled area into the future, with Interpeak generally demonstrating higher speed and more marked change. All figures are included in Table 7.3. The introduction of the LEB (DS) positively impacts the network in each case.

Figure 7-2 – Travel Distance by Scenario Fixed Demand

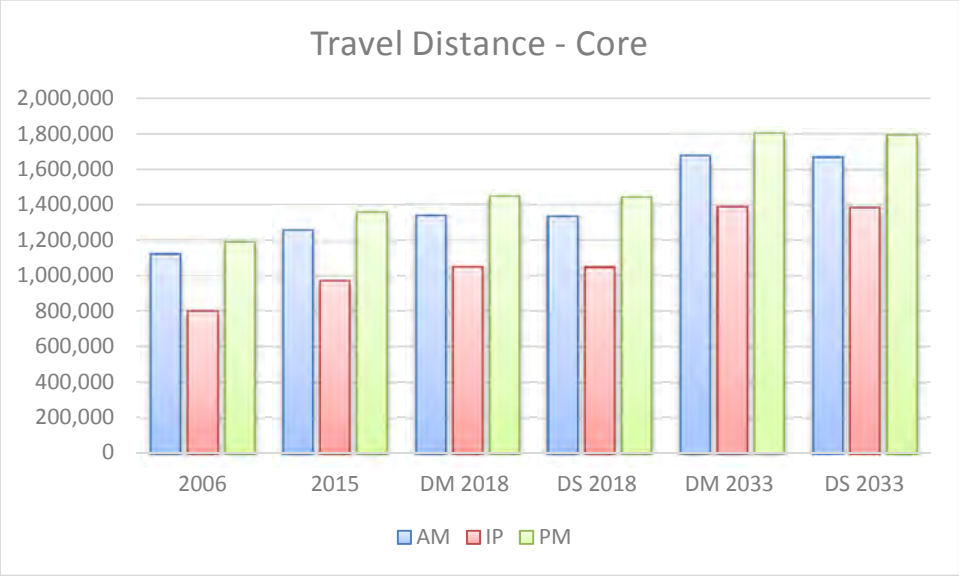


Figure 7-3 – Travel Time by Scenario – Fixed Demand

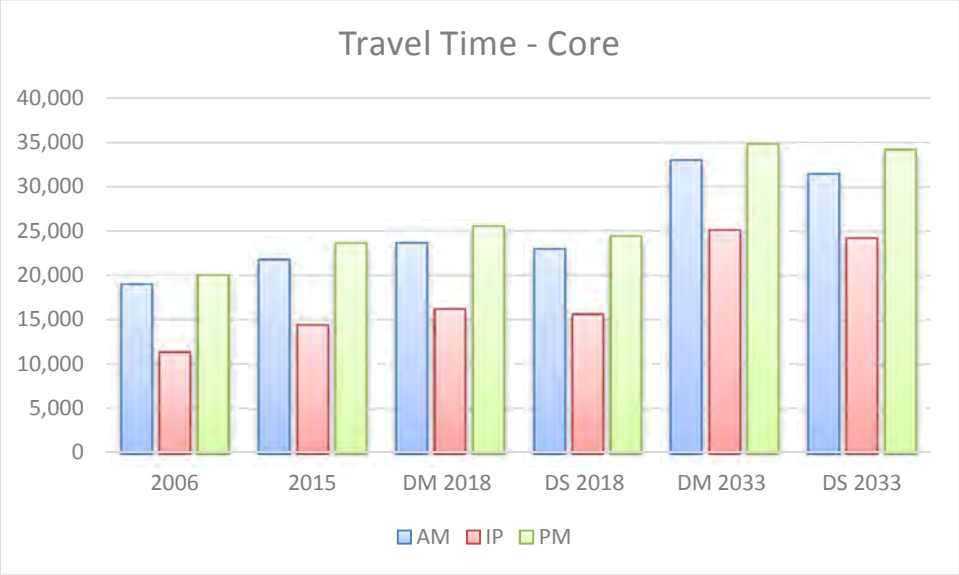


Figure 7-4 – Travel Speed by Scenario- Fixed Demand

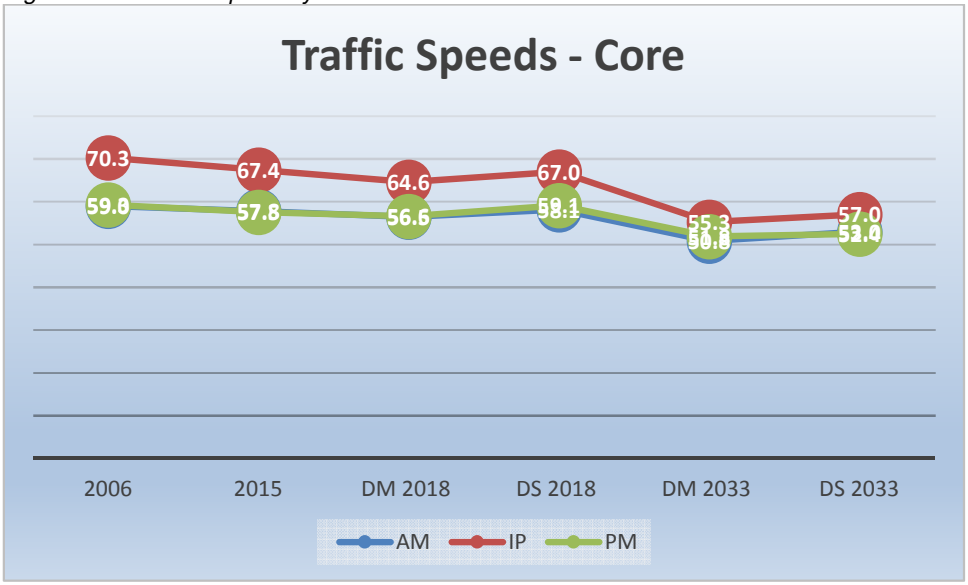


Table 7-3 – Skimmed Costs – Fixed Demand

Attribute	2006	2015	DM 2018	DS 2018	DM 2033	DS 2033
Pcu kms						
AM	1,120,206	1,259,448	1,338,419	1,336,449	1,677,546	1,669,695
IP	800,556	974,705	1,049,769	1,047,920	1,390,266	1,385,342
PM	1,188,584	1,361,787	1,447,916	1,443,558	1,804,598	1,794,526
Attribute	**2006**	**2015**	**DM 2018**	**DS 2018**	**DM 2033**	**DS 2033**
Pcu Hrs						
AM	18,993	21,798	23,703	22,987	33,020	31,526
IP	11,385	14,456	16,250	15,647	25,163	24,289
PM	20,050	23,665	25,596	24,414	34,823	34,223
Attribute	**2006**	**2015**	**DM 2018**	**DS 2018**	**DM 2033**	**DS 2033**
Speed kph						
AM	59.0	57.8	56.5	58.1	50.8	53.0
IP	70.3	67.4	64.6	67.0	55.3	57.0
PM	59.3	57.5	56.6	59.1	51.8	52.4

7.5.4 *Traffic Patterns*

2018 and 2033 assignment flow volumes are included in Appendix F.

7.5.5 *Matrix Values*

10 Sector matrix compressions are included in Appendix G.

8 Variable Demand Model Outputs

8.1 Introduction

This section provides the results of the Variable Demand forecasting process whereby the previously unconstrained demand forecasts are modified in response to future changes in travel costs to create the constrained demand forecasts. Iterations of the demand/ supply loop continue until these converge to a stable solution.

The chapter reports the following

- Core Scenario (TEMPRO v6.2)
- Low Growth alternative
- High Growth alternative
- Variant TEMPRO V7

Given the large number of the forecast runs and statistics only detail of the results of the Core scenario are described in detail in this report. However overall impacts for Low and High growth alternatives are also included.

8.2 Flow Impacts

8.2.1 Specific Flows - Variable Demand

Traffic flow on LEB is provided below. The VDM process results in higher flow volumes on the alignment, approximately 6,000 AADT extra traffic over the busiest section.

Table 8-1 –LEB VDM Core AADT volumes

Section	Forecast Two Way AADT Flows		
	2018	2033	Growth over Forecast Period
Section 1a	19,181	21,023	10%
Section 1b	18,768	21,258	13%
Section 2	27,377	30,143	10%
Section 3	18,961	21,520	13%
Section 4	18,851	21,403	14%

Traffic relief in the city Centre is indicated below. Changes are more muted from the fixed tests due to the impacts of VDM suppression and induction.

Table 8-2 –LEB VDM Core Traffic Relief

Part of Cordon	2006	2015	2018 DM	2018 DS	2033 DM	2033 DS
AADT Flows						
A46	31,670	32,884	35,263	34,185	36,217	34,898
City Centre - Brayford Way	20,949	24,168	26,390	24,091	28,308	26,218
City Centre - Wigford Way	13,303	14,066	14,215	13,720	15,698	15,888
City Centre - A15 Broadgate	38,968	42,218	42,591	34,582	44,773	38,605
LEB Section 2	0	0	0	29,303	0	32,997
SUM	104,890	113,336	118,459	135,881	124,996	148,607
Flow Change						
A46		4%	7%	-3%	6%	-4%
City Centre - Brayford Way		15%	9%	-9%	18%	-7%
City Centre - Wigford Way		6%	1%	-3%	14%	1%
City Centre - A15 Broadgate		8%	1%	-19%	29%	-14%
LEB Section 2		-	-	-	-	-
SUM		8%	5%	15%	-8%	19%

8.2.2 Network Plots – Variable Demand

Appendix H includes VDM flow difference plots demonstrating the catchment area of LEB and the flow relief afforded by the scheme.

8.3 Matrix Changes

The Variable Matrix runs involve Demand Model matrix changes in response to changes in travel cost as predicted by the highway Supply Model. As such before any network information is considered it is first important to understand the changes to the travel matrices output from the converged demand / supply model looping.

The matrix report provided uses Vehicle units and includes the highway matrix totals for all permutations of Scenario, Strategy, year and period, and for the five model User Classes of:

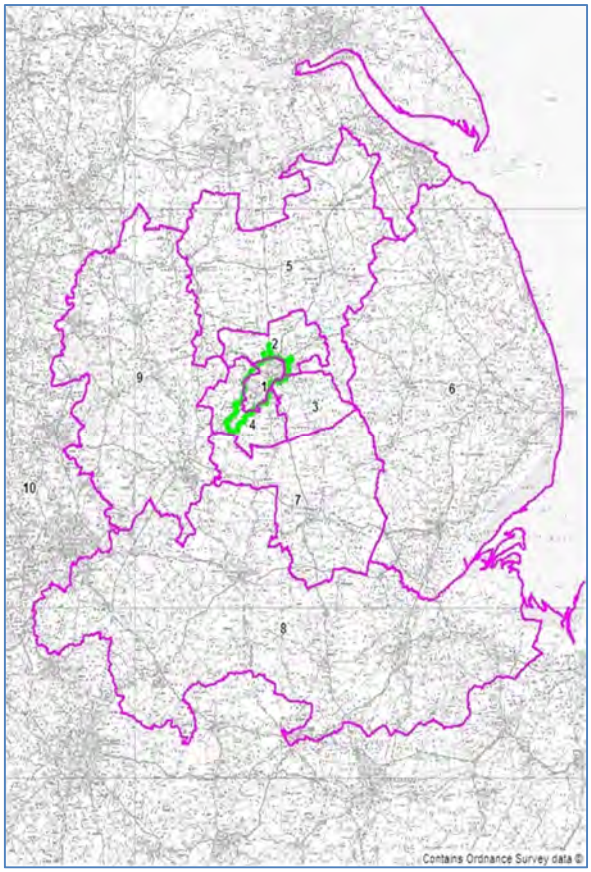
- Car Commute;
- Car Other;
- Car EB;

It should be noted that LGV and HGV are not subject to the demand model and are therefore not reported.

The Vehicle totals are reported for the Unconstrained (input) and Constrained (output) matrices for both DM and DS. Sectorised outputs by time period and daily are included in Appendix I.

Figure 8-1 below shows constrained matrix change at a sector level. The diagrams demonstrate daily origins and destinations by sector in terms of trip induction or suppression from reference, for both DM and DS.

Figure 8-1 – VDM Sectors

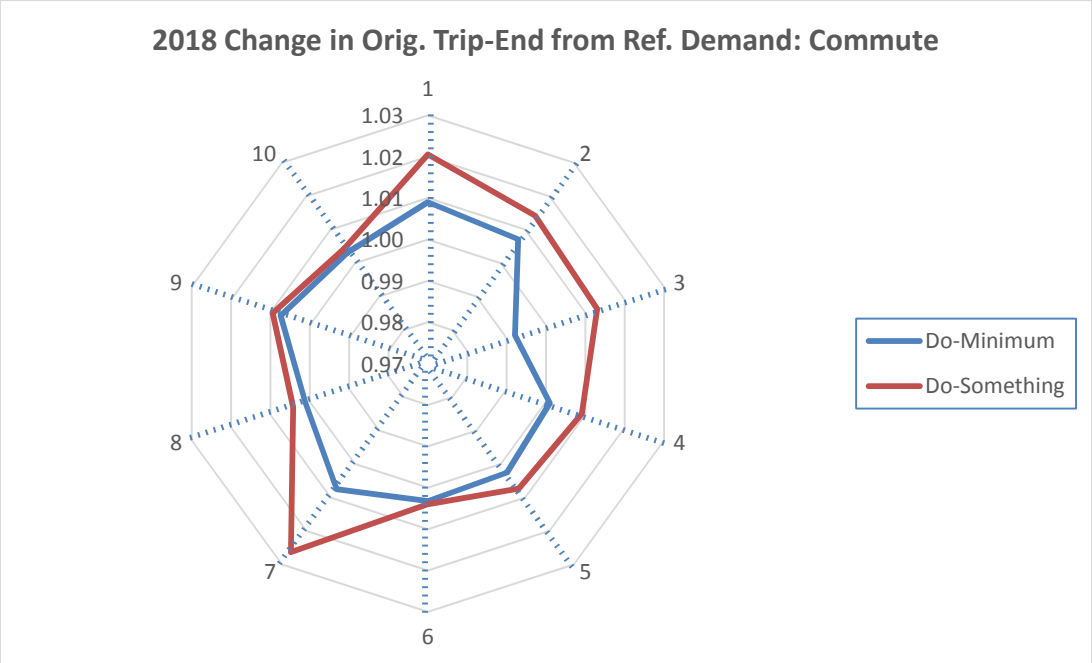


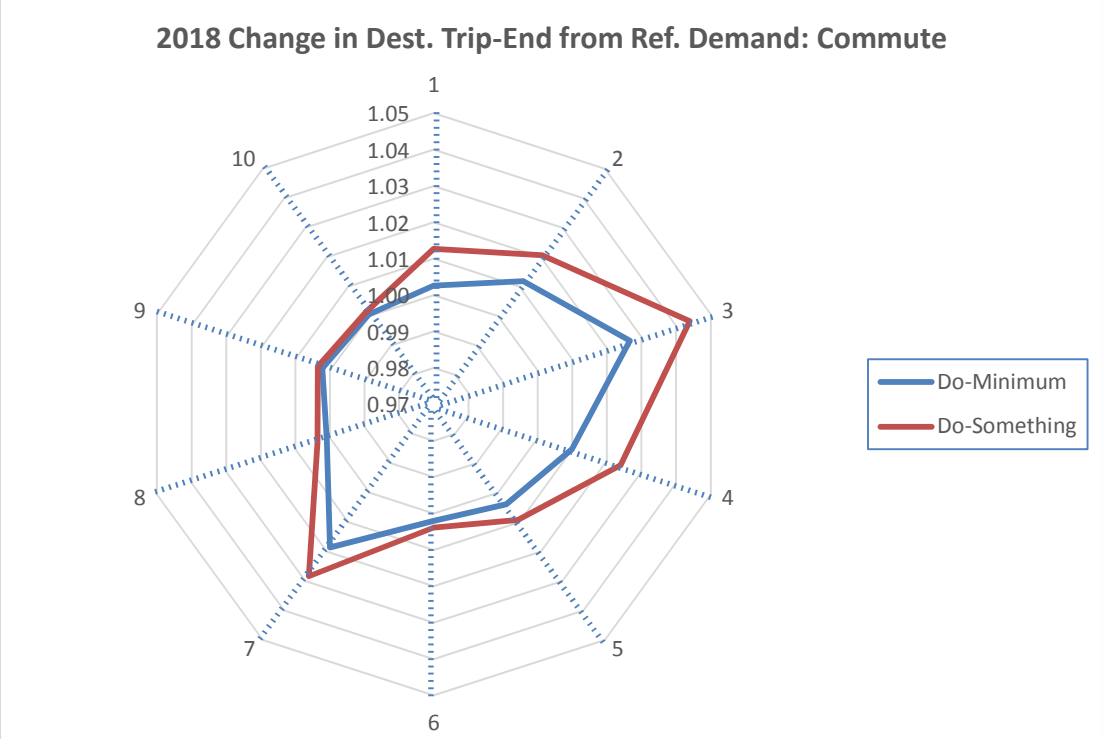
To comprehend the diagrams, Sector 10 does not contain full cost information and is therefore not subject to VDM activity. Figures less than 1.00 indicate suppression for a sector and in excess of 1.00 indicates induction.

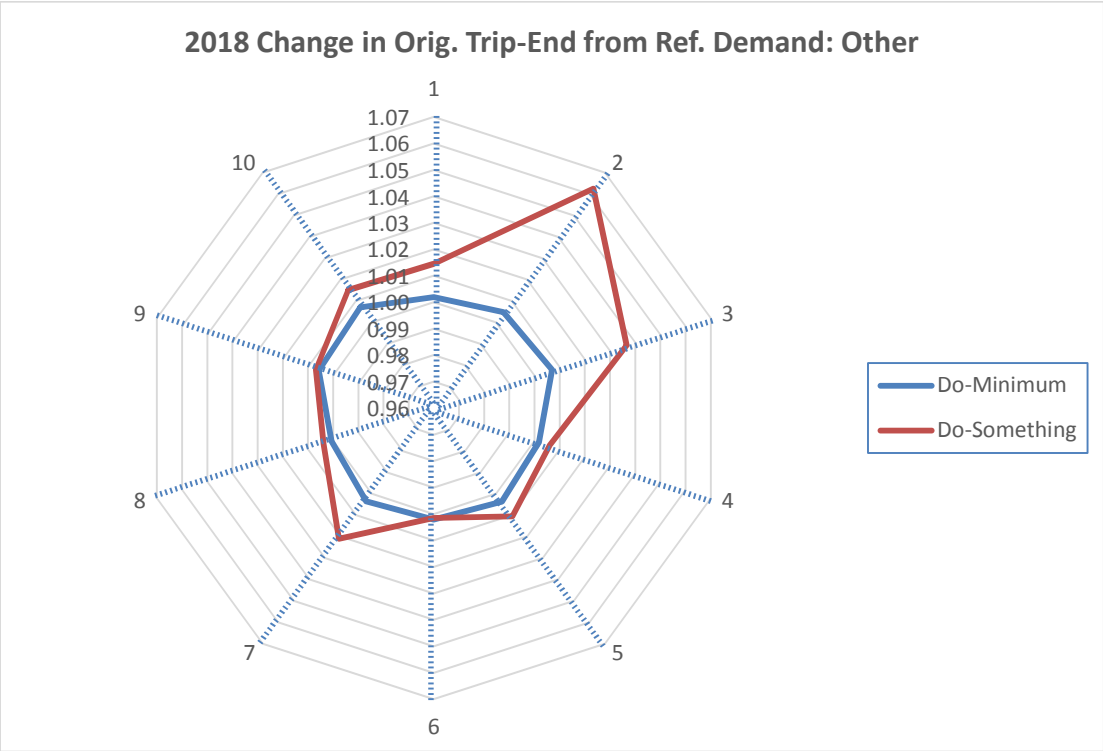
Figure 8.2 considers the 2018 models. For commute trips the greatest suppression is in sector 3 DM with induction in most other sectors, more strongly in the DS due to additional capacity. For other trips DS sees strong induction in the east (sectors 2 and 3), resultant from LEB. Business travel demonstrates strong induction for sector 5 in both the DM and DS, although the number of trips that this is applicable to is minimal. It is noted that for the Opening Year 2018, the LVDM demand model produces induced traffic for both the DM and DS demand, it is anticipated as the reduction in generalised costs associated with the change in VoT and VoC in 2018 from 2015 outweighs thegrowth in demand between 2015 and 2018.

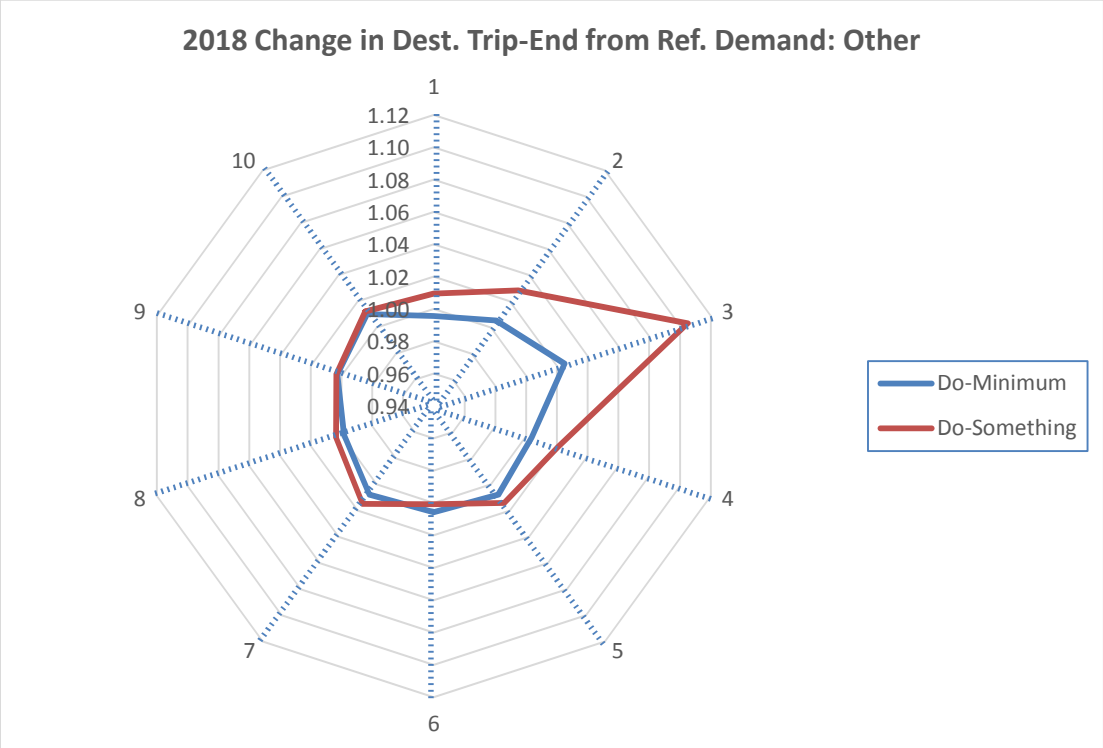
Figure 8.3 considers the 2033 models. Patterns are similar to 2018 but more marked due to a greater ratio difference between demands and resultant levels of congestion in DM and DS. Some longer distance movements involved in Sector 7 are affected by traffic induction for 2033. Due to its geography East Lincolnshire (Sector 6) continues to see little induction or suppression resultant from the forecasts.

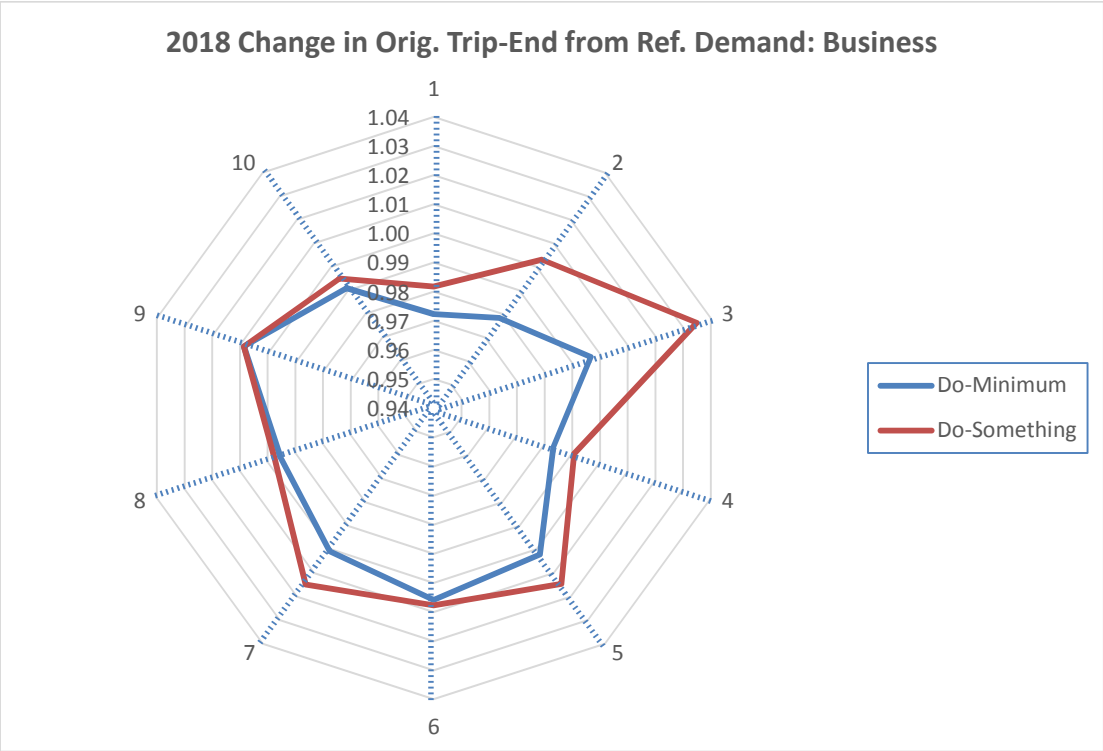
Figure 8-2 – Constrained Matrix Changes at Sector Trip End Level - 2018






2018 Change in Orig. Trip-End from Ref. Demand: Other
1
2
3
4
5
6
7
8
9
10
1.07
1.06
1.05
1.04
1.03
1.02
1.01
1.00
0.99
0.98
0.97
0.96
Do-Minimum
Do-Something


2018 Change in Dest. Trip-End from Ref. Demand: Other
1
2
3
4
5
6
7
8
9
10
1.12
1.10
1.08
1.06
1.04
1.02
1.00
0.98
0.96
0.94
Do-Minimum
Do-Something


2018 Change in Orig. Trip-End from Ref. Demand: Business
1
2
3
4
5
6
7
8
9
10
1.04
1.03
1.02
1.01
1.00
0.99
0.98
0.97
0.96
0.95
0.94
Do-Minimum
Do-Something

