**SIMULATION APPROACH TO THE STUDY OF DRIVING BEHAVIOUR,
FUEL CONSUMPTION, AND EMISSIONS**

by

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ABSTRACT

The thesis research investigated the simulation approach to the study of driving behaviour, fuel consumption, and emissions. Each of the two selected microscopic traffic simulation models, namely CORSIM and VISSIM, was combined with the Comprehensive Modal Emissions Model (CMEM) to estimate fuel consumption and emissions for P.M. peak hour traffic on an existing section of Highway 417 in Ottawa (Canada). The results from different model combinations were compared with other types of models (i.e. CORSIM Built-in emission module, MOBILE6, and MOBILE6C). Subsequently, the effect of driving behaviour on fuel consumption and emissions was tested by using scenarios, in which desired speed, desired headway, and desired acceleration were changed. The results show that the simulation approach is an innovative and effective way to analyze driving characteristics, fuel consumption, and emissions. It is observed that the desired speed has the most significant impact on the results. In addition, an analysis of different driver types indicates that aggressive driving has a highly adverse effect on fuel consumption and emissions.

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GLOSSARY OF ACRONYMS AND TERMS

CARB	California Air Resources Board
CCMTA	Canadian Council of Motor Transport Administrators
CFSF	Car-Following Sensitivity Factor
CMEM	Comprehensive Modal Emissions Model
CO	Carbon monoxide
CO ₂	Carbon dioxide
CORSIM	CORridor SIMulation
EMFAC	EMission FACtor
EPA	Environmental Protection Agency
FTP	Federal Test Procedure
GHG	Green House Gas
GPS	Global Positioning System
GUI	Graphical User Interface
GVWR	Gross Vehicle Weight Ratio
HC	Hydrocarbon
HGV	Heavy Goods Vehicle
HOV	High Occupancy Vehicle
I/M	Inspection and Maintenance
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation Systems
ME	Mean Error
MOBILE	Mobile Source Emission Factor Model
MOE	Ministry of the Environment Ontario
MOVES	Multi-scale mOtor Vehicle and Equipment Systems
MPE	Mean Percent Error
MPG	Miles Per Gallon
MTO	Ministry of Transportation Ontario
MY	Model Year
NO _x	Oxides of nitrogen
OD	Origin-Destination
OECD	Organization for Economic Co-operation and Development
ORNL	Oak Ridge National Laboratory
PM	Particulate Matter
RMSE	Root Mean Square Error
RMSPE	Root Mean Square Percent Error
RVP	Raid Vapour Pressure
SO _x	Sulphur Oxides
SUV	Sport Utility Vehicle
TSIS	Traffic Software Integrated System
VISSIM	Verkehr In Stadtten - SIMulation
VMT	Vehicle Miles of Travel
VT-Micro	Virginia Tech Microscopic

CHAPTER 1. INTRODUCTION

1.1 FINE SCALE MODELS FOR FUEL CONSUMPTION AND EMISSIONS ESTIMATION AND TRAFFIC SIMULATION

Human activity in transportation has been causing large adverse impact on the environment and human health. Currently, transportation is one of the major users of energy, and it accounts for one-third of final energy consumption in OECD countries (OECD 2001). The primary source of energy for transportation is fossil fuels. Consumption of these fuels directly affects green house gas (GHG) emissions that are contributing to global climate change. Also, various pollutants emitted from motor vehicles contribute to deterioration in air quality, especially in urban areas causing serious health problems.

To estimate and evaluate current conditions and future changes in vehicle emissions, various models have been developed. Among these, MOBILE series developed by the U.S. Environmental Protection Agency (EPA) (U.S. EPA 2002b) and EMFAC series developed by the California Air Resources Board (CARB) (CARB web source), both of which are macroscopic area wide emission inventory models, are probably the most well known emission estimation tools in North America. However, one of the recent movements in fuel consumption and emissions modelling effort is the development of fine scale high resolution models, which are suitable for more detailed local level analysis than traditional macroscopic models (e.g. MOBILE and EMFAC).

Some examples of these microscopic models include the Comprehensive Modal Emissions Model (CMEM), which was developed at the University of California (An et al. 1997, 1999, and Barth et al. 1996, 1997) and Virginia Tech Microscopic (VT-Micro) model, which was developed at the Virginia Polytechnic Institute and State University (Ahn et al. 2002, 2004, and Rakha et al. 2003a, 2004). The Multi-scale mOtor Vehicle and equipment Emissions System (MOVES), which is currently under development at U.S. EPA (U.S. EPA 2002a), although not a simple microscopic model, incorporates the microscopic emissions estimation component.

As they produce estimates at very detailed level, microscopic fuel consumption and emissions models require high resolution data of vehicle activities as model input (e.g. second-by-second speed profile). Since it is extremely expensive to obtain each vehicle's activity data in such detail from field observations, microscopic traffic simulation models, which are computer models designed to simulate traffic operations at microscopic level and typically capable of generating second-by-second vehicle activity data, are considered to be one of the most suitable sources for the data.

Microscopic traffic simulation models simulate behaviour of each individual vehicle (or driver-vehicle unit) travelling on the network. As they have enabled very detailed analysis of traffic flow, microscopic traffic simulation models are generally accepted as suitable tools to evaluate various traffic improvement strategies including Intelligent Transportation Systems (ITS). Thus, the combined use of microscopic traffic simulation

models and microscopic fuel consumption and emissions models is potentially an ideal combination to analyse and evaluate the environmental impact of traffic improvement strategies at operational level.

1.2 PROBLEM DEFINITION

Currently, a number of microscopic traffic simulation models are available, and each model has its own logic. This means that vehicle activity data produced by different models are not necessarily the same, which may result in different estimates of fuel consumption and emissions. A comparative analysis that uses the microscopic fuel consumption and emissions model with different vehicle activity input obtained from different microscopic traffic simulation models will be a contribution to knowledge in this problem area.

In addition, since microscopic traffic simulation models simulate each individual driver's behaviour, it is potentially possible to analyse the impact of driving behaviour on fuel consumption and emissions by applying microscopic traffic simulation model in association with microscopic fuel consumption and emissions model. Although research has been conducted to investigate the influence of driving behaviour on fuel consumption and emissions, detailed studies that utilized microscopic traffic simulation models were not reported in the literature.

1.3 RESEARCH OBJECTIVES

The first objective of this research is to advance the state of knowledge on the

microscopic simulation approach to the estimation of fuel consumption and emissions. This is to be achieved by an analysis of the impact of different vehicle activity data, produced by different microscopic traffic simulation models, on fuel consumption and emissions estimates calculated by a microscopic fuel consumption and emissions model. Specifically, two well known microscopic traffic simulation models, CORridor SIMulation (CORSIM) (FHWA 2003a) and Verkehr In Stadten – SIMulation (VISSIM) (PTV 2003), are used as a source of vehicle activity data, and one of the state-of-the-art microscopic fuel consumption and emissions models in North America, CMEM, is used to calculate fuel consumption and emissions. Additionally, CORSIM built-in fuel consumption and emissions calculation module and MOBILE are included in the comparison in order to investigate any match and/or gap among different models.

The second objective of the research is to provide an analysis of the impact of driving behaviour on fuel consumption and emissions using microscopic traffic simulation models in association with microscopic fuel consumption and emissions model. Specifically, the impact of drivers' desired travel speed, desired time headway to the leading vehicle, and desired acceleration and deceleration is investigated.

Given the above stated objectives, this research study is designed to be suitable for obtaining information that is not currently available. As the combination of the real world transportation facility and the computer laboratory environment, this study is innovative and has the potential to be effective in achieving a better understanding of driving behaviour, fuel consumption, and emissions. The combination of the latest computer

methods that are to be used in this study points to the innovative aspect of this research.

1.4 THESIS CONTRIBUTIONS

The major contribution of the thesis is to present similarities and/or differences in estimates of fuel consumption and vehicle emissions which are obtained from different combination of the models. Additionally, it presents information on similarities and/or differences among different types of models, including traditional macroscopic models. This will enhance the understanding of microscopic fuel consumption and emissions models and of the effect of combined use of microscopic traffic simulation model and microscopic fuel consumption and emissions model on estimation results.

The second major contribution of the thesis is to present the impact of driving behaviour on fuel consumption and emissions estimates by utilizing the driver behaviour modules in microscopic traffic simulation models. This will add to current knowledge and provide a basis to quantify the effect of measures intended to reduce aggressive driving behaviour.

1.5 THESIS ORGANISATION

In Chapter 2, background information and review of the previous research studies are provided. Then, the research methodologies, scope of the study, and the models used in the research are described in Chapter 3. In Chapter 4, input data preparation process for running CORSIM and VISSIM is presented. Subsequently, CORSIM and VISSIM are calibrated and validated for test bed traffic conditions in Chapter 5. In Chapter 6, the calculation process of fuel consumption and emissions estimates for different models is

presented. Then, the results and discussions are provided in Chapter 7. Major conclusions and recommendations for future research are presented in Chapter 8. Next, references are reported, and the appendices provide detailed information that is not included in the main text.

CHAPTER 2. BACKGROUND

2.1 INTRODUCTION

Along with development of computer hardware performance and software technologies, microscopic traffic simulation models have been rapidly becoming sophisticated in recent years. Since these models provide valuable measures of traffic flow for the analysis and evaluation of existing conditions and alternatives for future improvements, their application by the transportation community is expanding. In addition, most of the models incorporate visualization capabilities (some models even have 3D presentation ability) to show an appealing animation, from which the traffic flow is visually comprehended.

In the fuel consumption and emissions modelling field, development of higher resolution models has been one of the trends. These models are considered to be suitable for detailed local scale analysis and for the evaluation of various ITS strategies, the impact of which is often difficult to capture by the traditional macroscopic models.

This chapter provides basic information about microscopic models and presents a review of related previous research studies.

2.2 MICROSCOPIC TRAFFIC SIMULATION MODELS AND MICROSCOPIC FUEL CONSUMPTION AND EMISSIONS MODELS

Microscopic traffic simulation models move each vehicle on the network by updating each vehicle's state (e.g. position, speed, and acceleration) at short time intervals based on internal mathematical logics that represent a driver's driving behaviour (e.g. car-following and lane changing). In contrast to macroscopic models, in which traffic flow is expressed in terms of macroscopic measures (e.g. average speed, flow, and density), in microscopic models, the traffic flow is an outcome of the aggregated results of each vehicle's movement and interaction with other vehicles and road environment. In order to simulate traffic flows in detail, a large amount of input data are usually required (e.g. roadway geometries, vehicle characteristics, traffic conditions, signal timing, etc.) to run the model.

Most microscopic traffic simulation models utilize random numbers, generated from a random number seed, to determine various factors during a simulation run. The factors affected by the random numbers include, but are not limited to, vehicle release timing at network boundaries; released vehicles' type (e.g. car and truck); vehicles' route and destination; and drivers' desired speed. Thus, the use of different random number seeds will generate different random numbers, which results in different output even though the network is exactly the same. Microscopic traffic simulation models are generally stochastic in nature, and this is one of the major differences from deterministic models. This feature leads to the need for multiple simulation runs, as explained later in detail in Chapter 5.

Microscopic fuel consumption and emissions models associate instantaneous vehicle state (e.g. speed and acceleration) and external conditions (e.g. road way grade) with instantaneous fuel consumption and emissions rates. The internal logic varies from model to model including simple look-up tables, regression models, and complex physical models. Typically, vehicle characteristics, environmental and roadway conditions, and second-by-second vehicle activity data are required to execute the calculations.

The second-by-second vehicle activity data can be obtained from several sources, depending on the purpose of study and availability of equipment. Some examples of the sources include vehicle onboard measurement tools, global positioning system (GPS) equipment, video recording and image processing, and microscopic traffic simulation models. Among the methods, microscopic traffic simulation models are used in this study since these models can provide comprehensive second-by-second vehicle activity data without special equipment.

2.3 PREVIOUS RESEARCH

A literature search showed that studies that investigated the impact of different microscopic traffic simulation models on microscopic emissions modelling results were not found in the published literature. However, some related research studies can be found, and those are noted here. It should be pointed out that due to the ease of access to reading material on microscopic traffic simulation models and emissions modelling, basic reference to literature on these subjects are not included in this thesis document.

Kosman et al. (2003) compared the emissions estimated from different average speeds obtained from CORSIM and VISSIM. The researchers first compared the emissions estimates obtained by using CORSIM and VISSIM under different situations (i.e. in terms of location and time period) and found that the difference was within 7%. The researchers then compared the results for pre and post conditions for three traffic improvement projects and found that the CORSIM-predicted average speed exhibited larger reductions in emissions than the VISSIM-predicted average speed. However, the MOBILE emission model was used, which is a typical macroscopic model, and the average speed was the only conveyable data from CORSIM and VISSIM. Due to the use of a single average speed, the detailed nature of microscopic traffic simulation model results might not be fully reflected when combined with macroscopic type of emission models.

Regarding a comparative study of different fuel consumption and emissions models, several literature items can be found. However, most of the comparisons were made with limited predefined driving cycles.

Barth et al. (2001) compared CMEM, MOBILE5b, and EMFAC by using the MOBILE6 facility-specific driving cycles. The driving cycles were originally developed for the development of MOBILE6 in order to incorporate different driving patterns associated with different roadway types and congestion levels. It was observed that CMEM predicted slightly lower values for carbon monoxide (CO) at lower speeds as compared to

other models; for hydrocarbons (HC), CMEM predicted higher values at higher speeds than other models; and for oxides of nitrogen (NO_x), MOBILE predicted higher values than EMFAC for all conditions, while CMEM predicted slightly lower values than EMFAC.

Rakha et al. (2003b) conducted comparisons among MOBILE5a, MOBILE6, VT-Micro, CMEM, and U.S. EPA measured data for the MOBILE6 facility-specific driving cycles. In the study, VT-Micro showed good correspondence with EPA data with slight overestimation for HC; MOBILE5a appeared to show poor prediction as compared with EPA data; MOBILE6 followed similar cycle-to-cycle profile with EPA data with slight overestimations for HC, CO, and NO_x; and CMEM generally followed EPA data, but it failed to replicate cycle-to-cycle profile accurately. In addition, CMEM tended to underestimate NO_x emissions.

Yu (1998) developed the ONROAD vehicle exhaust emission model, which estimates CO and HC emissions from vehicle's instantaneous speed profile. The researcher conducted comparison against MOBILE5 and EMFAC using the Federal Test Procedure (FTP) driving cycle. It was observed that MOBILE and EMFAC were predicting lower emissions than ONROAD.

As for the impact of driving behaviour on fuel consumption and emissions, a number of research studies have been reported. These can be categorised into three types in terms of vehicle operating environment and tools/equipment used to obtain emissions

measurement.

The first type of research was conducted by Hansen et al. (1995). The researchers measured emissions from vehicles travelling the predefined driving patterns on the chassis dynamometer. It was observed that in most cases, travel speed was the dominant factor, and the speed fluctuation was less important.

The second type of the research studies includes De Vlieger (1997) and De Vlieger et al. (2000). In these studies, the researchers equipped vehicles with on-board fuel consumption and emissions measurement system, and collected the data through test runs of the vehicles in the real world roadway network. It was observed that aggressive driving, which was characterized by sudden acceleration and hard braking, had significant impact on fuel consumption and emissions.

Holmen et al. (1997) conducted a study in which the researchers measured emissions and vehicle operating parameters from real world driving using on-board equipment. The researchers found that significant variability in drivers existed in driving style and associated emissions among drivers tested. The researchers suggested that the major cause of the difference in emissions was in intensity of the operation within a mode rather than the frequency of different driving modes.

A large portion of the literature items falls in the third category, in which researchers obtained real world vehicle operation data from several sources (e.g. on-board

measurement equipment and GPS) and imported the data into fuel consumption and emissions models to predict the environmental impact of driving behaviour. This type of research includes, but is not limited to, Jensen (1995), LeBlanc et al. (1995), Malcolm et al. (2003), and Mullen et al. (1997).

Given the scarcity of research in the combined use of microscopic traffic simulation models and detailed fuel consumption and emissions models, such a study would be a useful addition to the state of knowledge in transportation.

2.4 SUMMARY

Brief descriptions of microscopic traffic simulation models and microscopic fuel consumption and emissions models were provided. Microscopic traffic simulation models are discrete and stochastic in nature, and these are able to record and output detailed vehicle activity data. Microscopic fuel consumption and emissions models require second-by-second vehicle activity data to calculate estimations estimates, and thus, microscopic traffic simulation models are potentially one of the suitable sources of high resolution vehicle activity data.

A review of literature did not uncover studies that investigated the impact of using different microscopic traffic simulation models as data sources for microscopic fuel consumption and emissions models. Also, comparative studies of different fuel consumption and emissions models were limited to the studies using specific driving cycles. Regarding the fuel consumption and emissions effect of driving behaviour,

previous research showed that studies have been conducted with limited real world traffic data. It is contended that due to their flexibilities, microscopic traffic simulation models can play role in studying driving behaviour, fuel consumption, and emissions.

CHAPTER 3. RESEARCH DESCRIPTION

3.1 INTRODUCTION

The core component of the research is the combined use of the microscopic traffic simulation models (CORSIM (FHWA 2003a) and VISSIM (PTV 2003)) and the microscopic fuel consumption and emissions model (CMEM (Barth et al. 2000)). Second-by-second vehicle activity data are generated from simulation runs by CORSIM and VISSIM. The obtained vehicle activity data are then fed into CMEM, and fuel consumption and emissions estimations are calculated.

In this chapter, first, methodology of the research is presented. Then, scope of the research is described, which is followed by the description of the test scenarios. Finally, brief descriptions of the models used in the study are provided.

3.2 METHODOLOGY

The whole research process is split into several phases. First, the microscopic traffic simulation models, CORSIM and VISSIM, are prepared for simulation runs. Input data collection phase and network coding phase complete this task. After the preparation, selected model parameters of CORSIM and VISSIM are adjusted to fine tune the models so that the simulated traffic conditions well represent the real world traffic conditions. This is done through calibration and validation phase. Then, the simulation runs are executed for different scenarios, and the detailed vehicle activity data are collected for

each scenario. Subsequently, data required for the fuel consumption and emissions models are prepared and model runs are executed. Finally, the obtained results are analysed. Figure 3-1 shows the methodological framework of the study.

Figure 3-1. Research Methodology

Various models used in this research are described in the text part of this thesis. Additional information can be found in appendices. Several computer programs were developed during this study to serve as interface between different models. Brief descriptions and the source codes of these programs are also included in the appendix part of this thesis.