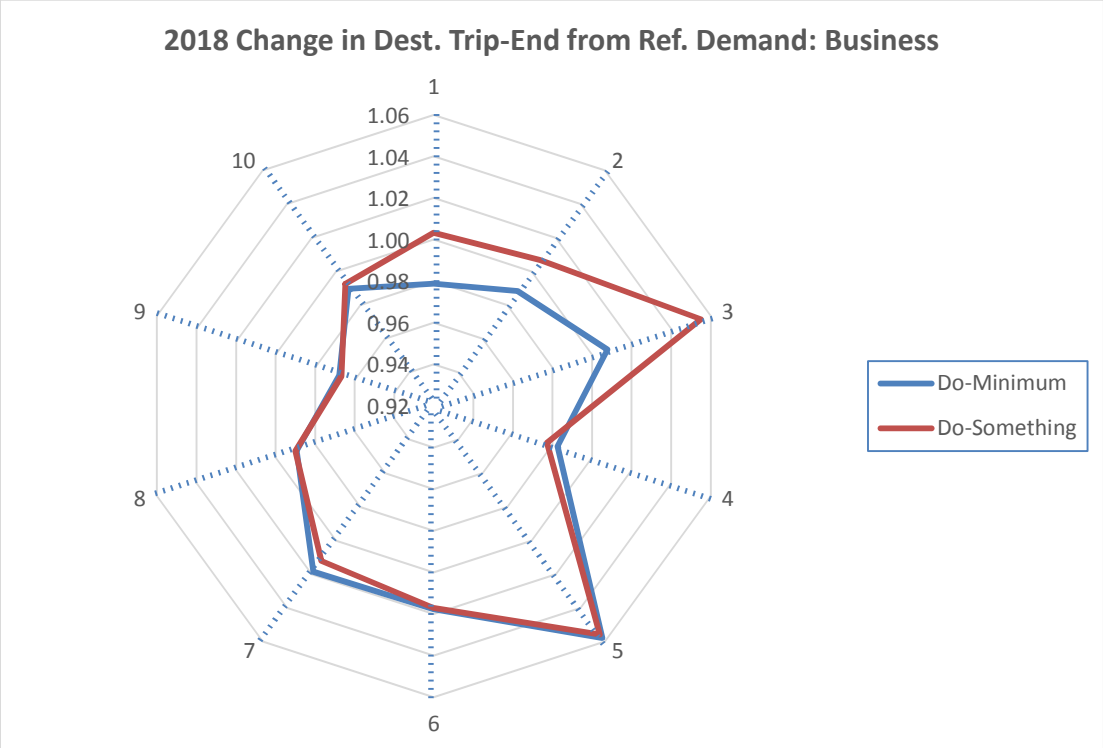
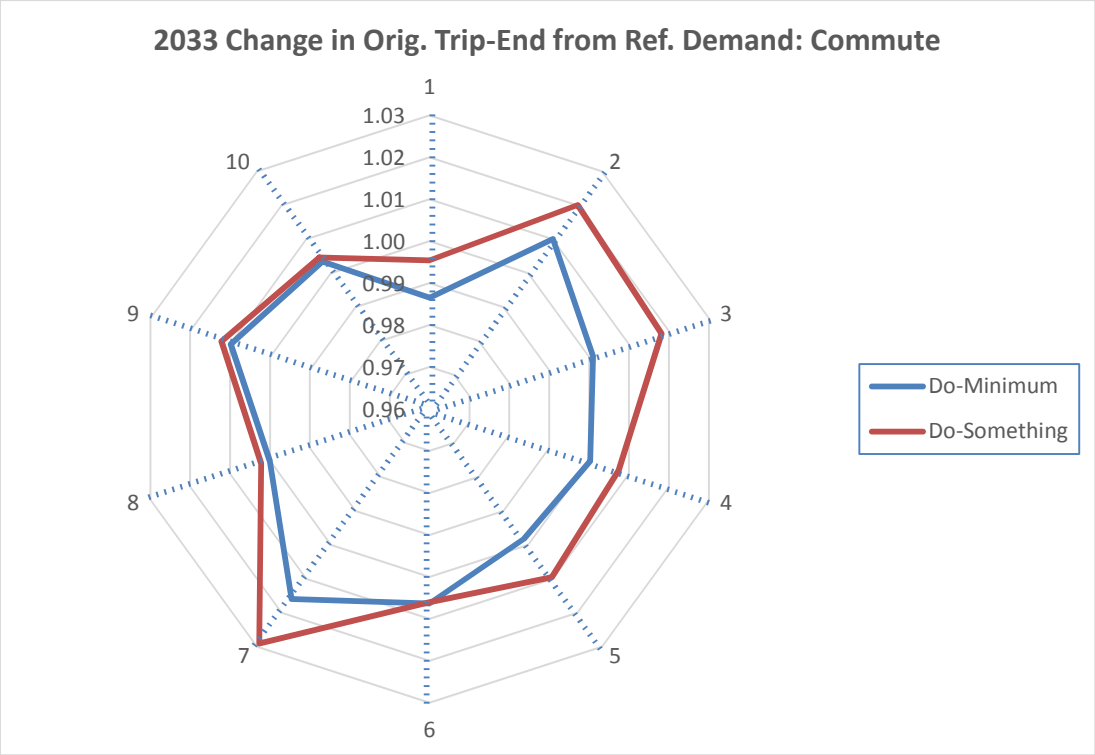
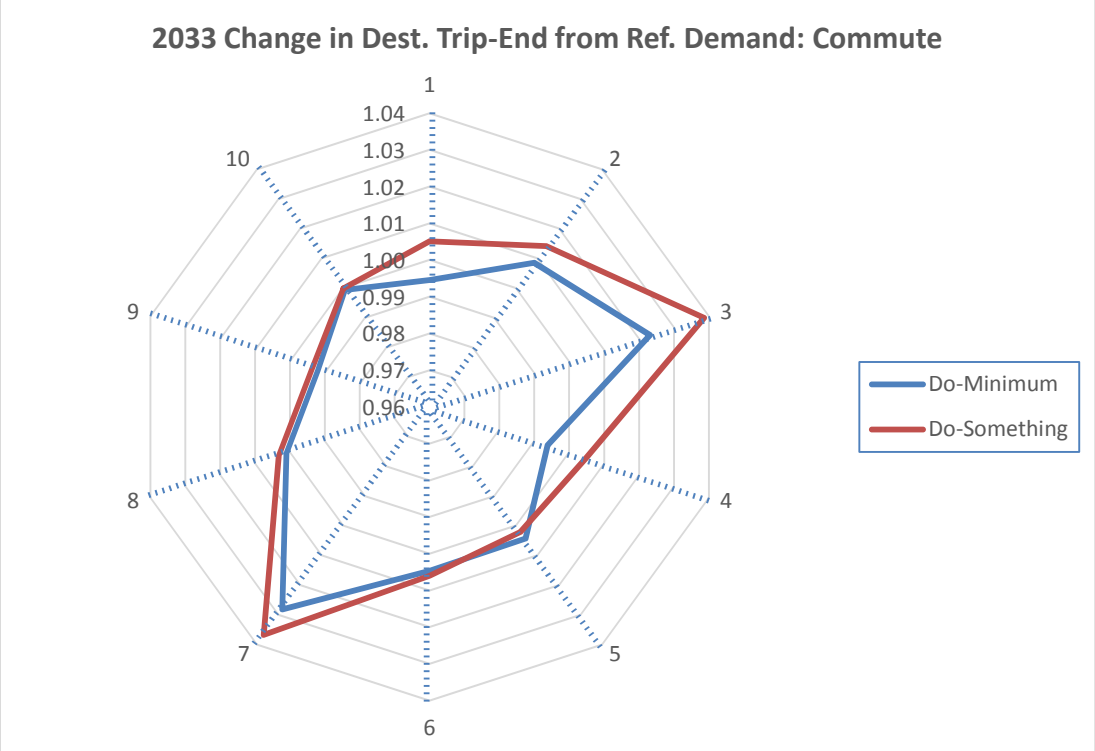
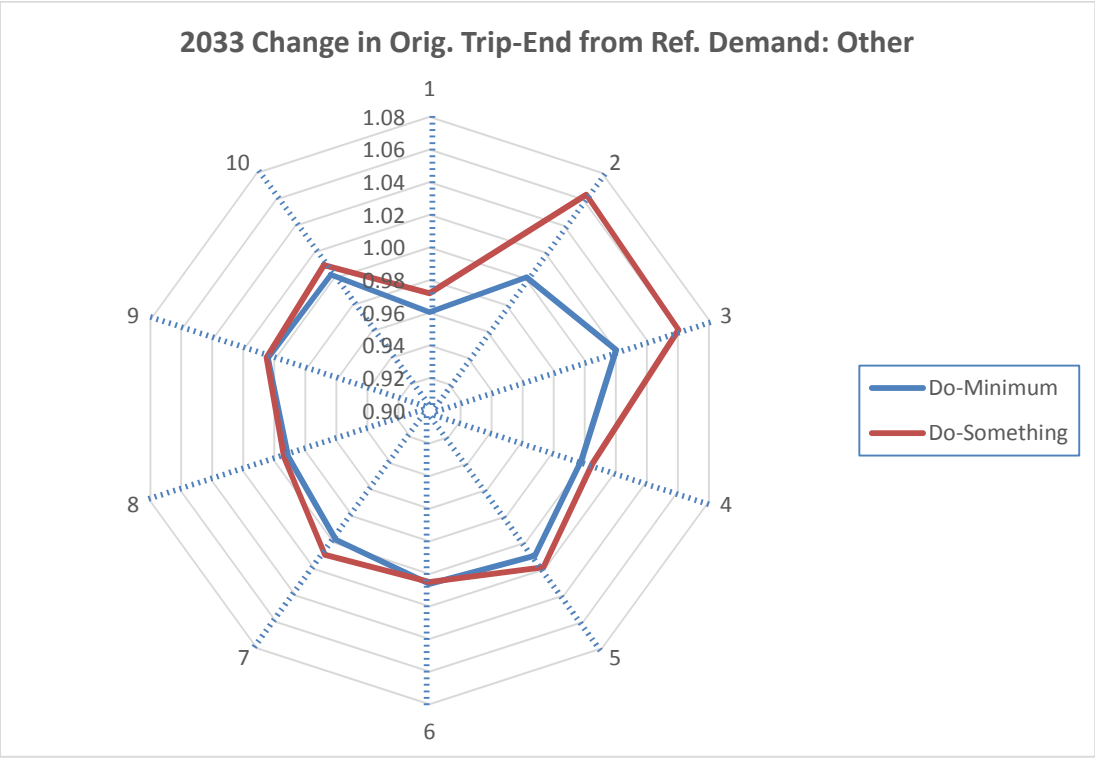
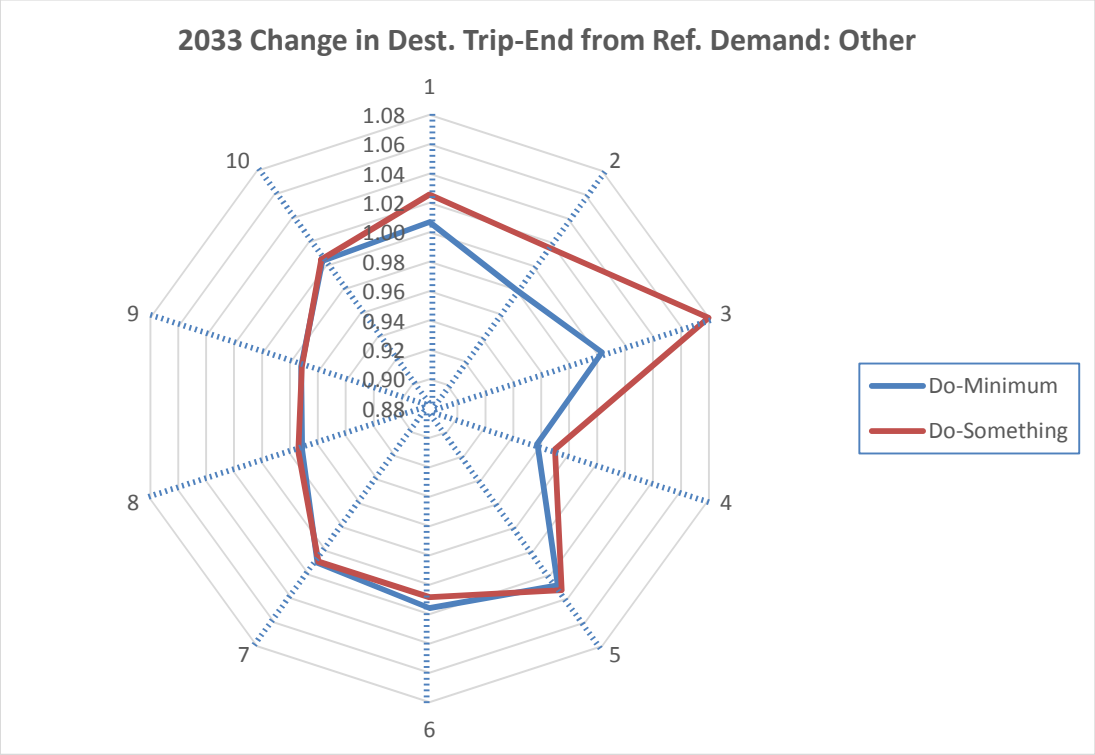

2018 Change in Dest. Trip-End from Ref. Demand: Business
1
2
3
4
5
6
7
8
9
10
1.06
1.04
1.02
1.00
0.98
0.96
0.94
0.92
Do-Minimum
Do-Something

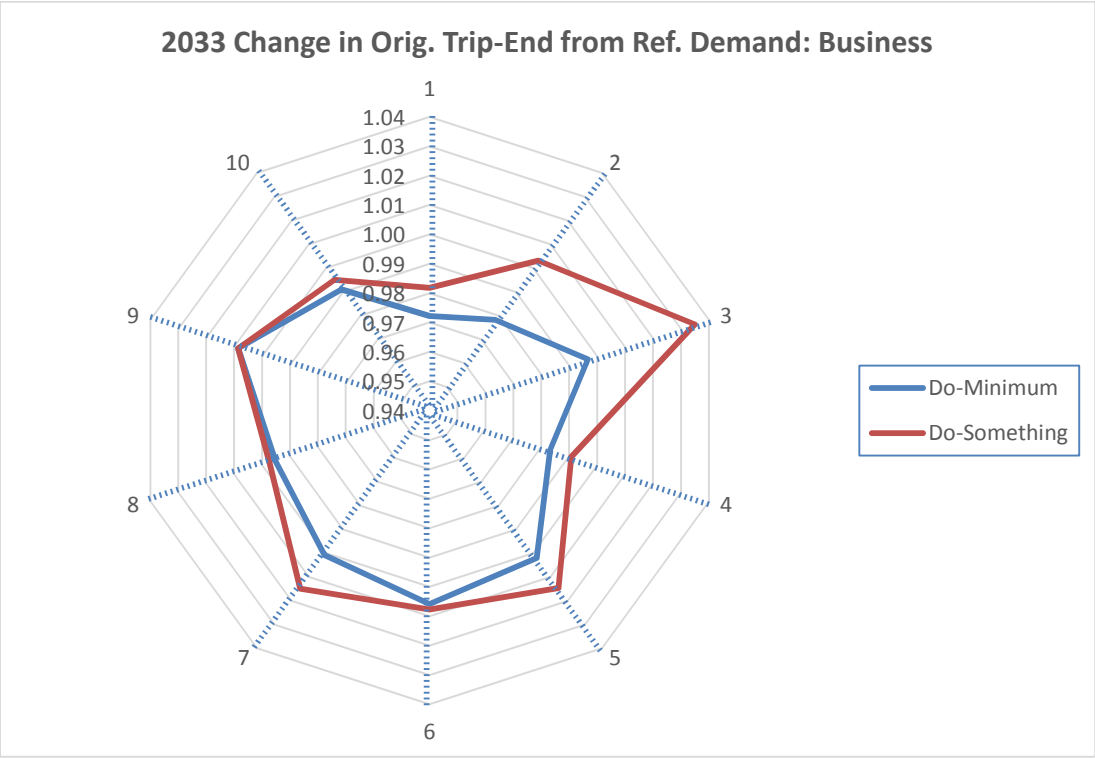
Figure 8-3 – Constrained Matrix Changes at Sector Trip End Level – 2033

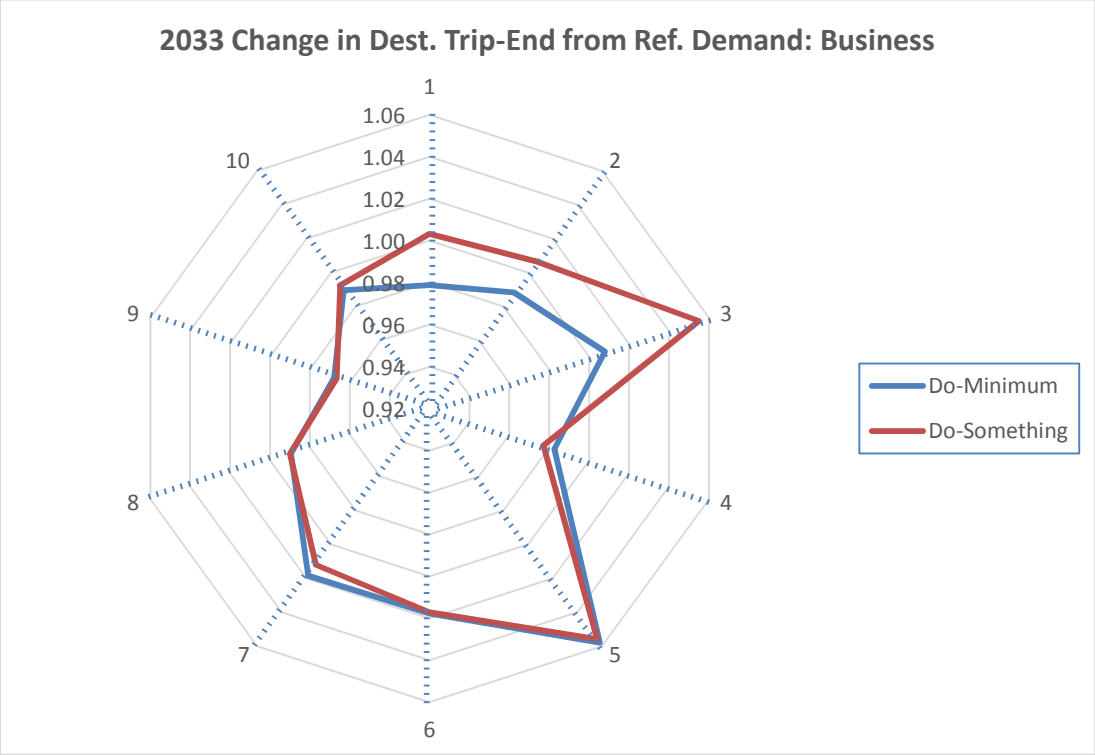





2033 Change in Orig. Trip-End from Ref. Demand: Other
1
2
3
4
5
6
7
8
9
10
1.08
1.06
1.04
1.02
1.00
0.98
0.96
0.94
0.92
0.90
Do-Minimum
Do-Something


2033 Change in Dest. Trip-End from Ref. Demand: Other
1
2
3
4
5
6
7
8
9
10
1.08
1.06
1.04
1.02
1.00
0.98
0.96
0.94
0.92
0.90
0.88
Do-Minimum
Do-Something


2033 Change in Orig. Trip-End from Ref. Demand: Business
1
2
3
4
5
6
7
8
9
10
1.04
1.03
1.02
1.01
1.00
0.99
0.98
0.97
0.96
0.95
0.94
Do-Minimum
Do-Something


2033 Change in Dest. Trip-End from Ref. Demand: Business
1
2
3
4
5
6
7
8
9
10
1.06
1.04
1.02
1.00
0.98
0.96
0.94
0.92
Do-Minimum
Do-Something

8.4 Network Statistics

8.4.1 Total Network Travel Statistic - Variable Demand

The following table and figures indicates how the total travel distance varies between the separate forecasts, for all three time period models.

Figure 8-4 – Total Travel Distance - Variable Demand

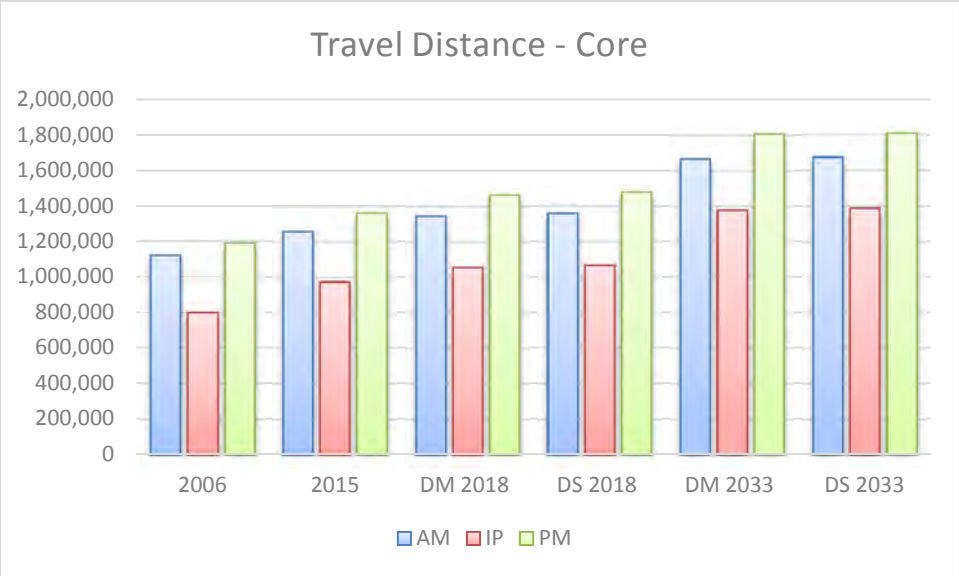


Figure 8-5 – Total Travel Time - Variable Demand

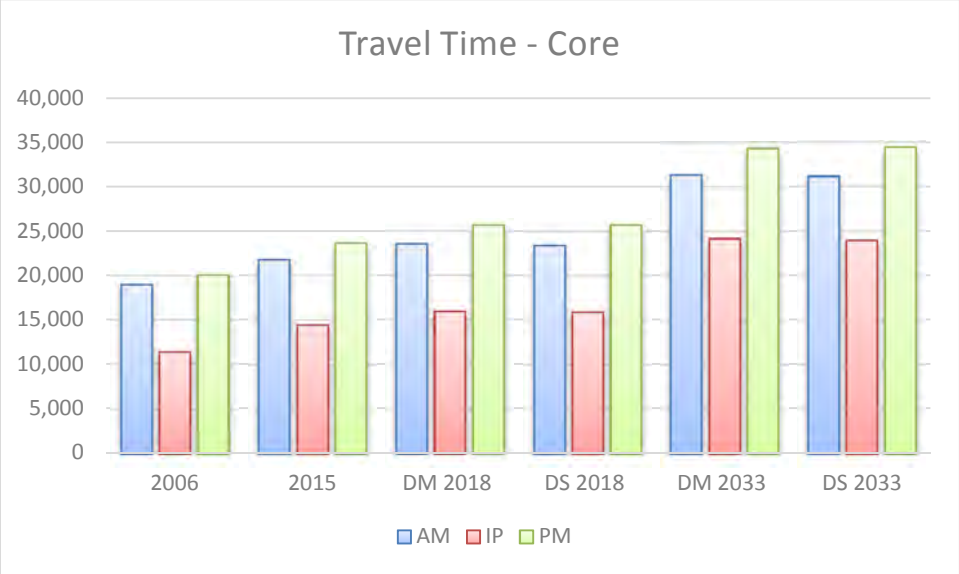


Figure 8-6 – Average Speed (Core) – Variable Demand

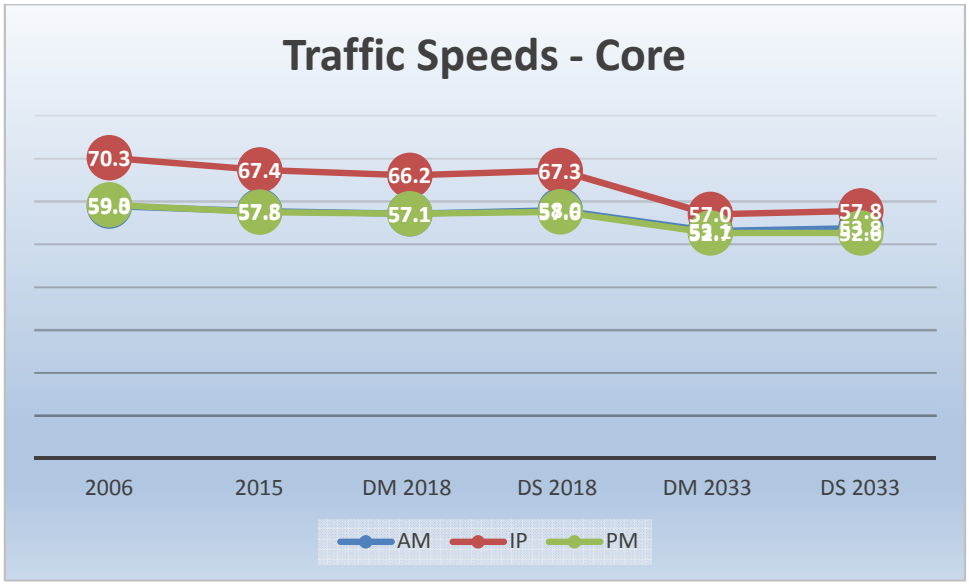


Table 8-3 – Skimmed Costs – Variable Demand

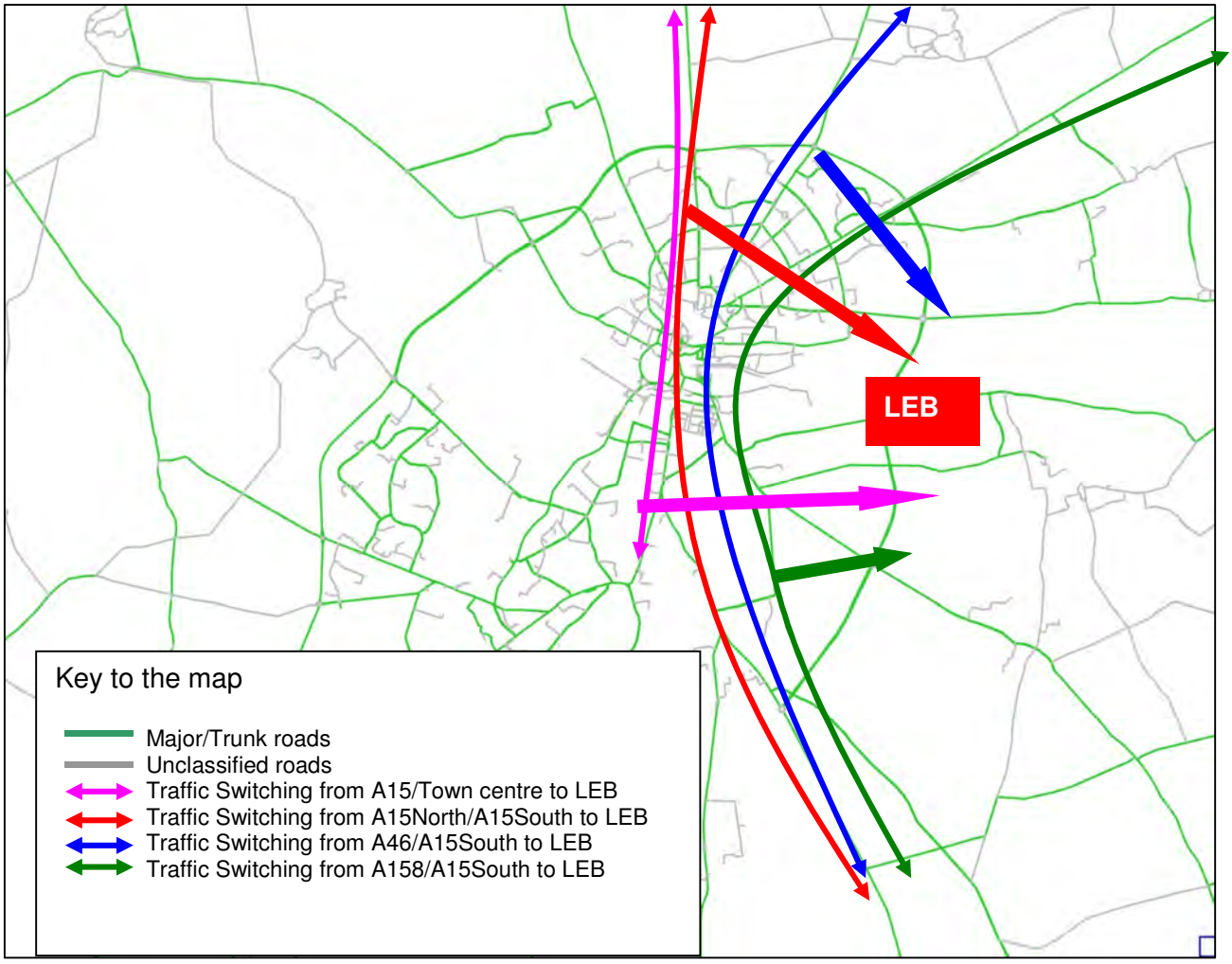
Attribute	2006	2015	DM 2018	DS 2018	DM 2033	DS 2033
Pcu kms						
AM	1,120,206	1,259,448	1,344,146	1,358,799	1,666,331	1,675,565
IP	800,556	974,705	1,056,514	1,067,410	1,377,094	1,387,469
PM	1,188,584	1,361,787	1,464,979	1,479,967	1,808,842	1,812,587
Attribute	**2006**	**2015**	**DM 2018**	**DS 2018**	**DM 2033**	**DS 2033**
Pcu Hrs						
AM	18,993	21,798	23,531	23,425	31,372	31,169
IP	11,385	14,456	15,962	15,871	24,159	24,004
PM	20,050	23,665	25,649	25,699	34,352	34,443
Attribute	**2006**	**2015**	**DM 2018**	**DS 2018**	**DM 2033**	**DS 2033**
Speed kph						
AM	59.0	57.8	57.1	58.0	53.1	53.8
IP	70.3	67.4	66.2	67.3	57.0	57.8
PM	59.3	57.5	57.1	57.6	52.7	52.6

In all three time periods, the percentage increase in pcu kilometres travelled is generally consistent with the growth in trip matrices. This is to be expected, since vehicle kilometres travelled are often used as a proxy of traffic growth.

In all three time periods, there is a reduction in the total travel time in the Do-Something case compared to the Do-Minimum case (significant travel time saving in AM 2018). This indicates that with the Lincoln Eastern Bypass in place there will be travel time savings in all three time periods.

In both opening year and design year traffic rerouting as the result of LEB in place is summarized in figure below. Similar to the fixed demand results, all route switching appears reasonable.

Figure 8-7 – Traffic switching from current base to LEB – Variable Demand



8.5 Summary Result - Variable Demand

Forecasting results with variable demand predicts that LEB will help to reduce total travel distance, reduce total travel time and increase average network speed in the study area.

The forecasting result indicates that LEB can significantly help to reduce traffic pressure on many busy major roads and reduce congestion at a number of junctions in Lincoln town centre.

9 Sensitivity Test Outputs

9.1 Introduction

The following sensitivity tests have been included in the analysis and are presented in this section.

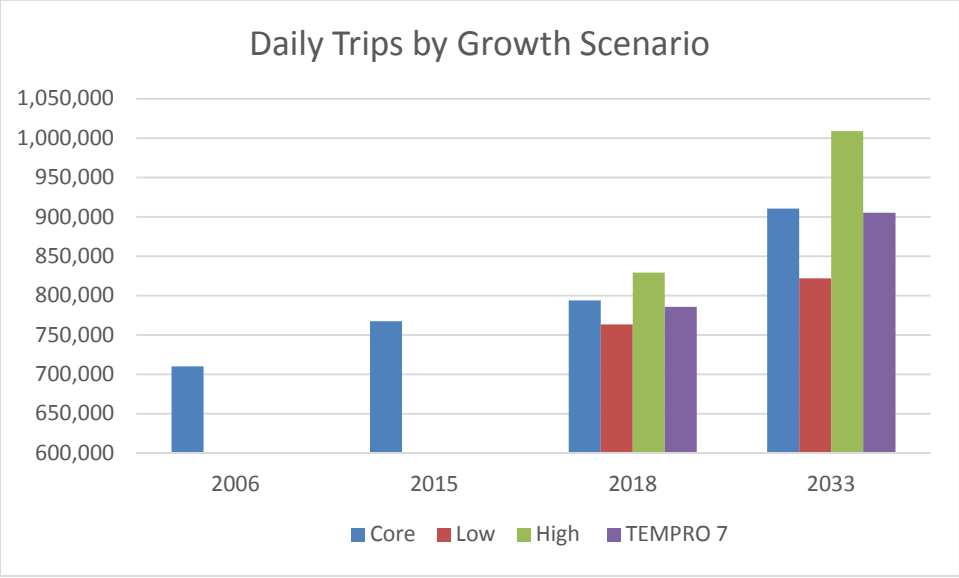
- TEMPRO 7; and
- Alternative (Low and High) growth

As the following tests have been conducted to provide sensitivity on the impact of the core scenario they are not reported in as complete a level of detail as the Core test. Flow volumes differences are included and the relative impacts are included in a tabulation. The Economic Appraisal Report provides the TUBA evaluation of tehse alternative specification tests.

9.2 Total Demands

Figure 9.1 demonstrates the flow magnitude (reference matrices) employed in each of the sensitivity tests relative to the core scenario (blue). This demonstrates a significant increase and reduction in demand for the high and low scenarios, particularly for 2033. The TEMPRO 7 scenario is not significantly different to the Core Low Scenario.

Figure 9-1 – Alternative Demand Scenarios



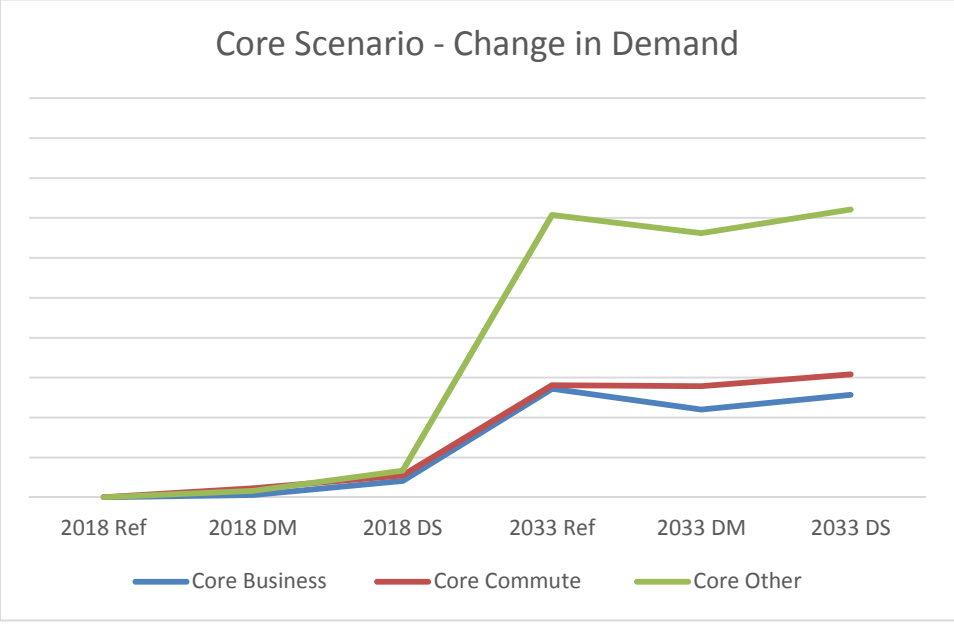
9.3 Sensitivity Test VDM Results

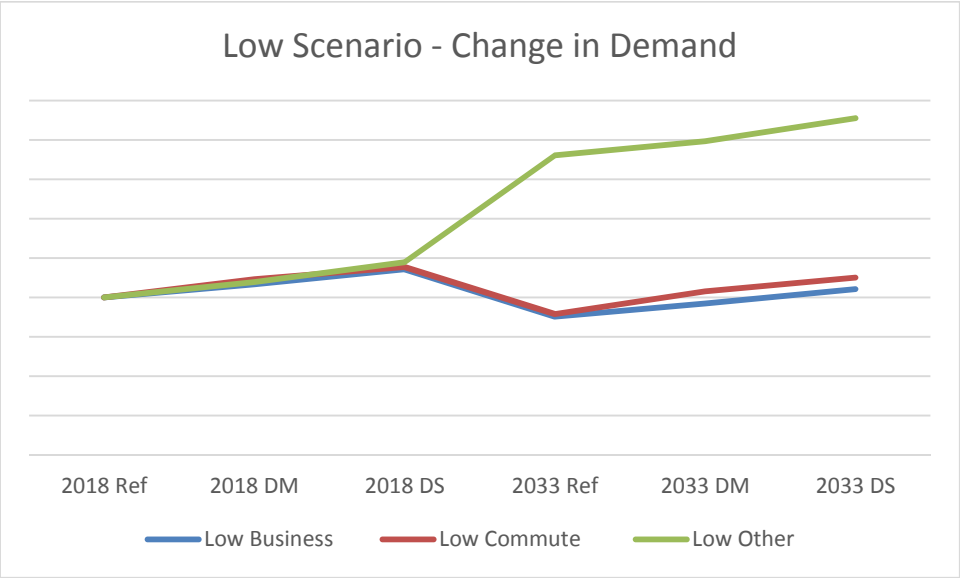
The impact of VDM on daily travel demand matrices is presented in Table 9.1 and Figure 9.2below. This demonstrates that trip induction occurs in everything other than the highest traffic growth in 2018. In 2033 the pattern is more marked, particularly for the “other” travel segment containing HBO where discretionary travel commands a stronger demand response.