3.3 SCOPE OF THE STUDY

As a test bed, an existing section of Highway 417 from Carp Road to Moodie Drive in the City of Ottawa was selected. According to study design, through lanes of the freeway as well as acceleration/deceleration lanes were analyzed in this study. The rationale for the selection of using freeway as a facility in this research is because of its importance in terms of serving high volumes of traffic and corresponding high level of fuel consumption and emissions. The selection of the section of the freeway in this study was influenced by availability of required data.

The section is approximately 11 km in length, and it has 5 interchanges within the site. It lies in the west suburban area of the city and serves high commuter traffic volume during peak periods. Figure 3-2 shows an overview of the study site. The section for each direction is divided into 5 subsections as shown in the figure. The subsections for eastbound are named from E1 to E5 from west to east, and those for westbound are named from W1 to W5 from west to east. Analyses are conducted at the entire section level as well as at the subsection level.

Figure 3-2. Highway 417 Study Site

A 30-minute period within the P.M. peak hour in June 2000 is selected as the study period. Peak hour in June 2000 is selected due to data availability, and P.M. peak hour is selected because it was estimated that larger fraction of vehicles were operating under hot stabilized conditions as compared to A.M. peak hour, which reduces the gap between the real world situation and the assumed condition (hot stabilized conditions and the assumption are described in the next paragraph). The 30-minute period reflects the limitations in computational power and in size of computer storage space. Both microscopic traffic simulation models (CORSIM and VISSIM) and microscopic fuel consumption and emissions model (CMEM) require intensive calculation effort and consume a huge portion of computer hard drive.

The pollutants of interest are HC, CO, and NO_x from tailpipe emissions of cars and light trucks. Due to limitations in available information, all vehicles are assumed to be operating under hot stabilized conditions, in which moving parts and emission control devices of the vehicles (e.g. engine and catalytic converter) get warm enough to operate efficiently. It was estimated by Armstrong (2000) that more than 84% of vehicles travelling on suburban freeway in Ottawa-Carleton area during P.M. peak hour were operating under hot stabilized conditions. Therefore, the assumed conditions are considered to be close to reality.

3.4 DEVELOPMENT OF SCENARIOS

The comparisons of the different models are made under the existing traffic conditions, which is called the “*Base case*” hereafter. For analysis of the impact of driving behaviour,

three scenarios are created. The purpose of the first scenario is to investigate the effect of drivers' desired speed on fuel consumption and emissions. Desired speed is the speed which drivers wish to keep if there are no impeding vehicles. The second scenario examines the impact of drivers' desired headway. Desired headway is the headway which drivers wish to maintain when following other vehicles. And the third scenario tests the effect of drivers' desired acceleration and deceleration levels. The desired acceleration and deceleration are the acceleration and deceleration levels at which drivers accelerate and decelerate under normal driving conditions. Since CORSIM does not have parameters that correspond to desired acceleration and deceleration, the third scenario is only applicable to VISSIM.

Each scenario contains 5 sub-scenarios, in which model parameters are changed from Base Case. Exception is the "*Desired Speed Change*" scenario for CORSIM, which contains only 4 sub-scenarios because maximum allowable desired speed in CORSIM is reached at +8 km/h (5 mph) sub-scenario. Table 3-1 presents details of each scenario.

Table 3-1. Driving Behaviour Test Scenarios

Scenario	CORSIM Sub-Scenario*	VISSIM Sub-Scenario
Desired Speed Change	+ 8 km/h (+5 mph) Base – 10 km/h (-6mph) – 20 km/h (-12mph)	+ 20 km/h + 10 km/h Base – 10 km/h – 20 km/h
Desired Headway Change	– 0.2 sec – 0.1 sec Base + 0.1 sec + 0.2 sec	– 0.2 sec – 0.1 sec Base + 0.1 sec + 0.2 sec
Desired Acceleration/ Deceleration Change		+ 20 % of Base + 10 % of Base Base – 10 % of Base – 20 % of Base

*CORSIM does not accept metric unit for model input, and the actual changes in desired speed are shown in the brackets.

**The fuel consumption and emissions models used for each scenario are summarized in Table 7-1 (Chapter 7).

3.5 DESCRIPTION OF THE TOOLS

3.5.1 CORSIM

CORSIM is a microscopic traffic simulation model developed by the Federal Highway Administration (FHWA) (Halati et al. 1997). It is one of the most widely used microscopic traffic simulation models in North America. It is part of the Traffic Software Integrated System (TSIS) and consists of two sub-models called FRESIM and NETSIM to cover the entire road network. FRESIM is designed to simulate freeway, and NETSIM is for an urban network. Since the focus of the study is on freeway segment, only

FRESIM is used in this research.

CORSIM has a built-in fuel consumption and emissions estimation module. This module utilizes simple look-up tables that associate instantaneous vehicle speed and acceleration with fuel consumption and emissions rates. Except the manuals (FHWA 2003a, 2003b), there is very little description of this built-in model in the published literature. The estimation results from this built-in model are included in the comparative analysis.

3.5.2 VISSIM

“VISSIM is a microscopic, time step and behavior based simulation model developed to model urban traffic and public transit operations” (PTV 2003). Although the model was originally developed in Germany, it is quite popular in North America. The model employs the psycho-physical driver behavior model developed by Wiedemann (Wiedemann and Reiter 1970s, Wiedemann 1991), which is based on a premise that a driver falls in one of the four driving modes: free driving, approaching, following, and braking.

VISSIM also has a built-in fuel consumption and emissions estimation module that uses similar look-up tables as those of CORSIM. However, the model was not included in the study for two reasons. One reason is that the look-up tables were developed based on EURO emission standards which is effective in Europe and cannot be easily transferred to North American conditions. The other reason is that the look-up tables seem to have blank cells, especially at higher speeds and at higher accelerations. When the model

function is enabled in VISSIM, it issues error messages at the end of the simulation warning that significant time of access to the table was out of the range. Since the tables are contained in binary files and the format is unknown, the files cannot be read. Thus, detailed cause of the problem is difficult to estimate.

3.5.3 Comprehensive Modal Emissions Model (CMEM)

CMEM calculates instantaneous fuel consumption and emissions based on second-by-second vehicle activity data. The model currently incorporates 26 vehicle types for light vehicles including high emitter vehicle categories. CMEM can predict emissions for HC, CO, NO_x, and carbon dioxide (CO₂) as well as fuel consumption. It employs physical, power-demand modal modelling approach, in which *“the entire emissions process is broken down into different components that correspond to physical phenomena associated with vehicle operation and emissions production”* (Barth et al. 2000). Specifically, the model is composed of six different modules each of which corresponds to physical event of the emissions process: engine power demand, engine speed, fuel/air ratio, fuel-use rate, engine-out emissions, and catalyst pass fraction (Barth et al. 2000).

In this study, CMEM is used in combination with CORSIM and VISSIM. Figure 3-3 shows the flow of data and calculation process from the traffic simulation models to fuel consumption and emissions model. Roadway geometry data, traffic data (e.g. volume, traffic composition, and transit data), and vehicle specifications are the input for CORSIM and VISSIM. Output from CORSIM and VISSIM are then processed into CMEM inputs which are vehicle definition and vehicle activity (i.e. second-by-second

vehicle state). These data are fed into CMEM, and estimation results for fuel consumption and emissions are obtained.

Figure 3-3. Fuel Consumption and Emissions Calculation Process

Currently, CMEM is available for both UNIX (SUN and SGI) and Windows platform. Windows version is integrated with Microsoft Access database software, and this version is used in this study.

3.5.4 MOBILE6/ MOBILE6C

MOBILE6 is the latest version of the MOBILE series emission factor model developed by the U.S. EPA. MOBILE6 is capable of estimating emission factors in gram per mile for a wide range of pollutants (i.e. HC, CO, NO_x, sulphur oxides (SO_x), fine particulate matter (PM), and toxics) for 28 vehicle classes for calendar years from 1952 to 2050 (U.S. EPA 2002b). MOBILE6 calculates emission factors by applying adjustments to basic emission rates which are obtained from emissions tests under standardized conditions (e.g. temperature, fuel, and driving cycle) (U.S. EPA 2002b). The adjustments are made to account for differences between the standard test conditions and actual conditions to be modelled. MOBILE6 has a wide range of parameters for the adjustments. These parameters include external conditions (e.g. temperature and humidity), vehicle fleet characteristics (e.g. vehicle registrations, diesel fractions, and annual mileage accumulation rates), vehicle activity (e.g. average speed and Vehicle Miles of Travel (VMT) fractions by facility type), state programs (e.g. inspection and maintenance (I/M) program), and fuel specifications (e.g. Reid vapour pressure (RVP) and sulphur content).

MOBILE6C is the Canadian modified version of MOBILE6 released by Environment Canada. It has identical function with the original MOBILE6, and its input data structure is fully compatible with MOBILE6. The modification was made to more closely reflect Canadian conditions. The major difference is that the program code was altered to account for pre-1988 Canadian specific emission standards (Environment Canada 2003a).

3.6 SUMMARY

The overall research study was organized into separate components, and the methodological framework was presented. The study site was selected from the existing section of Highway 417 in the City of Ottawa, and the time period was set to be a 30-minute period from P.M. peak hour in June 2000. Next, three scenarios were developed to test the effect of driving behaviour on fuel consumption and emissions. Finally, brief descriptions of the tools used in the study were provided.

CHAPTER 4. PREPARATIONS FOR SIMULATION RUNS

4.1 INTRODUCTION

Microscopic traffic simulation models require a large amount of input data to run the models. These are highway geometry data, traffic volume, traffic compositions, traffic controls, and vehicle specifications. If public transit is operating in the network, route and schedule information is further needed. Since public transit generally travels on a fixed route, it is modelled separately from other vehicles. These data can be obtained from provincial and city authorities, transit operators, and various publications.

Upon completion of data collection, the network is coded into the model. This is done through editing input files that contain roadway elements, traffic volumes, and other parameters through the graphical user interface (GUI). As the input files are usually simple text files, they can also be directly edited by text editors.

In this chapter, first, data preparation process is presented, and then, the process of coding network is described.

4.2 DESCRIPTION OF THE DATA

4.2.1 Highway Geometry Data

Highway geometry data is used for coding highway links, interchanges, and intersections.

The data was obtained from Highway 417 existing conditions report (Ontario Ministry of

Transportation (MTO) 2001). In addition, the digital orthophotos (i.e. processed aerial photographs with reduced distortion) of the study site (National Capital Commission 1999) were prepared. Digital orthophotos are highly useful since both CORSIM and VISSIM have functionality to load digital images into the background of the screen so that the users can draw links and nodes by tracing the image of the highway.

The study site of Highway 417 has following geometric features: three horizontal curves for each direction, fifteen vertical curves in the eastbound direction and fourteen vertical curves in the westbound direction, two 3.66 meter-wide lanes in each direction, and a 3.66 m wide exclusive bus lane between Eagleson Road and Moodie Drive on the right most lane in each direction. Details of the horizontal and vertical alignments can be found in Appendix A.

4.2.2 Volume Data

Volume data are used to determine the number of vehicles entering highway network and the number of vehicles that make turns at intersections and/or interchanges. The data are also used during model calibration and validation process, in which observed volume and simulated volume are compared. For these purposes, balanced A.M. and P.M. peak hour volume for year 2000, which had been obtained from the MTO, was used as the primary source. The balanced A.M. and P.M. peak hour volume data were used because they provide detailed entry/exit volume for all of the on- and off-ramps within the study site. Table 4-1 presents the entry/exit volume for A.M. and P.M. peak hour within the study site.

Table 4-1. Balanced Volume for Highway 417 within the Study Site (2000)

Direction	Entry/Exit		A.M. Peak Hour (veh/h)	P.M. Peak Hour (veh/h)
Eastbound	Highway 417	Boundary of the Study Area	2,030	740
	Carp Rd.	Entry (inner-loop)	300	370
		Entry (direct)	390	320
	Palladium Dr.	Exit	120	80
		Entry (inner-loop)	20	20
		Entry (direct)	50	40
	Terry Fox Dr.	Exit	210	180
		Entry (inner-loop)	200	240
		Entry (direct)	600	490
	Eagleson Rd.	Exit	710	180
		Entry (inner-loop)	740	1,080
		Entry (direct)	550	630
	Moodie Dr.	Exit	310	190
	Highway 417	Boundary of the Study Area	3,530	3,300
Westbound	Highway 417	Boundary of the Study Area	3,410	3,330
	Moodie Dr.	Entry (inner-loop)	80	190
		Entry (direct)	80	290
	Eagleson Rd.	Exit	2,260	1,350
		Entry (inner-loop)	20	60
		Entry (direct)	80	340
	Terry Fox Dr.	Exit	570	840
		Entry (inner-loop)	70	170
		Entry (direct)	80	250
	Palladium Dr.	Exit	80	140
		Entry (direct)	30	80
	Carp Rd.	Exit	430	750
	Highway 417	Boundary of the Study Area	510	1,630

Although the data are said to be adjusted for seasonal variations, it is considered that the volume data well represent the traffic conditions in early summer 2000. The reason is that the volume between Eagleson Road and Moodie Drive, which is the heaviest volume for both directions within the study site, is found to be very similar to the hourly vehicle count taken at Eagleson screenline. This screenline was located between Eagleson Rd. and Moodie Dr., during early summer 2000. The vehicle count study was conducted by the City of Ottawa between May and July (City of Ottawa 2004). Table 4-2 shows the balanced volume data from the MTO and the vehicle counts from the City of Ottawa.

Table 4-2. A.M./P.M. Peak Hour Volume at Eagleson Screenline

Time Period	Direction	MTO Balanced Volume (veh/h)	City of Ottawa Count (veh/h) (% difference from MTO data)
A.M. Peak Hour	Eastbound	3,840	3,905 (+1.7 %)
	Westbound	3,570	3,604 (+1.0 %)
P.M. Peak Hour	Eastbound	3,490	3,495 (+0.1 %)
	Westbound	3,810	3,917 (+2.8 %)

4.2.3 Vehicle Fleet Composition

Vehicle fleet composition information is used to determine the fractions of vehicle types that enter the network. For this purpose, previously described vehicle count data (City of Ottawa 2004) were used as the primary source. In the data, vehicles are classified into six

categories: Passenger car, Light truck, Heavy truck, Bus, Taxi, and Others. The data are summarised in Table 4-3.

Table 4-3. Vehicle Counts at Eagleson Screenline (Early Summer 2000)

		Pass	LT	HT	Bus	Taxi	Others	Total
A.M. Peak Hour	Eastbound	2,704	1,002	148	31	8	12	3,905
	Westbound	2,465	927	184	11	7	10	3,604
P.M. Peak Hour	Eastbound	2,411	886	151	15	10	22	3,495
	Westbound	2,493	1,223	143	30	8	20	3,917

*Pass = passenger car, LT = light truck, HT = heavy truck

Because CORSIM and VISSIM have different vehicle classification schemes, different vehicle fleet composition was required for each of the models. The following sections describe the development of vehicle fleet composition for CORSIM and VISSIM. Before starting the development activity, the following assumptions were made:

- (i). Vehicle composition at every entry point of the highway is same as that observed at Eagleson screenline.
- (ii). All buses are transit vehicles and travel on fixed routes, and thus they are modelled separately (i.e. not included in the vehicle fleet composition information).
- (iii). Vehicles categorized as Taxi and Others are treated as passenger cars.

CORSIM Vehicle Fleet Composition Development:

CORSIM has seven predefined vehicle types: low-performance passenger car,

high-performance passenger car, single-unit truck, semi-trailer truck with medium load, semi-trailer truck with full load, double-bottom trailer truck, and conventional bus. In fact, it has two additional vehicle types. However, their characteristics are identical to those of two passenger cars (i.e. high and low performance) except the fact that these additional vehicle types are used for High Occupancy Vehicles (HOV), and thus, these two types are not included in this study.

Since CORSIM does not have different vehicle types for passenger cars and light trucks, vehicles classified in these types are first combined into passenger car category, and then, distributed between low-performance passenger car and high-performance passenger car. Regarding the distribution ratio, CORSIM default value (25% and 75% for low-performance passenger car and high-performance passenger car respectively) is accepted due to lack of detailed information on low performance passenger car and high performance passenger car.

For heavy trucks, more detailed classification is needed to further distribute fractions to four truck categories (i.e. single-unit truck, semi-trailer truck with medium load, semi-trailer truck with full load, double-bottom trailer truck). Fractions for heavy trucks were mainly obtained from Truck Traffic Estimate Software Package (Canadian Council of Motor Transport Administrators (CCMTA) 2002), which was developed based on 1999 National Roadside Study by CCMTA. The software has capability to produce estimates of volume and characteristics of truck traffic on Canada's highways. Table 4-4 shows the results from the Truck Traffic Estimate Software Package for truck traffic in Ontario.

Further details of the estimates from the software can be found in Appendix B.

Table 4-4. Truck Traffic by Type and Load

Truck Type	Fraction
Straight Truck	23.50%
Tractor and One Trailer (0% to 75% loaded)	35.40%
Tractor and One Trailer (100% loaded)	29.95%
Tractor and Two Trailers	6.57%
Straight Truck and One Trailer (0% to 75% loaded)	1.00%
Straight Truck and One Trailer (100% loaded)	0.62%
Tractor only	2.87%
Others*	0.09%
Sum	100.00%

*Include Tractor and three trailers, Tractor pulling other tractors/straight trucks, etc.

Because the 1999 National Roadside Study targeted trucks with Gross Vehicle Weight Ratio (GVWR) greater than 4,500 kg (CCMTA 2001), Class 2B heavy vehicles (i.e. vehicles with 8,501 – 10,000lbs. GVWR (3,856 – 4,536kg)) are not included in the table above. In order to take Class 2B vehicles into account, travel fractions calculated by MOBILE6 were employed here. According to MOBILE6 calculation, Class 2B vehicles have a share of 31.2% of fractions travelled by all heavy duty trucks (detail of the use of MOBILE6 is presented in Chapter 6). The rest of the share (i.e. 68.8%) can be distributed among other heavy trucks according to the fractions shown in Table 4-4.

By combining Eagleson screenline counts and calculated fractions for heavy trucks,

vehicle fleet composition for CORSIM was developed. Table 4-5 shows the summary of the vehicle fleet composition for CORSIM input. Since CORSIM only accepts integers in percent for vehicle fleet composition, all fractions are rounded into integers.

Table 4-5. Vehicle Fleet Composition for CORSIM

(a) Fractions between Passenger Cars and Trucks

CORSIM Vehicle Type	A.M. Peak Hour		P.M. Peak Hour	
	Eastbound	Westbound	Eastbound	Westbound
Passenger Cars	96	95	96	96
Trucks	4	5	4	4
Sum	100	100	100	100

*Passenger Cars include light trucks

(b) Fractions between Passenger Cars

CORSIM Vehicle Type	Fraction
Low-Performance Passenger Car	25
High-Performance Passenger Car	75
Sum	100

(c) Fractions among Trucks

CORSIM Vehicle Type	Fraction
Single-unit Truck	49
Semi-trailer Truck (medium load)	25
Semi-trailer Truck (full load)	21
Double Bottom Trailer Truck	5
Sum	100

*Single-unit Truck includes Class 2B truck from MOBILE6, Straight Truck, and Tractor Only from Truck Traffic Estimate Software Package

*Semi-trailer Truck (medium load) includes Tractor & One Trailer and Straight Truck & One Trailer with 0% to 75% load.

*Semi-trailer Truck (full load) includes Tractor & One Trailer and Straight Truck & One Trailer with 100% load.

VISSIM Vehicle Fleet Composition Development:

In contrast to CORSIM, VISSIM has no limitations regarding number of vehicle types that can be defined in the model. In this study, nine vehicle types are defined. To keep consistency with CORSIM, vehicle types defined in VISSIM are similar to that in CORSIM. However, this time, in order to more closely represent the reality, passenger cars and light trucks are defined separately, and a slightly more detailed classification scheme is applied to heavy trucks. Nine vehicle types defined in VISSIM are listed below:

- Passenger Car
 - Light Truck
 - Class 2B Truck
 - Straight Truck (except Class 2B)
 - Tractor and One Trailer
 - Tractor and Two Trailers
 - Straight Truck and One Trailer
 - Tractor Only
 - Bus
- } Heavy Trucks

The same data that were used to develop CORSIM vehicle fleet composition were used to calculate VISSIM vehicle fleet composition. However, this time, (a) Passenger cars and Light trucks were dealt separately, (b) Single-unit trucks were divided into Class 2B truck, Straight truck (except Class 2B truck), and “Tractor Only”, (c) Tractor plus one trailer

and Straight truck plus one trailer were handled separately, and (d) Semi-trailer trucks with medium load and those with full load were combined into one category. Table 4-6 presents vehicle fleet composition developed for VISSIM input.

Table 4-6. Vehicle Fleet Composition for VISSIM

VISSIM Vehicle Type	A.M. Peak Hour		P.M. Peak Hour	
	Eastbound	Westbound	Eastbound	Westbound
Passenger Car	70.3	69.1	70.2	64.9
Light Truck	25.9	25.8	25.5	31.5
Class 2B Truck	1.2	1.6	1.3	1.2
Straight Truck (except Class 2B)	0.6	0.8	0.7	0.6
Tractor and One Trailer	1.7	2.3	1.9	1.6
Tractor and Two Trailers	0.2	0.2	0.2	0.2
Straight Truck and One Trailer	0.0	0.1	0.1	0.0
Tractor Only	0.1	0.1	0.1	0.1
Sum	100.0	100.0	100.0	100.1

4.2.4 Transit Data

Route and frequency of transit are required to model transit operations. Due to data availability, it was assumed that the route and frequency were similar to today's conditions. Based on time tables and the transit map (OC Transpo 2004), the routes and the average frequencies were determined, and then, the number of buses for each route was adjusted so that the share of buses between Eagleson Rd. and Moodie Dr. became equal to the share calculated from the City of Ottawa Eagleson screenline count. Table 4-7 shows the routes and frequency of transit bus used in this study.

Table 4-7. Transit Route and Frequency

Time Period	Direction	Route	Frequency (bus/hr)
A.M. Peak	Eastbound	Carp Rd. – East boundary of the study area	2
		Terry Fox Dr. – East boundary of the study area	3
		Eagleson Rd. – East boundary of the study area	25
	Westbound	East boundary of the study area – Eagleson Rd. Moodie Dr. – Eagleson Rd.	1 10
P.M. Peak	Eastbound	Eagleson Rd. - East boundary of the study area	15
	Westbound	East boundary of the study area – Carp Rd.	1
		East boundary of the study area – Terry Fox Dr.	3
		East boundary of the study area – Eagleson Rd. Moodie Dr. – Eagleson Rd.	5 20

4.2.5 Vehicle Specifications

Vehicle specifications are required to determine the physical characteristics of each vehicle type. Parameters include length, weight, power, and acceleration and deceleration performance. As both CORSIM and VISSIM provide wide range of default parameters, these default values are adopted whenever acceptable.

4.2.5.1 VISSIM Vehicle Specifications

As previously mentioned, nine vehicle types are newly defined for VISSIM. For lengths, data are obtained from published sources, and parameters were adjusted for all vehicle types. For weight and power, since parameters for light vehicles do not affect simulation results in VISSIM, these parameters are only adjusted for heavy vehicles. Regarding

acceleration and deceleration performance, parameters are defined in form of functions of speed. The functions that are applicable to each vehicle type are selected from the pool of VISSIM defaults. The specifications for each vehicle type used in this study are described below:

Passenger Car:

Average length of passenger car of 4.5 m is adopted from a study by Long (2002) (the value is rounded to the first decimal place). The weight and power of light vehicles have no effect on simulation results in VISSIM, and the parameters are left default for “Car”. For acceleration and deceleration performance, acceleration/deceleration functions for VISSIM default vehicle type “Car” are selected.

Light Truck:

Three vehicle models were defined in this category: Sport Utility Vehicle (SUV), Van, and Pick-up. These three models share the same specifications except length. Average lengths are again adopted from a study by Long (2002), and they are 4.3 m, 4.9 m, and 5.3 m for SUV, Van, and Pick-up, respectively. Share of each model is calculated from distance travelled by the three vehicle types (Statistics Canada 2001). The share for SUV, Van, and Pick-up are calculated as 20.1%, 38.5%, and 41.4%, respectively.

As mentioned previously, weight and power of light vehicles (i.e. passenger cars and light trucks) do not affect simulation results due to VISSIM specifications, and the parameters are left default for “Car” category. For acceleration and deceleration performance, default

acceleration/deceleration functions for light trucks are not provided in VISSIM (light truck category itself is not provided as a VISSIM default). Since its characteristics in traffic flow are generally close to passenger cars, the acceleration/deceleration functions for VISSIM default vehicle type “Car” are selected. Although weight, power, and acceleration/deceleration functions are set the same as VISSIM default “Car (i.e. passenger cars)”, the difference in fuel consumption and emissions characteristics between passenger cars and light trucks will be covered by fuel consumption and emissions models.

Class 2B Truck:

It is observed that Class 2B trucks listed in “*Investigation of Class 2B Trucks (Oak Ridge National Laboratory (ORNL) 2002)*” have length of around 5.8 m (230 inch), and this length is assumed as average length of this vehicle type. In VISSIM, power and weight are given in the form of distribution, and those for heavy vehicles have an effect on simulation results. Power is assumed to be uniformly distributed between 150 kW and 220 kW (200 hp – 300 hp). This range is also observed in the list in the report by ORNL (2002). Weight is assumed to be uniformly distributed between 2,500 kg and 4,500 kg. For acceleration and deceleration functions, those for VISSIM default vehicle type “Heavy Goods Vehicle (HGV)” are adopted.

Other Heavy Trucks:

Average length and weight distribution are determined from Truck Traffic Estimate Software Package (CCMTA 2002). The results are summarized in Table 4-8, and further

details of the estimates can be found in Appendix B. For acceleration and deceleration functions, the functions for VISSIM default vehicle type “HGV” are accepted for all heavy trucks. Regarding power distribution, the distribution for Class 2B trucks is adopted for Straight trucks (i.e. 150 kW - 220 kW). For combination trucks (including Tractor only), it is assumed that power is uniformly distributed between 260 kW and 410 kW. This range is adopted from the study by Rakha et al. (2002), in which it was found that a majority of Class 9 trucks (i.e. five-axle single trailer trucks) fall in range of 350 hp to 550 hp (260 kW – 410 kW).

Bus:

Typical length for an urban transit bus is 12.2 m (40.0 ft), and power is 170 kW (225 hp) (Institute of Transportation Engineers (ITE) 1992). These specifications are adopted in this study. Further, it is assumed that weight is uniformly distributed between 15,000 kg and 16,000 kg. This range is obtained by assuming empty weight of 12,000kg (ITE 1992) plus around 50 to 60 passengers onboard. The acceleration and deceleration functions for VISSIM default vehicle type “Bus” are accepted. It should be noted here that although the bus fleet includes articulated buses, it was assumed that all buses were conventional single-unit type of vehicle.

Vehicle specifications for nine vehicle types used in VISSIM are summarized in Table 4-8.

Table 4-8. Vehicle Specifications for VISSIM

Vehicle Type	Length (m)	Weight (1,000kg)	Power (kW)	Acceleration/Deceleration Functions
Passenger Car	4.5	Default "Car"*	Default "Car"*	Default "Car"
Light Truck				
SUV	4.3	Default	Default	Default "Car"
Van	4.9	"Car"*	"Car"*	
Pick-up	5.3			
Heavy Truck				
Class 2B Truck	5.8	2.5 – 4.5	150 – 220	Default "Heavy Goods Vehicle (HGV)"
Straight Truck (except Class 2B)	9.6	3.0 – 40.0	150 – 220	
Tractor and One Trailer	20.0	5.0 – 70.0	260 – 410	
Tractor and Two Trailers	23.2	10.0 – 70.0	260 – 410	
Straight Truck and One Trailer	19.6	5.0 – 65.0	260 – 410	
Tractor Only	8.1	3.0 – 20.0	260 – 410	
Bus	12.2	15.0 – 16.0	170	Default "Bus"

*These parameters have no effect on simulation results.

4.2.5.2 CORSIM Vehicle Specifications

For CORSIM, since seven default vehicle types are adopted, default vehicle specifications for these vehicle types are acceptable. However, to keep consistency with VISSIM, length of each vehicle type is slightly modified from the default value. Acceleration and deceleration performance for each vehicle type was kept at the CORSIM default values. Since CORSIM does not have parameters that correspond to weight and power, these parameters are not used in CORSIM.

Low/High-Performance Passenger Car:

Because passenger cars and light trucks are combined into passenger car category in CORSIM, vehicle length is obtained as a fraction weighted average of the length of passenger car and light trucks (including SUV, Van, and Pick-up). The average length is calculated as 4.6 m (15 ft).

Single-unit Truck:

Class 2B trucks, Straight trucks (except Class 2B), and Tractor only are included in this category. Fraction weighted average of the length is calculated as 7.1 m (23 ft).

Semi-trailer Truck (medium/full load):

Tractor with One Trailer and Straight truck with One Trailer are included in this category. Fraction weighted average length is calculated as 20.0 m (66 ft).

Double Bottom Trailer Truck:

Length of Tractor and Two Trailers are directly imported from VISSIM vehicle specifications: 23.2m (76ft).

Bus:

Length of bus is same as that of CORSIM default (i.e. 12.2 m (40 ft)), and it is kept unchanged.

Vehicle lengths for seven vehicle types in CORSIM are summarized in Table 4-9.

Table 4-9. Vehicle Length for CORSIM

Vehicle Type	Length (ft)
Low-Performance Passenger Car	15
High-Performance Passenger Car	15
Single-unit Truck	23
Semi-trailer Truck (medium load)	66
Semi-trailer Truck (full load)	66
Double Bottom Trailer Truck	76
Bus	40

4.3 NETWORK CODING

Obtained data are coded into input files of CORSIM and VISSIM. First, adjustments are made to vehicle specifications. Highway elements (e.g. roadway and interchanges) are then coded by placing and connecting links and nodes. Subsequently, volumes that enter the network and vehicle fleet composition are specified. For each entering volume, destinations are specified. Finally, transit routes and the schedules are coded according to the prepared data. Further details of the link editing and volume input are described in the following sections. Additionally, Appendix C provides the list of inputs/parameters, and outputs for CORSIM and VISSIM. Sample pages of input and output files for these models are also included in Appendix C.

4.3.1 Highway Link Editing

Using data from the MTO report (MTO 2001) and digital orthophotos (National Capital

Commission 1999), existing highway geometry is accurately coded for CORSIM and VISSIM. However, since these models do not have capability to model vertical curves, grades were specified so that the highest point within the crest curve and the lowest point within the sag curve were connected by a straight line.

During the process, desired speed is assigned for both CORSIM and VISSIM. It is called “Free Flow Speed” in CORSIM and “Desired Speed” in VISSIM. For CORSIM, default free flow speed for freeway link of 65 mph (104.6 km/h) is accepted for urban driving population. In VISSIM, desired speed is specified in form of a distribution, and one of the default distributions that have average speed of 106.7 km/h is selected. For entries and exits of the highway (except boundaries of the mainline link), free flow speed of 44mph (70.8 km/h) was assumed for CORSIM, and desired speed distribution with average speed of 70 km/h (uniform distribution between 62 – 78 km/h) was assumed for VISSIM. Please note that these speeds are applicable at the start of the acceleration lane or at the end of the deceleration lane.

4.3.2 Vehicle Input

CORSIM:

CORSIM (more specifically its sub-component FRESIM) has a built-in gravity model that calculates Origin-Destination (OD) tables based on user input of entry/exit volume for freeway network. The volume data obtained in this study does not include OD information, and OD tables calculated by CORSIM built-in gravity model are accepted. Because VISSIM does not have this functionality, the OD tables calculated by CORSIM

are also used in VISSIM.

According to TSIS technical support, however, it was found that the TSIS (version 5.1) has an error, and it cannot assign volumes correctly following the calculated OD tables. Thus, in this study, first the author let CORSIM calculate the OD tables based on entry/exit volumes, and then, the obtained OD tables were manually re-coded into the input file. Since CORSIM only accepts integer in percentage for manual OD input, accuracy is slightly compromised. Details of the OD data used in CORSIM can be found in Appendix D.

VISSIM:

In VISSIM, a functionality called “*Routing Decision*” is used to specify the fractions of volume that is assigned to a specific route. As mentioned previously, the OD tables calculated by CORSIM built-in gravity model were imported into VISSIM. Since VISSIM accepts decimal numbers to specify the fractions, it is possible to more accurately code OD data than CORSIM, in which the number of digit for assigning OD fraction is limited (i.e. percentage in integer). Further details of the OD data used for VISSIM can be found in Appendix D.

4.4 SUMMARY

In this chapter, the preparation process for running the microscopic traffic simulation models, namely CORSIM and VISSIM, was presented. First, necessary data were collected and compiled into the form that can be used as input data. Data collected in this

step were highway geometry data, volume data, vehicle fleet composition, transit data, and vehicle specifications. The collected data were then coded into CORSIM and VISSIM input files.

CHAPTER 5. MODEL CALIBRATION AND VALIDATION

5.1 INTRODUCTION

Since most of microscopic traffic simulation models are provided with wide range of default model parameters, after the network coding is completed, it is possible to run the simulation with these default parameters. However, it is pointed out by several researchers that these default values produce inaccurate results (Wang and Prevedouros 1998, Rilett et al. 2000), and thus, calibration and validation of the simulation models are necessary and important (Dowling et al. 2004, Park and Schneeberger 2003).

Model calibration can be defined as *“the process by which the individual components of the simulation model are adjusted or tuned so that the model will accurately represent field measured or observed traffic conditions”* (Milam and Choa 2001). During the process, selected model parameters are optimized to minimize the discrepancy between simulated traffic conditions and observed traffic conditions.

Then, the calibrated model is carried to validation process. Model validation is the process *“whereby, the accuracy of the model is tested by comparing traffic flow data generated by the model with that collected in the field”* (Milam and Choa 2001). During the process, a new data set that was not used in the calibration process is fed into the calibrated model, and the simulated traffic conditions are compared against the observed traffic conditions.

5.2 MODEL CALIBRATION

This section describes the methodology and the practice of the calibration process followed in this study. Specifically, following topics are presented: data preparation for model calibration; determination of the number of simulation runs required; development of the calibration targets; selection of the goodness-of-fit measures; visualization of the simulation results; selection of the calibration parameters, searching range and searching algorithm; and calibration results for CORSIM and VISSIM.

5.2.1 Calibration Data

Two data sets are identified for calibration; one is volume data, and the other is travel time data. For volume data, balanced A.M. peak hour volume, which was prepared in Chapter 4, was used. Data for P.M. peak hour were saved for model validation. Travel time data for A.M. and P.M. peak hour were obtained from the MTO. Similarly, data for A.M. peak hour was used for calibration. Details of the travel time data are described next.

Travel time data within the study site were obtained from the MTO. However, only the data for year 2001 were available and these were used instead of the data for 2000. Further, the A.M. peak data were only available for eastbound, and the P.M. peak data were only available for westbound. The measurement runs were taken on weekdays from 11th to 25th of June, 2001, in which travel times were measured for five sections within the study site by a car driven by a consultant. Since it was observed that the travel time

data for several measurement runs yielded unrealistic speed for some sections (in one case, greater than 300 km/h), measurement runs including such sections were excluded. Specifically, runs that have section speed at or greater than 160 km/h were excluded. After the screening, the maximum average speed for all five sections for all measurement runs reduced to 139 km/h, for which there was no strong reason to reject the value, considering today's vehicle performance and traffic flow conditions. The average travel times were calculated for 21 runs for A.M. peak period and for 14 runs for P.M. peak period. One possible reason for these errors can be attributed to time reading/recording errors. The author accepted the MTO data following the close examination for use in this study.

Since the distances of the sections that appeared in the MTO data and the distances coded in CORSIM and VISSIM were not exactly the same, the calculated average travel time could not be directly used for calibration. Thus, the travel time data were first converted into section speeds by dividing the section lengths by the travel times. Then, the travel times for the calibration were calculated by dividing the section lengths in CORSIM and VISSIM by the calculated section speeds. Table 5-1 shows the average travel times calculated from the MTO data and the travel times used for calibration of CORSIM and VISSIM.