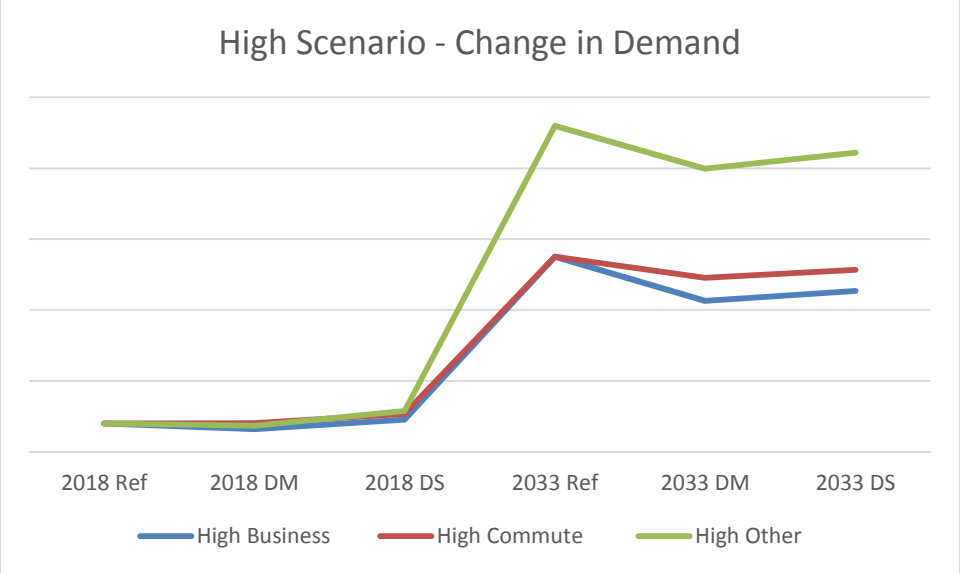
Table 9-1 –LEB Daily VDM Results - by Scenario

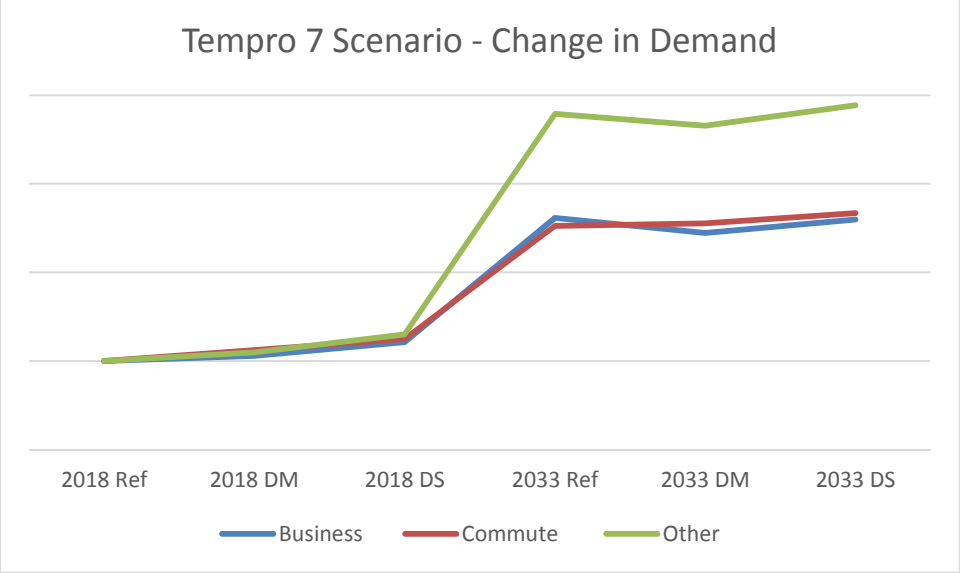
Scenario	Purpose	2018			2033		
		Ref	DM	DS	Ref	DM	DS
Core	Business	66,651	66,727	67,202	70,276	69,585	70,075
	Commute	194,827	195,705	196,960	205,763	205,681	206,841
	Other	379,413	380,661	384,503	433,125	429,636	434,108
	LGV	117,107	117,107	117,107	162,961	162,961	162,961
	HGV	37,905	37,905	37,905	41,752	41,752	41,752
Low	Business	63,865	64,287	64,773	63,245	63,666	64,131
	Commute	186,853	188,596	189,732	185,274	187,413	188,730
	Other	364,392	367,201	370,877	390,675	393,316	397,574
	LGV	112,037	112,037	112,037	145,679	145,679	145,679
	HGV	36,264	36,264	36,264	37,326	37,326	37,326
High	Business	69,512	69,222	69,688	77,686	75,513	76,013
	Commute	203,064	203,086	204,426	226,936	223,905	225,051
	Other	395,159	394,480	398,578	478,122	466,154	470,668
	LGV	122,177	122,177	122,177	180,243	180,243	180,243
	HGV	39,545	39,545	39,545	46,178	46,178	46,178
Tempro 7	Business	65,991	66,177	66,692	71,320	70,756	71,256
	Commute	190,740	191,911	193,121	205,288	205,553	206,666
	Other	374,278	376,059	379,858	426,493	423,990	428,321
	LGV	116,789	116,789	116,789	159,851	159,851	159,851
	HGV	38,140	38,140	38,140	42,353	42,353	42,353

Figure 9-2 – Change in Demand Relative to 2018 Reference Demands




Low Scenario - Change in Demand
2018 Ref
2018 DM
2018 DS
2033 Ref
2033 DM
2033 DS
Low Business
Low Commute
Low Other


High Scenario - Change in Demand
2018 Ref
2018 DM
2018 DS
2033 Ref
2033 DM
2033 DS
High Business
High Commute
High Other


Tempro 7 Scenario - Change in Demand
2018 Ref
2018 DM
2018 DS
2033 Ref
2033 DM
2033 DS
Business
Commute
Other

10 Summary and Conclusions

10.1 Summary

This report has described that the methods and assumptions used in preparing the future year traffic forecasts using the 2006 Base year traffic model for the Greater Lincoln area, in line with the Department's guidance. A projection from a 2015 Present Year has been conducted to the opening year, 2018, and the design year 2033.

A number of tests using different transport demand and supply assumptions were used to test the sensitivity of the model and also the plausibility of the economic assessment process that was used is assessing the benefits of the Lincoln Eastern Bypass scheme for three alternative scenarios.

10.2 Summary

Forecasting results, with both fixed demand and variable demand, predict that LEB will help to reduce total travel distance, reduce total travel time and increase average network speed in the study area.

The forecasting result indicates that LEB will significantly help to reduce traffic pressure on many busy major roads and reduce congestion at a number of junctions in Lincoln city centre.

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Appendix A – Zonal Correspondence - TEMPRO

Zone	Region	County	Authority	Detailed Description	TEMPRO Zone	District
				TEMPRO		
1	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
2	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
3	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
4	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
5	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
6	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
7	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
8	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
9	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
10	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
11	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
12	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
13	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
14	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
15	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
16	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
17	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
18	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
19	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
20	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
21	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
22	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
23	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
24	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
25	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
26	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
27	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
28	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
29	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
30	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
31	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
32	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
33	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
34	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
35	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
36	EM	Lincolnshire	Lincoln	Birchwood (32UD2)	2	1

Zone	Region	County	Authority	Detailed Description	TEMPRO Zone	District
				TEMPRO		
37	EM	Lincolnshire	Lincoln	Birchwood (32UD2)	2	1
38	EM	Lincolnshire	Lincoln	Birchwood (32UD2)	2	1
39	EM	Lincolnshire	Lincoln	Birchwood (32UD2)	2	1
40	EM	Lincolnshire	Lincoln	Birchwood (32UD2)	2	1
41	EM	Lincolnshire	Lincoln	Birchwood (32UD2)	2	1
42	EM	Lincolnshire	Lincoln	Birchwood (32UD2)	2	1
43	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
44	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
45	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
46	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
47	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
48	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
49	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
50	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
51	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
52	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
53	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
54	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
55	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
56	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
57	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
58	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
59	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
60	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
61	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
62	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
63	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
64	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
65	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
66	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
67	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
68	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
69	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
70	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
71	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
72	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
73	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
74	EM	Lincolnshire	Lincoln	Birchwood (32UD2)	2	1

Zone	Region	County	Authority	Detailed Description	TEMPRO Zone	District
				TEMPRO		
75	EM	Lincolnshire	North Kesteven	Skellingthorpe (32UE11)	3	2
76	EM	Lincolnshire	North Kesteven	Skellingthorpe (32UE11)	3	2
77	EM	Lincolnshire	North Kesteven	Lincoln(part of) (32UE1)	4	2
78	EM	Lincolnshire	North Kesteven	Heighington/Washingborough (32UE4)	6	2
79	EM	Lincolnshire	North Kesteven	Heighington/Washingborough (32UE4)	6	2
80	EM	Lincolnshire	North Kesteven	Branston (32UE8)	7	2
81	EM	Lincolnshire	North Kesteven	Branston (32UE8)	7	2
82	EM	Lincolnshire	North Kesteven	Branston (32UE8)	7	2
83	EM	Lincolnshire	North Kesteven	Bracebridge Heath (32UE6)	8	2
84	EM	Lincolnshire	North Kesteven	Bracebridge Heath (32UE6)	8	2
85	EM	Lincolnshire	North Kesteven	Bracebridge Heath (32UE6)	8	2
86	EM	Lincolnshire	North Kesteven	Waddington (32UE2)	9	2
87	EM	Lincolnshire	North Kesteven	Waddington (32UE2)	9	2
88	EM	Lincolnshire	North Kesteven	Waddington (32UE2)	9	2
89	EM	Lincolnshire	North Kesteven	Waddington (32UE2)	9	2
90	EM	Lincolnshire	North Kesteven	Lincoln(part of) (32UE1)	4	2
91	EM	Lincolnshire	North Kesteven	Lincoln(part of) (32UE1)	4	2
92	EM	Lincolnshire	North Kesteven	Lincoln(part of) (32UE1)	4	2
93	EM	Lincolnshire	North Kesteven	Lincoln(part of) (32UE1)	4	2
94	EM	Lincolnshire	North Kesteven	Lincoln(part of) (32UE1)	4	2
95	EM	Lincolnshire	North Kesteven	Lincoln(part of) (32UE1)	4	2
96	EM	Lincolnshire	North Kesteven	Lincoln(part of) (32UE1)	4	2
97	EM	Lincolnshire	North Kesteven	Lincoln(part of) (32UE1)	4	2
98	EM	Lincolnshire	North Kesteven	Lincoln(part of) (32UE1)	4	2
99	EM	Lincolnshire	North Kesteven	Waddington (32UE2)	9	2
100	EM	Lincolnshire	North Kesteven	Lincoln(part of) (32UE1)	4	2
101	EM	Lincolnshire	West Lindsey	Cherry Willingham/Reepham (32UH5)	10	3
102	EM	Lincolnshire	West Lindsey	rural (West Lindsey) (32UH0)	11	3
103	EM	Lincolnshire	West Lindsey	Cherry Willingham/Reepham (32UH5)	10	3
104	EM	Lincolnshire	West Lindsey	rural (West Lindsey) (32UH0)	11	3
105	EM	Lincolnshire	West Lindsey	Cherry Willingham/Reepham (32UH5)	10	3
106	EM	Lincolnshire	West Lindsey	Nettleham (32UH6)	12	3
107	EM	Lincolnshire	West Lindsey	Nettleham (32UH6)	12	3
108	EM	Lincolnshire	West Lindsey	rural (West Lindsey) (32UH0)	11	3
109	EM	Lincolnshire	West Lindsey	rural (West Lindsey) (32UH0)	11	3

Zone	Region	County	Authority	Detailed Description TEMPRO	TEMPRO Zone	District
110	EM	Lincolnshire	West Lindsey	rural (West Lindsey) (32UH0)	11	3
111	EM	Lincolnshire	West Lindsey	Saxilby (32UH4)	13	3
112	EM	Lincolnshire	West Lindsey	Welton/Dunholme (32UH3)	14	3
113	EM	Lincolnshire	West Lindsey	rural (West Lindsey) (32UH0)	11	3
114	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
115	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
116	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
117	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
118	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
119	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
120	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
121	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
122	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
123	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
124	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
125	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
126	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
127	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
128	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
129	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
130	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
131	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
132	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2
133	EM	Lincolnshire	North Kesteven	Metheringham (32UE10)	16	2
134	EM	Lincolnshire	North Kesteven	rural (North Kesteven) (32UE0)	15	2

Zone	Region	County	Authority	Detailed Description	TEMPRO Zone	District
				TEMPRO		
135	EM	Lincolnshire	North Kesteven	Metheringham (32UE10)	16	2
136	EM	Lincolnshire	North Kesteven	Woodhall Spa(part of) (32UE7)	17	2
137	EM	Lincolnshire	North Kesteven	Ruskington (32UE5)	18	2
138	EM	Lincolnshire	North Kesteven	Heckington (32UE9)	19	2
139	EM	Lincolnshire	North Kesteven	Sleaford (32UE3)	20	2
140	EM	Lincolnshire	East Lindsey	East Lindsey	33	5
140	EM	Lincolnshire	Boston	Boston	33	5
141	EM	Lincolnshire	East Lindsey	Louth (32UC3)	21	5
142	EM	Lincolnshire	East Lindsey	Horncastle (32UC5)	22	5
143	EM	Lincolnshire	East Lindsey	Boston (32UB1)	23	5
144	EM	Lincolnshire	South Holland	South Holland	34	11
144	EM	Lincolnshire	South Kesteven	South Kesteven	34	11
144	EM	Leicestershire	Melton	Melton	34	11
144	EM	Nottinghamshire	Rushcliffe	Rushcliffe	34	11
145	EM	Lincolnshire	South Holland	Spalding (32UF1)	24	11
146	EM	Lincolnshire	South Kesteven	Grantham (32UG1)	25	11
146	EM	Lincolnshire	South Kesteven	Great Gonerby (32UG2)	25	11
147	EM	Nottinghamshire	Bassetlaw	Bassetlaw	35	4
147	EM	Nottinghamshire	Newark and Sherwood	Newark and Sherwood	35	4
148	EM	Nottinghamshire	Newark and Sherwood	Newark-on-Trent (37UG2)	26	4
149	EM	Nottinghamshire	Bassetlaw	East Retford (37UC2)	27	4
150	EM	Lincolnshire	West Lindsey	rural (West Lindsey) (32UH0)	11	3
151	EM	Lincolnshire	West Lindsey	Gainsborough (32UH2)	28	3
152	EM	Lincolnshire	West Lindsey	Market Rasen (32UH7)	29	3
153	YH	Humberside	North East Lincolnshire	Grimsby (00FC1)	30	7
154	YH	Humberside	North East Lincolnshire	Cleethorpes (00FC2)	31	7
155	YH	Humberside	North Lincolnshire	Scunthorpe (00FD1)	32	9
156	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
157	EM	Lincolnshire	West Lindsey	rural (West Lindsey) (32UH0)	11	3
158	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
159	EM	Lincolnshire	West Lindsey	Lincoln(part of) (32UH1)	5	3
160	EM	Lincolnshire	West Lindsey	Lincoln(part of) (32UH1)	5	3
161	EM	Lincolnshire	West Lindsey	Lincoln(part of) (32UH1)	5	3
162	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1

Zone	Region	County	Authority	Detailed Description TEMPRO	TEMPRO Zone	District
163	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
164	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
165	EM	Lincolnshire	West Lindsey	Lincoln(part of) (32UH1)	5	3
166	EM	Lincolnshire	West Lindsey	Lincoln(part of) (32UH1)	5	3
167	EM	Lincolnshire	West Lindsey	Lincoln(part of) (32UH1)	5	3
168	YH	Humberside	North East Lincolnshire	North East Lincolnshire	36	4
169	YH	Humberside	North Lincolnshire	North Lincolnshire	37	9
169	YH	Humberside	East Riding of Yorkshire	East Riding of Yorkshire	37	9
169	YH	Humberside	Kingston upon Hull City	Kingston upon Hull City	37	9
170	NE			NE	41	8
170	NW			NW	41	8
170	YH	North Yorkshire		North Yorkshire	41	8
170	YH	South Yorkshire		South Yorkshire	41	8
170	YH	West Yorkshire		West Yorkshire	41	8
171	EM	Derbyshire		Derbyshire	38	10
171	EM	Nottinghamshire	Ashfield	Ashfield	38	10
171	EM	Nottinghamshire	Broxtowe	Broxtowe	38	10
171	EM	Nottinghamshire	Gelding	Gedling	38	10
171	EM	Nottinghamshire	Mansfield	Mansfield	38	10
171	EM	Nottinghamshire	Nottingham	Nottingham	38	10
172	WM	Shropshire		Shropshire	39	12
172	WM	Staffordshire		Staffordshire	39	12
172	WM	West Midlands county		West Midlands county	39	12
172	WALES	North Wales		North Wales	39	12
172	WALES	Mid Wales	Gwynedd(Meirionnydd)	Gwynedd(Meirionnydd)	39	12
173	SE			SE	42	6
173	EAST			EAST	42	6
173	LON			LON	42	6
173	EM	Leicestershire		Leicestershire	42	6
173	EM	Northamptonshire		Northamptonshire	42	6
174	SW			SW	40	12

Zone	Region	County	Authority	Detailed Description TEMPRO	TEMPRO Zone	District
174	WM	Hereford & Worcester		Hereford & Worcester	40	12
174	WM	Warwickshire		Warwickshire	40	12
174	WALES	Mid Wales	Ceredigion	Ceredigion	40	12
174	WALES	Mid Wales	Powys	Powys	40	12
174	WALES	South East Wales		South East Wales	40	12
174	WALES	South West Wales		South West Wales	40	12
175	EM	Lincolnshire	West Lindsey	rural (West Lindsey) (32UH0)	11	3
176	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
177	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1
178	EM	Lincolnshire	Lincoln	Lincoln(main) (32UD1)	1	1

Appendix B – TEMPRO 6.2 Growth

Based on Standard Lincoln Sectors

TEMPRO 6.2 Growth 2015–2018 – AM Peak

District	TEMPRO 6.2 OD Car Growth					
	Commute		Other		Emp.Bus	
	O	D	O	D	O	D
1	1.0384	1.0111	1.0346	1.0214	1.0293	1.0110
2	1.0231	1.0152	1.0338	1.0312	1.0210	1.0140
3	1.0034	1.0084	1.0197	1.0225	1.0040	1.0065
4	1.0184	1.0230	1.0343	1.0359	1.0216	1.0241
5	0.9958	1.0107	1.0179	1.0223	1.0022	1.0130
6	1.0218	1.0219	1.0306	1.0307	1.0227	1.0228
7	1.0036	1.0073	1.0183	1.0176	1.0064	1.0085
8	1.0201	1.0200	1.0256	1.0256	1.0211	1.0210
9	1.0098	1.0129	1.0268	1.0280	1.0117	1.0138
10	1.0206	1.0176	1.0295	1.0285	1.0208	1.0188
11	1.0142	1.0158	1.0266	1.0269	1.0153	1.0160
12	1.0182	1.0182	1.0266	1.0266	1.0186	1.0186

TEMPRO 6.2 Growth 2015–2018 – Inter Peak

District	TEMPRO 6.2 OD Car Growth					
	Commute		Other		Emp.Bus	
	O	D	O	D	O	D
1	1.0204	1.0260	1.0310	1.0316	1.0157	1.0164
2	1.0184	1.0195	1.0370	1.0372	1.0171	1.0161
3	1.0067	1.0052	1.0262	1.0259	1.0087	1.0087
4	1.0211	1.0204	1.0392	1.0393	1.0243	1.0247
5	1.0056	1.0025	1.0244	1.0240	1.0107	1.0125
6	1.0212	1.0212	1.0337	1.0337	1.0231	1.0231
7	1.0059	1.0048	1.0215	1.0215	1.0088	1.0091
8	1.0189	1.0190	1.0285	1.0285	1.0211	1.0211
9	1.0122	1.0116	1.0317	1.0316	1.0142	1.0143
10	1.0184	1.0190	1.0322	1.0322	1.0197	1.0196
11	1.0149	1.0147	1.0313	1.0312	1.0168	1.0167
12	1.0176	1.0176	1.0301	1.0301	1.0191	1.0191

TEMPRO 6.2 Growth 2015–2018 – PM Peak

District	TEMPRO 6.2 OD Car Growth					
	Commute		Other		Emp.Bus	
	O	D	O	D	O	D
1	1.0114	1.0362	1.0266	1.0306	1.0128	1.0302
2	1.0148	1.0222	1.0320	1.0331	1.0159	1.0214
3	1.0081	1.0034	1.0207	1.0203	1.0091	1.0069
4	1.0225	1.0183	1.0345	1.0337	1.0245	1.0221
5	1.0102	0.9966	1.0193	1.0175	1.0117	1.0036
6	1.0211	1.0210	1.0298	1.0298	1.0230	1.0229
7	1.0067	1.0033	1.0163	1.0161	1.0085	1.0066
8	1.0188	1.0188	1.0259	1.0259	1.0211	1.0211
9	1.0130	1.0101	1.0259	1.0256	1.0141	1.0122
10	1.0170	1.0197	1.0282	1.0285	1.0192	1.0210
11	1.0153	1.0138	1.0266	1.0265	1.0164	1.0157
12	1.0174	1.0174	1.0267	1.0267	1.0189	1.0189

TEMPRO 6.2 Growth 2015–2033 – AM Peak

District	TEMPRO 6.2 OD Car Growth					
	Commute		Other		Emp.Bus	
	O	D	O	D	O	D
1	1.1848	1.0365	1.1933	1.1212	1.1319	1.0393
2	1.0997	1.0652	1.2013	1.1930	1.0888	1.0586
3	0.9664	1.0422	1.1095	1.1414	0.9869	1.0471
4	1.0639	1.0989	1.1769	1.1937	1.0853	1.1061
5	0.9423	1.0146	1.0908	1.1106	0.9737	1.0267
6	1.0849	1.0855	1.1763	1.1766	1.0903	1.0906
7	1.0257	1.0469	1.0846	1.0838	1.0406	1.0549
8	1.0898	1.0891	1.1403	1.1401	1.0949	1.0944
9	1.0645	1.0800	1.1559	1.1611	1.0745	1.0850
10	1.0795	1.0634	1.1660	1.1593	1.0796	1.0687
11	1.0516	1.0520	1.1554	1.1557	1.0534	1.0522
12	1.0990	1.0990	1.1467	1.1468	1.0998	1.0998

TEMPRO 6.2 Growth 2015–2033 – Inter Peak

District	TEMPRO 6.2 OD Car Growth					
	Commute		Other		Emp.Bus	
	O	D	O	D	O	D
1	1.0906	1.1213	1.1770	1.1809	1.0656	1.0702
2	1.0825	1.0893	1.2296	1.2309	1.0791	1.0711
3	1.0152	0.9981	1.1592	1.1556	1.0388	1.0426
4	1.0872	1.0816	1.2126	1.2131	1.1083	1.1099
5	0.9938	0.9796	1.1303	1.1277	1.0197	1.0291
6	1.0866	1.0865	1.2012	1.2012	1.0962	1.0961
7	1.0361	1.0316	1.1043	1.1044	1.0529	1.0557
8	1.0857	1.0858	1.1593	1.1593	1.0967	1.0967
9	1.0760	1.0731	1.1839	1.1835	1.0877	1.0881
10	1.0725	1.0754	1.1854	1.1856	1.0778	1.0773
11	1.0555	1.0555	1.1859	1.1859	1.0617	1.0607
12	1.0958	1.0958	1.1682	1.1682	1.1037	1.1037

TEMPRO 6.2 Growth 2015–2033 – PM Peak

District	TEMPRO 6.2 OD Car Growth					
	Commute		Other		Emp.Bus	
	O	D	O	D	O	D
1	1.0417	1.1759	1.1467	1.1655	1.0503	1.1408
2	1.0677	1.0994	1.1904	1.1976	1.0704	1.0922
3	1.0429	0.9728	1.1165	1.1098	1.0438	0.9951
4	1.0979	1.0660	1.1813	1.1734	1.1075	1.0885
5	1.0155	0.9501	1.0923	1.0826	1.0225	0.9824
6	1.0853	1.0847	1.1639	1.1638	1.0940	1.0936
7	1.0427	1.0230	1.0823	1.0801	1.0541	1.0428
8	1.0847	1.0852	1.1386	1.1386	1.0958	1.0962
9	1.0800	1.0662	1.1523	1.1513	1.0869	1.0774
10	1.0646	1.0791	1.1522	1.1544	1.0730	1.0828
11	1.0534	1.0532	1.1487	1.1497	1.0577	1.0578
12	1.0947	1.0947	1.1491	1.1491	1.1022	1.1022

Appendix C – Daily Demand Matrices

2015 Matrices

Purpose	Format	AM period	IP Period	PM Period	OP Period	24hr Total
Home Based Persons						
HB Commute (PA)	from Home	59,576	20,868	7,811	868	89,123
	return Home	4,827	24,390	42,366	1,210	72,792
	Total	64,403	45,258	50,177	2,078	161,915
HB Education (PA)	from Home	12,729	9,955	1,324	10	24,018
	return Home	2,668	21,589	7,017	29	31,303
	Total	15,398	31,544	8,341	38	55,321
HB Other (PA)	from Home	20,045	60,213	28,859	999	110,116
	return Home	20,729	19,074	27,664	1,478	68,944
	Total	40,774	79,287	56,523	2,477	179,060
HB Business (PA)	from Home	6,023	5,292	2,245	216	13,776
	return Home	1,771	4,437	7,006	449	13,662
	Total	7,793	9,729	9,251	665	27,438
Home Based Vehicles						
HB Commute (PA)	from Home	52,031	18,370	6,974	774	78,149
	return Home	4,216	21,470	37,826	1,079	64,591
	Total	56,247	39,840	44,801	1,853	142,741
HB Education (PA)	from Home	7,752	5,832	754	6	14,343
	return Home	1,625	12,648	3,994	17	18,283
	Total	9,377	18,479	4,747	22	32,626
HB Other (PA)	from Home	12,208	35,274	16,425	582	64,489
	return Home	12,624	11,174	15,745	861	40,404
	Total	24,832	46,448	32,170	1,443	104,893
HB Business (PA)	from Home	4,961	4,488	1,944	185	11,578

Purpose	Format	AM period	IP Period	PM Period	OP Period	24hr Total
	return Home	1,458	3,764	6,066	385	11,672
	Total	6,419	8,252	8,009	570	23,251
Home Based Occupancy						
HB Commute (PA)	from Home	1.15	1.14	1.12	1.12	1.14
	return Home	1.14	1.14	1.12	1.12	1.13
	Total	1.14	1.14	1.12	1.12	1.13
HB Education (PA)	from Home	1.64	1.71	1.76	1.72	1.67
	return Home	1.64	1.71	1.76	1.72	1.71
	Total	1.64	1.71	1.76	1.72	1.70
HB Other (PA)	from Home	1.64	1.71	1.76	1.72	1.71
	return Home	1.64	1.71	1.76	1.72	1.71
	Total	1.64	1.71	1.76	1.72	1.71
HB Business (PA)	from Home	1.21	1.18	1.16	1.17	1.19
	return Home	1.21	1.18	1.16	1.17	1.17
	Total	1.21	1.18	1.15	1.17	1.18
Non Home Based Persons						
NHB Other (OD)	Total	27,250	261,267	60,453	7,690	356,661
NHB Business (OD)	Total	8,142	25,146	5,045	924	39,256
Non Home Based Vehicles						
NHB Other (OD)	Total	16,596	153,056	34,407	4,479	208,538
NHB Business (OD)	Total	6,707	21,328	4,368	791	33,194
Non Home Based Occupancy						
NHB Other (OD)	Total	1.64	1.71	1.76	1.72	1.71
NHB Business (OD)	Total	1.21	1.18	1.15	1.17	1.18

2018 Matrices

Purpose	Format	AM period	IP Period	PM Period	OP Period	24hr Total
Home Based Persons						
HB Commute (PA)	from Home	60,275	21,271	8,123	879	90,548
	return Home	4,907	24,619	42,749	1,226	73,502
	Total	65,182	45,890	50,873	2,105	164,050
HB Education (PA)	from Home	12,797	10,148	1,332	10	24,287
	return Home	2,688	22,187	7,102	29	32,005
	Total	15,485	32,335	8,434	39	56,293
HB Other (PA)	from Home	21,019	63,375	30,017	1,043	115,454
	return Home	21,945	19,748	28,196	1,542	71,431
	Total	42,964	83,123	58,213	2,586	186,886
HB Business (PA)	from Home	6,138	5,494	2,317	221	14,170
	return Home	1,792	4,513	7,079	458	13,842
	Total	7,930	10,007	9,396	679	28,012
Home Based Vehicles						
HB Commute (PA)	from Home	52,780	18,774	7,266	786	79,606
	return Home	4,297	21,729	38,237	1,095	65,359
	Total	57,077	40,503	45,503	1,881	144,965
HB Education (PA)	from Home	7,856	5,991	763	6	14,616
	return Home	1,650	13,097	4,070	17	18,834
	Total	9,506	19,088	4,833	23	33,450
HB Other (PA)	from Home	12,903	37,411	17,202	611	68,127
	return Home	13,471	11,658	16,158	904	42,191
	Total	26,375	49,069	33,360	1,515	110,318
HB Business (PA)	from Home	5,069	4,668	2,011	190	11,937
	return Home	1,480	3,834	6,145	394	11,853

Purpose	Format	AM period	IP Period	PM Period	OP Period	24hr Total
	Total	6,548	8,502	8,156	583	23,790
Home Based Occupancy						
HB Commute (PA)	from Home	1.14	1.13	1.12	1.12	1.14
	return Home	1.14	1.13	1.12	1.12	1.12
	Total	1.14	1.13	1.12	1.12	1.13
HB Education (PA)	from Home	1.63	1.69	1.75	1.71	1.66
	return Home	1.63	1.69	1.74	1.71	1.70
	Total	1.63	1.69	1.74	1.71	1.68
HB Other (PA)	from Home	1.63	1.69	1.74	1.71	1.69
	return Home	1.63	1.69	1.74	1.71	1.69
	Total	1.63	1.69	1.75	1.71	1.69
HB Business (PA)	from Home	1.21	1.18	1.15	1.16	1.19
	return Home	1.21	1.18	1.15	1.16	1.17
	Total	1.21	1.18	1.15	1.16	1.18
Non Home Based Persons						
NHB Other (OD)	Total	27,830	266,085	61,219	7,822	362,956
NHB Business (OD)	Total	8,204	25,416	5,080	932	39,632
Non Home Based Vehicles						
NHB Other (OD)	Total	17,084	157,075	35,082	4,582	213,824
NHB Business (OD)	Total	6,775	21,594	4,410	801	33,579
Non Home Based Occupancy						
NHB Other (OD)	Total	1.63	1.69	1.75	1.71	1.70
NHB Business (OD)	Total	1.21	1.18	1.15	1.16	1.18

2033 Matrices

Purpose	Format	AM period	IP Period	PM Period	OP Period	24hr Total
Home Based Persons						
HB Commute (PA)	from Home	61,943	22,442	9,159	908	94,451
	return Home	5,094	25,062	43,491	1,266	74,912
	Total	67,037	47,503	52,649	2,173	169,363
HB Education (PA)	from Home	12,977	10,909	1,393	10	25,289
	return Home	2,810	24,998	7,479	31	35,319
	Total	15,787	35,907	8,872	42	60,608
HB Other (PA)	from Home	23,960	82,747	34,326	1,196	142,229
	return Home	21,926	20,380	27,961	1,768	72,035
	Total	45,886	103,126	62,287	2,964	214,264
HB Business (PA)	from Home	6,486	6,341	2,563	236	15,626
	return Home	1,851	4,728	7,253	490	14,323
	Total	8,337	11,069	9,816	726	29,949
Home Based Vehicles						
HB Commute (PA)	from Home	54,914	20,020	8,258	817	84,009
	return Home	4,516	22,356	39,216	1,139	67,227
	Total	59,430	42,376	47,474	1,956	151,236
HB Education (PA)	from Home	8,271	6,697	825	6	15,799
	return Home	1,791	15,346	4,431	19	21,587
	Total	10,062	22,042	5,256	25	37,386
HB Other (PA)	from Home	15,271	50,796	20,335	721	87,123
	return Home	13,975	12,510	16,565	1,066	44,116
	Total	29,246	63,306	36,900	1,787	131,239
HB Business (PA)	from Home	5,423	5,438	2,253	205	13,319
	return Home	1,548	4,055	6,374	425	12,401