Table 5-1. Average Travel Time and Calculated Travel Time Used for Calibration**(a) A.M. Peak Period (Eastbound Only)**

Section		MTO Data		CORSIM		VISSIM	
		Distance (m)	Travel Time (sec)	Distance (m)	Travel Time (sec)	Distance (m)	Travel Time (sec)
E1	Carp Rd. – Palladium Dr.	2,050	78.3	2,069	79.1	2,063	78.8
E2	Palladium Dr. – Terry Fox Dr.	2,450	90.7	2,444	90.5	2,444	90.5
E3	Terry Fox Dr. – Eagleson Rd.	2,630	191.7	2,605	189.9	2,605	189.9
E4	Eagleson Rd. – CNR Overpass	2,670	183.7	2,695	185.5	2,695	185.4
E5	CNR Overpass – Moodie Dr.	1,350	56.9	1,331	56.1	1,331	56.1
Total		11,150	601.4	11,144	601.1	11,137	600.7

(b) P.M. Peak Period (Westbound Only)

Section		MTO Data		CORSIM		VISSIM	
		Distance (m)	Travel Time (sec)	Distance (m)	Travel Time (sec)	Distance (m)	Travel Time (sec)
W1	Carp Rd. – Palladium Dr.	2,050	83.1	2,063	83.7	2,063	83.7
W2	Palladium Dr. – Terry Fox Dr.	2,450	89.5	2,450	89.5	2,444	89.5
W3	Terry Fox Dr. – Eagleson Rd.	2,630	104.0	2,613	103.3	2,618	103.3
W4	Eagleson Rd. – CNR Overpass	2,670	111.3	2,669	111.3	2,670	111.3
W5	CNR Overpass – Moodie Dr.	1,350	97.6	1,368	98.9	1,367	98.9
Total		11,150	485.6	11,162	486.1	11,163	486.1

* Difference in distance between MTO data and CORSIM/VISSIM is considered to be due to (1) selection of surface objects and (2) rounding of the data. In CORSIM/VISSIM, centerlines of grade-separate crossings (e.g. Carp Rd., Palladium Dr., etc.) were used as surface objects that define the boundaries of the sections.

** For some sections, distance for CORSIM and that for VISSIM is different. This is due to the fact that (1) CORSIM accepts distance only in feet in integer, and that (2) CORSIM issues warning if a link is shorter than the distance that drivers with highest free-flow speed (i.e. Type 10 driver) travel within one simulation step, which requires slight change in link length.

***Due to rounding of the data, some sections have same distance with different travel time or different distance with same travel time among MTO data, CORSIM, and VISSIM.

5.2.2 Required Number of Simulation Runs

CORSIM and VISSIM are both stochastic models, in which random numbers generated from a random number seed are used to determine various aspects of the simulation process, including timing of vehicle release, destination and route of each vehicle, and vehicle attributes (e.g. vehicle type, driver type). Since a different random number seed yields different results, multiple simulation runs are required to obtain the average conditions of the results. After multiple runs are completed, average values are taken for such variables as volume and travel time. The required number of runs can be calculated by the equation derived from basic statistical equation as follows:

$$N = \left(t_{\left(\frac{\alpha}{2}; n-1\right)} \frac{s}{err} \right)^2 \quad (5.1)$$

where

N : required number of simulation runs;

$t_{\left(\frac{\alpha}{2}; n-1\right)}$: value from t-distribution;

α : a value by which $100(1 - \alpha)\%$ represents the confidence level;

n : number of the preliminary/previous runs;

s : standard deviation of the simulation output from the preliminary/previous runs;

err : acceptable error for the simulation output.

First, preliminary runs were made to obtain the initial mean and standard deviation of the simulation output. The number of the preliminary runs was set to ten in this study. Then,

based on the results from the preliminary runs, the required number of runs was calculated and compared against the number of the preliminary runs (i.e. 10 runs). If the required number of runs was greater than ten, the simulation models were executed for the new required number of runs. Then, based on the new results, required number of runs was calculated again, and compared against previous number of runs. The process was iteratively continued until the required number of runs became less than or equal to the number of runs already completed.

It should be noted here is that the newly obtained required number of runs was slightly adjusted to keep the process on the safe side before starting new runs. It is often the case that the newly calculated required number of runs exceeds the previously completed number of runs, which results in an increase in iterations. To lessen the effort required for iterations, newly obtained required number of runs was slightly increased from its original value before starting new iteration. Specifically, for CORSIM, newly calculated number of runs was rounded up to the nearest 10, and that for VISSIM was rounded up to the nearest 5 (the difference in the number comes from the fact that CORSIM requires less resources and effort for making large number of multiple runs).

During calibration and validation in this study, the confidence level was set to 95% (i.e. $\alpha = 0.05$), and the acceptable error was set to 5% of the mean of the simulation output (i.e. $err = 0.05u$, where u is mean of the simulation output) except for the following cases: for locations that have mean volume of greater than 1000 veh/h, acceptable error was set to 50 veh/h instead of 5% of the mean volume, and for sections

that have mean travel time of greater than 200 sec, acceptable error of 5% of the mean travel time was replaced by 10 sec. This prevents absolute errors from becoming excessive, which can happen when percent error is only used.

During calibration, it was observed that the required number of runs was ranging around 20 to 80. On the other hand, for validation (described later), it was observed that the required number was 20 to 30. The difference in required number of runs between calibration and validation is considered to come from difference in modelled traffic conditions (i.e. A.M. peak hour traffic conditions for calibration and P.M. peak hour traffic conditions for validation). When the standard deviations of volume and travel time were calculated from multiple runs, those for A.M. traffic conditions generally yielded larger values, which resulted in larger required number of runs.

5.2.3 Calibration Targets

Model calibration is the process, in which the optimal model parameters that yield the simulation results that well represent the observed conditions are searched. However, since resources including time and effort that can be spent for model calibration are usually limited, target values (i.e. allowable error from the observed traffic condition) are to be specified to indicate when to stop the process (Dowling et al. 2004).

Calibration targets were set for both volume and travel time. These targets are summarized in Table 5-2.

GEH statistic is used in United Kingdom to compare simulated results and observed values, and it is calculated by the following equation (Highways Agency 1996):

$$GEH = \sqrt{\frac{(M - C)^2}{(M + C) / 2}} \quad (5.2)$$

where

GEH : GEH statistic;

M : simulated flow;

C : observed flow.

Table 5-2. Calibration Targets

Measures	Targets
Volumes	Within 5% for each volume data. GEH<4 for each volume data.
Travel Times	Within 10% for each individual section. Within 5% for total section.

5.2.4 Goodness-of-Fit Measures

Among a number of available goodness-of-fit measures, four popular measures were used

in this study: root mean square error (RMSE), root mean square percent error (RMSPE), mean error (ME), and mean percent error (MPE), and they are given by the following equations (Toledo and Koutsopoulos 2004):

$$RMSE = \sqrt{\frac{1}{N} \sum_{n=1}^N (M_n - C_n)^2} \quad (5.3)$$

$$RMSPE = \sqrt{\frac{1}{N} \sum_{n=1}^N \left(\frac{M_n - C_n}{C_n} \right)^2} \quad (5.4)$$

$$ME = \frac{1}{N} \sum_{n=1}^N (M_n - C_n) \quad (5.5)$$

$$MPE = \frac{1}{N} \sum_{n=1}^N \left(\frac{M_n - C_n}{C_n} \right) \quad (5.6)$$

where

N : total number of measurement points;

M_n : simulated value at point n ;

C_n : observed value at point n .

RMSE and RMSPE indicate overall fit of the model, and ME and MPE indicate system wide over/under prediction of the model.

Among these, RMSE was used as primary measure. That is, the optimal parameter value that minimizes RMSE was searched during calibration process. Other three measures

were used as complementary measures, by which obtained parameter values were checked if excessive errors were observed in these three measures.

5.2.5 Visualization of the Results

Both CORSIM and VISSIM have tools to visualize simulation results in animations. For CORSIM, after a simulation run is finished, users can view the animation by TRAFVU, which is another component of TSIS package, by using the output files from CORSIM. In VISSIM, it is possible to see an animation on the screen simultaneously while the simulation is still running. Figure 5-1 shows some example screenshots for the section between Eagleson Road and CNR Overpass from TRAFVU and VISSIM.

These animations enable users to see the simulated travel behaviour of vehicles and provide useful information to evaluate whether the models are well replicating the reality or not. During the calibration process, animations are checked at several stages, and model parameters are adjusted when necessary.

(a) CORSIM/TRAFVU

(b) VISSIM

Figure 5-1. Screenshots from CORSIM/TRAFVU and VISSIM

5.2.6 Selection of the Calibration Parameters, the Search Range, and the Search Algorithm

5.2.6.1 Calibration Parameters

Because of the fact that microscopic traffic simulation models have numerous model parameters and that they are often highly correlated, *“the analyst can very easily get trapped in a never ending circular process fixing one problem only to find a new one pops up somewhere else”* (Dowling et al. 2002). Thus, during model calibration, the number of adjustable parameters should be kept as small as possible (Dowling et al. 2004).

To keep the calibration process simple, one model parameter that has the most significant effect on traffic flow was selected, and the parameter was thoroughly calibrated using volume and travel time data. Additionally, several other parameters were adjusted during animation check to improve the visual representation of the simulation results. The parameter selected in CORSIM is “car-following sensitivity factor (CFSF),” which is accepted by many researchers as the main factor that determines freeway capacity in CORSIM and thus has significant effect on simulation results (Aycin and Benekohal 1999, Halati et al. 1997, Khan et al. 2000, Payne et al. 1997, Prevedouros and Wang 1999, Rilett et al. 2000, Skabardonis 2002, Wang and Prevedouros 1998). In VISSIM, a model parameter called “CC1”, which has similar role as CFSF in CORSIM, was selected and calibrated. Following is a brief description of the selected parameters in the context of the car-following logic adopted in each of the models.

CORSIM (FRESIM) Car-Following Logic and CFSF:

In CORSIM (FRESIM), car-following behaviour of each vehicle is determined based on Pitt car-following model (Halati et al. 1997), which assumes that following vehicles attempt to maintain certain headway distance between their leaders and themselves. The headway distance is given by the following equation:

$$h_c = L + c + kv + bk(u - v)^2 \quad (5.7)$$

where

h_c : distance headway between leader and follower including length of the leader (ft);

L : length of leading vehicle (ft);

c : Pitt car-following constant (CORSIM default value is 10 ft.) (ft);

k : car-following sensitivity factor (CFSF) (sec);

b : calibration constant (0.1 when $u - v \leq 10$, 0 otherwise) (sec/ft);

u : speed of leader (ft/sec);

v : speed of follower (ft/sec).

During a simulation run, the acceleration of each vehicle which is in the following state is calculated so that the headway between the vehicle and its leader meets Equation (5.7). Then, the vehicle's position and speed are updated based on the calculated acceleration for each time step. Further details of the model functions can be found in the literature (Aycin and Benekohal 1999, Halati et al. 1997).

To account for driver variability in driving behaviour, CORSIM has ten different driver types, for which different CFSF can be assigned. This means desired distance headway can be different for different driver types (see Equation (5.7)). As default, type 1 driver (least aggressive) and type 10 driver (most aggressive) are assigned the value of 1.25 and 0.35 respectively, and drivers from type 2 to type 9 are assigned values ranging between these two values with constantly decreasing by 0.10 (i.e. 1.15 for type 2 driver, 1.05 for type 3 driver , ...).

Since mean value of CFSF has a major impact on link capacity and its variance has lesser impact on it (Halati et al. 1997), CFSF was adjusted by keeping this default variance during calibration process. That is, the difference in CFSF between two adjacent driver types was always 0.10, and only the average value of CFSF was changed.

VISSIM Car-Following Logic and CC1 Parameter:

VISSIM utilizes psycho-physical car-following models which are based on the researches by Wiedemann (Wiedemann and Reiter 1970s, Wiedemann 1991). The software includes two Wiedemann car-following models: Wiedemann 74 model and Wiedemann 99 model. According to the manual (PTV 2003), Wiedemann 99 model, which is based on Wiedemann's 1999 car-following model, is suitable for freeway links, and thus, this is the only model used in this study.

Wiedemann 99 model has ten adjustable parameters from CC0 to CC9. Among these, the following describes two parameters that were modified from their default values (a brief

description of other parameters can be found in PTV (2003)):

CC0: Average distance between vehicles (in meters) that drivers desire to have when vehicles are stopped.

CC1: Time headway (in seconds) that drivers attempt to maintain while following other vehicles.

Using these two parameters, the minimal distance that drivers desire to keep during following state can be given by the following equation* (PTV 2003):

$$h_v = L + CC0 + CC1 \cdot v \quad (5.8)$$

where

h_v : minimal distance headway including length of the leader (m);

L : length of leading vehicle (m);

CC0 : VISSIM CC0 parameter (m);

CC1 : VISSIM CC1 parameter (sec);

v : speed of follower (m/sec).

*Length of the vehicle (L) is added to the original equation which is shown in PTV (2003).

Actual VISSIM car-following model incorporates additional factors to account for further details of vehicle behaviour including, influence of speed difference between vehicles, stochastic nature in driver variability, and uncertainty in driver estimation ability (Wiedemann and Reiter 1970s).

When CORSIM car-following model and VISSIM car-following model are compared, some similarities can be observed. Especially, when a leader and its follower are travelling at the same speed (i.e. $u = v$), Equation (5.7) becomes identical to Equation (5.8), in which Pitt car-following constant and CFSF in CORSIM corresponds to CC0 and CC1 in VISSIM respectively. This does not mean that the two models are exactly identical since there are additional factors in both models (e.g. different emergency reaction models, and stochastic terms that account for driver variability). However, it can be considered that these two pairs of model parameter have similar effects on simulation results.

5.2.6.2 Search Range and Search Algorithm

Acceptable search range for average CFSF was estimated from “FRESIM car-following calibration nomographs” developed by Rakha and Crowther (2003). Here, average CFSF means the average of 10 driver types in CORSIM. By using the nomographs, approximate average value of CFSF can be obtained by cross-referencing saturation flow rate and jam density. For CC1 parameter, since its effect in VISSIM is highly similar to that of CFSF in CORSIM, same range was accepted.

The lower boundary was set to 1.15 and the upper boundary was set to 1.50. The values were estimated based on following conditions:

- (1) Saturation flow rate was assumed to fall in the range from 2,000 to 2,500 veh/h/lane
- (2) Jam density was calculated as 115 veh/lane/km

Jam density was calculated from fraction weighted average vehicle length and distance between vehicles at stopped condition (Equation (5.9)). Average vehicle length was calculated as 5.0 m based on data prepared in Chapter 4, and distance between stopped vehicles was assumed as 3.7 m, which was accepted from the study by Long (2002).

$$k_j = \frac{1000}{\bar{L} + h_j} \quad (5.9)$$

where

k_j : jam density (veh/ km);

$\bar{L}$: average length of vehicles (m/veh);

h_j : spacing between stopped vehicles (m/veh).

Regarding search algorithm, the Golden Section Method, which is a single parameter function minimization algorithm, was employed. As its name implies, the method utilizes *golden section*, which is a ratio of 0.38197... to 0.61803..., to iteratively narrow the range for the optimal value of the parameter. Details of the procedure can be found in

Dowling (2002) and Press et al. (1986).

5.2.7 CORSIM Calibration

During calibration, first, preliminary runs were made with default parameters, and the output and animation were checked. Then, the CFSF was calibrated against volume and travel time data. Finally, animation was checked again, and the calibration was completed.

It should be noted here that due to the error found in CORSIM, the OD data were assigned manually based on the CORSIM calculated OD tables. Because CORSIM accepts only integer in percent when manually coding OD fractions, there will be some difficulty to accurately replicate original balanced volumes. Specifically, a relatively large error was expected at westbound exit to Palladium Drive. The expected error was about 13% of balanced volume (approximately 10 veh/h). Detail of this error can be seen in Appendix D (CORSIM OD Table, (b) A.M. Peak Hour Westbound). Because this error is inevitable and the absolute error is relatively small (just around 10 veh/h), the error at this exit was not considered during the calibration process.

The following describes the CORSIM calibration process and its results.

Initial runs:

Before starting the calibration of CFSF, preliminary runs were made to check if the coding had been done correctly, and if the simulation was running as expected. Actually,

it was found at this stage that CORSIM cannot assign volume correctly reflecting its OD table, as described in Chapter 4. The check was done for both statistical output and animation.

Following parameters were adjusted during this stage: HOV lane warning sign position*, truck movement code, and for westbound Eagleson exit, exit warning sign position*. Although the study section of Highway 417 does not have HOV lanes, the HOV lane warning sign position also affects the operation of bus lanes in CORSIM, and this parameter was adjusted to minimize the number of cars and trucks that enter the exclusive bus lanes between Eagleson Road and Moodie Drive (detailed parameter values can be found in sample input/output file in Appendix C). The truck movement code was set to “biased to right most through lane” so that the trucks were biased to the right side lane of the two through lanes, which is generally observed in the real world. The exit warning sign position for westbound Eagleson exit was shortened to 1640 ft (500 m) from its default of 2500 ft (760 m) to make flow upstream of exits smoother and more natural.

* These warning sign positions mean the positions at which vehicles start to react to the forthcoming conditions and do not necessarily mean the positions of actual warning signs in the real world, in which drivers do not necessarily start attempting to change lanes at the position of actual signs.

CFSF Calibration:

After the initial check, the optimal CFSF was searched from the identified range by the Golden Section Method. As previously mentioned, only the average value of CFSF was changed, and the variance among different driver types was kept at default value.

Another item worth mentioning is that, during calibration, the Pitt car-following constant, which stands for a separation between stopped cars (see Equation (5.7)), was set to 9 ft (2.7 m). The value was accepted from the study by Long (2002), in which it was found that the average spacing between stopped cars was 3.66 m (12ft). The difference of 3 ft was absorbed by vehicle length in CORSIM, since CORSIM automatically adds 3 ft internally to obtain the effective vehicle length (FHWA 2003b).

During the beginning stage of the process, it was found that optimal value for CFSF was different for the volume and the travel time. For the volume, it was found that the optimal CFSF did not exist within the identified searching range (i.e. from 1.15 to 1.50). On the other hand, the optimal CFSF for the travel time was found to exist within the range. At this moment, compromise was needed to maintain balance between the error for volume and that for travel time. Close examination of the results at the beginning stage found the following facts: (1) for the volume, the searching range included values around lower boundary that yielded the results which cleared the calibration targets; and (2) for the travel time, although the optimal value existed within the searching range, the targets were not met at both of the lower and upper boundaries. Thus, optimizing CFSF for travel time has a possibility to find a parameter value that clears the targets for both volume and

travel time.