Purpose	Format	AM period	IP Period	PM Period	OP Period	24hr Total
	Total	6,971	9,493	8,626	630	25,720
Home Based Occupancy						
HB Commute (PA)	from Home	1.13	1.12	1.11	1.11	1.12
	return Home	1.13	1.12	1.11	1.11	1.11
	Total	1.13	1.12	1.11	1.11	1.12
HB Education (PA)	from Home	1.57	1.63	1.69	1.66	1.60
	return Home	1.57	1.63	1.69	1.66	1.64
	Total	1.57	1.63	1.69	1.66	1.62
HB Other (PA)	from Home	1.57	1.63	1.69	1.66	1.63
	return Home	1.57	1.63	1.69	1.66	1.63
	Total	1.57	1.63	1.69	1.66	1.63
HB Business (PA)	from Home	1.20	1.17	1.14	1.15	1.17
	return Home	1.20	1.17	1.14	1.15	1.15
	Total	1.20	1.17	1.14	1.15	1.16
Non Home Based Persons						
NHB Other (OD)	Total	28,098	281,965	62,153	8,135	380,351
NHB Business (OD)	Total	8,216	25,878	5,100	941	40,134
Non Home Based Vehicles						
NHB Other (OD)	Total	17,908	173,091	36,821	4,903	232,723
NHB Business (OD)	Total	6,869	22,194	4,481	816	34,361
Non Home Based Occupancy						
NHB Other (OD)	Total	1.57	1.63	1.69	1.66	1.63
NHB Business (OD)	Total	1.20	1.17	1.14	1.15	1.17

Appendix D – TEMPRO 7 Growth

Based on Standard Lincoln Sectors

TEMPRO 7 Growth 2015–2018 – AM Peak

District	TEMPRO 7 OD Car Growth					
	Commute		Other		Emp.Bus	
	O	D	O	D	O	D
1	1.0108	0.9891	1.0144	1.0111	1.0158	1.0040
2	0.9855	0.9855	1.0069	1.0078	0.9968	1.0009
3	0.9823	0.9823	1.0075	1.0071	0.9943	0.9981
4	0.9968	1.0033	1.0165	1.0207	1.0143	1.0185
5	0.9842	0.9868	1.0085	1.0121	1.0018	1.0025
6	1.0115	1.0116	1.0244	1.0244	1.0265	1.0266
7	1.0057	1.0057	1.0135	1.0140	1.0226	1.0204
8	1.0101	1.0101	1.0112	1.0113	1.0231	1.0231
9	1.0020	1.0022	1.0154	1.0150	1.0173	1.0172
10	1.0029	1.0021	1.0150	1.0149	1.0171	1.0167
11	0.9925	0.9924	1.0152	1.0132	1.0081	1.0069
12	1.0002	1.0006	1.0153	1.0154	1.0148	1.0150

TEMPRO 7 Growth 2015–2018 – Inter Peak

District	TEMPRO 7 OD Car Growth					
	Commute		Other		Emp.Bus	
	O	D	O	D	O	D
1	0.9942	0.9975	1.0169	1.0170	1.0021	1.0024
2	0.9805	0.9794	1.0125	1.0119	0.9961	0.9963
3	0.9779	0.9771	1.0127	1.0118	0.9936	0.9935
4	0.9993	0.9981	1.0213	1.0207	1.0135	1.0136
5	0.9837	0.9833	1.0143	1.0139	0.9993	0.9985
6	1.0098	1.0098	1.0273	1.0273	1.0230	1.0230
7	1.0046	1.0055	1.0179	1.0180	1.0160	1.0161
8	1.0066	1.0066	1.0125	1.0125	1.0177	1.0177
9	1.0005	1.0005	1.0185	1.0185	1.0130	1.0130
10	1.0010	1.0012	1.0171	1.0172	1.0128	1.0128
11	0.9912	0.9911	1.0188	1.0183	1.0039	1.0037
12	0.9994	0.9993	1.0176	1.0176	1.0112	1.0112

TEMPRO 7 Growth 2015–2018 – PM Peak

District	TEMPRO 7 OD Car Growth					
	Commute		Other		Emp.Bus	
	O	D	O	D	O	D
1	0.9898	1.0075	1.0113	1.0108	1.0030	1.0126
2	0.9843	0.9785	1.0041	1.0036	0.9976	0.9951
3	0.9814	0.9765	1.0037	1.0038	0.9953	0.9926
4	1.0024	0.9965	1.0178	1.0155	1.0162	1.0127
5	0.9864	0.9838	1.0099	1.0063	1.0005	0.9992
6	1.0107	1.0107	1.0233	1.0234	1.0246	1.0245
7	1.0048	1.0079	1.0156	1.0152	1.0180	1.0190
8	1.0080	1.0080	1.0120	1.0120	1.0198	1.0198
9	1.0012	1.0012	1.0142	1.0145	1.0146	1.0149
10	1.0012	1.0019	1.0134	1.0136	1.0144	1.0149
11	0.9918	0.9923	1.0116	1.0128	1.0055	1.0059
12	0.9998	0.9995	1.0138	1.0138	1.0130	1.0128

TEMPRO 7 Growth 2015–2033 – AM Peak

District	TEMPRO 7 OD Car Growth					
	Commute		Other		Emp.Bus	
	O	D	O	D	O	D
1	1.1378	1.0639	1.1680	1.1525	1.1291	1.0857
2	1.0256	1.0584	1.1321	1.1389	1.0604	1.0822
3	1.0150	1.0552	1.1257	1.1368	1.0514	1.0799
4	1.0650	1.0905	1.1458	1.1619	1.0982	1.1144
5	1.0584	1.0657	1.1310	1.1470	1.0875	1.0901
6	1.0937	1.0938	1.1958	1.1957	1.1176	1.1176
7	1.1110	1.1002	1.1513	1.1547	1.1295	1.1239
8	1.1088	1.1087	1.1282	1.1281	1.1254	1.1253
9	1.0920	1.0953	1.1255	1.1256	1.1147	1.1162
10	1.0939	1.0866	1.1499	1.1473	1.1132	1.1083
11	1.0467	1.0686	1.1456	1.1472	1.0778	1.0909
12	1.0776	1.0798	1.1416	1.1421	1.0993	1.1007

TEMPRO 7 Growth 2015–2033 – Inter Peak

District	TEMPRO 7 OD Car Growth					
	Commute		Other		Emp.Bus	
	O	D	O	D	O	D
1	1.0762	1.0871	1.1745	1.1740	1.0868	1.0859
2	1.0333	1.0278	1.1506	1.1497	1.0689	1.0697
3	1.0273	1.0208	1.1461	1.1444	1.0647	1.0646
4	1.0680	1.0641	1.1624	1.1608	1.1020	1.1022
5	1.0511	1.0499	1.1486	1.1486	1.0832	1.0817
6	1.0855	1.0855	1.2155	1.2155	1.1136	1.1136
7	1.0886	1.0907	1.1675	1.1673	1.1140	1.1142
8	1.0905	1.0905	1.1357	1.1357	1.1124	1.1124
9	1.0804	1.0797	1.1327	1.1327	1.1059	1.1058
10	1.0769	1.0782	1.1587	1.1590	1.1016	1.1015
11	1.0486	1.0451	1.1627	1.1609	1.0805	1.0803
12	1.0693	1.0689	1.1525	1.1525	1.0935	1.0935

TEMPRO 7 Growth 2015–2033 – PM Peak

District	TEMPRO 7 OD Car Growth					
	Commute		Other		Emp.Bus	
	O	D	O	D	O	D
1	1.0629	1.1221	1.1484	1.1513	1.0857	1.1180
2	1.0503	1.0222	1.1214	1.1191	1.0759	1.0597
3	1.0474	1.0135	1.1194	1.1143	1.0726	1.0518
4	1.0821	1.0593	1.1428	1.1349	1.1085	1.0957
5	1.0601	1.0525	1.1326	1.1221	1.0862	1.0825
6	1.0901	1.0901	1.1826	1.1827	1.1150	1.1150
7	1.0924	1.1005	1.1487	1.1461	1.1181	1.1221
8	1.0974	1.0975	1.1254	1.1254	1.1174	1.1174
9	1.0857	1.0831	1.1185	1.1186	1.1103	1.1093
10	1.0789	1.0851	1.1369	1.1382	1.1040	1.1079
11	1.0611	1.0431	1.1331	1.1336	1.0860	1.0756
12	1.0733	1.0714	1.1325	1.1324	1.0972	1.0961

Appendix E – Convergence Statistics

Do Minimum Assignments

Scenario	Iteration	Percentage of turns with a change of less than 0.2GEH between assignments	Percentage of turns with a change of less than 0.2GEH between assignment and ICA	Percentage of turns with relative difference of less than 0.01GEH in delays between assignment and ICA	Percentage of links with a change of less 0.2GEH between assignments	Percentage of links with reletive difference of less than 0.01 in travel time between assignments	GAP
DM AM 18	52	0.96	0.99	0.93	0.97	0.98	0.000001
	53	0.97	0.99	0.93	0.97	0.98	0.000002
	54	0.98	0.99	0.94	0.99	0.98	0.000001
	55	0.98	0.99	0.93	0.98	0.98	0.000003
	56	0.98	0.99	0.95	0.99	0.98	0.000002
	57	0.97	0.99	0.94	0.98	0.98	0.000001
	58	0.98	1.00	0.94	0.99	0.98	0.000001
	59	0.98	1.00	0.94	0.99	0.98	0.000003
	60	0.99	1.00	0.95	0.99	0.98	0.000003
	61	0.99	1.00	0.95	0.99	0.98	0.000001
DM IP 18	16	0.93	0.98	0.92	0.95	0.99	0.000004
	17	0.95	0.98	0.92	0.96	0.99	0.000003
	18	0.95	0.98	0.93	0.97	0.99	0.000002
	19	0.97	0.99	0.94	0.99	0.99	0.000005
	20	0.97	0.99	0.95	0.98	0.99	0.000004
	21	0.97	0.99	0.95	0.98	0.99	0.000003
	22	0.98	1.00	0.96	0.99	0.99	0.000003
	23	0.98	0.99	0.96	0.99	0.99	0.000003
	24	0.97	0.99	0.96	0.98	0.99	0.000002
	25	0.99	1.00	0.96	0.99	0.99	0.000002
DM PM 18	59	0.98	1.00	0.95	0.99	0.97	0.000001
	60	0.97	1.00	0.93	0.98	0.97	0.000004
	61	0.96	1.00	0.94	0.97	0.97	0.000002
	62	0.98	1.00	0.94	0.99	0.97	0.000001
	63	0.97	1.00	0.94	0.98	0.97	0.000001
	64	0.96	1.00	0.94	0.97	0.97	0.000002
	65	0.98	1.00	0.94	0.99	0.97	0.000001
	66	0.99	1.00	0.95	0.99	0.97	0.000001
	67	0.99	1.00	0.95	0.99	0.97	0.000001
	68	0.99	1.00	0.95	1.00	0.97	0.000000
DM AM 33	60	0.99	1.00	0.94	0.99	0.96	0.000002

Scenario	Iteration	Percentage of turns with a change of less than 0.2GEH between assignments	Percentage of turns with a change of less than 0.2GEH between assignment and ICA	Percentage of turns with relative difference of less than 0.01GEH in delays between assignment and ICA	Percentage of links with a change of less 0.2GEH between assignments	Percentage of links with reletive difference of less than 0.01 in travel time between assignments	GAP
	61	1.00	1.00	0.95	1.00	0.96	0.000001
	62	0.99	1.00	0.95	0.99	0.96	0.000001
	63	0.96	0.99	0.92	0.95	0.95	0.000004
	64	0.91	0.98	0.88	0.91	0.95	0.000004
	65	0.96	0.99	0.90	0.97	0.96	0.000002
	66	0.96	0.99	0.92	0.97	0.96	0.000001
	67	0.98	0.99	0.92	0.97	0.96	0.000001
	68	0.99	1.00	0.94	0.99	0.96	0.000002
	69	1.00	1.00	0.95	1.00	0.96	0.000003
DM IP 33	18	0.87	0.96	0.86	0.88	0.97	0.000005
	19	0.91	0.97	0.88	0.93	0.97	0.000005
	20	0.84	0.95	0.86	0.87	0.97	0.000005
	21	0.92	0.97	0.89	0.94	0.97	0.000006
	22	0.94	0.99	0.91	0.97	0.97	0.000004
	23	0.96	0.99	0.92	0.97	0.98	0.000008
	24	0.96	0.99	0.92	0.97	0.97	0.000002
	25	0.96	0.99	0.93	0.96	0.98	0.000004
	26	0.97	1.00	0.94	0.98	0.98	0.000004
	27	0.98	1.00	0.95	0.99	0.98	0.000003
DM PM 33	75	0.99	1.00	0.94	0.99	0.95	0.000002
	76	0.99	1.00	0.95	0.99	0.95	0.000001
	77	0.99	1.00	0.95	0.99	0.95	0.000001
	78	0.99	1.00	0.94	1.00	0.95	0.000001
	79	0.99	1.00	0.94	1.00	0.95	0.000004
	80	0.99	1.00	0.95	1.00	0.95	0.000001
	81	0.99	1.00	0.95	1.00	0.95	0.000001
	82	0.99	1.00	0.94	0.99	0.95	0.000001
	83	0.98	1.00	0.94	0.99	0.95	0.000002
	84	0.99	1.00	0.95	1.00	0.95	0.000004

Do Something Assignments

Scenario	Iteration	Percentage of turns with a change of less than 0.2GEH between assignments	Percentage of turns with a change of less than 0.2GEH between assignment and ICA	Percentage of turns with relative difference of less than 0.01GEH in delays between assignment and ICA	Percentage of links with a change of less 0.2GEH between assignments	Percentage of links with reletive difference of less than 0.01 in travel time between assignments	GAP
DS AM 18	18	0.90	0.98	0.89	0.92	0.98	0.000002
	19	0.92	0.97	0.88	0.93	0.98	0.000002
	20	0.96	0.99	0.90	0.97	0.99	0.000002
	21	0.97	0.99	0.92	0.98	0.99	0.000003
	22	0.97	0.99	0.93	0.98	0.98	0.000001
	23	0.99	1.00	0.94	0.99	0.99	0.000001
	24	0.99	1.00	0.95	0.99	0.99	0.000001
	25	0.99	1.00	0.94	0.99	0.99	0.000003
	26	0.99	1.00	0.94	0.99	0.99	0.000001
	27	0.98	1.00	0.95	0.99	0.99	0.000001
DS IP 18	7	0.83	0.94	0.84	0.87	0.99	0.000003
	8	0.86	0.94	0.86	0.88	0.99	0.000004
	9	0.91	0.97	0.88	0.94	0.99	0.000005
	10	0.94	0.99	0.91	0.96	0.99	0.000004
	11	0.97	0.99	0.93	0.98	0.99	0.000003
	12	0.94	0.98	0.94	0.96	1.00	0.000004
	13	0.96	0.99	0.95	0.98	1.00	0.000002
	14	0.94	0.98	0.93	0.96	1.00	0.000001
	15	0.98	0.99	0.95	0.99	1.00	0.000003
	16	0.98	1.00	0.97	0.99	1.00	0.000005
DS PM 18	50	0.94	0.99	0.92	0.95	0.98	0.000003
	51	0.97	1.00	0.95	0.98	0.98	0.000003
	52	0.98	1.00	0.94	0.99	0.98	0.000001
	53	0.97	1.00	0.94	0.98	0.98	0.000004
	54	0.92	0.98	0.90	0.92	0.97	0.000003
	55	0.93	0.99	0.93	0.93	0.98	0.000003
	56	0.98	1.00	0.95	0.98	0.98	0.000002
	57	0.99	1.00	0.95	0.99	0.98	0.000001
	58	0.99	1.00	0.94	0.99	0.98	0.000003
	59	0.99	1.00	0.96	0.99	0.98	0.000004
DS AM 33	39	0.96	0.99	0.91	0.98	0.98	0.000002
	40	0.98	0.99	0.91	0.98	0.98	0.000003

Scenario	Iteration	Percentage of turns with a change of less than 0.2GEH between assignments	Percentage of turns with a change of less than 0.2GEH between assignment and ICA	Percentage of turns with relative difference of less than 0.01GEH in delays between assignment and ICA	Percentage of links with a change of less 0.2GEH between assignments	Percentage of links with reletive difference of less than 0.01 in travel time between assignments	GAP
	41	0.93	0.99	0.88	0.94	0.97	0.000004
	42	0.94	0.99	0.89	0.95	0.97	0.000001
	43	0.98	1.00	0.92	0.98	0.98	0.000002
	44	0.98	1.00	0.93	0.99	0.98	0.000001
	45	0.99	1.00	0.94	1.00	0.98	0.000001
	46	1.00	1.00	0.94	1.00	0.98	0.000001
	47	0.99	1.00	0.94	1.00	0.98	0.000003
	48	1.00	1.00	0.95	1.00	0.98	0.000002
DS IP 33	15	0.96	0.99	0.92	0.98	1.00	0.000002
	16	0.96	0.99	0.92	0.98	1.00	0.000001
	17	0.97	0.99	0.93	0.98	0.99	0.000001
	18	0.96	0.99	0.93	0.98	1.00	0.000005
	19	0.98	0.99	0.94	0.99	1.00	0.000004
	20	0.97	1.00	0.94	0.98	0.99	0.000004
	21	0.98	1.00	0.94	0.99	1.00	0.000002
	22	0.97	1.00	0.95	0.98	0.99	0.000003
	23	0.97	1.00	0.95	0.98	0.99	0.000002
	24	0.98	1.00	0.96	0.99	0.99	0.000004
DS PM 33	51	0.97	1.00	0.93	0.98	0.96	0.000002
	52	0.98	1.00	0.94	0.99	0.96	0.000001
	53	0.98	1.00	0.94	0.99	0.96	0.000005
	54	0.99	1.00	0.94	0.99	0.96	0.000002
	55	0.97	1.00	0.94	0.98	0.95	0.000002
	56	0.98	1.00	0.94	0.99	0.96	0.000001
	57	0.99	1.00	0.95	0.99	0.96	0.000002
	58	0.97	1.00	0.94	0.98	0.95	0.000004
	59	0.98	1.00	0.95	0.98	0.96	0.000003
	60	0.98	1.00	0.95	0.99	0.96	0.000002

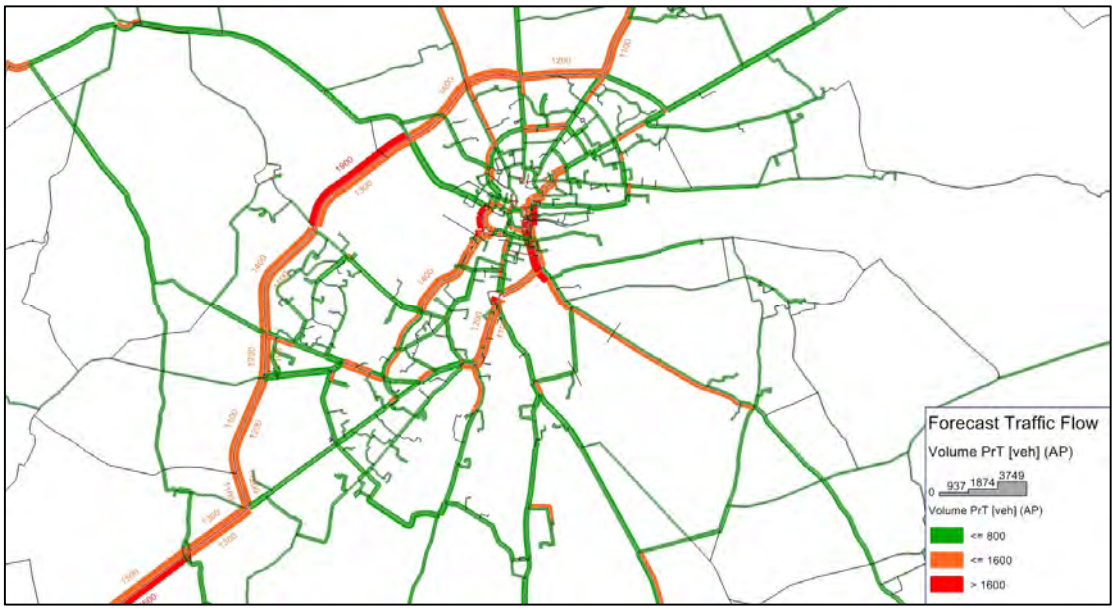
Appendix F – Fixed Traffic Flows

2018 AM Do Minimum

2018 IP Do Minimum

2018 PM Do Minimum

2033 AM Do Minimum

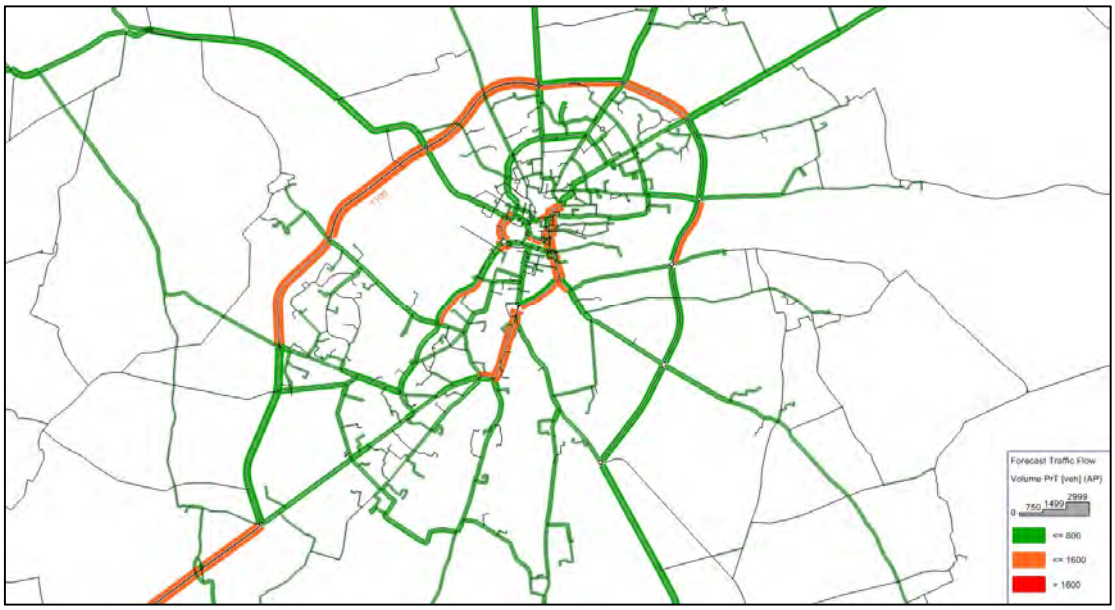


2033 IP Do Minimum

2033 PM Do Minimum

2018 AM LEB

2018 IP LEB



2018 PM LEB

2033 AM LEB

2033 IP LEB

2033 PM LEB

Appendix G – Core Matrix Compression

2015 AM

UC1	1	2	3	4	5	6	7	8	9	10
1	4,044	301	74	1,001	224	153	98	75	449	375
2	988	481	13	116	199	74	21	18	97	310
3	247	2	332	251	9	63	179	47	22	33
4	1,274	70	75	1,231	86	66	216		155	59
5	693	178	8	68	208	19	7	2	6	99
6	139	78	26	75	21	1,111	25	72	1	114
7	152	7	66	233	1	38	193	54	14	10
8	183	18	11	146	0	44	32	1,625	48	201
9	377	62	18	145	1	35	9	59	1,013	138
10	270	13	1	60	103	193	17	396	366	4,608

UC2	1	2	3	4	5	6	7	8	9	10
1	3,597	293	169	825	89	55	23	49	67	103
2	397	1,042	13	75	188	14	8	14	19	42
3	405	29	705	187	10	17	63	25	36	39
4	709	55	100	1,426	35	20	100	44	80	51
5	220	296	7	29	227	9	1	2	5	34
6	78	15	9	11	5	933	7	30	2	77
7	121	32	60	120	1	11	234	29	10	7
8	48	15	10	70	1	21	23	1,255	16	113
9	209	23	5	125	4	9	6	18	374	84
10	95	46	4	35	59	109	11	352	185	1,851

UC3	1	2	3	4	5	6	7	8	9	10
1	551	32	41	169	22	28	24	7	23	73
2	174	45	3	13	46	9	0	2	19	173
3	88	2	29	31	0	7	25	5	7	40
4	234	16	11	145	10	21	37	24	25	48
5	29	34	2	9	30	2	0	0	1	21
6	61	8	3	12	2	158	2	9	1	23
7	58	0	10	35	0	4	31	6	3	5
8	53	8	1	40	0	5	3	245	5	138
9	47	3	2	25	0	12	1	7	149	75
10	186	36	1	25	24	32	10	276	208	1,228

LGV	1	2	3	4	5	6	7	8	9	10
1	1,966	75	40	444	27	14	18	17	52	84
2	97	9	2	21	27	5	0	1	15	46
3	72	1	1	15	0	3	5	5	4	7
4	578	40	6	156	16	11	27	16	24	68
5	36	26	1	27	9	2	0	1	1	15
6	31	3	2	8	1	63	2	11	2	44
7	18	9	5	23	0	2	3	5	2	9
8	39	0	5	26	1	11	4	138	9	161
9	46	3	2	31	1	10	2	9	48	95
10	139	20	8	102	57	155	33	581	357	2,575

HGV	1	2	3	4	5	6	7	8	9	10
1	874	3	0	175	2	4	5	6	23	47
2	18	1	7	10	5	1	1	0	0	4
3	2	0	0	4	0	0	1	1	1	1
4	211	2	3	49	4	3	8	4	7	12
5	0	5	4	1	2	0	0	0	0	3
6	15	0	0	3	0	12	0	2	1	7
7	7	1	1	6	0	0	1	0	0	1
8	7	0	1	5	1	2	1	28	1	25
9	19	0	1	4	1	12	0	2	9	17
10	19	4	2	109	11	28	6	105	67	502

2015 IP

UC1	1	2	3	4	5	6	7	8	9	10
1	836	91	44	229	41	40	25	16	24	36
2	87	69	3	19	24	11	9	6	4	5
3	49	2	46	30	1	6	15	4	2	1
4	200	15	23	218	18	9	32	23	29	8
5	43	24	1	12	136	11	1	1	1	23
6	39	10	7	11	12	731	22	39	0	49
7	30	6	19	31	1	20	125	28	7	3
8	19	4	5	19	0	42	30	1,054	39	91
9	28	5	2	39	2	0	8	38	681	59
10	35	5	1	8	27	58	3	103	64	374

UC2	1	2	3	4	5	6	7	8	9	10
1	4,476	610	261	994	274	157	81	71	165	153
2	587	662	21	85	193	22	11	30	34	100

3	237	16	378	147	7	19	69	24	18	46
4	931	78	113	1,260	66	27	113	122	170	106
5	232	168	8	40	885	20	4	25	41	99
6	140	19	19	36	27	3,937	38	200	45	255
7	119	9	66	94	4	38	909	114	59	27
8	67	38	23	101	18	197	107	5,813	183	790
9	148	32	18	203	41	43	44	185	3,297	456
10	130	113	52	122	82	227	25	715	438	2,014

UC3	1	2	3	4	5	6	7	8	9	10
1	450	64	26	143	77	54	17	28	43	112
2	67	16	4	6	27	4	8	5	4	44
3	26	2	10	9	2	2	9	2	2	26
4	152	6	7	99	21	16	22	32	23	74
5	89	25	2	15	87	4	3	2	2	23
6	55	3	2	15	3	399	6	17	5	41
7	20	5	9	18	1	7	83	12	8	5
8	33	5	2	22	1	13	9	589	14	154
9	38	3	2	35	1	4	4	18	367	90
10	119	46	28	79	15	27	5	145	88	266

LGV	1	2	3	4	5	6	7	8	9	10
1	1,869	108	48	377	45	37	56	18	36	93
2	96	9	1	40	19	5	2	2	10	34
3	67	1	1	6	1	2	4	4	1	6
4	310	44	3	216	13	16	22	25	16	82
5	52	19	2	6	28	4	0	4	3	40
6	37	3	2	15	4	213	5	40	12	134
7	53	1	4	18	0	6	11	16	5	22
8	22	2	5	21	2	40	18	459	37	492
9	36	11	1	27	3	11	5	39	153	300
10	104	37	8	72	45	132	25	497	295	1,047

HGV	1	2	3	4	5	6	7	8	9	10
1	830	6	2	179	38	28	20	6	23	51
2	6	3	2	1	9	2	2	0	0	17
3	2	2	0	10	0	1	2	1	0	3
4	135	1	8	45	7	7	10	9	8	31
5	28	10	0	3	14	2	1	3	0	20
6	24	1	1	7	2	103	2	14	3	58
7	15	2	2	8	1	2	5	4	2	11

8	5	0	2	8	2	14	4	231	12	214
9	16	0	0	11	0	2	2	13	75	138
10	45	18	3	31	21	57	12	216	137	521

2015 PM

UC1	1	2	3	4	5	6	7	8	9	10
1	2,897	598	334	1,171	283	95	215	106	295	167
2	141	305	6	61	105	52	8	9	44	15
3	85	13	216	90	6	18	46	8	16	2
4	847	89	156	882	89	57	189	101	102	85
5	178	111	8	40	184	18	1	2	1	97
6	157	42	41	44	15	1,003	34	41	31	186
7	157	29	115	114	2	23	173	30	8	16
8	71	13	30	113	1	64	48	1,455	52	376
9	461	61	15	112	3	1	13	45	912	349
10	336	265	39	54	97	106	12	180	138	4,172

UC2	1	2	3	4	5	6	7	8	9	10
1	3,138	713	358	1,028	309	141	151	39	233	114
2	325	565	69	103	126	9	15	12	12	76
3	276	21	335	135	6	6	53	13	6	6
4	768	114	137	1,054	67	22	97	78	119	51
5	167	142	13	47	222	3	1	3	6	100
6	99	10	10	51	4	968	7	18	22	228
7	71	10	65	65	1	6	232	24	11	27
8	43	23	22	67	8	20	31	1,503	27	788
9	126	28	46	94	8	2	14	26	908	523
10	174	140	90	103	57	125	12	253	197	4,669

UC3	1	2	3	4	5	6	7	8	9	10
1	337	144	20	186	17	70	23	52	40	206
2	26	31	1	14	15	5	0	11	3	135
3	5	1	21	11	0	2	7	1	1	1
4	156	22	14	141	16	7	35	42	12	15
5	38	20	1	7	24	2	0	1	0	34
6	34	5	5	16	1	136	4	5	8	43
7	15	1	14	30	0	3	25	4	1	12
8	21	9	4	26	0	7	5	201	6	328
9	52	18	11	17	1	1	2	6	125	235
10	151	265	75	77	40	20	5	146	78	1,232

LGV	1	2	3	4	5	6	7	8	9	10
1	1,562	156	78	632	62	28	32	13	61	111
2	87	8	1	55	27	3	18	2	3	40
3	58	7	1	13	3	2	5	4	2	7
4	461	67	14	207	49	17	45	31	30	89
5	58	23	0	19	9	1	0	1	1	48
6	28	3	2	16	1	55	2	9	21	138
7	39	2	4	19	0	2	3	4	2	26
8	31	2	5	30	2	10	7	120	10	492
9	68	24	2	29	2	3	2	10	41	314
10	113	64	7	105	15	37	9	134	81	2,277

HGV	1	2	3	4	5	6	7	8	9	10
1	507	19	11	139	12	24	12	3	13	26
2	3	1	0	2	3	1	2	0	0	2
3	0	0	0	6	0	0	1	1	0	1
4	117	19	6	45	6	4	12	6	3	64
5	0	3	0	1	1	0	0	0	0	7
6	10	0	0	8	0	9	0	1	11	20
7	7	1	1	4	0	0	0	0	0	4
8	6	0	1	6	0	1	0	20	1	73
9	16	0	1	5	0	0	0	1	6	48
10	48	2	1	65	2	5	1	18	12	356

2018 AM

UC1	1	2	3	4	5	6	7	8	9	10
1	4,141	310	80	1,030	231	159	102	87	472	419
2	988	482	14	116	199	75	22	18	97	313
3	251	3	334	254	9	65	181	51	25	37
4	1,290	72	77	1,248	88	69	219	148	172	71
5	691	178	8	68	207	19	7	2	6	101
6	137	77	25	74	21	1,106	24	71	1	112
7	153	7	66	234	1	39	195	58	15	13
8	183	19	11	148	0	46	35	1,630	54	207
9	379	63	18	147	1	36	9	62	1,021	163
10	273	15	2	62	104	207	18	405	395	4,627

UC2	1	2	3	4	5	6	7	8	9	10

1	3,671	325	177	840	95	61	24	54	72	108
2	407	1,048	14	77	190	15	8	16	19	44
3	415	32	723	191	11	19	65	29	37	41
4	764	67	109	1,535	41	25	105	64	90	66
5	223	297	7	29	227	9	2	3	6	38
6	79	15	10	11	5	936	7	32	2	83
7	122	32	61	121	1	13	237	34	11	8
8	49	16	12	72	2	24	27	1,263	19	121
9	211	24	5	127	5	10	6	21	377	103
10	97	48	5	37	62	120	12	360	203	1,865

UC3	1	2	3	4	5	6	7	8	9	10
1	564	32	42	172	22	28	25	9	26	79
2	174	45	3	13	46	9	0	2	19	173
3	89	2	29	31	0	8	26	6	8	41
4	236	16	11	147	10	21	37	25	27	52
5	29	34	2	9	30	2	0	0	1	21
6	61	8	3	12	2	158	2	9	1	23
7	59	0	10	35	1	4	31	7	4	6
8	54	8	1	40	0	5	3	245	6	142
9	47	3	2	25	0	13	1	7	150	81
10	187	36	1	26	25	34	10	280	217	1,243

LGV	1	2	3	4	5	6	7	8	9	10
1	2,127	82	42	472	31	16	19	20	56	95
2	107	10	2	24	28	5	0	2	16	49
3	77	1	2	16	0	3	5	6	5	8
4	614	43	7	175	18	11	28	19	29	75
5	40	27	1	28	10	2	0	1	1	18
6	34	3	2	8	1	64	2	12	3	51
7	19	10	5	24	0	2	4	7	2	10
8	41	1	5	28	2	12	6	140	11	181
9	49	3	2	33	1	11	2	11	50	104
10	163	22	9	115	61	171	37	630	386	2,794

HGV	1	2	3	4	5	6	7	8	9	10
1	892	3	0	178	2	4	5	7	23	48
2	18	1	7	10	5	1	1	0	0	4
3	2	0	0	4	0	0	1	1	1	1
4	214	2	3	52	4	3	8	4	7	12

5	0	5	4	1	2	0	0	0	0	3
6	16	0	0	3	0	13	0	2	1	7
7	7	1	1	6	0	0	1	1	0	1
8	7	0	1	5	1	2	1	28	2	26
9	19	0	1	5	1	12	0	2	9	17
10	20	4	2	110	11	29	6	107	68	507

2018 IP

UC1	1	2	3	4	5	6	7	8	9	10
1	857	92	45	233	41	40	25	17	26	37
2	88	69	3	20	24	12	9	6	4	5
3	51	2	47	31	1	6	16	4	3	1
4	205	15	24	222	18	9	32	24	30	8
5	43	25	1	12	136	11	1	1	1	24
6	40	10	7	11	12	732	23	40	1	51
7	30	6	19	32	1	20	126	30	7	3
8	21	4	5	21	0	43	33	1,059	44	93
9	31	5	3	41	2	0	8	43	690	63
10	36	6	1	8	28	59	4	106	67	375

UC2	1	2	3	4	5	6	7	8	9	10
1	4,607	626	269	1,032	280	161	83	80	174	155
2	602	669	23	90	200	24	11	36	38	102
3	245	18	387	152	8	21	71	29	21	48
4	966	83	119	1,332	67	29	116	136	183	109
5	238	173	9	43	891	23	4	27	49	101
6	145	21	22	39	29	3,966	43	238	56	274
7	120	9	68	97	4	43	917	137	63	30
8	76	45	28	117	22	234	130	5,857	238	820
9	159	36	21	218	49	52	48	240	3,351	493
10	132	114	53	126	85	245	27	744	474	2,025

UC3	1	2	3	4	5	6	7	8	9	10
1	459	64	27	145	78	55	17	28	45	113
2	68	16	4	6	27	4	8	6	5	44
3	26	2	10	9	2	2	9	2	2	26
4	154	6	7	100	21	16	22	34	25	75
5	90	25	2	16	87	4	3	2	2	23
6	56	3	2	16	3	401	6	18	5	42
7	20	5	9	18	1	8	83	13	9	6

8	34	5	2	23	1	15	10	592	17	158
9	40	4	2	37	2	4	4	20	373	94
10	119	46	28	80	15	28	6	149	91	269

LGV	1	2	3	4	5	6	7	8	9	10
1	2,028	118	50	402	49	38	57	24	39	102
2	105	10	1	42	21	5	2	3	10	35
3	70	1	2	7	1	2	4	6	1	7
4	333	46	4	234	14	17	22	31	19	89
5	56	21	2	7	29	4	0	5	3	44
6	39	3	2	16	4	221	6	48	13	150
7	53	1	5	18	0	7	11	23	6	24
8	28	4	7	28	3	48	25	464	46	536
9	39	12	1	30	4	12	5	48	161	324
10	112	38	8	79	50	149	27	543	318	1,142

HGV	1	2	3	4	5	6	7	8	9	10
1	847	6	2	182	39	29	20	7	23	52
2	6	3	2	1	9	2	2	0	0	17
3	3	2	0	10	0	1	2	2	0	3
4	137	1	8	46	8	7	10	9	8	31
5	28	10	0	4	14	2	1	3	0	20
6	25	1	1	7	2	104	2	15	3	59
7	15	2	2	8	2	2	5	4	2	11
8	6	0	2	8	2	15	5	232	13	220
9	17	0	0	11	0	2	2	14	76	140
10	46	18	3	32	21	59	12	221	138	526

2018 PM

UC1	1	2	3	4	5	6	7	8	9	10
1	2,956	598	337	1,193	282	94	216	107	297	171
2	146	305	7	63	105	52	8	9	44	15
3	89	13	218	92	6	17	46	8	16	3
4	881	90	159	913	89	56	190	103	105	87
5	182	112	9	42	184	18	1	2	1	99
6	162	43	42	47	15	999	35	43	32	198
7	160	29	116	117	2	23	175	32	8	17
8	79	13	33	124	1	63	52	1,459	54	383
9	479	61	17	128	3	1	14	48	919	379
10	370	266	42	67	98	105	14	186	161	4,191

UC2	1	2	3	4	5	6	7	8	9	10
1	3,205	727	367	1,089	312	142	153	43	236	124
2	338	569	71	110	127	9	16	13	12	78
3	284	23	341	144	7	7	55	16	7	8
4	797	118	143	1,132	69	22	99	85	124	56
5	171	144	14	50	223	4	2	3	6	106
6	102	10	11	53	4	971	8	21	24	243
7	73	11	67	68	1	6	234	28	12	29
8	47	25	26	83	8	22	36	1,511	31	815
9	132	29	47	105	9	2	14	30	914	574
10	189	144	93	115	63	138	14	267	241	4,713

UC3	1	2	3	4	5	6	7	8	9	10
1	345	145	20	188	17	70	23	53	40	209
2	27	31	2	14	15	6	0	12	3	136
3	5	1	21	11	0	2	7	1	1	1
4	158	22	15	143	16	7	35	43	12	17
5	38	21	1	7	24	2	0	1	0	35
6	34	5	5	17	1	136	4	6	8	45
7	16	1	14	31	0	3	26	4	1	12
8	22	9	4	27	0	7	5	201	6	334
9	55	18	11	20	1	1	2	7	126	244
10	158	267	76	81	40	21	6	150	83	1,250

LGV	1	2	3	4	5	6	7	8	9	10
1	1,697	170	82	670	67	30	34	14	64	132
2	95	10	1	59	29	3	18	2	3	42
3	61	7	2	14	4	2	5	4	2	8
4	491	72	16	232	51	17	46	33	33	103
5	62	24	1	21	9	1	0	1	1	52
6	31	3	2	17	2	56	3	10	22	152
7	40	2	5	21	0	2	3	5	2	29
8	33	3	6	34	2	12	9	122	11	534
9	73	25	3	34	2	3	3	12	43	339
10	125	67	8	116	18	43	11	151	90	2,470

HGV	1	2	3	4	5	6	7	8	9	10
1	517	19	11	142	12	24	12	4	13	27
2	3	1	0	2	3	1	2	0	0	2

3	0	0	0	6	0	0	1	1	0	1
4	119	19	6	47	6	4	12	6	4	65
5	0	3	0	1	1	0	0	0	0	7
6	10	0	0	8	0	9	0	1	11	21
7	7	1	1	4	0	0	0	0	0	4
8	6	0	1	6	0	1	0	20	1	74
9	16	0	1	5	0	0	0	1	6	48
10	49	2	1	65	2	5	1	19	12	359

2033 AM

UC1	1	2	3	4	5	6	7	8	9	10
1	4,399	357	105	1,151	268	172	121	131	583	661
2	957	471	13	110	192	75	20	17	88	301
3	264	7	340	263	11	70	185	61	31	64
4	1,339	81	83	1,285	95	73	226	168	198	122
5	662	173	8	64	199	19	6	2	5	91
6	125	72	22	66	19	1,063	22	62	1	97
7	155	8	67	235	1	43	198	69	18	26
8	185	21	12	151	1	51	43	1,636	67	232
9	392	66	19	151	2	39	10	66	1,018	243
10	291	24	4	69	122	242	23	432	534	4,727

UC2	1	2	3	4	5	6	7	8	9	10
1	3,932	428	238	1,160	131	87	38	150	123	123
2	442	1,104	21	92	205	21	9	22	23	55
3	462	50	817	222	16	28	74	50	42	48
4	1,010	86	130	1,612	47	30	115	90	106	81
5	236	311	9	35	230	12	2	5	9	55
6	84	17	11	14	6	954	10	39	4	110
7	130	35	67	132	2	21	252	57	15	16
8	57	26	21	95	4	39	48	1,302	35	161
9	228	27	7	137	9	11	8	31	393	179
10	121	56	9	52	72	148	18	389	263	1,932

UC3	1	2	3	4	5	6	7	8	9	10
1	594	38	45	183	26	30	26	14	42	99
2	172	44	3	13	45	9	0	2	18	169
3	92	2	30	33	1	8	26	8	9	47
4	243	17	12	152	11	22	38	27	31	64
5	28	34	2	9	30	2	0	0	1	21

6	59	7	2	11	2	154	2	8	1	22
7	59	0	10	35	1	5	32	8	4	10
8	55	9	2	41	0	6	4	246	7	156
9	49	4	3	26	1	13	1	8	153	98
10	193	38	2	30	27	37	12	293	245	1,306

LGV	1	2	3	4	5	6	7	8	9	10
1	2,965	119	55	616	49	26	24	36	79	150
2	157	14	4	36	33	7	1	7	19	62
3	102	3	3	22	1	4	6	11	6	11
4	803	58	12	275	25	14	32	35	51	115
5	61	32	2	35	12	3	0	3	3	29
6	45	4	3	10	2	71	3	21	5	87
7	25	10	6	27	1	4	5	17	4	18
8	54	3	8	38	4	20	13	149	22	281
9	67	5	3	44	3	12	3	22	63	150
10	274	33	14	181	82	252	56	880	527	3,806

HGV	1	2	3	4	5	6	7	8	9	10
1	984	4	1	197	4	5	5	10	25	54
2	21	2	7	11	5	1	1	0	1	5
3	3	0	0	4	0	0	1	1	1	2
4	231	3	3	62	5	3	8	5	8	16
5	1	5	4	2	2	0	0	1	0	3
6	16	0	0	3	0	13	0	3	1	9
7	7	1	1	6	0	0	1	1	0	2
8	9	0	1	6	1	2	1	29	2	30
9	20	0	1	6	1	12	0	3	10	20
10	30	4	2	118	12	33	7	116	75	540

2033 IP

UC1	1	2	3	4	5	6	7	8	9	10
1	928	91	48	249	40	38	26	21	30	38
2	90	68	3	20	23	11	9	6	4	5
3	56	2	49	33	1	6	16	6	3	1
4	224	15	25	229	17	9	33	26	33	8
5	45	25	1	13	135	11	1	1	2	24
6	41	10	8	12	12	720	23	41	0	51
7	32	6	20	33	1	19	129	37	8	4
8	32	5	7	26	0	40	41	1,071	53	102

9	42	5	3	45	2	0	9	56	714	77
10	39	6	2	10	27	56	4	116	83	381

UC2	1	2	3	4	5	6	7	8	9	10
1	5,139	685	316	1,245	310	177	92	149	238	171
2	655	714	32	108	237	35	13	72	59	111
3	287	29	433	176	12	30	84	57	36	54
4	1,197	98	140	1,480	75	37	130	194	227	118
5	270	201	14	57	922	36	6	40	99	113
6	159	29	31	50	42	4,088	65	416	100	348
7	129	11	80	115	6	64	961	261	83	42
8	151	84	53	186	42	405	253	6,064	510	956
9	213	52	35	267	97	94	67	517	3,597	650
10	145	119	58	137	97	316	39	876	626	2,079

UC3	1	2	3	4	5	6	7	8	9	10
1	483	66	28	151	79	56	17	32	52	118
2	69	17	4	7	27	4	8	6	5	45
3	27	2	10	10	2	3	9	3	4	27
4	163	7	8	105	21	16	23	37	30	78
5	92	26	3	16	88	4	3	3	4	25
6	56	3	2	16	4	403	7	18	6	44
7	21	5	9	19	1	8	84	16	10	8
8	37	6	3	25	2	16	12	597	23	173
9	50	5	3	40	4	5	5	26	390	109
10	125	47	29	82	17	31	7	164	105	281

LGV	1	2	3	4	5	6	7	8	9	10
1	2,852	171	62	533	69	48	60	57	51	144
2	151	19	2	54	27	7	2	12	12	41
3	86	3	4	13	2	3	5	13	2	12
4	452	58	7	331	18	18	24	63	33	121
5	76	27	2	11	34	5	0	11	6	66
6	49	5	4	18	4	262	11	94	19	235
7	56	1	5	20	0	11	12	61	7	32
8	62	12	15	62	9	91	67	487	98	748
9	52	14	1	46	7	18	6	99	204	439
10	149	44	10	115	73	236	36	765	429	1,573

HGV	1	2	3	4	5	6	7	8	9	10

1	937	8	3	197	42	31	21	11	26	59
2	8	3	2	2	10	2	2	1	1	18
3	4	2	0	11	0	1	2	2	0	3
4	149	2	8	53	9	7	10	12	10	34
5	31	10	0	5	15	3	1	4	1	22
6	27	1	1	7	2	107	2	20	4	69
7	16	2	2	8	2	3	5	7	3	12
8	10	1	2	11	3	20	8	235	22	246
9	19	1	0	13	1	3	3	22	79	150
10	52	19	3	35	23	69	14	249	148	559

2033 PM

UC1	1	2	3	4	5	6	7	8	9	10
1	3,144	582	355	1,275	273	86	222	112	311	186
2	177	301	9	68	103	48	9	11	46	22
3	110	13	222	95	5	16	47	10	17	4
4	1,000	88	166	918	86	51	193	107	108	96
5	207	109	10	46	179	16	2	3	2	110
6	173	44	45	49	15	965	38	47	34	225
7	177	28	120	122	2	20	179	39	9	20
8	122	14	41	135	1	56	63	1,469	59	403
9	560	59	22	141	3	1	17	56	928	515
10	528	263	57	114	92	93	22	210	237	4,300

UC2	1	2	3	4	5	6	7	8	9	10
1	3,426	783	419	1,291	332	148	164	79	280	225
2	372	596	82	129	137	12	17	21	17	88
3	321	33	380	162	9	10	63	32	10	16
4	976	138	170	1,186	73	25	109	114	140	79
5	185	157	18	55	228	6	3	5	12	126
6	107	15	16	59	6	985	15	32	30	284
7	81	12	74	78	2	10	245	52	15	38
8	85	35	48	117	10	32	63	1,544	47	931
9	172	36	57	131	15	4	19	54	950	755
10	311	158	103	142	82	175	24	323	381	4,870

UC3	1	2	3	4	5	6	7	8	9	10
1	365	144	22	195	17	69	23	54	42	219
2	30	30	2	15	15	5	0	12	3	139
3	6	1	22	12	0	2	7	1	1	2

4	170	22	16	147	16	7	36	44	13	22
5	40	20	1	7	24	2	0	1	0	37
6	35	5	5	17	1	134	4	6	8	46
7	17	1	15	31	0	3	26	5	2	14
8	25	9	5	29	0	7	6	202	6	353
9	69	18	13	25	1	1	3	9	129	273
10	194	264	82	93	40	20	9	162	97	1,324

LGV	1	2	3	4	5	6	7	8	9	10
1	2,399	238	104	864	95	40	44	23	81	230
2	138	19	4	83	37	5	19	3	6	54
3	78	11	4	23	5	3	6	6	3	13
4	646	99	24	360	61	20	53	43	46	171
5	83	33	2	31	12	2	1	3	4	71
6	44	7	4	21	3	64	6	15	27	223
7	48	3	6	27	1	3	5	12	4	44
8	48	10	10	56	5	21	23	131	22	741
9	99	30	4	56	7	5	7	22	52	464
10	185	85	12	173	32	74	21	236	134	3,359

HGV	1	2	3	4	5	6	7	8	9	10
1	571	22	12	157	13	26	13	5	14	34
2	4	1	0	2	4	1	2	0	0	2
3	1	0	0	7	0	0	1	1	0	1
4	132	20	6	56	6	4	12	6	5	70
5	1	4	0	2	1	0	0	0	0	7
6	12	0	0	8	0	9	0	2	12	24
7	7	1	1	5	0	0	1	1	0	5
8	8	0	1	7	0	2	1	21	2	81
9	18	1	1	6	1	1	0	2	7	52
10	54	3	1	68	2	7	2	21	14	382

Appendix I – VDM Sector Changes

Demand by 10 sectors -insert

- AM Peak
- Inter Peak
- PM Peak
- Daily

2018 AM Peak

Reference Demand

RefCom	1	2	3	4	5	6	7	8	9	10	Total
1	4,169	309	80	1,031	231	159	102	86	473	416	7,056
2	989	482	14	116	199	75	22	18	97	313	2,324
3	253	3	334	254	9	65	180	51	25	37	1,212
4	1,306	72	77	1,245	88	68	219	147	168	68	3,457
5	691	178	8	68	208	19	7	2	6	101	1,288
6	138	77	25	74	21	1,107	25	71	1	113	1,650
7	153	7	66	234	1	39	195	59	15	13	782
8	184	19	11	148	0	46	35	1,631	54	207	2,334
9	381	62	18	147	1	36	9	62	1,021	163	1,901
10	274	15	2	62	104	207	18	405	396	4,628	6,112
Total	8,538	1,225	636	3,378	862	1,821	812	2,531	2,255	6,060	28,116

RefOth	1	2	3	4	5	6	7	8	9	10	Total
1	3,720	323	179	876	95	59	24	55	73	108	5,513
2	412	1,049	14	77	190	15	8	16	19	44	1,844
3	421	31	722	191	11	19	64	29	37	41	1,567
4	867	60	104	1,484	38	22	103	54	84	57	2,873
5	224	298	7	29	228	9	2	3	6	37	844
6	80	15	10	11	5	937	7	33	2	84	1,185
7	123	32	61	122	1	13	237	35	11	8	643
8	51	16	12	73	2	24	27	1,265	19	121	1,610
9	215	24	5	127	5	9	6	21	377	103	892
10	99	48	5	38	62	120	12	361	204	1,867	2,817
Total	6,212	1,898	1,120	3,029	637	1,229	491	1,871	833	2,470	19,788

RefEmB	1	2	3	4	5	6	7	8	9	10	Total
1	567	32	42	172	22	28	25	9	26	78	1,002
2	174	45	3	13	46	9	0	2	19	173	484
3	89	2	29	31	0	8	25	6	8	41	239
4	239	16	11	147	10	21	37	25	27	51	583
5	29	34	2	9	30	2	0	0	1	21	129
6	61	8	3	12	2	158	2	9	1	23	278
7	59	0	10	35	1	4	31	7	4	6	157
8	54	8	1	40	0	5	3	245	6	142	507
9	48	3	2	25	0	13	1	7	150	81	330
10	188	36	1	26	25	34	10	280	217	1,243	2,060
Total	1,507	184	104	511	137	281	136	591	458	1,861	5,770

Car	1	2	3	4	5	6	7	8	9	10	Total
1	8,456	665	300	2,080	348	246	151	150	572	603	13,571
2	1,575	1,576	31	206	436	99	30	36	135	530	4,652
3	764	36	1,085	476	20	91	270	86	69	119	3,018
4	2,411	148	192	2,876	136	112	358	225	278	176	6,914
5	945	510	18	106	466	30	9	6	13	160	2,261
6	278	100	38	97	28	2,201	34	112	3	220	3,112
7	335	40	137	390	3	56	463	101	30	27	1,582
8	289	43	24	261	2	76	65	3,141	79	471	4,451
9	644	90	26	299	7	58	17	90	1,548	346	3,124
10	560	99	7	126	192	361	41	1,046	818	7,739	10,988
Total	16,257	3,306	1,859	6,918	1,636	3,331	1,439	4,993	3,546	10,390	53,674

VDM Demand - DM

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	4,154	304	82	1,055	234	154	109	86	499	419	7,097
2	995	483	14	112	204	76	22	18	91	315	2,331
3	272	3	328	220	10	69	184	51	23	41	1,200
4	1,288	66	77	1,234	87	71	228	150	162	68	3,432
5	684	187	9	68	208	19	8	2	6	100	1,291
6	145	79	26	75	21	1,107	24	71	1	113	1,660
7	152	8	68	250	1	38	191	57	12	13	790
8	172	17	12	161	0	46	34	1,631	54	207	2,333
9	406	63	18	151	1	36	8	62	1,021	163	1,929
10	279	17	2	68	104	207	18	405	396	4,628	6,124
Total	8,546	1,227	636	3,393	871	1,822	827	2,534	2,265	6,067	28,187

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	3,711	304	171	885	95	64	25	53	79	116	5,504
2	399	1,046	15	74	193	16	7	14	21	51	1,836
3	447	34	720	169	11	20	65	29	40	46	1,581
4	854	58	100	1,473	38	22	105	55	96	60	2,860
5	222	302	8	29	228	9	2	3	6	38	847
6	83	16	10	11	5	937	7	33	2	84	1,189
7	121	27	63	124	1	13	236	35	10	9	640
8	48	15	12	79	2	24	27	1,265	19	121	1,611
9	225	26	5	134	5	9	6	21	377	103	911
10	107	53	5	39	63	120	12	361	204	1,867	2,831
Total	6,218	1,880	1,109	3,018	641	1,235	492	1,867	854	2,495	19,809

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	562	33	42	176	22	27	26	8	28	77	1,001
2	171	44	3	12	48	9	0	2	17	179	485
3	92	2	28	27	0	8	26	6	9	42	240
4	233	16	11	146	11	20	37	25	30	54	581
5	28	35	2	9	30	2	0	0	1	22	129
6	62	8	3	12	2	158	2	9	1	23	279
7	61	0	10	36	0	5	31	7	3	6	159
8	51	8	2	44	0	5	3	245	6	142	508
9	49	3	2	26	0	13	1	7	150	81	332
10	185	35	1	32	25	34	10	280	217	1,243	2,061
Total	1,495	183	103	519	139	280	138	590	461	1,869	5,775

Car	1	2	3	4	5	6	7	8	9	10	Total
1	8,427	642	295	2,116	352	245	160	148	606	612	13,602
2	1,566	1,572	33	199	444	101	30	35	129	545	4,652
3	811	39	1,076	416	21	97	275	85	71	129	3,021
4	2,375	140	188	2,853	136	113	370	230	288	182	6,874
5	934	524	19	106	466	30	10	6	12	160	2,267
6	290	103	39	97	28	2,201	34	112	3	220	3,128
7	334	35	140	410	3	56	458	98	25	28	1,588
8	271	39	26	283	2	76	64	3,141	79	471	4,452
9	679	92	25	310	7	58	15	90	1,548	346	3,171
10	570	105	8	139	192	361	40	1,046	818	7,739	11,017
Total	16,258	3,290	1,849	6,929	1,650	3,337	1,456	4,991	3,580	10,431	53,771

VDM Demand - DS

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	4,173	303	95	1,075	238	155	117	93	509	415	7,172
2	929	460	23	132	195	81	41	30	94	313	2,298
3	292	7	313	244	13	64	173	45	21	41	1,212
4	1,317	81	77	1,224	91	76	218	143	160	71	3,457
5	670	175	13	77	208	20	12	2	5	108	1,290
6	146	76	27	79	20	1,107	24	71	1	113	1,663
7	181	12	67	230	1	39	187	56	11	12	798
8	200	34	10	143	0	46	31	1,631	54	207	2,357
9	407	63	21	150	1	36	8	62	1,021	163	1,932
10	281	16	2	68	104	207	18	405	396	4,628	6,126
Total	8,597	1,227	647	3,421	873	1,831	829	2,537	2,273	6,071	28,306

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	3,748	293	197	916	90	66	29	58	85	117	5,599
2	335	1,027	34	91	190	16	15	28	20	62	1,818
3	492	99	706	173	17	19	62	24	35	51	1,679
4	876	89	102	1,460	45	24	102	52	96	58	2,906
5	198	289	11	34	228	9	2	3	6	40	821
6	83	15	10	11	5	937	8	33	2	84	1,188
7	163	74	60	120	2	12	231	33	10	8	713
8	61	32	10	72	2	24	26	1,265	19	121	1,632
9	225	25	5	136	5	9	7	21	377	103	912
10	108	60	5	39	62	120	12	361	204	1,867	2,838
Total	6,291	2,002	1,140	3,050	646	1,238	494	1,878	855	2,512	20,106

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	567	31	43	181	21	28	26	9	28	79	1,012
2	156	40	4	14	47	9	1	3	17	185	476
3	96	2	26	29	0	8	25	5	9	38	237
4	237	23	10	143	10	21	35	24	30	54	585
5	27	33	3	10	30	2	0	0	1	24	131
6	64	7	2	12	2	158	2	9	1	23	281
7	83	0	9	31	1	4	27	6	3	6	169
8	60	12	1	37	0	5	3	245	6	142	512
9	50	3	2	25	0	13	1	7	150	81	332
10	187	36	1	31	25	34	10	280	217	1,243	2,064
Total	1,526	187	102	513	137	280	129	588	461	1,875	5,798

Car	1	2	3	4	5	6	7	8	9	10	Total
1	8,488	627	334	2,171	349	248	172	160	621	610	13,783
2	1,420	1,527	62	238	432	106	56	61	131	560	4,592
3	881	107	1,045	446	30	91	260	75	65	130	3,129
4	2,430	192	189	2,826	147	121	355	218	286	184	6,948
5	895	497	27	121	465	31	14	6	12	172	2,241
6	293	98	40	102	28	2,201	34	112	3	220	3,132
7	426	87	136	381	4	56	445	94	24	26	1,679
8	322	77	22	252	2	76	60	3,141	79	471	4,501
9	682	92	28	311	7	58	16	90	1,548	346	3,177
10	576	112	7	137	192	361	40	1,046	818	7,739	11,028
Total	16,414	3,417	1,889	6,984	1,656	3,348	1,452	5,004	3,589	10,458	54,210

2018 Inter-Peak

Reference Demand

RefCom	1	2	3	4	5	6	7	8	9	10	Total
1	863	92	45	235	42	40	25	17	27	37	1,423
2	88	69	3	19	24	12	9	6	4	5	237
3	51	2	47	31	1	6	16	4	3	1	160
4	207	15	24	221	18	9	32	24	30	8	587
5	43	25	1	12	136	11	1	1	1	24	256
6	40	10	7	11	12	732	23	40	1	51	926
7	31	6	19	32	1	20	126	30	7	3	275
8	21	4	5	21	0	43	33	1,059	44	93	1,323
9	32	5	2	41	2	0	8	43	690	63	886
10	36	6	1	8	28	59	4	106	67	375	688
Total	1,412	233	155	631	262	932	276	1,330	873	658	6,762

RefOth	1	2	3	4	5	6	7	8	9	10	Total
1	4,656	629	273	1,078	281	162	83	88	191	157	7,599
2	605	668	23	88	200	24	11	36	38	102	1,795
3	248	18	386	151	8	21	71	29	21	48	1,000
4	1,007	82	117	1,301	67	28	116	134	180	108	3,141
5	240	173	9	42	890	23	4	27	49	101	1,558
6	145	21	21	38	29	3,966	43	238	55	275	4,831
7	121	9	68	96	4	43	918	136	62	30	1,488
8	85	45	28	114	22	234	130	5,857	233	820	7,567
9	175	35	20	213	48	52	47	235	3,348	491	4,665
10	134	114	53	125	85	246	27	744	472	2,026	4,025
Total	7,416	1,794	997	3,246	1,635	4,799	1,451	7,525	4,649	4,157	37,668

RefEmB	1	2	3	4	5	6	7	8	9	10	Total
1	461	65	27	146	78	55	17	29	46	113	1,036
2	68	16	4	6	27	4	8	6	5	44	188
3	26	2	10	9	2	2	9	2	2	26	92
4	155	6	7	100	21	16	22	33	25	75	461
5	90	25	2	16	87	4	3	2	2	23	255
6	56	3	2	16	3	401	6	18	5	42	553
7	20	5	9	18	1	8	83	13	9	6	170
8	34	5	2	23	1	15	10	592	17	158	856
9	42	4	2	37	2	4	4	20	372	93	580
10	120	46	28	80	15	28	6	149	91	268	831
Total	1,072	177	93	450	238	537	167	864	573	850	5,022

Car	1	2	3	4	5	6	7	8	9	10	Total
1	5,979	786	344	1,459	401	257	126	134	265	307	10,058
2	761	753	29	114	251	40	28	47	46	151	2,219
3	325	22	442	190	11	29	96	35	26	75	1,252
4	1,370	103	148	1,622	105	54	170	192	234	192	4,189
5	373	222	12	70	1,113	38	9	31	52	148	2,069
6	241	34	31	65	45	5,099	72	296	61	368	6,311
7	172	20	96	146	7	71	1,126	179	78	39	1,933
8	140	54	35	158	23	291	172	7,508	294	1,070	9,746
9	249	43	25	290	52	56	59	298	4,410	647	6,131
10	290	166	81	213	128	333	37	998	630	2,669	5,544
Total	9,900	2,204	1,245	4,327	2,135	6,269	1,894	9,719	6,095	5,665	49,452

VDM Demand - DM

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	856	93	48	241	41	40	27	17	24	36	1,423
2	89	69	3	21	25	12	9	6	3	5	241
3	53	2	46	27	1	6	16	4	2	1	159
4	212	15	21	221	17	10	34	25	29	8	593
5	43	25	1	12	136	11	2	1	1	24	257
6	40	10	8	12	12	732	22	40	1	51	927
7	32	7	20	33	1	20	124	29	6	3	275
8	21	4	5	22	0	43	32	1,059	44	93	1,324
9	32	5	2	40	2	0	6	43	690	63	883
10	35	6	1	8	28	59	3	106	67	375	688
Total	1,414	235	156	637	262	933	275	1,331	868	657	6,769