Figure 5-2 shows the average CFSF and the resultant RMSE for volume and travel time. Please note that this figure does not pertain to any specific section (this is also applicable to Figure 5-3). Although average CFSF of 0.80 was not included in the searching range, it is the CORSIM default value and included in the figure as a reference. Although it was found that the optimal CFSF for volume did not exist within the searching range, it was observed that the CFSF less than or equal to 1.20 produced the results that meet the calibration targets for volume. For the travel time, the calibration targets were attained with CFSF between 1.19 and 1.23, while 1.20 yielded the best results. Thus, taking both conditions into account, 1.19 and 1.20 cleared the targets, and they can be considered as acceptable value for CFSF. Both of 1.19 and 1.20 were carried to the model validation process, and the value that yielded better results was finally selected. Further details of the calibration can be found in Appendix E.

Figure 5-2. RMSE vs. CFSF (CORSIM)

Animation Check:

In the next step, animation of the simulation results was checked again. During the check, it was observed that at the upstream link of the eastbound Eagleson inner-loop entrance, vehicles were queuing only on the left-side lane, while the right-side lane was flowing at considerable speed. This was considered to be due to *anticipatory lane change* modelled in CORSIM. This feature models vehicles' lane changing behaviour which is an attempt to avoid congestion caused by entering volume from on-ramps. The distance at which vehicles start anticipatory lane change was shortened to 500 ft (150 m) from its default value of 1500 ft (450 m) for this location. The new value seemed to produce visually acceptable results, in which the queue on the left-side lane reduced and the flow became

more balanced with that of the right-side lane.

This change could affect the volume and the travel time, and thus, further refinement of CFSF might be required. To ensure that the model output of volume and travel time was still in acceptable range, simulation output and observed values were compared. It was found that both 1.19 and 1.20 of average CFSF produced values within the calibration target.

5.2.8 VISSIM Calibration

A similar process was followed for the calibration of CC1 parameter in VISSIM. First, initial runs were made to check if the model was functioning properly. Then, CC1 parameter was calibrated. And finally, the animation was checked.

Initial runs:

Initial runs were made with default parameters except *lane change distance*. *Lane change distance* is a parameter that specifies the distance between an intersection/interchange and an upstream point at which vehicles start attempting to change lanes to maintain their route. It has similar role as *exit warning sign position* in CORSIM. Gomes et al. (2004) have suggested that the default value of 200 m is “*too small*” and needed to be tuned individually. In this study, it is first set to 500m, which is the same distance as used for the *exit warning sign position* in CORSIM. During initial runs, no specific problem was found either in simulation output or in animation.

CC1 Calibration:

Instead of searching the optimal CC1 from the beginning, the first run was made with CC1 of 1.20 (i.e. one of the values of CFSF that met the calibration targets during CORSIM calibration). The premise for selecting this value was that since both CORSIM and VISSIM contain similar logic in their car-following models, the optimal value for CFSF might also be optimal for CC1.

However, the results revealed that CC1 of 1.20 did not clear the targets either for volume or travel time. The model was underestimating the volumes for westbound mainline sections and westbound exits by approximately 15 to 20 percent, and at the same time, it was also underestimating the travel times for two of the eastbound mainline sections by approximately 25 to 50 percent. This means the calibration targets cannot be achieved by simply changing CC1 parameter for the following reasons:

- (1) To meet the targets for volume, simulated volume should be increased. However, to increase the simulated volume, capacity needs to be increased, which requires reduction in CC1 value (i.e. smaller headway).
- (2) On the other hand, to meet the targets for travel time, simulated travel time should be increased. However, to increase the simulated travel time, capacity needs to be reduced to deteriorate the flow condition, and this requires increase in CC1 value.

Thus, to improve the performance for volume, CC1 should be reduced, and to improve the performance for travel time, CC1 should be increased. In order to change the situation so that the total model performance can be improved by simply changing CC1, before starting the tuning of CC1, this condition was needed to be fixed by other means.

Through the careful observation of the animation, it was found that many vehicles exiting to Eagleson westbound off-ramp made attempts to change their lanes to right side lane on the upstream 2-lane section. These lane changing manoeuvres significantly affected westbound traffic flow. It can be considered that large exiting volume at Eagleson westbound off-ramp was the cause of the problem. Reducing the *lane changing distance* at Eagleson exit was found to be effective to increase the westbound volume, and it was shortened to 375m from its initial value of 500 m.

After the modification, the results showed good fit for the volume (within $\pm 2.5\%$ from observed values for all locations) and considerable underestimation for the travel time (i.e. no change from before modification). This means increasing the CC1 would improve the travel time estimation while keeping volume estimation within the calibration targets. Then, the lower limit for the new searching range was set to 1.20, and the upper limit was set to 1.50, which was the original upper boundary of the search range. By using the newly identified search range, CC1 was optimized by the Golden Section Method.

Figure 5-3 displays the results of the calibration of CC1 parameter. Although average CC1 of 0.90 was not included in the searching range, it is the VISSIM default value and included in the figure as a reference. As compared to CORSIM, similar trends can be observed. For the volume, the optimal CC1 did not exist within the search range, and a smaller value of CC1 produced better results. For the travel time, the optimal value for CC1 was found within the search range, and the best fit was obtained at the value of 1.31.

Figure 5-3. RMSE vs. CC1 Parameter (VISSIM)

This time, however, the CC1 to meet the calibration targets for travel time was not found. Even with the optimal CC1 of 1.31, the travel time for one section (Eagleson Rd. – CNR Overpass) slightly fell below the target, at which the percent error from observed travel time was -11.5% (target: within 10%). However, these results were accepted, and the CC1 of 1.31 was carried to validation process on considering the facts that (1) the volumes for all locations met the targets, (2) the travel times also met the targets except one section, and (3) the error from the target for the section was minor (target: within 10%, actual error: -11.5%). Further details of the calibration can be found in Appendix E.

It is noteworthy that the best values for CFSF and CC1 had approximately 0.1 second of difference, although both parameters have similar effect on the car-following models in CORSIM and VISSIM. The causes of this difference are unknown. However, the differences in additional factors in the car-following models and those in other components of the models (e.g. lane changing model, gap acceptance model, etc.) would be affecting the results.

Animation Check:

The animation was checked after the calibration of CC1 parameter, and no specific problem was observed.

5.3 MODEL VALIDATION

For model validation, balanced P.M. peak hour volume and the P.M. peak hour transit schedule were fed into the calibrated models. The OD tables were adopted from the results of CORSIM built-in gravity model and were manually input into CORSIM and VISSIM. Again for CORSIM, because of the fact that the model does not accept decimal numbers when manually assigning OD fractions, relatively large error was expected at one exit (i.e. westbound exit to Palladium Drive). The expected error was around 10% of observed value (approximately 14 veh/h). Given the fact that the error is small, the error at this location was not considered during validation process. Detail of this error can be seen in Appendix D (CORSIM OD Table, (d) P.M. Peak Hour Westbound).

For CORSIM, the results from both CFSF of 1.19 and that of 1.20 showed good fit against observed conditions while meeting all targets. The errors for mainline volumes were within 2.3% of the balanced volumes, and those for entry/exit volumes were within 3.2% of the balanced volumes. The GEH statistics were less than 1.2 for all locations. As previously mentioned, errors for the westbound exit to Palladium Drive were not included in these values. The error of total travel time for the entire section was within 0.9% for CFSF 1.20 and within 0.8% for CFSF 1.19. For individual sections, the errors in travel times were within 8.6% for CFSF 1.20 and within 8.5% for CFSF 1.19. Details can be found in Appendix E. Although both of the CFSF values yielded almost same performance, the CFSF of 1.20 was selected for further use since the results from 1.20 showed slightly better overall fit than that from 1.19. During the process, the animations were also checked, and no specific problem was observed.

For VISSIM, similar trends that were seen during the calibration process (i.e. A.M. peak hour conditions) were observed again. The volumes for all individual locations meet the targets with the errors within 4.7% and GEH less than or equal to 2.9. For westbound mainline sections, the volumes were constantly underestimated by -3.4% to -4.7% errors. The travel times did not meet the targets at one section (Moodie Dr. – CNR Overpass) with -10.5% error (target: within 10%) and for overall travel time with -5.2% error (target: within 5%). Details can be found in Appendix E. Although the travel times did not meet the targets at two sections (i.e. one individual and one total), the model was accepted as valid with considering the facts that the volumes for all locations met the targets and that the difference from the targets in travel time for the two sections were

small. For the animations, any specific problem was not found.

5.4 SUMMARY

In this chapter, calibration and validation of CORSIM and VISSIM were presented. Both models were calibrated and validated through optimization of the parameters that reflect the desired time headway (i.e. CFSF in CORSIM and CC1 parameter in VISSIM). During the calibration process, the volumes and the travel times estimated by the models were compared against observed values for A.M. peak hour conditions, and the optimal model parameters were searched from the predefined range. In addition, the simulation results were visually checked through the animations, and the model parameters were corrected when necessary. During the validation process the volumes and the travel times were compared against the observed values by using P.M. peak hour data as input, and the animation results were visually checked.

CHAPTER 6. USE OF FUEL CONSUMPTION AND VEHICLE EMISSIONS MODELS

6.1 INTRODUCTION

Using the traffic simulation models that were calibrated and validated, it was now possible to run the simulation and obtain the output that describes traffic conditions and travel activities. The obtained output was then used to calculate fuel consumption and vehicle emissions. For a built-in fuel consumption and emissions model, the output from the traffic simulation model already contained these environmental measures. On the other hand, the output from the traffic simulation model was further processed into input data for an independent fuel consumption and emissions model. For this type of model, additional data are often required to complete the input data. This chapter presents the process of obtaining fuel consumption and emissions using CMEM in combination with each of CORSIM output and VISSIM output, CORSIM built-in model, and MOBILE6/MOBILE6C.

6.2 ESTIMATION OF FUEL CONSUMPTION AND VEHICLE EMISSIONS

For each model, the process generally consists of data preparation, model run, and post processing. Data required to run the models (e.g. vehicle fleet data, vehicle activity data, climate data, fuel data, etc.) were collected and compiled during data preparation stage. The models were then executed using the input data, and the raw model output was processed to obtain the amount of fuel consumptions and vehicle emissions.

Ideally, calibration and validation of model parameters will produce more accurate predictions for fuel use and emissions, as has been seen in the case of microscopic traffic simulation models. However, due to difficulty in collecting relevant data (e.g. amount of fuel consumption and emissions from vehicles travelling in the real world network), model-provided default parameters were accepted for fuel consumption and emissions models in this study.

The list of inputs/parameters, and outputs for each of the models are provided in Appendix F. Sample pages of input and output files for these models are also included in Appendix F.

6.2.1 CMEM

Data Preparation:

Two sets of data are needed to run the CMEM: vehicle definition data, and vehicle activity data. The vehicle definition data specifies vehicle characteristics, and the vehicle activity data contains second-by-second vehicle speed. In the vehicle activity data, second-by-second acceleration, grade of the roadway, and secondary load (e.g. use of air conditioner) can be optionally specified.

To generate the vehicle definition data, the vehicles contained in the vehicle activity data are needed to be assigned to any of the 23 CMEM vehicle categories according to local traffic compositions. The 23 vehicle categories consist of 11 normal emitting cars, 7

normal emitting trucks, and 5 high emitting vehicles. Definition of each vehicle type can be found in Table 6-1.

To classify the vehicles, small computer programs were developed that assign the vehicles to one of the 23 CMEM vehicle categories in accordance with predefined distribution. Brief description and the source code of the programs are provided in Appendix G. The distribution was obtained by following the flow charts (Figure 6-1 (a) for cars and (b) for light trucks) that were included in CMEM user's guide (Barth et al. 2000).

The vehicle categorization method was originally developed in the U.S., and it may not be directly applicable to the Canadian conditions. However, since developing a new categorization method is beyond the scope of this study, the original method was accepted. Vehicle age distribution for Ontario for year 2000 (see Table 6-3), which was obtained from Environment Canada, was used to determine the distribution of vehicle model year (MY). The obtained model year distribution was then fed into the classification trees. Since vehicle fleet composition is different for eastbound and westbound, different frequency distribution for CMEM vehicle category was developed for each direction. The developed distribution is summarized in Table 6-1.

Adopted from: Comprehensive Modal Emissions Model (CMEM), version 2.0,
User's Guide (Barth et al. 2000)

Figure 6-1. (b) Vehicle Categorization Flow for Light-Duty Trucks

Adopted from: Comprehensive Modal Emissions Model (CMEM), version 2.0,

User's Guide (Barth et al. 2000)

Table 6-1. CMEM Vehicle Categorization

No.	Vehicle Category	Frequency Distribution (%)	
		Eastbound	Westbound
Normal Emitting Cars			
1	No Catalyst	0.25	0.23
2	2-way Catalyst	0.37	0.34
3	3-way Catalyst, Carbureted	1.62	1.48
4	3-way Catalyst, >50k miles, low power/weight	9.67	8.87
5	3-way Catalyst, >50k miles, high power/weight	14.50	13.31
6	3-way Catalyst, <50k miles, low power/weight	0.46	0.43
7	3-way Catalyst, <50k miles, high power/weight	0.85	0.78
8	Tier 1, >50k miles, low power/weight	4.73	4.34
9	Tier 1, >50k miles, high power/weight	10.05	9.22
10	Tier 1, <50k miles, low power/weight	5.88	5.39
11	Tier 1, <50k miles, high power/weight	16.43	15.08
Normal Emitting Trucks			
12	Pre-1979 (<=8500GVW)	0.10	0.13
13	1979 to 1983 (<=8500 GVW)	0.12	0.15
14	1984 to 1987 (<=8500 GVW)	0.60	0.74
15	1988 to 1993, <=3750 LVW	1.18	1.45
16	1988 to 1993, >3750 LVW	6.42	7.88
17	Tire 1 LDT2/3 (3751-5750 LVW or Alt. LVW)	14.90	18.29
18	Tire 1 LDT4 (6001-8500GVW, >5750 Alt. LVW))	1.13	1.39
High Emitting Vehicles			
19	Runs lean	2.04	2.00
20	Runs rich	1.46	1.43
21	Misfire	4.09	4.01
22	Bad catalyst	2.75	2.70
23	Runs very rich	0.36	0.35

Regarding the vehicle activity data, small programs that convert the simulation output into CMEM input format are developed. Brief description and the source code of the programs are provided in Appendix G. For CORSIM, second-by-second vehicle activity data were extracted from an animation data file. The file is called *Time Step Data File*

(.tsd) (FHWA 2002), which is a binary file that includes step-by-step condition of every individual vehicle during a simulation run. For VISSIM, necessary data are extracted from the output text file and transferred to CMEM input. For both processes, data included in the CMEM input are second-by-second speed data, road grade, and secondary load (e.g. air conditioner use). The secondary load cannot be estimated from simulation models, and it is assumed that 80 % of vehicles are using air conditioner.

Model Run:

On the completion of the two data sets, these data were imported into CMEM, and the fuel consumption and emissions were calculated for each scenario. Since CMEM itself is not a stochastic type of model, unlike microscopic traffic simulation models, multiple runs are not necessary for CMEM itself. However, since it uses vehicle activity data generated by CORSIM and VISSIM, which are stochastic models, running CMEM more than once with different vehicle activity data that were generated from different random number seeds will increase the reliability of the results. Since execution of CMEM requires significant time and computer storage space (e.g. about 2 hours of time* and more than 500 MB of computer storage space for each individual run), the number of model runs that can be executed is limited. Specifically, the results were obtained for 5 runs for each sub-scenario, and the statistics (i.e. average and standard deviations) were calculated from 5 runs. As a total, 105 runs of CMEM were made (i.e. 5 runs were made

* Used computer was Microsoft Windows XP based system with AMD Athlon XP 2800+ (2.08 GHz) processor.

for each sub-scenario, and there were total of 21 sub-scenarios – 8 for CORSIM and 13 for VISSIM). It was found that this number of runs (i.e. 5 runs) of CMEM was sufficient to obtain reliable results with limited resources used.

Post Processing:

Windows version of CMEM is integrated with Microsoft Access database software. The results were processed by using database functionalities.

6.2.2 CORSIM Built-in Model

Data Preparation:

CORSIM utilizes simple look-up table to obtain second-by-second fuel consumption and emissions rates by cross-referencing vehicles' instantaneous speeds and accelerations (FHWA 2003b). It was assumed that the tables were developed for hot stabilized conditions due to lack of available information.

Each of the nine vehicle types has four associated tables*, which correspond to fuel consumption, HC emission, CO emission, and NOx emission. When the default fuel consumption and emissions look-up tables were used, all data needed to obtain the results are those required to run the simulation. This means that additional data are not required. In this study, the default tables were accepted, and no additional data was collected for CORSIM built-in model.

* Type 8 vehicle and type 9 vehicle (HOVs) share the same tables with type 1 vehicle and type 2 vehicle (single occupancy vehicles), respectively (FHWA 2003b).

Model Run:

The fuel consumption and emissions estimation component is fully incorporated in the CORSIM simulation model, and no special effort is needed to obtain the estimates of fuel consumption and emissions. By simply turning on the "*calculate environmental measures*" option will execute calculations, and the results are written to the output file. Animation files were also created, for they were needed in the post processing stage.

CORSIM Built-in fuel consumption and emissions estimation module is a simple look-up table based model. It does not include stochastic variables in the model itself, which means that multiple runs are not required for model itself. However, like CMEM, vehicle activity data used for calculation of fuel consumption and emissions comes from CORSIM simulation results, which means increasing the number of runs will increase the reliability of the results. Since running CORSIM Built-in model requires only a small amount of resources, a larger number of runs is possible as compared to CMEM. Specifically, 30 CORSIM runs were carried out by using different random number seeds for each sub-scenario, and the statistics on fuel consumption and emissions (i.e. averages and standard deviations) were calculated. These 30 runs provided results with small errors related to the estimation of the means, while only reasonable amount of resources were consumed.

Post Processing:

CORSIM produces output in different format for fuel consumption and emissions. For fuel consumption, both the amount of fuel used (gallon) and fuel efficiency (MPG) are

generated in text output file for each vehicle type on a link basis. Thus, calculating total fuel consumption is not a difficult task. On the other hand, for emissions, CORSIM only outputs emission rates (in gram per mile) for each vehicle type on a link basis. To obtain the total amount of emissions, VMT by each vehicle type for each link is required. However, the data are not included in the regular output file, and the Time Step Data File (.tsd file) was used to calculate VMT for each vehicle type for each link. After VMT for each vehicle type is calculated, amount of emissions can be obtained by simple multiplication of emission rates and VMTs. To read the binary file and to facilitate the calculation tasks required to obtain fuel consumptions and emissions for multiple runs with multiple scenarios, small computer programs written in C language were developed. Brief description and the source code of the programs are provided in Appendix G.