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	4,604	636	277	1,085	286	174	86	78	176	169	7,570
2	602	660	24	87	205	26	11	33	36	110	1,793
3	253	19	383	147	8	23	73	29	21	54	1,009
4	1,014	81	118	1,283	70	31	120	140	186	122	3,164
5	242	174	10	41	891	23	5	27	49	102	1,563
6	149	22	22	38	30	3,966	43	238	55	275	4,837
7	126	10	69	100	5	45	915	130	62	33	1,495
8	87	45	28	119	22	234	126	5,857	233	820	7,571
9	179	34	22	227	48	52	48	235	3,348	491	4,685
10	144	120	59	131	85	246	27	744	472	2,026	4,052
Total	7,399	1,799	1,012	3,256	1,650	4,819	1,454	7,511	4,638	4,201	37,739

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	452	64	28	144	80	57	17	29	46	118	1,034
2	66	16	4	6	28	4	8	5	4	46	187
3	26	2	10	9	2	2	9	2	2	27	92
4	154	6	7	99	21	16	23	34	24	77	463
5	90	26	2	15	87	4	3	2	2	23	255
6	56	3	2	15	3	401	6	18	5	42	553
7	20	5	9	18	1	8	83	12	8	6	170
8	35	5	2	24	1	15	9	592	17	158	857
9	44	4	2	37	2	4	4	20	372	93	583
10	123	47	28	80	15	28	5	149	91	268	836
Total	1,066	178	95	448	241	540	167	864	572	858	5,029

Car	1	2	3	4	5	6	7	8	9	10	Total
1	5,911	793	353	1,470	407	270	129	124	247	322	10,027
2	757	745	30	113	258	42	28	44	43	160	2,220
3	332	23	439	182	11	32	98	35	26	81	1,259
4	1,380	101	147	1,603	108	57	177	200	240	207	4,220
5	375	225	13	69	1,113	39	9	31	52	148	2,074
6	245	35	33	64	45	5,099	71	296	61	368	6,318
7	178	21	98	151	7	73	1,122	171	76	42	1,940
8	143	54	35	165	23	291	167	7,508	294	1,070	9,752
9	255	42	27	303	51	56	59	298	4,410	647	6,150
10	302	173	88	219	128	333	35	998	630	2,669	5,576
Total	9,880	2,212	1,262	4,341	2,153	6,292	1,897	9,705	6,078	5,716	49,537

VDM Demand - DS

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	864	89	54	249	41	40	30	19	24	35	1,446
2	88	66	6	28	24	12	16	10	4	5	257
3	58	4	44	29	1	6	15	4	2	1	164
4	215	18	23	218	18	10	32	23	29	9	596
5	43	24	2	14	136	12	2	1	1	24	260
6	41	10	7	12	12	732	23	40	1	51	928
7	36	11	19	31	2	20	121	27	6	3	276
8	23	7	5	20	0	43	31	1,059	44	93	1,325
9	32	5	3	39	2	0	6	43	690	63	883
10	35	6	1	9	28	59	3	106	67	375	688
Total	1,434	240	163	650	263	934	280	1,333	867	657	6,822

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	4,638	610	349	1,128	273	166	97	94	179	169	7,703
2	595	644	56	107	200	25	19	66	37	118	1,867
3	280	46	352	136	13	22	70	25	21	57	1,022
4	1,034	94	112	1,263	74	30	116	134	190	118	3,165
5	234	170	18	48	891	23	6	27	49	110	1,576
6	150	21	22	37	30	3,966	42	238	55	275	4,836
7	140	16	68	98	7	45	904	126	62	29	1,494
8	90	72	26	113	23	234	118	5,857	233	820	7,586
9	181	35	23	226	48	52	48	235	3,348	491	4,687
10	145	129	66	129	94	246	27	744	472	2,026	4,077
Total	7,487	1,838	1,091	3,285	1,652	4,808	1,447	7,547	4,645	4,213	38,014

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	456	64	32	149	78	58	20	31	47	117	1,051
2	66	15	9	6	27	4	12	8	4	49	200
3	28	5	9	8	3	2	9	2	2	32	100
4	157	6	7	99	22	16	22	34	24	78	464
5	90	24	3	17	87	4	4	2	2	23	257
6	58	3	2	15	3	401	6	18	5	42	554
7	23	8	9	18	3	7	80	11	8	6	172
8	36	8	2	22	1	15	8	592	17	158	859
9	45	4	2	37	2	4	4	20	372	93	583
10	122	51	35	80	15	28	5	149	91	268	845
Total	1,079	188	111	451	240	540	171	867	573	866	5,086

Car	1	2	3	4	5	6	7	8	9	10	Total
1	5,958	764	435	1,526	391	264	147	144	249	321	10,200
2	749	724	70	141	251	41	47	84	44	172	2,325
3	365	56	404	173	17	31	94	31	26	90	1,286
4	1,405	118	142	1,580	114	56	171	191	243	204	4,225
5	367	219	23	79	1,113	39	13	31	52	157	2,093
6	249	35	32	64	45	5,099	71	296	61	368	6,319
7	198	35	95	147	11	73	1,105	165	77	37	1,942
8	150	88	33	155	24	291	157	7,508	294	1,070	9,769
9	258	44	28	301	52	56	58	298	4,410	647	6,153
10	301	185	103	219	137	333	36	998	630	2,669	5,610
Total	10,000	2,267	1,366	4,386	2,155	6,282	1,898	9,747	6,085	5,736	49,922

2018 PM Peak

Reference Demand

RefCom	1	2	3	4	5	6	7	8	9	10	Total
1	2,984	599	339	1,216	283	94	217	108	300	174	**6,314**
2	145	305	7	62	105	52	8	9	44	15	**753**
3	89	13	218	91	6	17	46	8	16	3	**508**
4	883	90	159	907	89	56	191	103	105	88	**2,670**
5	182	112	9	42	184	18	1	2	1	99	**648**
6	161	43	42	46	15	1,000	35	43	32	197	**1,614**
7	160	29	116	116	2	23	175	32	8	17	**678**
8	79	13	33	121	1	63	52	1,460	54	383	**2,260**
9	479	62	17	123	3	1	14	48	919	381	**2,047**
10	366	266	42	64	98	105	14	187	161	4,193	**5,495**
Total	**5,528**	**1,532**	**980**	**2,789**	**786**	**1,429**	**753**	**2,001**	**1,641**	**5,548**	**22,987**

RefOth	1	2	3	4	5	6	7	8	9	10	Total
1	3,238	733	371	1,139	314	143	154	46	242	133	**6,513**
2	338	569	70	108	127	9	16	14	12	79	**1,341**
3	284	22	341	141	7	7	55	16	7	8	**889**
4	811	118	143	1,109	69	22	99	86	124	57	**2,638**
5	171	144	14	49	223	4	2	3	6	106	**721**
6	101	10	11	52	4	971	8	21	23	243	**1,444**
7	73	11	67	67	1	6	234	28	12	29	**528**
8	47	25	26	77	8	22	36	1,511	30	816	**2,598**
9	132	29	47	101	9	2	14	30	914	575	**1,852**
10	187	143	92	110	63	139	14	266	239	4,713	**5,966**
Total	**5,382**	**1,803**	**1,182**	**2,954**	**825**	**1,325**	**632**	**2,021**	**1,610**	**6,759**	**24,491**

RefEmB	1	2	3	4	5	6	7	8	9	10	Total
1	347	145	20	190	17	70	23	53	41	210	**1,116**
2	27	31	2	14	15	6	0	12	3	136	**244**
3	5	1	21	11	0	2	7	1	1	1	**51**
4	159	22	15	143	16	7	35	43	12	17	**468**
5	38	21	1	7	24	2	0	1	0	35	**128**
6	34	5	5	17	1	136	4	6	8	45	**260**
7	16	1	14	30	0	3	26	4	1	12	**107**
8	22	9	4	27	0	7	5	201	6	334	**616**
9	55	18	11	20	1	1	2	7	126	244	**485**
10	158	267	76	81	40	21	6	150	83	1,250	**2,130**
Total	**860**	**519**	**169**	**540**	**115**	**254**	**108**	**477**	**281**	**2,283**	**5,605**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	6,569	1,477	730	2,546	614	307	394	207	583	516	**13,943**
2	510	904	79	184	247	66	24	35	59	230	**2,338**
3	378	37	580	244	13	26	107	26	24	12	**1,447**
4	1,853	230	316	2,159	174	86	325	232	241	162	**5,777**
5	390	276	24	97	431	23	3	6	8	239	**1,497**
6	296	58	57	115	20	2,107	47	69	63	485	**3,318**
7	248	41	197	214	3	31	435	65	22	58	**1,313**
8	148	48	63	226	10	92	93	3,172	90	1,533	**5,474**
9	667	108	75	243	13	4	30	84	1,959	1,200	**4,384**
10	711	676	210	255	201	264	34	603	482	10,156	**13,591**
Total	**11,770**	**3,854**	**2,331**	**6,282**	**1,726**	**3,007**	**1,492**	**4,498**	**3,532**	**14,590**	**53,083**

VDM Demand - DM

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	2,958	612	387	1,254	280	100	235	106	312	176	**6,421**
2	143	306	8	63	109	53	9	9	46	17	**763**
3	91	14	213	88	6	18	47	9	16	3	**505**
4	891	87	153	910	88	57	206	109	106	83	**2,690**
5	179	115	9	41	184	18	1	2	1	99	**650**
6	162	43	44	48	15	1,000	34	43	32	197	**1,619**
7	167	30	118	119	2	22	172	32	7	16	**686**
8	82	14	33	126	1	63	51	1,460	54	383	**2,267**
9	512	59	17	120	3	1	11	48	919	381	**2,071**
10	374	281	48	65	97	105	13	187	161	4,193	**5,524**
Total	**5,560**	**1,562**	**1,030**	**2,834**	**786**	**1,437**	**780**	**2,003**	**1,655**	**5,549**	**23,196**

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	3,159	757	450	1,178	308	164	180	43	261	140	**6,642**
2	324	559	81	111	132	10	16	12	13	130	**1,388**
3	290	23	338	133	7	8	56	16	7	9	**888**
4	786	111	147	1,087	69	23	102	94	141	61	**2,621**
5	169	148	17	48	223	4	2	3	6	106	**726**
6	104	11	12	57	4	971	8	21	23	243	**1,454**
7	75	10	68	68	1	7	231	28	12	33	**531**
8	48	25	27	79	8	22	35	1,511	30	816	**2,601**
9	144	30	33	114	9	2	14	30	914	575	**1,864**
10	192	175	98	114	67	139	13	266	239	4,713	**6,017**
Total	**5,292**	**1,849**	**1,270**	**2,989**	**829**	**1,349**	**657**	**2,024**	**1,647**	**6,826**	**24,732**

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	335	142	21	192	17	72	23	53	40	216	**1,111**
2	25	30	2	14	16	6	0	11	3	132	**237**
3	5	1	21	11	0	2	7	1	1	1	**50**
4	154	19	14	142	16	7	35	44	13	19	**465**
5	38	21	1	7	24	2	0	1	0	35	**129**
6	34	5	5	17	1	136	4	6	8	45	**260**
7	16	1	15	30	0	3	26	4	1	12	**107**
8	22	8	4	28	0	7	5	201	6	334	**616**
9	62	18	13	21	1	1	2	7	126	244	**494**
10	158	270	77	85	41	21	6	150	83	1,250	**2,141**
Total	**849**	**516**	**172**	**546**	**117**	**256**	**108**	**478**	**281**	**2,287**	**5,610**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	6,452	1,512	857	2,623	606	337	439	202	613	532	**14,174**
2	493	894	91	187	257	68	25	33	61	278	**2,388**
3	386	38	572	232	13	28	110	26	25	13	**1,443**
4	1,831	217	314	2,140	172	88	343	247	260	164	**5,775**
5	386	284	28	96	431	23	3	6	8	240	**1,505**
6	300	59	61	122	20	2,107	46	69	63	485	**3,334**
7	258	41	200	217	3	31	428	63	21	61	**1,324**
8	152	47	64	233	10	92	91	3,172	90	1,533	**5,485**
9	718	107	62	255	13	4	27	84	1,959	1,200	**4,429**
10	725	726	222	264	206	264	33	603	482	10,156	**13,681**
Total	**11,701**	**3,926**	**2,472**	**6,370**	**1,731**	**3,043**	**1,545**	**4,506**	**3,583**	**14,661**	**53,538**

VDM Demand - DS

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	2,981	569	404	1,298	265	98	258	122	312	178	**6,484**
2	141	292	14	87	104	51	15	18	45	17	**783**
3	105	23	204	89	9	18	46	8	19	3	**525**
4	916	101	157	899	97	61	190	99	106	92	**2,718**
5	182	111	12	47	184	18	1	2	1	99	**657**
6	159	46	41	49	15	1,000	35	43	32	197	**1,617**
7	182	63	111	113	3	22	168	29	7	16	**714**
8	85	23	29	118	1	63	50	1,460	54	383	**2,266**
9	522	60	16	119	3	1	11	48	919	381	**2,080**
10	364	291	48	65	112	105	13	187	161	4,193	**5,538**
Total	**5,636**	**1,579**	**1,036**	**2,884**	**793**	**1,437**	**788**	**2,015**	**1,656**	**5,558**	**23,382**

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	3,217	596	489	1,243	293	121	208	51	258	140	**6,616**
2	328	538	250	188	128	9	40	26	13	130	**1,650**
3	294	75	300	127	14	7	53	14	7	8	**899**
4	825	129	127	1,061	81	23	98	88	136	59	**2,628**
5	170	141	23	77	223	4	2	3	6	106	**756**
6	102	11	11	55	4	971	8	21	23	243	**1,450**
7	81	27	65	64	1	7	229	27	12	28	**541**
8	52	43	24	75	9	22	33	1,511	30	816	**2,615**
9	155	31	29	113	9	2	14	30	914	575	**1,871**
10	187	227	105	116	88	139	14	266	239	4,713	**6,095**
Total	**5,412**	**1,818**	**1,423**	**3,121**	**850**	**1,305**	**700**	**2,036**	**1,639**	**6,818**	**25,122**

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	338	125	21	196	17	73	25	54	40	213	**1,103**
2	24	26	2	16	14	5	0	17	3	137	**245**
3	7	2	19	11	1	2	6	1	1	1	**51**
4	160	20	13	141	17	7	33	42	13	19	**467**
5	39	20	2	7	24	2	0	1	0	35	**129**
6	35	5	5	17	1	136	4	6	8	45	**261**
7	17	2	14	28	0	3	25	3	1	12	**105**
8	21	15	4	27	0	7	5	201	6	334	**621**
9	63	17	13	21	1	1	2	7	126	244	**494**
10	160	279	68	82	49	21	5	150	83	1,250	**2,147**
Total	**863**	**511**	**159**	**548**	**124**	**258**	**105**	**482**	**282**	**2,289**	**5,621**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	6,536	1,290	914	2,738	574	292	491	227	610	530	**14,203**
2	492	857	265	291	246	66	56	60	60	284	**2,678**
3	406	100	523	227	24	28	106	22	27	11	**1,475**
4	1,902	250	297	2,101	195	91	322	229	255	170	**5,813**
5	391	272	37	131	431	23	4	6	8	239	**1,542**
6	297	62	57	121	20	2,107	47	69	63	485	**3,328**
7	280	92	190	205	5	32	422	59	21	56	**1,360**
8	157	81	57	220	11	92	88	3,172	90	1,533	**5,501**
9	740	109	57	253	12	4	26	84	1,959	1,200	**4,445**
10	711	798	220	264	249	264	32	603	482	10,156	**13,781**
Total	**11,911**	**3,909**	**2,618**	**6,553**	**1,768**	**2,999**	**1,594**	**4,532**	**3,576**	**14,664**	**54,125**

2018 24-Hour

Reference Demand

RefCom	1	2	3	4	5	6	7	8	9	10	Total
1	26,696	3,294	1,544	8,181	1,789	1,002	1,113	686	2,444	1,966	**48,715**
2	3,877	2,760	80	650	1,047	447	145	119	438	981	**10,544**
3	1,334	62	1,927	1,211	49	278	763	199	137	121	**6,082**
4	7,791	575	854	7,774	637	428	1,417	890	996	512	**21,875**
5	2,829	1,013	58	403	2,048	184	32	23	29	742	**7,359**
6	1,143	417	246	426	181	11,032	326	602	102	1,250	**15,724**
7	1,123	150	666	1,233	16	317	1,918	463	114	108	**6,108**
8	907	123	165	928	7	605	474	16,084	608	2,361	**22,260**
9	2,752	397	121	1,063	25	111	120	605	10,263	2,025	**17,481**
10	2,126	876	137	423	778	1,300	118	2,428	2,071	28,421	**38,679**
Total	**50,576**	**9,666**	**5,798**	**22,291**	**6,577**	**15,704**	**6,426**	**22,098**	**17,203**	**38,487**	**194,827**

RefOth	1	2	3	4	5	6	7	8	9	10	Total
1	51,211	7,287	3,428	13,065	3,075	1,671	1,084	882	2,201	1,745	**85,648**
2	6,201	9,153	402	1,129	2,252	231	142	322	341	1,035	**21,207**
3	3,711	276	5,659	1,971	101	215	822	323	263	457	**13,799**
4	11,590	1,068	1,505	16,208	758	320	1,357	1,299	1,803	1,053	**36,961**
5	2,745	2,432	120	508	7,209	189	38	197	358	1,096	**14,892**
6	1,493	212	202	440	221	31,815	329	1,728	439	2,789	**39,667**
7	1,373	186	825	1,191	36	339	7,447	1,087	480	305	**13,270**
8	849	418	294	1,197	176	1,680	1,042	46,876	1,687	8,207	**62,425**
9	2,173	386	290	2,074	358	374	375	1,704	25,947	5,262	**38,943**
10	1,730	1,321	638	1,264	929	2,388	258	6,754	4,422	32,897	**52,602**
Total	**83,075**	**22,738**	**13,363**	**39,046**	**15,115**	**39,223**	**12,895**	**61,172**	**37,941**	**54,846**	**379,413**

RefEmB	1	2	3	4	5	6	7	8	9	10	Total
1	5,724	955	358	2,034	629	654	251	374	503	1,604	**13,086**
2	1,032	329	36	119	357	70	54	79	92	1,201	**3,369**
3	445	20	213	186	17	43	153	36	42	295	**1,450**
4	2,190	152	124	1,515	213	189	361	421	275	695	**6,135**
5	791	327	25	149	736	37	20	20	16	319	**2,440**
6	647	59	37	187	33	3,514	60	159	60	480	**5,237**
7	348	34	130	311	11	70	714	117	72	93	**1,901**
8	447	85	31	350	7	134	89	5,220	145	2,456	**8,963**
9	582	88	54	373	14	68	36	175	3,271	1,581	**6,243**
10	1,808	1,209	413	845	294	344	84	2,244	1,476	9,112	**17,830**
Total	**14,015**	**3,258**	**1,421**	**6,068**	**2,310**	**5,124**	**1,822**	**8,845**	**5,952**	**17,836**	**66,651**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	83,631	11,535	5,331	23,279	5,493	3,327	2,447	1,942	5,148	5,315	**147,448**
2	11,109	12,242	517	1,897	3,656	748	341	520	872	3,217	**35,119**
3	5,490	359	7,800	3,367	168	536	1,738	558	442	873	**21,330**
4	21,571	1,796	2,483	25,497	1,608	937	3,135	2,610	3,074	2,260	**64,971**
5	6,365	3,771	203	1,059	9,993	411	90	239	403	2,157	**24,691**
6	3,283	687	485	1,053	435	46,361	715	2,488	602	4,519	**60,628**
7	2,845	371	1,621	2,735	63	727	10,080	1,667	666	506	**21,280**
8	2,202	625	490	2,474	189	2,419	1,605	68,180	2,440	13,023	**93,648**
9	5,507	870	464	3,511	397	553	532	2,484	39,480	8,868	**62,666**
10	5,664	3,405	1,188	2,532	2,001	4,032	461	11,427	7,970	70,430	**109,110**
Total	**147,666**	**35,662**	**20,582**	**67,405**	**24,002**	**60,051**	**21,143**	**92,115**	**61,096**	**111,169**	**640,892**

VDM Demand - DM

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	26,525	3,327	1,715	8,399	1,788	1,008	1,198	680	2,539	1,976	**49,155**
2	3,897	2,769	84	650	1,080	454	150	117	425	993	**10,619**
3	1,412	66	1,888	1,076	52	295	779	201	130	134	**6,034**
4	7,792	548	823	7,755	629	440	1,503	927	979	501	**21,897**
5	2,797	1,055	62	403	2,048	184	38	23	28	741	**7,378**
6	1,170	424	259	438	181	11,032	317	602	102	1,250	**15,774**
7	1,153	156	680	1,299	18	308	1,887	453	96	105	**6,154**
8	883	118	167	988	7	605	463	16,084	608	2,361	**22,284**
9	2,919	387	119	1,057	25	111	100	605	10,263	2,025	**17,611**
10	2,161	928	155	446	775	1,300	113	2,428	2,071	28,421	**38,800**
Total	**50,710**	**9,780**	**5,953**	**22,511**	**6,603**	**15,736**	**6,546**	**22,119**	**17,241**	**38,506**	**195,705**

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	50,607	7,349	3,671	13,252	3,090	1,826	1,179	796	2,177	1,871	**85,817**
2	6,101	9,056	443	1,119	2,309	248	144	296	333	1,260	**21,309**
3	3,832	289	5,627	1,859	103	234	837	322	278	515	**13,895**
4	11,522	1,031	1,509	15,992	777	336	1,400	1,363	1,931	1,162	**37,024**
5	2,749	2,463	136	501	7,212	190	41	197	357	1,100	**14,946**
6	1,538	224	213	451	222	31,815	330	1,728	439	2,789	**39,750**
7	1,407	174	839	1,221	38	356	7,420	1,042	474	345	**13,316**
8	856	414	301	1,249	177	1,680	1,016	46,876	1,687	8,207	**62,463**
9	2,268	391	259	2,226	358	374	377	1,704	25,947	5,262	**39,165**
10	1,833	1,471	696	1,318	946	2,388	251	6,754	4,422	32,897	**52,976**
Total	**82,712**	**22,861**	**13,695**	**39,187**	**15,233**	**39,449**	**12,995**	**61,077**	**38,045**	**55,408**	**380,661**

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	5,613	948	364	2,037	644	668	255	374	504	1,647	**13,054**
2	1,007	321	38	114	368	72	53	75	83	1,212	**3,345**
3	455	22	211	167	17	45	156	35	44	300	**1,451**
4	2,156	141	122	1,501	216	187	364	432	285	724	**6,128**
5	787	333	26	147	736	38	20	20	16	319	**2,441**
6	652	60	38	184	33	3,514	61	159	60	480	**5,242**
7	356	35	131	315	11	73	714	110	70	92	**1,905**
8	445	80	32	371	7	134	85	5,220	145	2,456	**8,974**
9	617	87	58	383	14	68	35	175	3,271	1,581	**6,289**
10	1,824	1,220	419	876	297	344	82	2,244	1,476	9,112	**17,897**
Total	**13,912**	**3,246**	**1,439**	**6,096**	**2,344**	**5,143**	**1,825**	**8,845**	**5,954**	**17,923**	**66,727**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	82,745	11,624	5,751	23,688	5,523	3,501	2,631	1,850	5,220	5,493	**148,027**
2	11,005	12,146	565	1,882	3,758	775	347	488	841	3,465	**35,273**
3	5,699	377	7,726	3,102	172	574	1,771	557	452	949	**21,379**
4	21,470	1,721	2,454	25,248	1,622	963	3,267	2,723	3,195	2,386	**65,049**
5	6,334	3,851	224	1,051	9,996	412	98	239	401	2,161	**24,765**
6	3,359	708	511	1,074	436	46,361	708	2,488	602	4,519	**60,766**
7	2,915	365	1,650	2,836	68	737	10,020	1,604	639	541	**21,375**
8	2,184	612	500	2,607	190	2,419	1,565	68,180	2,440	13,023	**93,721**
9	5,804	865	437	3,665	397	553	512	2,484	39,480	8,868	**63,065**
10	5,818	3,619	1,270	2,640	2,019	4,032	447	11,427	7,970	70,430	**109,672**
Total	**147,334**	**35,887**	**21,087**	**67,793**	**24,179**	**60,327**	**21,366**	**92,041**	**61,240**	**111,837**	**643,092**

VDM Demand - DS

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	26,702	3,170	1,843	8,642	1,750	1,007	1,314	760	2,566	1,962	**49,716**
2	3,689	2,641	146	827	1,034	462	270	205	429	989	**10,693**
3	1,542	117	1,803	1,164	73	281	739	178	133	131	**6,161**
4	7,975	653	845	7,673	676	466	1,412	865	971	537	**22,074**
5	2,769	1,000	83	457	2,047	188	54	23	27	764	**7,413**
6	1,166	423	251	454	183	11,032	323	602	102	1,250	**15,787**
7	1,305	296	649	1,210	25	314	1,846	429	93	102	**6,269**
8	986	213	149	902	7	605	440	16,084	608	2,361	**22,354**
9	2,953	394	125	1,048	24	111	97	605	10,263	2,025	**17,646**
10	2,132	957	157	449	819	1,300	113	2,428	2,071	28,421	**38,847**
Total	**51,220**	**9,865**	**6,053**	**22,826**	**6,638**	**15,765**	**6,609**	**22,179**	**17,263**	**38,544**	**196,960**

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	51,114	6,662	4,337	13,824	2,940	1,647	1,348	945	2,198	1,876	**86,890**
2	5,882	8,835	1,217	1,536	2,252	242	287	594	339	1,349	**22,532**
3	4,152	816	5,263	1,779	177	224	805	277	261	551	**14,305**
4	11,834	1,266	1,416	15,746	863	337	1,359	1,298	1,939	1,124	**37,182**
5	2,630	2,384	217	646	7,209	190	54	201	357	1,162	**15,050**
6	1,540	217	211	442	221	31,815	324	1,728	439	2,789	**39,727**
7	1,636	400	815	1,183	54	355	7,324	1,008	477	296	**13,549**
8	930	697	272	1,176	185	1,680	954	46,876	1,687	8,207	**62,664**
9	2,314	399	254	2,221	359	374	375	1,704	25,947	5,262	**39,208**
10	1,828	1,704	765	1,315	1,067	2,388	255	6,754	4,422	32,897	**53,396**
Total	**83,859**	**23,380**	**14,767**	**39,869**	**15,328**	**39,253**	**13,085**	**61,384**	**38,067**	**55,512**	**384,503**

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	5,664	889	398	2,096	625	681	281	391	508	1,637	**13,171**
2	960	292	75	130	354	70	83	116	84	1,269	**3,432**
3	482	45	193	170	22	44	150	30	44	320	**1,499**
4	2,198	167	117	1,487	225	187	346	417	286	726	**6,157**
5	786	313	36	163	736	37	29	20	16	326	**2,463**
6	674	57	37	183	32	3,514	58	159	60	480	**5,254**
7	437	58	125	292	19	69	681	101	69	89	**1,940**
8	475	134	28	336	7	134	77	5,220	145	2,456	**9,010**
9	626	86	59	378	14	68	34	175	3,271	1,581	**6,292**
10	1,823	1,277	439	867	321	344	80	2,244	1,476	9,112	**17,984**
Total	**14,126**	**3,317**	**1,507**	**6,102**	**2,355**	**5,149**	**1,818**	**8,874**	**5,958**	**17,996**	**67,202**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	83,481	10,720	6,579	24,562	5,316	3,334	2,943	2,096	5,272	5,475	**149,777**
2	10,531	11,768	1,438	2,493	3,640	774	640	915	852	3,606	**36,657**
3	6,175	977	7,260	3,114	271	549	1,693	486	437	1,002	**21,965**
4	22,008	2,086	2,378	24,905	1,764	990	3,117	2,580	3,197	2,387	**65,413**
5	6,185	3,698	336	1,267	9,993	415	137	243	400	2,252	**24,926**
6	3,380	697	499	1,078	437	46,361	705	2,488	602	4,519	**60,767**
7	3,378	755	1,590	2,685	98	738	9,852	1,537	639	487	**21,759**
8	2,391	1,044	449	2,413	199	2,419	1,472	68,180	2,440	13,023	**94,028**
9	5,893	878	437	3,648	397	553	506	2,484	39,480	8,868	**63,146**
10	5,783	3,938	1,362	2,631	2,206	4,032	447	11,427	7,970	70,430	**110,227**
Total	**149,204**	**36,562**	**22,327**	**68,797**	**24,321**	**60,166**	**21,512**	**92,437**	**61,288**	**112,051**	**648,665**

2033 AM Peak

Reference Demand

RefCom	1	2	3	4	5	6	7	8	9	10	Total
1	4,432	356	105	1,151	267	171	121	130	580	658	**7,970**
2	957	471	13	110	192	75	20	17	89	301	**2,245**
3	266	7	340	263	11	70	185	60	31	63	**1,296**
4	1,354	81	83	1,282	95	73	226	168	198	121	**3,682**
5	663	173	8	64	199	19	6	2	5	91	**1,231**
6	125	72	22	66	19	1,063	22	62	1	97	**1,549**
7	156	8	67	235	1	43	198	69	18	26	**821**
8	186	21	12	152	1	51	43	1,636	67	232	**2,400**
9	393	66	19	151	2	39	10	66	1,019	243	**2,009**
10	292	25	4	69	122	241	23	432	536	4,728	**6,471**
Total	**8,823**	**1,278**	**673**	**3,544**	**910**	**1,846**	**854**	**2,642**	**2,542**	**6,560**	**29,674**

RefOth	1	2	3	4	5	6	7	8	9	10	Total
1	4,085	454	245	1,134	135	91	40	154	128	129	**6,596**
2	444	1,095	21	89	204	21	9	23	23	55	**1,986**
3	463	48	814	215	16	28	74	50	42	49	**1,799**
4	1,090	89	134	1,682	50	33	117	100	110	88	**3,495**
5	236	308	9	34	228	12	2	6	9	56	**900**
6	83	17	11	13	6	952	10	38	4	110	**1,244**
7	130	34	67	130	2	21	251	57	15	16	**723**
8	56	25	21	90	4	40	48	1,299	35	161	**1,778**
9	229	27	7	134	9	11	8	31	391	180	**1,026**
10	117	54	9	48	71	149	18	388	260	1,931	**3,045**
Total	**6,934**	**2,151**	**1,338**	**3,571**	**726**	**1,359**	**577**	**2,146**	**1,018**	**2,774**	**22,592**

RefEmB	1	2	3	4	5	6	7	8	9	10	Total
1	598	38	45	183	26	30	26	14	41	99	**1,100**
2	172	44	3	13	45	9	0	2	18	169	**476**
3	92	2	30	33	1	8	26	8	9	46	**256**
4	246	17	12	151	11	22	38	27	32	64	**620**
5	28	34	2	9	30	2	0	0	1	21	**127**
6	59	7	2	11	2	154	2	8	1	22	**270**
7	59	0	10	35	1	5	32	8	4	10	**165**
8	55	9	2	41	0	6	4	246	7	156	**525**
9	49	4	3	26	1	13	1	8	153	98	**353**
10	194	38	2	30	27	37	12	293	245	1,306	**2,184**
Total	**1,552**	**193**	**110**	**532**	**143**	**286**	**143**	**614**	**509**	**1,992**	**6,075**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	9,116	848	394	2,469	428	293	187	297	749	885	**15,666**
2	1,574	1,610	37	212	442	105	30	41	129	526	**4,706**
3	821	57	1,184	511	28	106	286	118	82	158	**3,350**
4	2,689	187	229	3,116	156	129	381	296	340	274	**7,797**
5	927	514	19	106	458	33	9	8	15	168	**2,258**
6	267	96	36	90	27	2,170	34	109	5	229	**3,062**
7	346	43	144	401	4	68	481	134	37	52	**1,710**
8	297	54	35	283	4	97	94	3,181	108	549	**4,702**
9	670	96	28	312	12	64	20	104	1,562	521	**3,389**
10	603	117	14	148	220	427	53	1,113	1,041	7,964	**11,700**
Total	**17,309**	**3,622**	**2,120**	**7,648**	**1,779**	**3,491**	**1,574**	**5,402**	**4,069**	**11,326**	**58,340**

VDM Demand - DM

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	4,404	329	97	1,118	246	163	122	117	536	608	**7,739**
2	949	475	13	105	204	81	22	20	85	305	**2,259**
3	271	6	325	251	10	77	193	64	28	75	**1,298**
4	1,281	69	88	1,285	100	77	246	182	204	131	**3,663**
5	633	187	8	64	199	19	9	2	4	102	**1,227**
6	141	76	26	72	19	1,063	20	62	1	97	**1,576**
7	179	10	73	260	2	39	191	61	15	30	**859**
8	201	23	13	168	1	51	35	1,636	67	232	**2,427**
9	423	68	21	160	2	39	9	66	1,019	243	**2,050**
10	302	29	5	77	122	241	27	432	536	4,728	**6,498**
Total	**8,784**	**1,273**	**669**	**3,559**	**903**	**1,850**	**874**	**2,643**	**2,495**	**6,550**	**29,597**

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	4,104	352	189	944	110	79	28	51	69	120	**6,046**
2	441	1,097	21	79	216	27	10	16	20	63	**1,989**
3	463	45	807	193	16	36	80	45	36	62	**1,781**
4	1,060	74	128	1,645	58	39	124	90	128	87	**3,433**
5	225	318	10	34	229	13	3	5	9	58	**904**
6	96	18	13	13	6	952	10	38	4	110	**1,261**
7	144	44	72	135	3	21	248	48	13	20	**748**
8	59	18	19	98	4	40	41	1,299	35	161	**1,774**
9	229	26	6	149	9	11	8	31	391	180	**1,040**
10	118	52	10	49	72	149	19	388	260	1,931	**3,048**
Total	**6,939**	**2,043**	**1,275**	**3,340**	**722**	**1,366**	**569**	**2,011**	**965**	**2,792**	**22,023**

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	597	39	41	178	27	31	23	9	30	85	**1,060**
2	165	47	2	10	50	11	0	2	16	175	**478**
3	89	2	31	31	1	10	29	6	10	45	**254**
4	226	17	12	153	12	24	40	24	31	64	**602**
5	25	37	2	8	30	2	0	0	1	22	**126**
6	60	8	3	12	2	154	2	8	1	22	**273**
7	60	0	11	38	1	5	33	6	4	9	**167**
8	53	7	2	41	0	6	3	246	7	156	**521**
9	48	4	2	27	1	13	1	8	153	98	**354**
10	184	33	2	35	27	37	13	293	245	1,306	**2,176**
Total	**1,507**	**193**	**108**	**535**	**150**	**294**	**144**	**602**	**497**	**1,982**	**6,011**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	9,105	719	327	2,240	383	272	172	176	635	814	**14,844**
2	1,555	1,618	36	195	469	119	32	37	121	543	**4,726**
3	822	53	1,163	474	26	123	302	115	74	182	**3,334**
4	2,567	160	228	3,083	170	141	410	297	363	281	**7,699**
5	882	543	20	106	458	33	11	8	14	182	**2,257**
6	297	102	42	97	27	2,170	31	109	5	229	**3,110**
7	383	54	155	433	5	65	472	115	32	60	**1,774**
8	313	48	34	307	5	97	79	3,181	108	549	**4,722**
9	700	98	29	336	12	64	18	104	1,562	521	**3,444**
10	605	114	17	161	221	427	59	1,113	1,041	7,964	**11,722**
Total	**17,230**	**3,510**	**2,051**	**7,433**	**1,775**	**3,510**	**1,587**	**5,256**	**3,957**	**11,324**	**57,632**

VDM Demand - DS

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	4,431	327	109	1,136	258	159	129	121	556	603	**7,830**
2	862	453	21	127	192	84	40	31	85	328	**2,224**
3	290	13	317	249	14	77	187	60	27	74	**1,309**
4	1,321	87	85	1,273	99	81	235	173	199	128	**3,681**
5	637	172	11	72	199	21	11	2	5	100	**1,230**
6	139	74	27	74	19	1,063	20	62	1	97	**1,577**
7	194	13	71	252	2	39	188	60	14	30	**862**
8	224	36	12	156	1	51	33	1,636	67	232	**2,447**
9	423	70	23	158	2	39	9	66	1,019	243	**2,052**
10	301	28	5	79	122	241	27	432	536	4,728	**6,498**
Total	**8,824**	**1,273**	**682**	**3,574**	**907**	**1,856**	**878**	**2,644**	**2,509**	**6,563**	**29,711**

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	4,150	333	214	997	104	80	31	53	76	118	**6,156**
2	368	1,078	53	100	209	28	16	31	20	73	**1,976**
3	512	139	800	188	25	34	77	39	32	70	**1,916**
4	1,095	113	127	1,631	60	38	118	82	148	85	**3,496**
5	202	310	13	34	226	13	3	6	9	58	**874**
6	92	18	13	13	6	952	10	38	4	110	**1,256**
7	172	71	69	129	4	21	244	47	15	19	**789**
8	67	35	18	91	4	40	40	1,299	35	161	**1,790**
9	232	25	6	150	9	11	9	31	391	180	**1,044**
10	119	66	10	49	72	149	17	388	260	1,931	**3,060**
Total	**7,010**	**2,189**	**1,322**	**3,381**	**718**	**1,366**	**565**	**2,013**	**990**	**2,804**	**22,358**

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	605	36	43	184	26	31	23	8	30	83	**1,070**
2	151	43	4	13	48	11	1	3	14	177	**464**
3	95	3	29	31	1	10	28	6	10	41	**254**
4	234	24	11	150	12	24	36	21	31	62	**606**
5	25	34	3	10	30	2	0	0	1	23	**127**
6	62	8	3	12	2	154	2	8	1	22	**274**
7	80	1	10	33	1	5	29	5	4	9	**176**
8	58	11	1	38	0	6	3	246	7	156	**524**
9	49	4	2	27	1	13	1	8	153	98	**354**
10	190	35	2	34	27	37	12	293	245	1,306	**2,181**
Total	**1,548**	**199**	**108**	**530**	**148**	**293**	**136**	**599**	**494**	**1,976**	**6,030**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	9,187	696	366	2,316	388	270	184	183	663	804	**15,056**
2	1,381	1,575	78	240	449	124	57	65	119	578	**4,665**
3	897	156	1,146	467	40	121	293	105	69	185	**3,479**
4	2,651	224	223	3,053	171	143	390	276	378	274	**7,784**
5	864	516	28	115	455	35	14	8	15	181	**2,232**
6	294	100	43	99	27	2,170	32	109	5	229	**3,107**
7	445	85	150	414	6	65	461	112	33	57	**1,828**
8	348	82	31	284	5	97	75	3,181	108	549	**4,761**
9	704	98	31	335	12	64	19	104	1,562	521	**3,450**
10	611	129	16	161	221	427	56	1,113	1,041	7,964	**11,739**
Total	**17,381**	**3,661**	**2,112**	**7,485**	**1,773**	**3,516**	**1,580**	**5,257**	**3,992**	**11,343**	**58,099**

2033 Inter-Peak

Reference Demand

RefCom	1	2	3	4	5	6	7	8	9	10	Total
1	935	91	48	253	41	38	26	21	31	38	**1,522**
2	91	68	3	20	23	11	9	6	4	5	**240**
3	56	2	48	33	1	6	16	6	3	1	**172**
4	228	15	25	231	17	9	33	27	33	8	**625**
5	45	25	1	13	135	11	1	1	2	24	**258**
6	41	10	8	12	12	720	23	41	0	51	**917**
7	32	6	20	33	1	19	129	37	8	4	**291**
8	32	5	7	26	0	40	41	1,071	53	102	**1,378**
9	43	5	3	45	2	0	9	56	714	77	**953**
10	39	6	2	10	27	56	4	116	83	381	**724**
Total	**1,540**	**233**	**166**	**676**	**259**	**910**	**292**	**1,382**	**931**	**690**	**7,080**

RefOth	1	2	3	4	5	6	7	8	9	10	Total
1	5,204	690	318	1,275	312	179	93	157	252	173	**8,654**
2	660	712	32	107	237	35	13	72	58	110	**2,035**
3	291	28	432	174	12	30	84	57	36	54	**1,197**
4	1,219	96	139	1,467	74	36	129	192	225	117	**3,696**
5	272	201	13	56	922	36	6	40	98	113	**1,759**
6	160	29	31	49	42	4,088	65	416	99	348	**5,328**
7	130	11	80	114	6	64	961	261	82	42	**1,752**
8	158	83	53	182	42	405	253	6,064	505	956	**8,702**
9	227	52	35	263	96	93	67	513	3,595	649	**5,589**
10	147	119	58	137	97	316	39	876	624	2,079	**4,491**
Total	**8,468**	**2,021**	**1,191**	**3,824**	**1,840**	**5,283**	**1,709**	**8,648**	**5,575**	**4,643**	**43,203**

RefEmB	1	2	3	4	5	6	7	8	9	10	Total
1	485	66	28	153	79	56	17	32	54	118	**1,088**
2	69	17	4	7	27	4	8	6	5	45	**193**
3	28	2	10	10	2	2	9	3	4	27	**98**
4	164	7	8	105	21	16	23	37	30	78	**487**
5	92	26	3	16	88	4	3	3	4	25	**263**
6	56	3	2	16	4	403	7	18	6	44	**559**
7	21	5	9	19	1	8	84	16	10	8	**180**
8	37	6	3	26	2	16	12	597	23	172	**894**
9	51	5	3	41	4	5	5	26	389	109	**638**
10	125	47	29	83	17	31	7	163	105	281	**888**
Total	**1,127**	**183**	**99**	**475**	**246**	**546**	**176**	**901**	**630**	**907**	**5,289**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	6,623	848	395	1,682	431	272	137	210	337	329	**11,264**
2	820	797	39	133	288	50	29	84	67	161	**2,468**
3	374	32	490	217	15	38	109	66	43	82	**1,468**
4	1,610	118	172	1,803	112	62	185	255	288	204	**4,808**
5	409	251	17	85	1,146	52	11	44	104	162	**2,280**
6	257	43	41	77	58	5,211	95	475	105	443	**6,804**
7	183	22	109	166	8	92	1,173	314	101	54	**2,223**
8	227	94	63	234	44	461	306	7,732	581	1,230	**10,974**
9	321	61	41	349	101	98	81	595	4,698	834	**7,180**
10	311	171	88	229	141	403	51	1,155	811	2,742	**6,104**
Total	**11,136**	**2,437**	**1,456**	**4,975**	**2,345**	**6,739**	**2,177**	**10,931**	**7,135**	**6,239**	**55,572**

VDM Demand - DM

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	933	91	50	241	40	38	29	20	25	36	**1,503**
2	91	69	3	19	25	12	10	6	4	5	**243**
3	58	2	46	31	1	6	17	6	3	1	**172**
4	221	14	24	232	17	10	36	29	33	8	**624**
5	43	26	1	13	135	11	2	1	2	24	**259**
6	42	11	8	13	12	720	21	41	0	51	**918**
7	36	7	21	37	1	17	124	32	7	4	**287**
8	29	5	7	28	0	40	35	1,071	53	102	**1,371**
9	42	5	3	46	2	0	8	56	714	77	**952**
10	37	5	2	10	27	56	5	116	83	381	**723**
Total	**1,532**	**235**	**168**	**671**	**261**	**911**	**287**	**1,377**	**923**	**688**	**7,052**

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	5,259	673	290	1,157	325	209	90	78	149	169	**8,399**
2	676	718	31	95	261	43	14	45	31	114	**2,027**
3	331	26	437	173	12	40	91	40	25	67	**1,243**
4	1,235	92	144	1,465	82	43	141	181	207	133	**3,722**
5	274	210	14	55	923	37	7	40	97	113	**1,770**
6	174	35	37	48	43	4,088	61	416	99	348	**5,349**
7	137	11	87	124	7	68	998	167	82	51	**1,734**
8	144	70	49	181	43	405	202	6,064	505	956	**8,620**
9	231	44	37	286	95	93	67	513	3,595	649	**5,611**
10	145	109	72	141	96	316	42	876	624	2,079	**4,500**
Total	**8,607**	**1,989**	**1,199**	**3,725**	**1,887**	**5,343**	**1,713**	**8,420**	**5,414**	**4,680**	**42,977**

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	476	65	28	144	89	60	17	29	41	112	**1,061**
2	66	17	4	5	30	5	8	5	3	45	**190**
3	28	2	11	9	3	3	10	2	2	28	**98**
4	159	6	8	106	22	17	25	40	25	71	**480**
5	91	28	3	15	88	4	3	3	4	25	**263**
6	57	4	3	15	4	403	6	18	6	44	**560**
7	20	5	10	20	2	8	88	10	8	8	**179**
8	35	6	3	28	2	16	9	597	23	172	**891**
9	53	4	3	42	4	5	5	26	389	109	**640**
10	125	45	30	76	17	31	7	163	105	281	**879**
Total	**1,109**	**182**	**101**	**461**	**260**	**553**	**179**	**894**	**607**	**894**	**5,239**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	6,667	830	368	1,542	455	307	136	127	216	316	**10,964**
2	833	805	38	119	316	60	32	56	38	163	**2,460**
3	417	30	494	214	15	49	119	48	30	96	**1,513**
4	1,616	111	176	1,804	121	70	202	249	264	213	**4,826**
5	408	264	18	83	1,146	52	12	44	103	161	**2,292**
6	273	50	48	76	58	5,211	88	475	105	443	**6,827**
7	192	23	118	181	10	94	1,210	209	98	63	**2,199**
8	208	80	59	237	46	461	247	7,732	581	1,230	**10,882**
9	326	53	44	374	101	98	80	595	4,698	834	**7,203**
10	307	159	104	227	140	403	53	1,155	811	2,742	**6,103**
Total	**11,247**	**2,406**	**1,468**	**4,857**	**2,408**	**6,807**	**2,179**	**10,691**	**6,943**	**6,262**	**55,268**

VDM Demand - DS

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	947	89	56	254	40	39	32	21	25	34	**1,537**
2	91	66	6	28	24	12	16	12	4	4	**262**
3	63	4	45	31	1	6	17	6	3	1	**177**
4	229	18	24	231	18	10	35	27	32	8	**631**
5	45	25	2	15	135	11	2	2	2	24	**263**
6	42	11	8	13	12	720	21	41	0	51	**919**
7	39	11	21	35	2	18	122	31	7	4	**289**
8	30	7	7	26	0	40	34	1,071	53	102	**1,371**
9	42	5	4	45	2	0	7	56	714	77	**951**
10	37	5	2	10	27	56	5	116	83	381	**722**
Total	**1,565**	**240**	**175**	**687**	**262**	**912**	**293**	**1,381**	**922**	**686**	**7,122**

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	5,344	643	360	1,210	313	196	103	91	150	165	**8,575**
2	672	703	82	120	257	42	23	82	31	125	**2,138**
3	365	73	402	158	21	37	87	34	22	74	**1,273**
4	1,279	111	134	1,443	88	42	136	171	206	130	**3,740**
5	272	205	25	63	922	37	8	40	97	118	**1,789**
6	174	35	37	48	43	4,088	61	416	99	348	**5,348**
7	154	19	85	122	9	69	986	160	82	50	**1,738**
8	140	114	44	170	44	405	193	6,064	505	956	**8,637**
9	234	45	36	286	95	93	67	513	3,595	649	**5,612**
10	149	125	84	137	102	316	38	876	624	2,079	**4,530**
Total	**8,784**	**2,072**	**1,290**	**3,758**	**1,895**	**5,326**	**1,703**	**8,447**	**5,412**	**4,694**	**43,380**

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	485	65	32	150	87	60	20	31	42	109	**1,082**
2	67	16	9	6	30	5	12	8	3	50	**205**
3	30	6	10	9	3	3	9	2	2	32	**107**
4	165	7	8	105	23	17	24	38	25	73	**485**
5	94	26	3	16	88	4	4	3	4	25	**267**
6	59	4	3	15	4	403	6	18	6	44	**561**
7	23	8	10	20	2	8	86	9	8	7	**180**
8	35	8	3	27	2	16	9	597	23	172	**891**
9	54	4	3	41	4	5	5	26	389	109	**640**
10	122	52	37	74	17	31	6	163	105	281	**889**
Total	**1,135**	**195**	**117**	**463**	**260**	**553**	**181**	**895**	**607**	**902**	**5,308**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	6,776	796	448	1,614	440	295	155	143	217	308	**11,194**
2	829	785	97	154	311	59	51	102	38	179	**2,605**
3	458	83	457	197	25	47	114	41	27	107	**1,557**
4	1,673	135	166	1,779	129	69	195	236	262	211	**4,856**
5	412	256	30	94	1,146	53	15	44	103	167	**2,319**
6	276	49	48	75	58	5,211	88	475	105	443	**6,828**
7	216	37	116	177	14	95	1,194	200	97	61	**2,207**
8	205	130	54	223	47	461	236	7,732	581	1,230	**10,900**
9	330	53	43	372	101	98	79	595	4,698	834	**7,204**
10	309	182	123	221	146	403	49	1,155	811	2,742	**6,141**
Total	**11,484**	**2,506**	**1,582**	**4,907**	**2,417**	**6,791**	**2,177**	**10,723**	**6,941**	**6,282**	**55,810**

2033 PM Peak

Reference Demand

RefCom	1	2	3	4	5	6	7	8	9	10	Total
1	3,191	583	357	1,319	273	86	222	113	312	191	**6,647**
2	175	301	9	69	103	48	9	11	46	22	**793**
3	108	13	222	96	5	16	47	10	17	5	**539**
4	1,015	88	167	941	86	51	194	108	109	97	**2,855**
5	204	109	10	47	179	16	2	3	2	110	**683**
6	172	44	45	50	15	965	38	47	34	224	**1,634**
7	174	28	120	123	2	20	179	39	9	20	**715**
8	116	14	40	139	1	56	63	1,469	59	403	**2,360**
9	550	59	22	147	3	1	17	56	929	516	**2,300**
10	516	263	56	118	92	93	22	210	236	4,301	**5,908**
Total	**6,223**	**1,500**	**1,048**	**3,050**	**759**	**1,353**	**793**	**2,065**	**1,753**	**5,888**	**24,432**

RefOth	1	2	3	4	5	6	7	8	9	10	Total
1	3,506	784	419	1,369	332	147	164	76	280	217	**7,296**
2	382	593	81	131	136	11	17	21	16	87	**1,475**
3	326	33	378	165	9	10	62	31	9	15	**1,038**
4	983	136	168	1,215	73	25	108	111	138	75	**3,032**
5	189	156	18	57	228	6	3	5	11	125	**797**
6	110	15	17	60	6	985	15	32	30	285	**1,555**
7	82	12	74	80	2	9	245	52	15	38	**609**
8	90	35	48	124	10	31	63	1,544	47	928	**2,920**
9	179	35	57	136	15	4	19	54	949	752	**2,199**
10	324	158	104	147	82	174	24	324	380	4,869	**6,588**
Total	**6,170**	**1,958**	**1,364**	**3,486**	**893**	**1,402**	**720**	**2,250**	**1,876**	**7,392**	**27,510**

RefEmB	1	2	3	4	5	6	7	8	9	10	Total
1	367	144	22	198	17	69	23	55	43	220	**1,158**
2	30	30	2	15	15	5	0	12	3	139	**252**
3	6	1	22	12	0	2	7	1	1	2	**54**
4	169	22	16	148	16	7	36	44	13	22	**493**
5	40	20	1	7	24	2	0	1	0	37	**133**
6	35	5	5	17	1	134	4	6	8	46	**263**
7	17	1	15	31	0	3	26	5	2	14	**113**
8	25	9	5	29	0	7	6	202	6	353	**642**
9	69	18	13	26	1	1	3	9	129	273	**540**
10	194	264	82	94	40	20	8	162	97	1,323	**2,283**
Total	**952**	**513**	**183**	**577**	**114**	**249**	**113**	**496**	**303**	**2,431**	**5,932**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	7,065	1,511	799	2,886	622	302	410	244	634	628	**15,100**
2	587	924	92	215	254	65	27	44	65	248	**2,520**
3	440	46	622	273	15	27	116	42	28	22	**1,631**
4	2,168	245	351	2,304	174	82	338	263	260	195	**6,381**
5	433	285	29	112	431	24	4	9	14	272	**1,613**
6	318	64	67	127	23	2,084	57	85	72	555	**3,452**
7	274	42	209	234	4	32	450	95	25	72	**1,436**
8	230	58	93	293	11	94	132	3,215	112	1,685	**5,923**
9	797	113	91	309	18	6	39	118	2,007	1,541	**5,039**
10	1,034	685	242	360	214	287	54	696	714	10,493	**14,780**
Total	**13,345**	**3,972**	**2,595**	**7,113**	**1,766**	**3,003**	**1,627**	**4,811**	**3,931**	**15,711**	**57,874**

VDM Demand - DM

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	3,203	593	391	1,236	260	97	262	122	320	189	**6,671**
2	170	304	10	63	110	51	14	13	47	27	**809**
3	107	13	212	99	5	18	51	11	18	5	**539**
4	986	85	170	948	86	56	219	120	113	95	**2,877**
5	194	117	9	48	179	16	2	3	2	110	**680**
6	169	47	49	53	15	965	35	47	34	224	**1,638**
7	178	31	125	131	2	18	173	32	8	23	**722**
8	103	15	42	145	1	56	56	1,469	59	403	**2,348**
9	575	57	21	154	3	1	14	56	929	516	**2,326**
10	496	267	67	123	112	93	25	210	236	4,301	**5,930**
Total	**6,181**	**1,528**	**1,095**	**2,999**	**773**	**1,372**	**851**	**2,081**	**1,766**	**5,893**	**24,540**

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	3,475	768	461	1,188	346	220	184	40	253	158	**7,093**
2	373	596	85	107	152	16	31	15	13	111	**1,498**
3	354	29	380	158	10	14	68	25	9	19	**1,064**
4	932	117	170	1,193	79	29	121	131	149	83	**3,005**
5	189	172	23	60	228	6	3	5	11	125	**823**
6	116	20	22	68	7	985	16	32	30	285	**1,581**
7	81	12	80	80	2	11	247	40	15	45	**612**
8	80	34	49	117	10	31	53	1,544	47	928	**2,893**
9	179	34	37	157	15	4	20	54	949	752	**2,201**
10	297	181	120	142	108	174	27	324	380	4,869	**6,624**
Total	**6,078**	**1,964**	**1,425**	**3,270**	**955**	**1,490**	**769**	**2,210**	**1,856**	**7,376**	**27,392**

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	368	147	21	186	16	72	23	47	35	213	**1,128**
2	29	33	2	13	17	6	0	9	3	119	**231**
3	6	1	23	11	0	2	7	1	1	2	**55**
4	156	17	16	149	16	9	39	52	13	23	**491**
5	39	22	1	9	24	2	0	1	0	37	**136**
6	37	6	6	18	1	134	4	6	8	46	**268**
7	16	1	16	31	0	3	28	4	2	15	**116**
8	24	8	5	28	0	7	5	202	6	353	**639**
9	79	17	17	28	1	1	3	9	129	273	**556**
10	176	251	77	95	46	20	7	162	97	1,323	**2,254**
Total	**932**	**503**	**184**	**569**	**122**	**256**	**117**	**492**	**295**	**2,404**	**5,873**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	7,046	1,508	873	2,609	621	390	469	209	607	560	**14,892**
2	572	932	96	183	279	73	45	37	63	257	**2,538**
3	468	43	614	268	14	34	126	37	28	26	**1,658**
4	2,075	220	356	2,289	181	94	380	303	275	200	**6,372**
5	422	311	33	117	431	24	5	9	14	272	**1,639**
6	322	73	77	138	23	2,084	55	85	72	555	**3,486**
7	275	43	221	241	4	33	448	76	25	83	**1,450**
8	208	57	96	290	12	94	113	3,215	112	1,685	**5,881**
9	833	108	74	340	18	6	37	118	2,007	1,541	**5,082**
10	969	699	264	360	266	287	59	696	714	10,493	**14,808**
Total	**13,190**	**3,995**	**2,705**	**6,838**	**1,849**	**3,118**	**1,737**	**4,783**	**3,917**	**15,673**	**57,805**

VDM Demand - DS

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	3,226	530	396	1,271	246	93	271	133	317	184	**6,667**
2	168	291	18	89	104	50	17	22	48	27	**834**
3	119	22	207	95	8	19	50	10	20	5	**554**
4	1,010	99	166	942	92	57	213	109	112	101	**2,902**
5	205	113	12	54	179	16	2	3	2	110	**696**
6	160	48	50	53	16	965	35	47	34	224	**1,632**
7	187	59	121	123	3	19	170	30	8	23	**742**
8	106	20	39	137	1	56	55	1,469	59	403	**2,345**
9	592	58	20	151	3	1	14	56	929	516	**2,340**
10	488	295	68	123	109	93	26	210	236	4,301	**5,949**
Total	**6,261**	**1,535**	**1,098**	**3,037**	**761**	**1,371**	**852**	**2,089**	**1,765**	**5,893**	**24,663**

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	3,564	583	481	1,225	338	153	203	45	225	154	**6,972**
2	369	582	261	190	149	15	43	29	13	108	**1,759**
3	357	103	339	143	21	13	64	21	8	17	**1,085**
4	965	141	146	1,168	87	30	121	120	150	79	**3,006**
5	198	165	33	85	227	6	4	5	11	126	**859**
6	115	20	21	62	7	985	16	32	30	285	**1,572**
7	86	29	76	75	2	12	245	39	16	43	**623**
8	79	56	45	111	11	31	51	1,544	47	928	**2,902**
9	187	35	41	154	15	4	20	54	949	752	**2,209**
10	290	234	141	139	110	174	24	324	380	4,869	**6,686**
Total	**6,209**	**1,948**	**1,584**	**3,351**	**966**	**1,422**	**790**	**2,213**	**1,828**	**7,362**	**27,674**

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	378	124	22	185	15	74	24	47	35	213	**1,116**
2	28	29	3	16	16	6	1	15	2	124	**239**
3	9	1	21	11	1	2	7	1	1	2	**56**
4	161	20	15	147	17	8	39	49	13	24	**491**
5	40	21	2	8	24	2	0	1	0	37	**136**
6	38	6	6	18	1	134	4	6	8	46	**267**
7	17	2	15	29	0	3	27	3	2	14	**113**
8	23	13	5	27	0	7	5	202	6	353	**641**
9	80	16	15	28	1	1	3	9	129	273	**554**
10	182	258	69	88	47	20	7	162	97	1,323	**2,253**
Total	**955**	**490**	**172**	**557**	**122**	**257**	**116**	**494**	**295**	**2,409**	**5,867**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	7,168	1,237	898	2,681	599	320	498	226	577	551	**14,755**
2	566	902	282	296	269	71	61	66	63	258	**2,833**
3	485	127	567	249	29	34	121	32	29	24	**1,696**
4	2,135	259	327	2,256	196	96	373	278	275	204	**6,399**
5	443	298	46	147	431	24	6	9	14	273	**1,691**
6	313	74	76	132	23	2,084	55	85	72	555	**3,471**
7	290	90	213	227	5	33	442	72	25	80	**1,478**
8	207	89	89	275	12	94	111	3,215	112	1,685	**5,888**
9	859	109	76	333	18	6	36	118	2,007	1,541	**5,104**
10	959	787	278	350	266	287	57	696	714	10,493	**14,888**
Total	**13,425**	**3,972**	**2,854**	**6,946**	**1,849**	**3,049**	**1,759**	**4,796**	**3,888**	**15,664**	**58,203**

2033 24-Hour

Reference Demand

RefCom	1	2	3	4	5	6	7	8	9	10	Total
1	28,551	3,377	1,692	8,955	1,856	1,002	1,190	851	2,813	2,724	**53,010**
2	3,891	2,714	85	657	1,019	434	144	124	419	967	**10,455**
3	1,461	72	1,969	1,264	54	286	786	242	162	202	**6,498**
4	8,460	595	906	8,051	646	424	1,452	983	1,115	698	**23,331**
5	2,825	989	60	413	2,006	177	32	23	32	751	**7,307**
6	1,147	404	249	417	177	10,723	330	590	108	1,284	**15,429**
7	1,188	149	686	1,268	17	313	1,963	563	133	159	**6,438**
8	1,096	133	202	1,030	7	580	583	16,210	720	2,549	**23,110**
9	3,066	400	143	1,178	26	119	138	725	10,444	2,758	**18,996**
10	2,648	895	188	621	810	1,348	161	2,642	2,802	29,073	**41,189**
Total	**54,332**	**9,727**	**6,181**	**23,854**	**6,617**	**15,406**	**6,779**	**22,953**	**18,750**	**41,165**	**205,763**

RefOth	1	2	3	4	5	6	7	8	9	10	Total
1	56,692	8,222	4,067	15,805	3,447	1,886	1,219	1,715	2,877	2,163	**98,093**
2	6,790	9,649	514	1,355	2,563	325	161	601	496	1,151	**23,605**
3	4,234	423	6,338	2,266	153	310	954	615	387	541	**16,222**
4	14,150	1,299	1,810	18,198	851	409	1,516	1,892	2,221	1,258	**43,603**
5	3,046	2,684	169	638	7,436	293	55	295	711	1,284	**16,611**
6	1,627	288	288	544	317	32,708	501	2,957	752	3,473	**43,453**
7	1,483	206	944	1,368	52	513	7,805	2,045	631	439	**15,486**
8	1,475	726	554	1,837	319	2,885	1,998	48,437	3,579	9,560	**71,370**
9	2,699	525	419	2,532	703	658	524	3,639	27,719	7,057	**46,475**
10	2,277	1,416	719	1,484	1,090	3,040	382	7,882	6,014	33,903	**58,208**
Total	**94,473**	**25,438**	**15,822**	**46,028**	**16,930**	**43,027**	**15,114**	**70,076**	**45,387**	**60,829**	**433,125**

RefEmB	1	2	3	4	5	6	7	8	9	10	Total
1	6,032	977	381	2,136	647	659	262	414	601	1,727	**13,835**
2	1,043	329	38	124	357	71	55	83	96	1,205	**3,402**
3	467	24	221	196	19	46	156	48	54	320	**1,552**
4	2,298	158	135	1,573	217	192	367	455	328	766	**6,491**
5	807	328	28	154	740	40	21	22	30	333	**2,504**
6	647	59	38	190	33	3,511	62	162	63	491	**5,257**
7	359	35	134	320	12	75	723	143	83	126	**2,008**
8	479	90	40	375	13	143	111	5,258	190	2,650	**9,350**
9	685	95	66	421	31	73	47	220	3,401	1,817	**6,854**
10	1,969	1,211	440	916	309	368	110	2,411	1,693	9,596	**19,024**
Total	**14,787**	**3,305**	**1,520**	**6,405**	**2,380**	**5,178**	**1,914**	**9,216**	**6,540**	**19,031**	**70,276**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	91,275	12,575	6,139	26,896	5,951	3,547	2,670	2,980	6,292	6,614	**164,938**
2	11,724	12,691	638	2,136	3,939	831	360	808	1,012	3,324	**37,463**
3	6,163	519	8,528	3,727	226	642	1,896	904	604	1,063	**24,272**
4	24,909	2,052	2,851	27,821	1,714	1,025	3,335	3,331	3,664	2,722	**73,424**
5	6,679	4,000	257	1,205	10,182	510	108	340	773	2,368	**26,422**
6	3,421	750	574	1,152	527	46,941	893	3,709	924	5,249	**64,139**
7	3,029	391	1,765	2,956	80	901	10,490	2,750	846	724	**23,932**
8	3,050	949	797	3,242	339	3,608	2,693	69,905	4,489	14,760	**103,830**
9	6,449	1,019	627	4,131	759	850	709	4,584	41,565	11,631	**72,324**
10	6,894	3,523	1,347	3,021	2,210	4,756	654	12,935	10,509	72,572	**118,420**
Total	**163,592**	**38,469**	**23,523**	**76,286**	**25,927**	**63,611**	**23,807**	**102,245**	**70,677**	**121,026**	**709,164**