6.2.3 MOBILE6/MOBILE6C

Data Preparation:

MOBILE6 and MOBILE6C incorporate a wide range of model parameters that affect vehicle emissions. Among these, several input parameters are necessary to run the model, including calendar year of evaluation, temperature, and fuel RVP. For other parameters, although a variety of default values is provided by the U.S. EPA, users are allowed to modify these parameters to reflect local conditions. These include, but are not limited to, external conditions, vehicle fleet characteristics, vehicle activity, and fuel specifications.

Regarding external conditions, temperature and humidity data were prepared. “*Ambient temperature is key to estimating emission rates for highway vehicles* (U.S. EPA 2002b),”

and thus, temperature is one of the required input to run the model. The averages for the maximum and minimum temperatures for the days that had high ozone concentration in 2000 were aimed at. However, according to the data obtained from Ministry of the Environment Ontario (MOE), Ottawa did not experience an exceedance day* in June 2000. Indeed, Ottawa did not have an exceedance day during the entire year in 2000 (MOE web source), so the period was expanded to June from 1999 to 2001. This still included only 2 exceedance days in June 2001. Therefore, the criterion for ozone concentration was lowered to 70 ppb from 80 ppb so as to increase the sample. Table 6-2 summarizes samples and averages of the minimum and maximum temperatures.

Table 6-2 Minimum and Maximum Temperatures

Year	Day	Maximum Hourly Ozone Concentration (ppb)	Minimum Temperature (°C)	Maximum Temperature (°C)
June 1999	12	74	18.2	31.0
	24	71	16.0	31.2
June 2001	15	81	19.1	33.8
	19	92	16.7	32.0
	27	75	17.1	31.9
	29	74	14.9	28.9
	30	79	18.8	31.3
Average Temperature			17.3	31.4

Source: Environment Canada Climate Data Online (http://www.climate.weatheroffice.ec.gc.ca/climateData/canada_e.html) and MOE

* An ozone exceedance day has at least one hour of ozone concentration greater than 80 ppb (MOE web source).

Humidity indirectly affects HC, CO, and NO_x emissions through its impact on air conditioning usage, and it also directly affects NO_x emissions (U.S. EPA 2002b). This parameter is specified in absolute humidity expressed as grains of water per pound of dry air (U.S. EPA 2002b). Although humidity varies within a day, current version of the MOBILE model only accepts a single value for this parameter. To choose the value, one of the suggested methods by U.S. EPA was applied (U.S. EPA 2002c). As a parameter, the highest value that does not exceed 100% when converted to relative humidity for all hours of day for all days selected was chosen. Specifically, the parameter was set to 76.8 grains per pound. The obtained value was relatively close to the default parameter of 75.0 grains per pound for MOBILE6 (U.S. EPA 2002b).

For vehicle fleet specifications, due to their local variability, use of local vehicle age distribution is recommended by U.S. EPA (2002b). The age distribution in Ontario was obtained from Environment Canada, and the data for year 2000 was used as input. The data is summarized in Table 6-3.

Table 6-3. Vehicle Age Distribution Ontario 2000

Vehicle Age	LDV	LDT1	LDT2	LDT3	LDT4	HDV2B	HDV3	HDV4
1	0.0653	0.0904	0.0904	0.0870	0.0870	0.0681	0.0681	0.0681
2	0.0718	0.0979	0.0979	0.1023	0.1023	0.0860	0.0860	0.0860
3	0.0694	0.0996	0.0996	0.0820	0.0820	0.0651	0.0651	0.0651
4	0.0696	0.0760	0.0760	0.0663	0.0663	0.0562	0.0562	0.0562
5	0.0526	0.0617	0.0617	0.0603	0.0603	0.0480	0.0480	0.0480
6	0.0670	0.0659	0.0659	0.0735	0.0735	0.0632	0.0632	0.0632
7	0.0633	0.0613	0.0613	0.0621	0.0621	0.0467	0.0467	0.0467
8	0.0650	0.0648	0.0648	0.0409	0.0409	0.0413	0.0413	0.0413
9	0.0727	0.0572	0.0572	0.0466	0.0466	0.0356	0.0356	0.0356
10	0.0678	0.0550	0.0550	0.0350	0.0350	0.0357	0.0357	0.0357
11	0.0689	0.0511	0.0511	0.0535	0.0535	0.0572	0.0572	0.0572
12	0.0655	0.0548	0.0548	0.0586	0.0586	0.0656	0.0656	0.0656
13	0.0586	0.0517	0.0517	0.0536	0.0536	0.0741	0.0741	0.0741
14	0.0416	0.0333	0.0333	0.0356	0.0356	0.0503	0.0503	0.0503
15	0.0325	0.0236	0.0236	0.0364	0.0364	0.0434	0.0434	0.0434
16	0.0211	0.0167	0.0167	0.0235	0.0235	0.0378	0.0378	0.0378
17	0.0136	0.0101	0.0101	0.0152	0.0152	0.0260	0.0260	0.0260
18	0.0065	0.0044	0.0044	0.0078	0.0078	0.0154	0.0154	0.0154
19	0.0036	0.0028	0.0028	0.0056	0.0056	0.0142	0.0142	0.0142
20	0.0044	0.0044	0.0044	0.0101	0.0101	0.0187	0.0187	0.0187
21	0.0038	0.0034	0.0034	0.0075	0.0075	0.0072	0.0072	0.0072
22	0.0029	0.0034	0.0034	0.0067	0.0067	0.0091	0.0091	0.0091
23	0.0019	0.0034	0.0034	0.0075	0.0075	0.0055	0.0055	0.0055
24	0.0010	0.0034	0.0034	0.0050	0.0050	0.0045	0.0045	0.0045
25	0.0095	0.0034	0.0034	0.0175	0.0175	0.0252	0.0252	0.0252

* Source: Data compiled for MOBILE6C by Environment Canada

Table 6-3. Vehicle Age Distribution Ontario 2000 (Continued)

Vehicle Age	HDV5	HDV6	HDV7	HDV8A	HDV8B	HDBS	HDBT	MC
1	0.0681	0.0681	0.0681	0.0681	0.0681	0.0681	0.0968	0.1440
2	0.0860	0.0860	0.0860	0.0860	0.0860	0.0860	0.1177	0.1680
3	0.0651	0.0651	0.0651	0.0651	0.0651	0.0651	0.0922	0.1350
4	0.0562	0.0562	0.0562	0.0562	0.0562	0.0562	0.0710	0.1090
5	0.0480	0.0480	0.0480	0.0480	0.0480	0.0480	0.0660	0.0880
6	0.0632	0.0632	0.0632	0.0632	0.0632	0.0632	0.0875	0.0700
7	0.0467	0.0467	0.0467	0.0467	0.0467	0.0467	0.0605	0.0560
8	0.0413	0.0413	0.0413	0.0413	0.0413	0.0413	0.0536	0.0450
9	0.0356	0.0356	0.0356	0.0356	0.0356	0.0356	0.0417	0.0360
10	0.0357	0.0357	0.0357	0.0357	0.0357	0.0357	0.0370	0.0290
11	0.0572	0.0572	0.0572	0.0572	0.0572	0.0572	0.0520	0.0230
12	0.0656	0.0656	0.0656	0.0656	0.0656	0.0656	0.0485	0.0970
13	0.0741	0.0741	0.0741	0.0741	0.0741	0.0741	0.0432	0.0000
14	0.0503	0.0503	0.0503	0.0503	0.0503	0.0503	0.0365	0.0000
15	0.0434	0.0434	0.0434	0.0434	0.0434	0.0434	0.0304	0.0000
16	0.0378	0.0378	0.0378	0.0378	0.0378	0.0378	0.0206	0.0000
17	0.0260	0.0260	0.0260	0.0260	0.0260	0.0260	0.0117	0.0000
18	0.0154	0.0154	0.0154	0.0154	0.0154	0.0154	0.0053	0.0000
19	0.0142	0.0142	0.0142	0.0142	0.0142	0.0142	0.0061	0.0000
20	0.0187	0.0187	0.0187	0.0187	0.0187	0.0187	0.0061	0.0000
21	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0044	0.0000
22	0.0091	0.0091	0.0091	0.0091	0.0091	0.0091	0.0040	0.0000
23	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055	0.0020	0.0000
24	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0011	0.0000
25	0.0252	0.0252	0.0252	0.0252	0.0252	0.0252	0.0041	0.0000

* Source: Data compiled for MOBILE6C by Environment Canada

Regarding vehicle activities, travel speed and VMT fractions on different facility types were specified. For travel speed, since field measured data were not available for whole sections of the highway, average travel speed estimated by CORSIM was accepted. The results from CORSIM were selected because it showed a good fit to observed data during model validation process, which utilized the same P.M. peak traffic data. For VMT, MOBILE6 allows a user to assign VMT fractions to four different facility types: non-ramp freeway, arterial/collector, local roadway, and freeway ramp, each of which has different driving patterns.

Since the study site consists of freeway mainline and acceleration/deceleration lanes, VMT fractions were assigned to non-ramp freeway and freeway ramp. Although MOBILE6 has default freeway ramp VMT fraction of 8%, this parameter was modified because this study did not include all parts of ramps, as stated in Chapter 3. Please note that all through lanes and acceleration/deceleration lanes were included in the analysis. The part of a ramp that connects acceleration/deceleration lane of arterial and that of freeway was not included due to study design. To calculate the VMT fractions, total VMT and VMT for acceleration/deceleration activities were calculated. The total VMT was obtained by multiplying the length of the sections and the volumes travelled on the sections. The VMT related to acceleration/deceleration activities were calculated by multiplying the length for these activities and the entry/exit volumes. The length for acceleration/deceleration activities was assumed to be 200 m by considering the vehicles' acceleration capabilities and actual length of acceleration/deceleration lanes. Table 6-4 shows average speed and VMT fractions by facility type for different sections. For

Section E4, W4, and W5, flow conditions are slightly congested, and some drops in average speed were observed. It should be noted here that speed was assigned in distribution instead of single average speed for total segment.

Table 6-4 Average Speed and VMT Fractions by Facility Type

Section ID	Section*	Speed** (km/h)	Travel Fraction (%)	
			Non-Ramp	Ramp
E1	Carp Rd. – Palladium Dr., EB	96.0	94.3	5.7
E2	Palladium Dr. – Terry Fox Dr., EB	99.6	98.6	1.4
E3	Terry Fox Dr. – Eagleson Rd., EB	95.8	96.1	3.9
E4	Egleson Rd. – CNR Overpass, EB	78.3	96.2	3.8
E5	CNR Overpass – Moodie Dr., EB	94.6	99.2	0.8
W1	Carp Rd. – Palladium Dr., WB	94.4	96.3	3.7
W2	Palladium Dr. – Terry Fox Dr., WB	95.5	98.0	2.0
W3	Terry Fox Dr. – Eagleson Rd., WB	93.0	96.4	3.6
W4	Egleson Rd. – CNR Overpass, WB	79.9	97.1	2.9
W5	CNR Overpass – Moodie Dr., WB	50.5	98.1	1.9
	Total Segment	Range (Frequency) 44.2 – 52.3 (9.3%) 76.4 – 84.5 (32.6%) 92.5 – 100.6 (52.0%) >100.6 (6.1%)	97.0	3.0

*EB: Eastbound, WB: Westbound

**Except Total Segment, speed is adjusted from original CORSIM estimates to account for the unchangeable ramp speed of MOBILE6. Details can be found in the technical guidance (U.S. EPA 2002b)

For fuel specifications, gasoline volatility, sulphur content, and oxygen content were determined, based on several reports from Environment Canada (2002 and 2003).

Model Run:

Same input files are used for both MOBILE6 and MOBILE6C. For each model, separate runs were executed for each of the sections and for entire segment of the highway within the study site. Since the models do not include stochastic factors, only one run is enough to obtain the results. To facilitate the post processing, database output option, which enables the generation of the results in database format, was selected.

Post Processing:

From the output in database format, fuel economy and emission factors for P.M. peak period were calculated for each section and for the entire segment of the highway. A two hour period from 4:00 P.M. to 5:59 P.M. was selected as P.M. peak period. Since calculating fuel economy and emission factors for multiple vehicle classes for multiple output files requires much calculation effort, it was done by a computer program written in C. Brief description and the source code of the programs are provided in Appendix G. After the fuel economy and emission factors were obtained, amount of fuel consumption and emissions for each section and for entire section of the highway were calculated by multiplying the obtained factors and VMT for the section.

The VMT for each vehicle class for each highway section used in the calculation was obtained by multiplying the travel fraction for the vehicle class and the total VMT for the highway section. The travel fractions were obtained by distributing the fractions obtained from the City of Ottawa vehicle count, which had relatively coarse classification scheme,

in accordance with the MOBILE calculated detailed travel fractions. The total VMT for each section is obtained by summing the VMT of the links within the section that are calculated by multiplying the length of the link and the volume of the link. Table 6-5 shows calculated travel fractions for 28 vehicle classes. The difference in travel fraction for eastbound and westbound arises from different vehicle fleet composition for each direction.

Table 6-5 Travel Fraction Used for Calculating VMT by Vehicle Class

Vehicle Class	MOBILE6/C Calculated Travel Fraction	Eastbound		Westbound	
		City of Ottawa Vehicle Count	Calculated Travel Fraction	City of Ottawa Vehicle Count	Calculated Travel Fraction
LDGV	0.4679	0.6957	0.6947	0.6434	0.6424
LDDV	0.0007		0.0010		0.0010
LDGT1	0.0688	0.2546	0.0430	0.3146	0.0532
LDGT2	0.2291		0.1433		0.1770
LDGT3	0.0737		0.0461		0.0570
LDGT4	0.0339		0.0212		0.0262
LDDT12	0.0001		0.0001		0.0001
LDDT34	0.0015		0.0009		0.0012
HDGV2B	0.0271	0.0434	0.0102	0.0368	0.0086
HDGV3	0.0009		0.0003		0.0003
HDGV4	0.0006		0.0002		0.0002
HDGV5	0.0012		0.0005		0.0004
HDGV6	0.0026		0.0010		0.0008
HDGV7	0.0012		0.0005		0.0004
HDGV8A	0.0000		0.0000		0.0000
HDGV8B	0.0000		0.0000		0.0000
HDDV2B	0.0089		0.0033		0.0028
HDDV3	0.0026		0.0010		0.0008
HDDV4	0.0024		0.0009		0.0008
HDDV5	0.0010		0.0004		0.0003
HDDV6	0.0061		0.0023		0.0019
HDDV7	0.0091		0.0034		0.0029
HDDV8A	0.0114		0.0043		0.0036
HDDV8B	0.0403		0.0152		0.0129
HDGB	0.0004	0.0000	0.0000	0.0000	0.0000
HDDBS	0.0014		0.0000		0.0000
HDDBT*	0.0010	-	-	-	-
MC	0.0060	0.0063	0.0063	0.0051	0.0051

*VMT for transit buses was calculated separately and not included in this table.

6.3 SUMMARY

In this chapter, calculation process of fuel consumption and emissions were presented. The models described were CMEM, CORSIM built-in model, and MOBILE6 and MOBILE6C. Specifically, input data preparation, model execution, and post-processing were explained for each model.

CHAPTER 7. COMPARISON OF THE MODELS AND ANALYSIS OF IMPACT OF DRIVING BEHAVIOUR

7.1 INTRODUCTION

By using the process described in Chapter 6, fuel consumption and emission estimates are obtained for each scenario from different models and model combinations. Models used are CMEM, CORSIM built-in model, MOBILE6, and MOBILE6C. For CMEM, two different results are obtained by importing different vehicle activity data from CORSIM and from VISSIM. Two MOBILE models are used only for the base case scenario. For the scenarios that test the impact of driving behaviour, CMEM and CORSIM built-in model are used. Summary of the models used for each scenario is presented in Table 7-1.

The estimates are obtained separately for the whole section and for five sub-sections within the study site. For each case, the results are mainly presented in bar charts. In the charts, estimated values of the mean as well as the confidence interval for the mean obtained from model runs (i.e. 5 runs for CMEM and 30 runs for CORSIM built-in model) are displayed. Please note that the bars show mean values and error bands that correspond to 95% confidence level, which are more stringent than standard error of estimate commonly used. Specifically, results from CMEM and CORSIM built-in model are presented according to this scheme.

Table 7-1. Models Used for the Scenarios

Scenario	Sub-Scenario	CORSIM & CMEM	VISSIM & CMEM	CORSIM Built-in Model	MOBILE6	MOBILE6C
Base Case		X	X	X	X	X
Desired Speed Change	+20 km/h		X			
	+10 km/h	X*	X	X*		
	-10 km/h	X	X	X		
	-20 km/h	X	X	X		
Desired Headway Change	-0.2 sec	X	X	X		
	-0.1 sec	X	X	X		
	+0.1 sec	X	X	X		
	+0.2 sec	X	X	X		
Desired Acceleration/ Deceleration Change	+20%		X			
	+10%		X			
	-10%		X			
	-20%		X			

*Due to the limitation of CORSIM, desired speed increase was set to +8 km/h (+5mph).

In the bar charts, since the names of all subsections are abbreviated due to space constraint, they are summarized in Table 7-2. Additionally, some basic measures for the sub-sections are included for reference purposes.

Table 7-2. Highway 417 Speed and Volume for Base Case

Abbreviation	Direction	Section	Length* (m)	Volume (veh/h)	Average Speed** (km/h)
E1	Eastbound	Carp Rd. – Palladium Dr.	2,063	1,430	100.3
E1		Palladium Dr. – Terry Fox Dr.	2,444	1,410	100.6
E3		Terry Fox Dr. – Eagleson Rd.	2,605	1,960	98.6
E4		Eagleson Rd. – CNR Overpass	2,695	3,490	79.6
E5		CNR Overpass – Moodie Dr.	1,331	3,490	95.1
W1	Westbound	Carp Rd. – Palladium Dr.	2,063	2,380	97.1
W2		Palladium Dr. – Terry Fox Dr.	2,444	2,440	96.9
W3		Terry Fox Dr. – Eagleson Rd.	2,618	2,860	95.2
W4		Eagleson Rd. – CNR Overpass	2,670	3,810	81.2
W5		CNR Overpass – Moodie Dr.	1,367	3,810	50.6

*Measured from plan (MTO 2001)

**Estimated value for Base Case by CORSIM

The results are presented in terms of total amount of fuel consumed and emissions for each section under each scenario. The changes in driving behaviour potentially affect vehicle kilo-metres travelled (e.g. closer headways resulting in higher amount of traffic flow), which indirectly affects the total fuel consumption and emissions within the sections. To capture the overall effect of changing driving behaviour on fuel consumption and emissions, total amount of fuel use and emissions on a section-by-section basis as well as for the entire study site was used. Since the scenarios investigated are resulting in different dynamics of sections studied, this is an appropriate indicator of fuel consumption and emissions.