VDM Demand - DM

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	28,491	3,329	1,782	8,530	1,753	1,014	1,327	832	2,673	2,562	**52,293**
2	3,853	2,741	88	617	1,086	463	170	138	412	992	**10,561**
3	1,485	72	1,882	1,228	46	317	827	256	152	241	**6,505**
4	8,119	546	923	8,088	660	454	1,611	1,075	1,144	716	**23,336**
5	2,697	1,067	59	416	2,004	176	42	23	30	780	**7,295**
6	1,190	429	278	449	177	10,723	298	590	108	1,284	**15,526**
7	1,288	167	726	1,386	20	283	1,891	483	114	183	**6,541**
8	1,083	142	213	1,105	7	580	501	16,210	720	2,549	**23,111**
9	3,222	397	145	1,228	25	119	120	725	10,444	2,758	**19,183**
10	2,608	919	228	657	869	1,348	184	2,642	2,802	29,073	**41,331**
Total	**54,035**	**9,810**	**6,324**	**23,705**	**6,646**	**15,478**	**6,970**	**22,975**	**18,600**	**41,138**	**205,681**

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	57,016	7,766	3,845	13,929	3,503	2,268	1,227	782	1,942	1,934	**94,212**
2	6,857	9,701	521	1,177	2,801	408	211	384	302	1,268	**23,630**
3	4,588	390	6,359	2,173	152	410	1,037	469	294	680	**16,551**
4	14,017	1,170	1,829	18,010	941	487	1,651	1,849	2,180	1,381	**43,516**
5	3,029	2,821	191	642	7,442	298	64	293	704	1,290	**16,774**
6	1,778	345	349	558	321	32,708	477	2,957	752	3,473	**43,718**
7	1,563	239	1,022	1,450	61	547	8,046	1,362	628	533	**15,451**
8	1,365	618	524	1,828	329	2,885	1,613	48,437	3,579	9,560	**70,737**
9	2,725	470	374	2,795	700	658	529	3,639	27,719	7,057	**46,666**
10	2,187	1,414	862	1,501	1,167	3,040	410	7,882	6,014	33,903	**58,380**
Total	**95,126**	**24,934**	**15,878**	**44,062**	**17,416**	**43,709**	**15,264**	**68,054**	**44,113**	**61,080**	**429,636**

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	5,974	984	363	2,025	714	701	244	361	465	1,621	**13,452**
2	1,000	348	36	105	395	88	56	66	75	1,158	**3,328**
3	460	21	228	184	20	57	172	37	50	318	**1,547**
4	2,174	139	138	1,591	229	210	396	487	293	724	**6,382**
5	788	356	27	146	740	40	23	22	30	337	**2,509**
6	663	69	44	188	34	3,511	63	162	63	491	**5,288**
7	352	35	144	336	14	80	761	95	70	123	**2,010**
8	456	81	39	389	14	143	87	5,258	190	2,650	**9,305**
9	722	91	76	440	30	73	43	220	3,401	1,817	**6,913**
10	1,885	1,142	436	888	328	368	104	2,411	1,693	9,596	**18,853**
Total	**14,474**	**3,266**	**1,532**	**6,293**	**2,518**	**5,270**	**1,950**	**9,118**	**6,330**	**18,835**	**69,585**

Car	1	2	3	4	5	6	7	8	9	10	Total
1	91,481	12,079	5,991	24,483	5,970	3,982	2,797	1,976	5,079	6,118	**159,956**
2	11,710	12,790	645	1,900	4,282	959	437	588	789	3,419	**37,519**
3	6,532	483	8,469	3,585	217	784	2,035	762	495	1,239	**24,603**
4	24,311	1,855	2,890	27,689	1,830	1,151	3,658	3,412	3,617	2,821	**73,235**
5	6,514	4,244	277	1,204	10,186	514	129	338	764	2,407	**26,577**
6	3,631	842	672	1,195	531	46,941	838	3,709	924	5,249	**64,532**
7	3,203	441	1,892	3,172	94	910	10,698	1,939	812	838	**24,001**
8	2,904	841	776	3,321	349	3,608	2,201	69,905	4,489	14,760	**103,153**
9	6,669	958	595	4,463	756	850	692	4,584	41,565	11,631	**72,762**
10	6,681	3,475	1,527	3,046	2,364	4,756	699	12,935	10,509	72,572	**118,564**
Total	**163,635**	**38,009**	**23,734**	**74,060**	**26,580**	**64,456**	**24,184**	**100,148**	**69,043**	**121,053**	**704,901**

VDM Demand - DS

VdmCom	1	2	3	4	5	6	7	8	9	10	Total
1	28,732	3,120	1,869	8,771	1,750	994	1,399	889	2,721	2,522	**52,766**
2	3,597	2,617	158	816	1,025	471	273	235	415	1,057	**10,665**
3	1,610	132	1,837	1,206	71	322	803	240	157	237	**6,616**
4	8,355	664	904	8,025	684	469	1,552	1,005	1,121	724	**23,503**
5	2,758	1,000	80	467	2,005	182	53	24	31	777	**7,377**
6	1,163	431	284	455	180	10,723	304	590	108	1,284	**15,522**
7	1,378	285	705	1,328	24	288	1,860	466	110	180	**6,625**
8	1,163	212	200	1,034	7	580	485	16,210	720	2,549	**23,161**
9	3,277	405	151	1,207	25	119	115	725	10,444	2,758	**19,227**
10	2,577	998	231	661	860	1,348	186	2,642	2,802	29,073	**41,379**
Total	**54,611**	**9,864**	**6,419**	**23,970**	**6,631**	**15,498**	**7,029**	**23,027**	**18,631**	**41,161**	**206,841**

VDMOth	1	2	3	4	5	6	7	8	9	10	Total
1	57,980	6,954	4,438	14,545	3,379	1,988	1,380	891	1,885	1,891	**95,333**
2	6,609	9,507	1,478	1,653	2,747	406	326	720	303	1,359	**25,107**
3	4,958	1,193	5,987	2,014	273	383	993	399	263	741	**17,202**
4	14,507	1,481	1,689	17,747	1,012	478	1,604	1,725	2,237	1,339	**43,819**
5	2,977	2,745	301	770	7,429	300	75	295	704	1,327	**16,922**
6	1,759	341	342	537	321	32,708	476	2,957	752	3,473	**43,667**
7	1,774	417	992	1,404	80	550	7,953	1,310	634	514	**15,629**
8	1,354	1,024	479	1,721	338	2,885	1,544	48,437	3,579	9,560	**70,922**
9	2,779	470	378	2,783	701	658	526	3,639	27,719	7,057	**46,710**
10	2,198	1,716	1,003	1,463	1,210	3,040	371	7,882	6,014	33,903	**58,799**
Total	**96,895**	**25,848**	**17,086**	**44,638**	**17,489**	**43,395**	**15,248**	**68,254**	**44,091**	**61,164**	**434,108**

VDMEmB	1	2	3	4	5	6	7	8	9	10	Total
1	6,090	903	404	2,074	698	705	271	371	470	1,597	**13,583**
2	959	317	78	126	382	84	82	102	68	1,214	**3,413**
3	502	50	213	179	25	56	165	32	47	337	**1,606**
4	2,247	172	131	1,568	238	210	380	460	291	733	**6,430**
5	814	331	35	161	740	40	28	22	30	339	**2,540**
6	685	64	44	184	33	3,511	60	162	63	491	**5,297**
7	433	57	137	313	19	78	731	86	69	114	**2,038**
8	466	123	34	365	14	143	81	5,258	190	2,650	**9,325**
9	735	89	71	435	31	73	43	220	3,401	1,817	**6,913**
10	1,903	1,219	457	853	333	368	96	2,411	1,693	9,596	**18,929**
Total	**14,835**	**3,327**	**1,604**	**6,259**	**2,513**	**5,267**	**1,937**	**9,124**	**6,322**	**18,888**	**70,075**

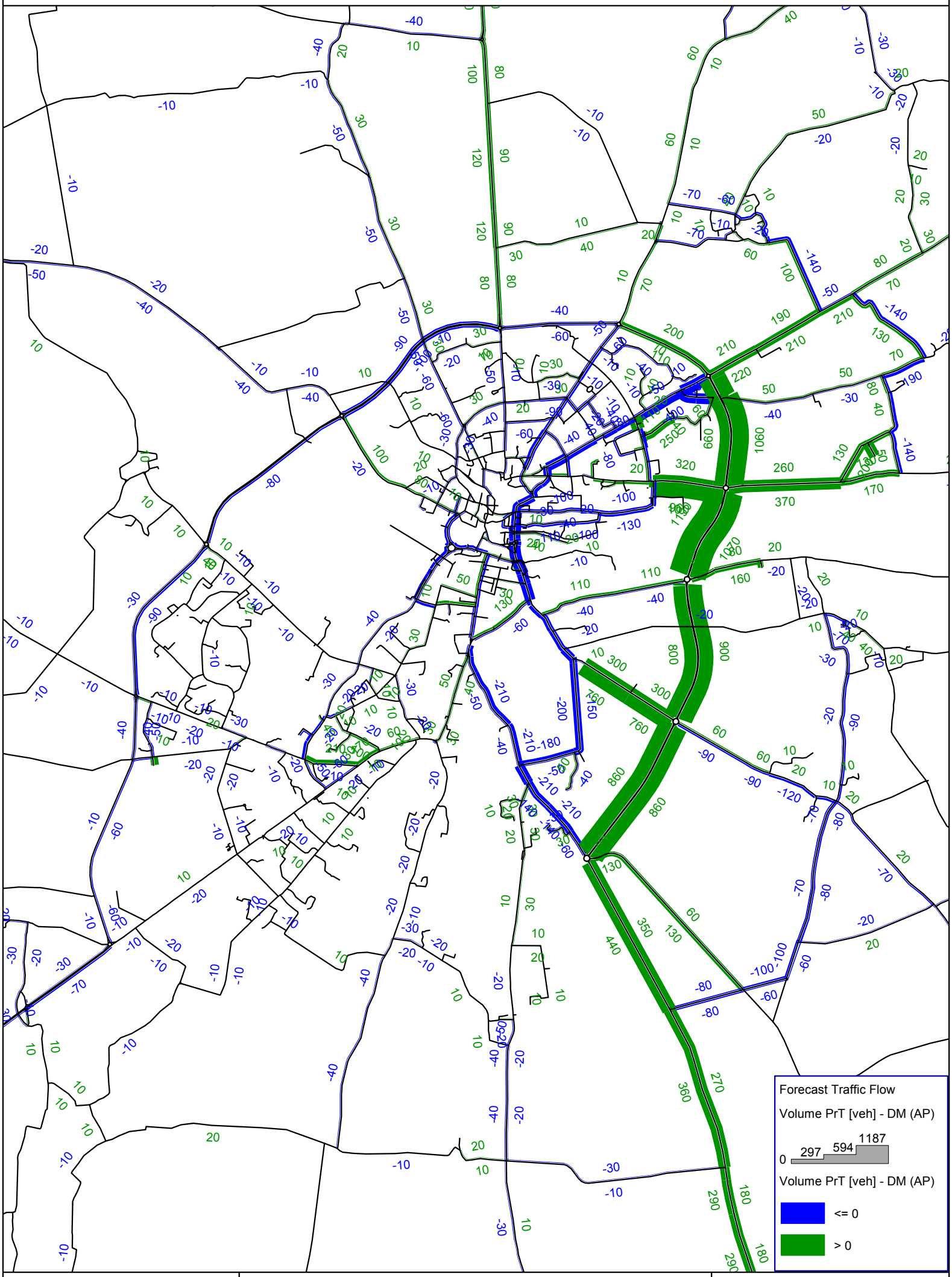
Car	1	2	3	4	5	6	7	8	9	10	Total
1	92,802	10,977	6,711	25,390	5,827	3,687	3,050	2,151	5,077	6,011	**161,682**
2	11,165	12,441	1,713	2,595	4,154	961	682	1,057	787	3,629	**39,185**
3	7,070	1,376	8,036	3,398	369	761	1,961	671	467	1,315	**25,423**
4	25,110	2,317	2,724	27,341	1,933	1,157	3,536	3,190	3,649	2,796	**73,753**
5	6,548	4,076	416	1,398	10,174	522	156	341	765	2,443	**26,839**
6	3,607	836	670	1,177	535	46,941	840	3,709	924	5,249	**64,486**
7	3,585	760	1,834	3,045	124	916	10,544	1,861	813	808	**24,292**
8	2,984	1,360	713	3,120	358	3,608	2,110	69,905	4,489	14,760	**103,407**
9	6,791	964	600	4,425	756	850	684	4,584	41,565	11,631	**72,849**
10	6,678	3,933	1,691	2,977	2,403	4,756	652	12,935	10,509	72,572	**119,107**
Total	**166,341**	**39,039**	**25,109**	**74,867**	**26,632**	**64,159**	**24,215**	**100,404**	**69,044**	**121,214**	**711,024**

Appendix H – VDM Results

Flow Difference plots - insert

- 2018 AM Peak Flow Differences
- 2018 IP Peak Flow Differences
- 2018 PM Peak Flow Differences
- 2033 AM Peak Flow Differences
- 2033 IP Peak Flow Differences
- 2033 PM Peak Flow Differences

GREATER LINCOLN VISUM MODEL



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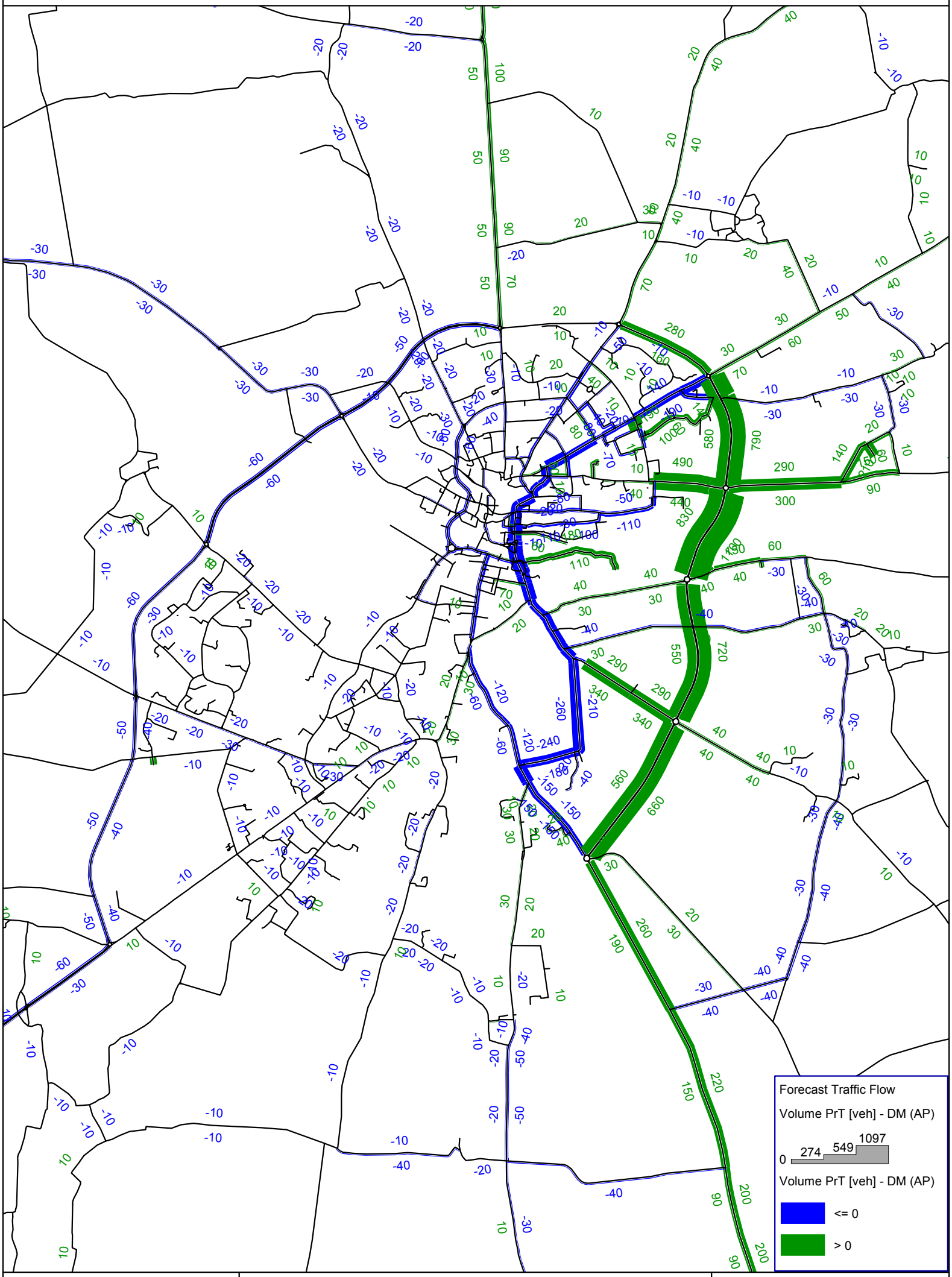
GREATER LINCOLN VISUM MODEL



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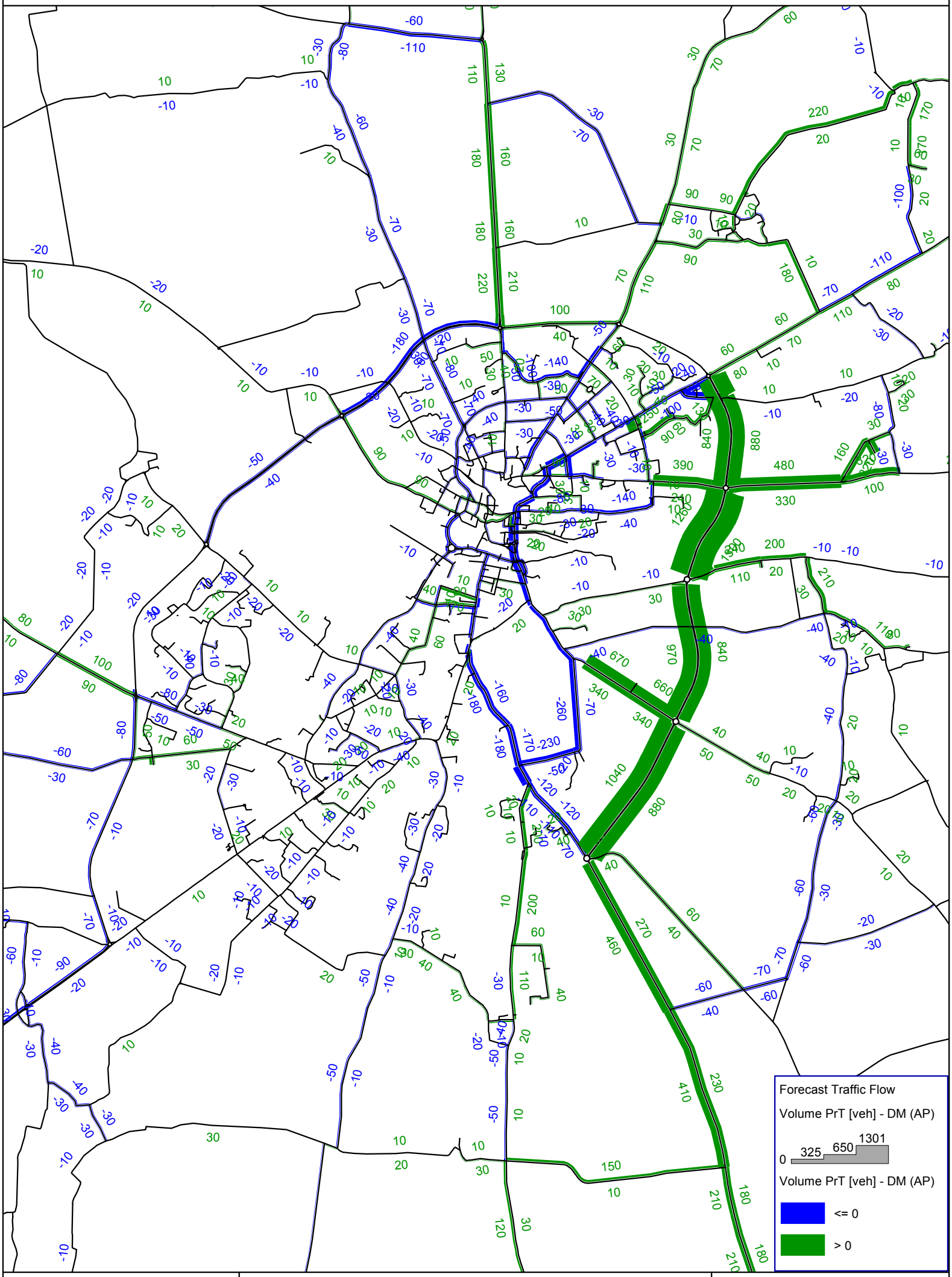
GREATER LINCOLN VISUM MODEL



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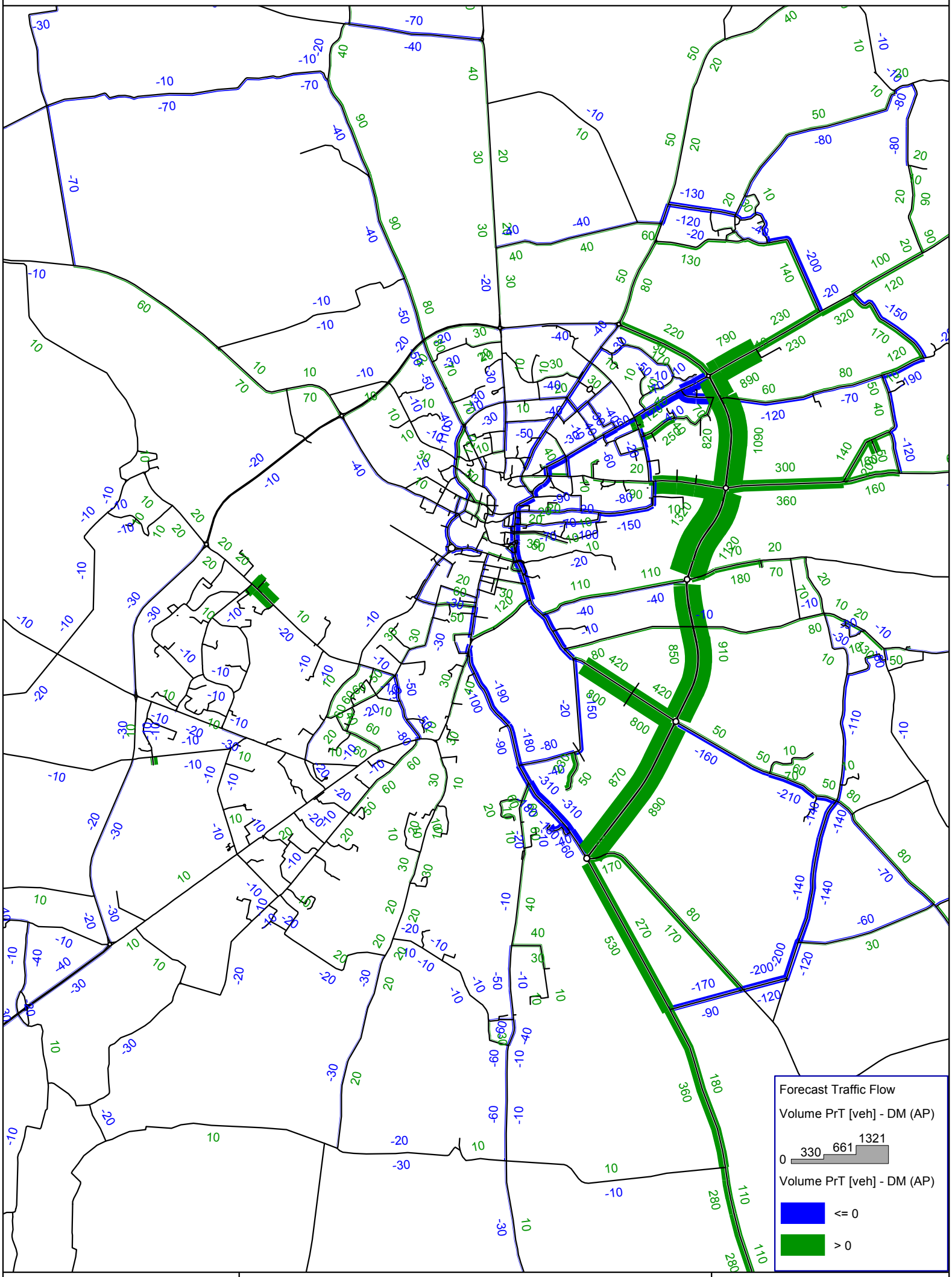

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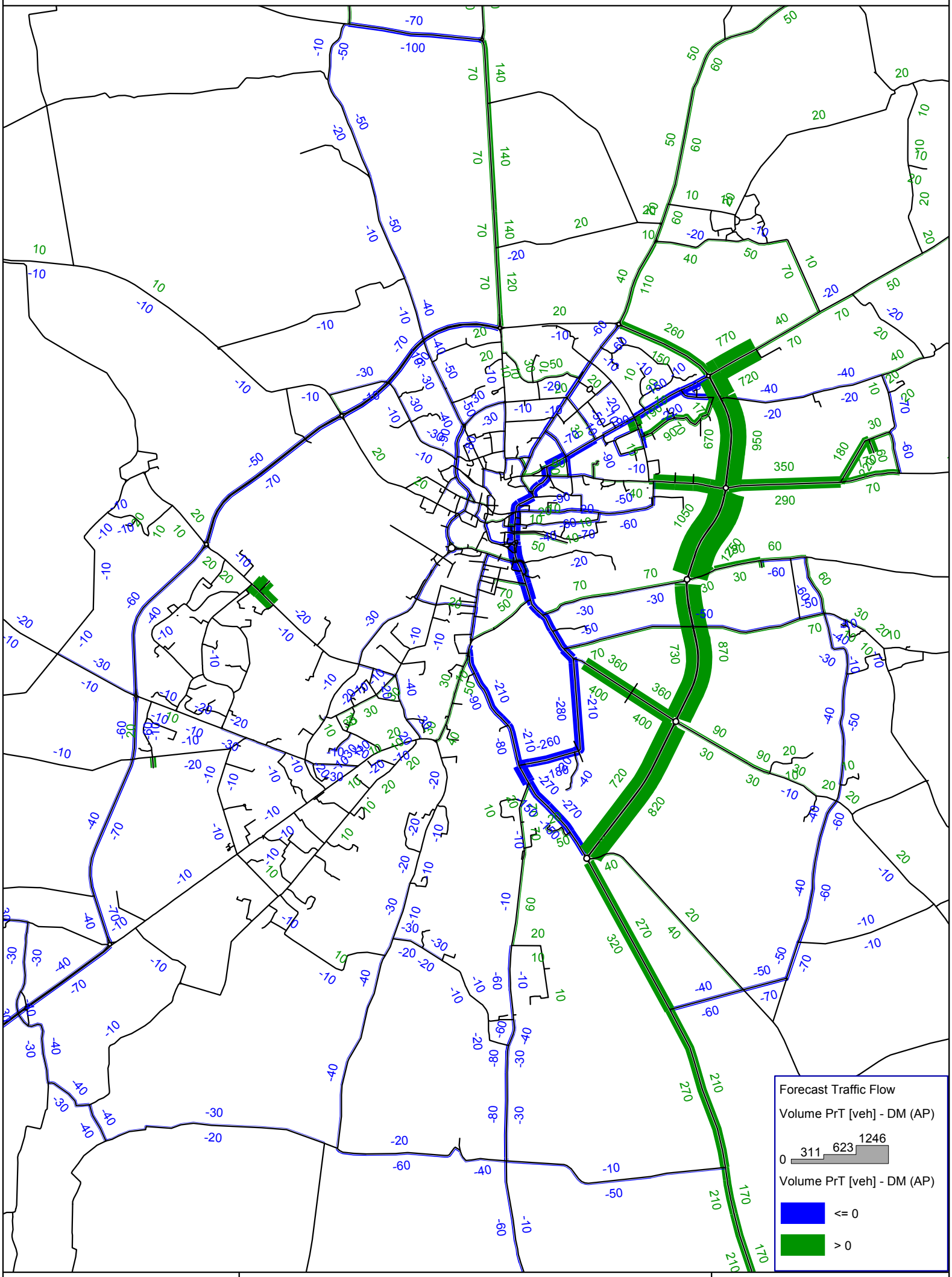

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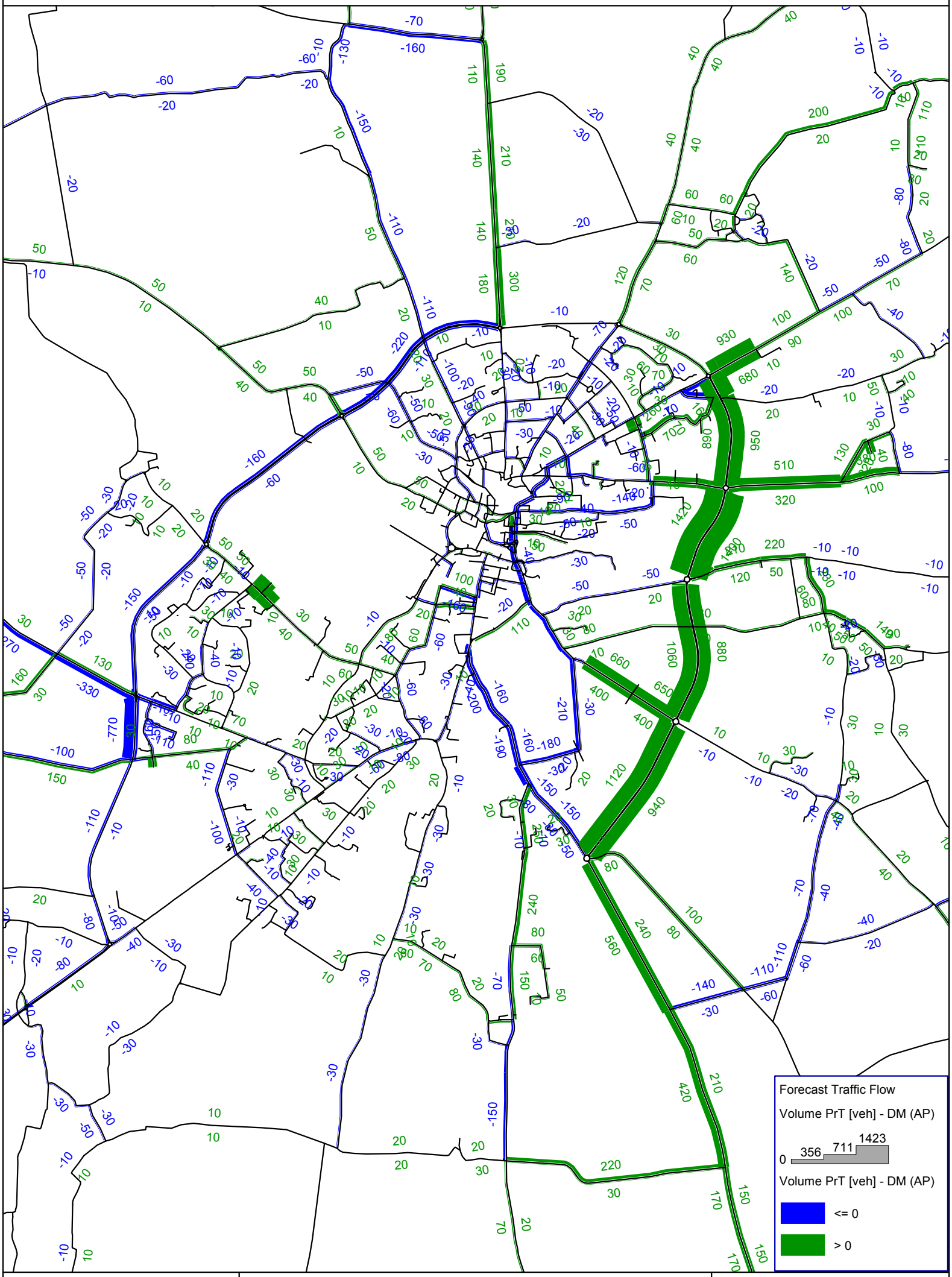

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