7.2 COMPARISON OF DIFFERENT MODELS

Figure 7-1 shows the results for total fuel consumption and emissions for the entire section. The results are obtained for a 30 minute period from P.M. peak hour for the base case.

For fuel consumption, all models are showing generally consistent results, with CMEM slightly higher for both CORSIM and VISSIM, and slightly lower for two MOBILE models. The CORSIM built-in model falls between these. Fuel economy estimated by MOBILE has only accounted for type and age of vehicle (U.S. EPA 2002a), and this might be the cause of lower estimates of the models.

For HC emissions, CORSIM built-in model seems to be predicting significantly lower results than other models. Other four models predict generally consistent values with CMEM slightly higher than MOBILE.

For CO emissions, CMEM predicts significantly higher values for both CORSIM and VISSIM by a factor of approximately two. Other three models are generally consistent with slightly lower for CORSIM built-in and slightly higher for MOBILE6C. MOBILE6 falls between these two.

(a) Fuel Consumption

(b) HC Emissions

(c) CO Emissions

(d) NOx Emissions

Figure 7-1. Total Fuel Consumption and Emissions Estimates from Different Models

For NO_x emissions, all models predict generally consistent results, with slightly lower for CMEM, slightly higher for MOBILE, and in the middle for CORSIM built-in. These results are consistent with other researches (Barth et al. 2001 and Rakha et al. 2003), in which CMEM tends to estimate lower NO_x than MOBILE.

When two CMEM model applications are compared for fuel consumption and all three pollutants, they predict almost identical results for mean values. However, a close observation of the results will find that those obtained from VISSIM output show slightly larger deviations than the results obtained from CORSIM output. VISSIM incorporates many stochastic factors in its model so as to account for variability in driver behaviour and uncertainty in driver ability, and this might be the cause of the larger deviations as compared to those of the results from CORSIM output.

Overall, all five models are generally consistent except CORSIM built-in for HC emissions and CMEM for CO emissions. It is a little surprise to observe that CORSIM built-in model, which is a fairly simple model with quite rough vehicle categorization (i.e. only two vehicle types for light vehicle category (i.e. low-performance passenger car and high-performance passenger car)), showed fairly good match with other sophisticated models except for HC emissions. Another item to be noted is that although MOBILE6 and MOBILE6C share the same input file, MOBILE6C tends to predict slightly higher than MOBILE6 (approximately 17%, 13%, and 7% for HC, CO, and NO_x respectively). The difference can be attributed to the changes made to MOBILE6 so that MOBILE6C reflects Canadian conditions.

Figure 7-2 presents similar results at individual section level. In the following sections, CORSIM&CMEM represents CMEM combined with CORSIM output of vehicle activity data, and VISSIM&CMEM represents CMEM combined with VISSIM output of vehicle activity data.

For fuel consumption, all models are generally consistent for low to medium volume sections (i.e. E1 ~ E3, W1 ~ W3). Although MOBILE fuel economy estimates are not sensitive to traffic conditions, they are included for comparison purposes. The results from CORSIM built-in are slightly lower for low volume sections (i.e. E1 ~ E3), and those from VISSIM&CMEM are slightly higher for medium volume sections (i.e. W1 ~ W3). For high volume sections (i.e. E4, W4, and W5), CMEM and CORSIM built-in predict significantly higher values than MOBILE (+11 % ~ +79 %). However, this trend is not observed for section E5, which also has high volume. Instead, the characteristics at E5 are closer to those at medium volume sections (i.e. W1 ~ W3), in which all estimates are generally consistent with slightly higher estimate for VISSIM&CMEM and slightly lower estimate for CORSIM built-in.

(a) Fuel Consumption

(b) HC Emissions

(c) CO Emissions

(d) NOx Emissions

**Figure 7-2. Fuel Consumption and Emissions Estimates from
Different Models for Individual Sections**

For HC emissions, a similar trend is observed as fuel consumption, except the fact that CORSIM built-in model predicts significantly lower values. All results except CORSIM built-in are generally consistent for low to medium volume sections (i.e. E1 ~ E3, W1 ~ W3), and CMEM predicts significantly higher for high volume sections (i.e. E4, W4, and W5) as compared to MOBILE. Section E5 shows a similar trend as medium volume sections, which was also observed for fuel consumption.

For CO emissions, all results are generally consistent for low volume sections (i.e. E1 ~ E3), except that CORSIM built-in model predicts significantly lower values (half or less of other estimates). For medium volume sections (i.e. W1~W3), the two CMEM applications, especially CMEM&VISSIM, predict higher values, and CORSIM built-in model estimates lower values. For high volume sections (i.e. E4, E5, W4, and W5) two CMEM applications predict extremely higher estimates by a factor of two to three as compared to other models. It should be noted that CORSIM&CMEM predicts higher values than VISSIM&CMEM for sections E4, W4, and W5, and the situation is reversed for E5.

For NO_x, two CMEM applications tend to predict lower values as compared to other models, which was also observed for the estimates for the total section. The differences are larger for low to medium volume sections (i.e. E1 ~ E3, W1 ~ W3) and getting smaller at high volume sections (i.e. E4, E5, W4, and W5). Again, it is observed that CORSIM&CMEM predicts higher values than VISSIM&CMEM for sections E4, W4, and W5, and the situation is inverted for E5.

When two CMEM applications are compared for fuel consumption and all three pollutants, for low volume sections (i.e. E1 ~ E3), the results obtained from VISSIM output and those obtained from CORSIM output are fairly close, while those from VISSIM output constantly showing slightly higher estimates. For medium volume sections (i.e. W1 ~ W3), the same trend continues, but the differences become larger. For high volume sections (i.e. E4, W4, and W5), on the other hand, the estimates from CORSIM output become higher than those from VISSIM output at significant levels. This implies that CORSIM and VISSIM behave differently.

Considering the fact that fuel consumption and emissions are highly related with acceleration events, potential differences in the two models are that CORSIM includes more severe accelerations under unstable flow conditions (e.g. breakdowns in traffic flow caused by upgrade and high volume) than VISSIM and that VISSIM includes more acceleration events under constant flow conditions (e.g. low to medium volume) than CORSIM. Further detailed analysis of the car-following models and resultant vehicle trajectories in CORSIM and VISSIM is required to investigate if this is really the case or not.

It should be noted that section E5, which is also loaded with high volume, is showing much closer characteristics to medium volume sections (i.e. W1~W3). This implies that other factors are also affecting the behaviour of the simulation models. In fact, there is a hill in the middle of Section E4 and W4, and the traffic flow was observed to be unstable

on the uphill lanes in the animations. Section W5 is located upstream of the hill and directly affected by the unstable flow conditions. On the other hand, Section E5 is located downstream of the hill, and the traffic on Section E5 is observed to be fairly smooth. This is considered to be the reason why Section E5 shows a different trend from other three high volume sections.

For CORSIM built-in model, the results for all sections are generally consistent with other models for fuel consumption and NO_x emissions as was observed in the results for the total section. For HC emissions, the results are showing similar trend as the total section, in which the results are significantly lower than other estimates. For CO emissions, the results are showing significantly lower values than other models for low to medium volume sections. Thus, it is considered that estimates of HC and CO emissions from CORSIM built-in model need to be used with caution. In spite of this fact, since the trends in both HC and CO emissions follow those of other models, it may still be used for relative comparison purpose, in which the absolute values are not used.

For MOBILE6 and MOBILE6C, exactly the same results are obtained for fuel consumption. For all three pollutants, MOBILE6C tends to predict higher than original MOBILE6. Specifically, for all sections except W5, MOBILE6C estimates higher than MOBILE6 by 16 to 18% for HC, 12 to 14% for CO, and 7% for NO_x. For section W5, differences are slightly larger than other sections (22%, 18%, and 8% for HC, CO and NO_x, respectively).

7.3 IMPACT OF DRIVING BEHAVIOUR

The impact of driving behaviour on fuel consumption and emissions are tested by the scenarios developed in Chapter 3. These scenarios are (1) desired speed change, (2) desired headway parameter change, and (3) desired acceleration/deceleration change. Three models and model combinations are used for this purpose: CORSIM&CMEM, VISSIM&CMEM, and CORSIM built-in model. The results and analysis are provided in the following sections.

In addition to the results for fuel consumption and emissions, figures presented next also show the impact of changing driving behaviour on traffic conditions. Theoretically, changes in traffic conditions (e.g. vehicle kilo-metre travelled and average travel speed), fuel consumption, and emissions can be expected with the changes in driving behaviour (e.g. desired speed, headway, and acceleration). The results obtained in this respect are discussed in the forthcoming pages.

7.3.1 Effect of Desired speed

The first scenario is the “*Desired Speed Change.*” For the scenario, CORSIM and VISSIM were executed for five sub-scenarios, in which different desired speeds (i.e. Desired Free-Flow-Speed (FFS) in CORSIM and Desired Speed in VISSIM) were coded into the input files. The five sub-scenarios are Base Case, Base Case +10 km/h, Base Case +20 km/h, Base Case -10 km/h, and Base Case -20 km/h.

Figures 7-3 to 7-5 present the effect of desired speed on total fuel consumption and emissions. As a general trend, it is observed that the results respond linearly to the change in desired speed for all three methods. Among them, VISSIM&CMEM comes out to be the most sensitive to the change in desired speed. For example, as compared to Base Case, VISSIM&CMEM estimates for fuel consumption show about 8 to 11 % change per 10 km/h change in the desired speed, while CORSIM&CMEM and CORSIM built-in model predict only 6 % change per 10 km/h change in the desired speed. Overall, it is observed that the results for VISSIM&CMEM are 1.5 to 2 times more sensitive than those for CORSIM&CMEM and CORSIM built-in. The effect of desired speed on the estimates of fuel consumption and three pollutants are summarized in Table 7-3.

(a) Fuel Consumption

(b) HC/NOx Emissions

(c) CO Emissions

(d) Vehicle kilo-metre Travelled

(e) Average Travel Speed

(f) Average Travel Time

Figure 7-3. Effect of Desired Speed on Fuel Consumption, Emissions, and Traffic Measures (Total Section, CORSIM&CMEM)

(a) Fuel Consumption

(b) HC/NOx Emissions

(c) CO Emissions

(d) Vehicle kilo-metre Travelled

(e) Average Travel Speed

(f) Average Travel Time

Figure 7-4. Effect of Desired Speed on Fuel Consumption, Emissions, and Traffic Measures (Total Section, VISSIM&CMEM)

(a) Fuel Consumption

(b) HC/NOx Emissions

(c) CO Emissions

Figure 7-5. Effect of Desired Speed on Fuel Consumption, Emissions, and Traffic Measures (Total Section, CORSIM Built-in)

Table 7-3. Effect of Desired Speed on Fuel Consumption and Emissions

	Model	% change per 10 km/h change of the Desired Speed	
		Decreasing Desired Speed from Base Case	Increasing Desired Speed from Base Case
Fuel Consumption	CORSIM&CMEM	-6 %	6 %
	VISSIM&CMEM	-10 % ~ -11 %	8 %
	CORSIM Built-in	-6 %	6 %
HC	CORSIM&CMEM	-10 % ~ -11 %	11 %
	VISSIM&CMEM	-20 % ~ -22 %	16 % ~ 17 %
	CORSIM Built-in	-13 % ~ -14 %	9 %
CO	CORSIM&CMEM	-13 % ~ -15 %	13 %
	VISSIM&CMEM	-28 % ~ -30 %	23 % ~ 24 %
	CORSIM Built-in	-13 %	15 %
NOx	CORSIM&CMEM	-10 %	10 %
	VISSIM&CMEM	-17 % ~ -19 %	15 %
	CORSIM Built-in	-15 % ~ -17 %	15 %

Traffic related measures are showing quite similar trends for CORSIM and VISSIM. As the desired speed increases, the actual average speed increases, and the average travel time decreases. Approximately, increasing the desired speed by 10 km/h is estimated to save 20 to 30 seconds of the total travel time, while same level of reduction in the desired speed is estimated to increase the total travel time by 30 to 40 seconds. For the total distance travelled by vehicles, significant impact is not observed.

Figures 7-6 to 7-8 show the break down of the same results at the individual section level. Like the estimates for total section, the results for fuel consumption and emissions responds linearly to the change in desired speed for most of the sections. As the desired speed increases, the fuel consumption and emissions increase. One exception is Section W5, in which the results are not as sensitive as those for other sections especially when desired speed is increased from the Base Case. As previously mentioned, Section W5 suffers from traffic breakdown caused by the up-hill section downstream. Together with high volume (i.e. about 1900 vehicle/hour/lane), there is little room for the traffic conditions to be changed. Thus, the desired speed has less impact on the traffic conditions for Section W5, and this is considered to be the reason of the lower sensitivity of the results for this section.

Through a closer look at the results, it is observed that the estimates for low volume sections (i.e. E1 ~ E3) are showing slightly higher sensitivity than those for other sections. Because of the low volume, which means little impedance from other vehicles, vehicles can attain the speed which is fairly close to their desired speed on these sections. In fact, the actual average speeds for Section E1 to Section E3 show higher values than other sections. Thus, on these sections, the impact of desired speed is larger than on other sections, which results in higher sensitivity to the desired speed.

(a) Fuel Consumption

(b) HC Emissions

(c) CO Emissions

(d) NOx Emissions

(e) Vehicle kilo-metre Travelled

(f) Average Travel Speed

Figure 7-6. Effect of Desired Speed on Fuel Consumption, Emissions, and Traffic Measures (Individual Section, CORSIM&CMEM)

(a) Fuel Consumption

(b) HC Emissions

(c) CO Emissions

(d) NOx Emissions

(e) Vehicle kilo-metre Travelled

(f) Average Travel Speed

Figure 7-7. Effect of Desired Speed on Fuel Consumption, Emissions, and Traffic Measures (Individual Section, VISSIM&CMEM)

(a) Fuel Consumption

(b) HC Emissions

(c) CO Emissions

(d) NOx Emissions

Figure 7-8. Effect of Desired Speed on Fuel Consumption, Emissions, and Traffic Measures (Individual Section, CORSIM Built-in)

The results from VISSIM&CMEM are observed to be more sensitive to the change in desired speed than those for CORSIM&CMEM and for CORSIM built-in model. It is considered that the differences in the simulation logics adopted in CORSIM and VISSIM are the cause of this difference in the sensitivity.

Regarding traffic related measures, inconsistency in the average travel speed is observed between CORSIM and VISSIM for Section E5. For CORSIM, the impact of the desired speed on the actual average speed is highly significant, while the impact of the desired speed is not clear for VISSIM. Although it is not as clear as Section E5, Section E4 also shows similar tendency. These differences are again considered to come from differences in the simulation logics employed in both models.

7.3.2 Effect of Desired Headway

The second scenario is the “*Desired Headway Change*.” For this scenario, CORSIM and VISSIM were executed for five sub-scenarios, in which the parameters that are highly related to the desired headways (i.e. CFSF in CORSIM and CC1 in VISSIM) are changed in the input files. Specifically, Base Case, Base Case +0.10 second, Base Case +0.20 second, Base Case -0.10 second, and Base Case -0.20 second are tested.

Figures 7-9 to 7-11 present the effect of desired headway parameter on the total fuel consumption and emissions estimates. As compared to desired speed change scenario, the effect of desired headway parameter change is observed to be less significant, especially when the parameter is changed from Base Case -0.10 second to Base Case -0.20 second. For other cases, the fuel consumption and emissions estimates reduce as the desired headway parameter increases. For example, it is estimated by CORSIM&CMEM that the fuel consumption is reduced by about 3% when the desired headway parameter is increased by 0.10 second as compared to the Base Case. The effect of desired headway parameter on the estimates of fuel consumption and emissions are summarized in Table 7-4.

(a) Fuel Consumption

(b) HC/NOx Emissions

(c) CO Emissions

(d) Vehicle kilo-metre Travelled

(e) Average Travel Speed

(f) Average Travel Time

Figure 7-9. Effect of CFSF on Fuel Consumption, Emissions, and Traffic Measures (Total Section, CORSIM&CMEM)

(a) Fuel Consumption

(b) HC/NOx Emissions

(c) CO Emissions

(d) Vehicle kilo-metre Travelled

(e) Average Travel Speed

(f) Average Travel Time

Figure 7-10. Effect of CC1 Parameter on Fuel Consumption, Emissions, and Traffic Measures (Total Section, VISSIM&CMEM)

(a) Fuel Consumption

(b) HC/NOx Emissions

(c) CO Emissions

Figure 7-11. Effect of CFSF on Fuel Consumption, Emissions, and Traffic Measures
(Total Section, CORSIM Built-in)

Table 7-4. Effect of Desired Headway Parameter on Fuel Consumption and Emissions

	Model	% change per 0.10 second change of the Desired Headway Parameter	
		Increasing Desired Headway Parameter from Base Case	Decreasing Desired Headway Parameter from Base Case*
Fuel Consumption	CORSIM&CMEM	-3 %	4 %
	VISSIM&CMEM	-2 % ~ -3 %	1 %
	CORSIM Built-in	-3 %	3 %
HC	CORSIM&CMEM	-6 % ~ -7 %	6 %
	VISSIM&CMEM	-5 %	1 %
	CORSIM Built-in	-5 % ~ -7 %	4 %
CO	CORSIM&CMEM	-10 % ~ -11 %	9 %
	VISSIM&CMEM	-6 % ~ -7 %	1 %
	CORSIM Built-in	-6 % ~ -8 %	6 %
NOx	CORSIM&CMEM	-5 %	6 %
	VISSIM&CMEM	-4 %	1 %
	CORSIM Built-in	-3 % ~ -4 %	3 %

*Change in the desired headway parameter from Base Case -0.10 second to Base Case -0.20 second is not included.

When the results are examined closely, it is observed that the maximal values seem to exist around the desired headway parameter of Base Case -0.10 second for fuel consumption and emissions estimates for all three estimation methods. It will be noteworthy that although the absolute value of the desired headway parameter is different for CORSIM and VISSIM (i.e. 1.20 for CFSF and 1.31 for CC1), the maximal values are similarly observed around the Base Case -0.10 second.

From the traffic related measures, it is observed that the traffic conditions are slightly impacted by the desired headway parameter. The vehicle kilo-metre travelled for the westbound direction increase slightly as the desired headway parameter decreases, while

that for eastbound remain almost constant. The average travel speed increases for eastbound as the desired headway parameter decreases, and it reduces the travel time. The average travel speed and the average travel time for westbound are fluctuating and do not appear to have a specific trend.

Figures 7-12 to 7-14 show similar results at the individual section level. It is observed that, fuel consumption and emissions estimates generally decrease as desired headway parameter increases for the two highest volume sections (i.e. W4 and W5). One exception is Base Case -0.20 second. In most cases, the estimates for Base Case -0.20 second show approximately equal or smaller values as compared to those for Base Case -0.10 second.

For Section E4, which also has high volume, the emissions estimates generally show a similar trend as for Section W4 and W5. However, in some cases, it is observed that the maximal value exist at Base Case or even at Base Case +0.10 second. Regarding the fuel consumption estimates for Section E4, CORSIM built-in model shows increasing estimates as the desired headway parameter increases, while the impact of the parameter is not very significant for CORSIM&CMEM and VISSIM&CMEM.

For low volume sections (i.e. E1 ~ E3), it is observed for estimates obtained from VISSIM& CMEM that fuel consumption and emissions reduce as the desired headway parameter reduces. The impact is not significant for CORSIM&CMEM and CORSIM built-in model.

(a) Fuel Consumption

(b) HC Emissions

(c) CO Emissions

(d) NOx Emissions

(e) Vehicle kilo-metre Travelled

(f) Average Travel Speed

Figure 7-12. Effect of CFSF on Fuel Consumption, Emissions, and Traffic Measures (Individual Section, CORSIM&CMEM)

(a) Fuel Consumption

(b) HC Emissions

(c) CO Emissions

(d) NOx Emissions

(e) Vehicle kilo-metre Travelled

(f) Average Travel Speed

Figure 7-13. Effect of CC1 on Fuel Consumption, Emissions, and Traffic Measures (Individual Section, VISSIM&CMEM)

(a) Fuel Consumption

(b) HC Emissions

(c) CO Emissions

(d) NOx Emissions

Figure 7-14. Effect of CFSF on Fuel Consumption, Emissions, and Traffic Measures (Individual Section, CORSIM Built-in)

Regarding traffic measures, it is observed that the desired headway parameter has a significant impact on the average speed of Section E4 for both CORSIM and VISSIM. This is considered to be due to a large number of vehicles entering the highway at this section. Further, in VISSIM, another drop in the average speed is observed for Section E3, which is upstream of E4. This phenomenon is not observed for CORSIM.

For the vehicle kilo-metre travelled, an increase is observed for medium to high volume sections (i.e. E4, E5, and W1 ~ W5) as the desired headway parameter reduces. This is fairly clear for VISSIM&CMEM, while the impact is not very significant for CORSIM&CMEM (except W3, W4, and W5).

7.3.3 Effect of Desired Acceleration/Deceleration

The third scenario is the “*Desired Acceleration/Deceleration Change*.” This scenario was only executed for VISSIM&CMEM since CORSIM does not have the capability to model the desired acceleration. In this scenario, desired acceleration and deceleration are changed for five sub-scenarios. Specifically, Base Case, 110 % of the Base Case, 120 % of the Base Case, 90 % of the Base Case, and 80 % of the Base Case are tested.

Figure 7-15 shows the impact of desired acceleration/deceleration on total fuel consumption and emissions. A significant impact on the estimated results is observed when the desired acceleration/deceleration is reduced from the Base Case, while increasing the desired acceleration/deceleration from the Base Case has little effect on the results. As compared to the Base Case, the estimates for fuel consumption decrease by 1 to 2 % when the desired acceleration/deceleration is reduced by 10 % of the Base Case. In the case of emissions, the estimates decrease by 6 to 3 %, 10 to 7 %, and 4 to 2 % for HC, CO, and NO_x, respectively. As for traffic related measures, it is observed that the impact of the desired acceleration/deceleration change is marginal.

(a) Fuel Consumption

(b) HC/NOx Emissions

(c) CO Emissions

(d) Vehicle kilo-metre Travelled

(e) Average Travel Speed

(f) Average Travel Time

Figure 7-15. Effect of Desired Acceleration/Deceleration on Fuel Consumption, Emissions, and Traffic Measures (Total section, VISSIM&CMEM)

Figure 7-16 presents the results for the same scenario at the individual section level. The trend of the results is fairly consistent for the fuel consumption and all three pollutants, with HC emissions and CO emissions showing slightly higher sensitivity than others. For high volume sections (i.e. E4, E5, and W4), it is observed that the results are showing slightly higher sensitivity to the change in desired acceleration/deceleration than those for low to medium volume sections (i.e. E1 ~ E3 and W1 ~ W3). Although Section W5 is also a high volume section, it is observed that the desired acceleration/deceleration has only a little impact. For the vehicle kilo-metre travelled and the average travel speed, the impact of the desired acceleration/deceleration is not significant.

(a) Fuel Consumption

(b) HC Emissions

(c) CO Emissions

(d) NOx Emissions

(e) Vehicle kilo-metre Travelled

(f) Average Travel Speed

Figure 7-16. Effect of Desired Acceleration/Deceleration on Fuel Consumption, Emissions, and Traffic Measures (Individual Section, VISSIM&CMEM)

7.3.4 Fuel Consumption and Emissions for Different Driver Types

So far, the impact of driving behaviour on the fuel consumption and emissions has been analyzed at aggregated level for the highway sections. However, because microscopic traffic simulation models are capable of simulating the movement of each individual vehicle, and because microscopic fuel consumption and emissions models have the ability to estimate fuel use and emissions for each of these vehicles, a more detailed level of analysis is possible. This section provides a discussion of such analysis.

CMEM with CORSIM Vehicle Activity Data

CORSIM has 10 driver types, each of which is assigned a different desired speed and CFSF. Type 10 driver is the most aggressive and type 1 driver is the least aggressive. The driver type affects not only desired speed and CFSF but also the internal logic of CORSIM, such as the lane changing model. The driver type is used to categorize the results of fuel consumption and emissions estimates for each vehicle calculated by CMEM. The methods and the results are presented next.

From the CORSIM simulation output of the first run for the Base Case, drivers who travelled greater than or equal to 5 km were extracted and classified according to the driver type. From the CMEM output, average fuel consumption and emissions rates were calculated for each driver type. The results are summarized in Figure 7-17. A bar shows the mean value, and the error bands bound an interval for mean at 95% confidence level. These statistics are calculated from the results for fuel consumption and emissions for all drivers who fall in the same driver type. Thus, the meaning of the statistics is different

from the former charts, in which means and errors were calculated from the results of multiple simulation runs.

From Figure 7-17, as expected, a general trend is observed that more aggressive driving consumes higher energy and emits higher pollutants. Specifically, when the most aggressive driving (type 10 driver) is compared against normal driving (type 5 and type 6 driver), it is estimated that the fuel consumption is elevated by around 10 ~ 20 % by aggressive driving. HC emissions increase by 40 ~ 50 %, and CO emissions are raised by 35 ~ 65 %. NOx emissions increase by 30 ~ 40 % by aggressive driving.

It should be noted here that although its reason is unknown, the HC and NOx emissions estimates for driver type 8 are observed to be slightly out of the line.

(a) Fuel Consumption

(b) HC Emissions

(c) CO Emissions

(d) NOx Emissions

Figure 7-17. Fuel Consumption and Emissions for Different Driver Type (CORSIM)

CMEM with VISSIM Vehicle Activity Data

VISSIM also simulates the discrete nature in driving behaviour. However, it does not have explicit driver types like CORSIM. In VISSIM, each driver is assigned a different set of model parameters according to probability distributions. The desired speed, which was changed during the scenario tests described in the previous section, is one of these parameters. In VISSIM, the desired speed for a vehicle is constant for a certain period of time and relatively easy to track as compared to other measures, such as actual speed and acceleration, which continuously change their values. Thus, the desired speed is selected as a measure to classify drivers into different level of the aggressiveness.

From the VISSIM simulation output of the first run for the Base Case, drivers who travelled more than or equal to 5 km are extracted. This time, the drivers are classified by their desired speed. From the CMEM output, the average fuel consumption and emissions are calculated for each class. The results are summarised in Figure 7-18.

A trend similar to CORSIM results can be observed, in which more aggressive driving contributes more to fuel consumption and emissions than less aggressive driving. Again, comparisons are made between the most aggressive driving, which has the highest desired speed, and the normal driving, which is assumed to be associated with desired speed of 100 km/h to 110 km/h. It is estimated that aggressive driving causes fuel consumption to increase by 15 ~ 20 %. The HC emissions are elevated by 50 ~ 60 %, and CO emissions are raised by 70 ~ 100 %. NO_x emissions increase by 30 ~ 40 % due to the aggressive driving.

(a) Fuel Consumption

(b) HC Emissions

(c) CO Emissions

(d) NOx Emissions

Figure 7-18. Fuel Consumption and Emissions for Drivers with Different Desired Speed (VISSIM)

7.4 SUMMARY

In this chapter, the results and analysis for the fuel consumption and emissions estimates were presented. First, the results estimated by different models and model combinations were compared. Specifically, the following model and model combinations were used: CMEM executed with CORSIM output vehicle activity data, CMEM executed with VISSIM output vehicle activity data, CORSIM built-in model, MOBILE6, and MOBILE6C. The comparisons were made for the entire section of the study site and for each individual section within the study site. The similarities and differences of the different models and model combinations were demonstrated through the comparisons.

Then, CMEM and CORSIM built-in model were executed for three predefined scenarios in order to test the impact of driving behaviour on the fuel consumption and emissions estimates. Three scenarios were (1) desired speed change, (2) desired headway parameter change, and (3) desired acceleration/deceleration change. For CMEM, two input data sets were prepared for each scenario. One was compiled from CORSIM output, and the other from VISSIM output. Through the analysis of the results, the impact of driving behaviour on the fuel consumption and emissions estimated by three models was described.

CHAPTER 8. CONCLUSIONS

8.1 MAJOR CONCLUSIONS

The thesis presented a simulation approach to the study of driving behaviour (within microscopic traffic simulation software environment), fuel consumption, and emissions. The core of the approach is the combination of a microscopic traffic simulation model and a microscopic fuel consumption and emissions model. The research illustrates that the microscopic traffic simulation approach is suitable for the study of driving behaviour, fuel consumption, and emissions. Factors that affect driving behaviour were modified, and the results were studied. Scenarios can be tested in a virtual network developed in the computer laboratory, which are usually very difficult or even impossible to test in the actual networks.

Specifically, CORSIM and VISSIM were selected as microscopic traffic simulation models, and CMEM was chosen as a microscopic fuel consumption and emissions model. Selected study site of Highway 417 was coded into CORSIM and VISSIM. Both models were carefully calibrated and validated to reflect the local traffic conditions before use. Two different vehicle activity data sets were generated by CORSIM and VISSIM, and then, these data sets were fed into CMEM. The results were compared with each other, while other types of models (i.e. CORSIM built-in model, MOBILE6, and MOBILE6C) were also included in the comparison. Subsequently, the effect of driving behaviour on fuel consumption and emissions was tested by using three scenarios.

The major conclusions drawn from the results are summarized as follows:

Model Calibration:

1. Running CORSIM and VISSIM with default model parameters in this study yielded significantly different travel time from field observed values (i.e. CORSIM: -10% ~ -50%, VISSIM: -30% ~ -50%). Therefore, adjustment of model parameters is an important step when using these models.
2. Adjustment of single model parameter (i.e. CFSF for CORSIM and CC1 for VISSIM) improves the performance of the models dramatically. After the tuning of the parameters, both models produce acceptable results.

CORSIM & CMEM vs. VISSIM & CMEM:

3. At the entire section level, both models predict almost identical results for total fuel consumption and emissions. When the variances are compared, CORSIM seems to predict more stable results than VISSIM.
4. At the individual section level, CORSIM predicts higher fuel consumption and emissions than VISSIM for high volume sections. On the other hand, for low to medium volume sections, VISSIM predicts higher values than CORSIM.
5. From the scenario for the desired speed change, it is observed that VISSIM is more sensitive to the change in desired speed than CORSIM.
6. From the scenario for the desired headway parameter change, it is observed that CORSIM is more sensitive to the change in desired headway than VISSIM.

7. The results from CORSIM and VISSIM are generally consistent. However, it is observed that the models behave differently under different traffic conditions.

Different Model Comparison:

8. CORSIM built-in emissions model seems to yield significantly lower estimates for HC emissions as compare to other models. On the other hand, fuel consumption and NOx emissions showed fairly consistent results with other models.
9. CMEM model when coupled with CORSIM or VISSIM produces estimates of CO emissions that are significantly higher for medium to high volume sections as compared to other models.
10. MOBILE6 and MOBILE6C predict identical estimates for fuel consumption. For HC, CO, and NOx emissions, MOBILE6C tends to predict higher than MOBILE6.

Impact of Driving Behaviour:

11. Desired speed is observed to have a major impact on fuel consumption and emissions. It is observed that an increase/decrease in the desired speed linearly increases/reduces the fuel consumption and emissions both for entire section and for most of its sub-sections.
12. Desired headway parameter is observed to have a moderate impact on fuel consumption and emissions except for the sub-scenario of Base Case -0.20 second. An increase/decrease in the parameter reduces/increases the fuel consumption and emissions at the entire section level. However, at the individual section level, it is observed that the impact is limited to high volume sections.

13. Desired acceleration/deceleration is observed to have a minor to moderate impact on fuel consumption and emissions only if it is reduced from the Base Case. An increase/decrease in the parameter increases/reduces the fuel consumption and emissions at the entire section level. However, at the individual section level, it is observed that the impact is limited to medium to high volume sections.
14. Analysis of the different driver type for CORSIM and the different desired speed classes for VISSIM demonstrates that aggressive driving consumes more energy and emits more pollutants than normal driving.

8.2 RECOMMENDATIONS

Based on the results and the conclusions of this thesis research, recommendations for future researches and suggestions for several actions are made. These recommendations and suggestions are presented below.

1. Given the success of the simulation approach to the study of driver behaviour, fuel consumption, and emissions in this thesis research, it is recommended that further studies should be conducted to expand the coverage to various conditions. As is usually the case, this study on a new subject was carried out under some constraints and assumptions. Further research is needed to develop an expanded virtual test bed for extending this research.
 - (i). The test bed in this study is a simple stretch of freeway section, which is only a part of overall highway components. The study should be expanded to other types of road facilities including interchanges, arterials and collectors, and urban grids.

Given adequate input data and computing resources, this can be done. The results obtained from expanding research will add diversity to the conclusions reached in this thesis.

(ii). In this thesis research, all vehicles were assumed to be operating under hot stabilized conditions. It is recommended that the impact of start emissions should be included in a future research.

(iii). The analysis period was limited to 30 minutes in this study. In addition, the volume was kept constant during the period. A study with longer analysis period using dynamic volume demand will extend the research into more realistic time series analysis.

(iv). Data for real world ramp activity is insufficient, and some assumptions were needed. In order to obtain data for modelling ramp traffic activity, detailed study of the ramp activity is recommended.

(v). In this study, only one parameter was systematically calibrated. Increasing the number of parameters might improve the performance of simulation models. A study is recommended that investigates fast, easy to use, and reliable calibration methods.

2. A comparison of results obtained from different models give the impression that the CORSIM built-in emissions module is in need of a close examination. Specifically, the model predicts significantly lower estimates for HC and CO emissions as compared to other models (i.e. CMEM and MOBILE). Therefore, CORSIM emissions look-up table for HC and CO emissions should be used with caution and that the tables might need update.

3. An improvement for microscopic traffic simulation models is suggested as follows:

The car following and lane changing modules should be revisited from the perspective of driver behaviour under complex driving conditions.

4. The improvements for microscopic fuel consumption and emissions models are suggested as follows:

(i). The models should be expanded to incorporate a wide range of vehicle categories.

(ii). Since most of the currently available models do not account for evaporative emissions, these should be included in the future models.

(iii). The Current model (i.e., CMEM) can take a few hours to complete calculations for a small network. Its calculation speed should be improved from both software improvement and hardware development perspectives.

5. For long-term future application, vehicles with advanced technologies, such as hybrid vehicles and alternative fuel vehicles (e.g. fuel cell based vehicles) should be included in microscopic fuel consumption and emissions models.

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APPENDIX. A

Highway 417 Geometries

Horizontal Alignment

Three horizontal curves for each direction:

(a) Eastbound

Code	Twp	Station	Station	Radius
HC-1	March	10+000.000	10+594.644	2354.225
HC-3	March	11+495.838	12+034.688	2408.249
HC-5	March	13+969.795	14+398.061	2371.657

(b) Westbound

Code	Twp	Station	Station	Radius
HC-2	March	10+000.000	10+605.107	2395.678
HC-4	March	11+506.306	12+035.878	2366.796
HC-6	March	13+970.986	14+406.738	2413.109

Chainage Equations: Two chainage equations within the study site.

1st: Between the former Huntley and March Townships.

Eastbound: Sta 31+159.243 Twp Huntley = 10+000.000 Twp March

Westbound: Sta 31+107.177 Twp Huntley = 10+000.000 Twp March

2nd: Between the former March and Nepean Townships.

Eastbound: Sta 14+432.211 Twp March = 10+004.357 Twp Nepean

Westbound: Sta 14+447.123 Twp March = 10+010.589 Twp Nepean

Source: Highway 417, (Ottawa Queensway), From Highway 416 Westerly to Highway 7, District 42, Ottawa, W.P. 458-98-00, Existing Conditions and Environmental Features Report, October 2001

Vertical Alignment

15 vertical curves for the eastbound and 14 vertical curves for the westbound:

(a) Eastbound

Code	Twp	VPI Sta	G1	G2	Type	K Value	Length
VC-4	Huntley	29+366.078	-1.379	-0.300	Sag	488	526.085
VC-5	Huntley	30+054.316	-0.300	-0.450	Crest	760	113.995
VC-7	Huntley	30+787.360	-0.450	-0.570	Crest	762	91.440
VC-8	March	10+289.560	-0.570	-0.890	Crest	339	108.509
VC-10	March	10+929.640	-0.890	0.878	Sag	339	598.627
VC-13	March	11+981.200	0.878	-0.704	Crest	339	535.838
VC-15	March	12+407.920	-0.704	-1.769	Crest	274	291.998
VC-16	March	12+865.120	-1.769	0.305	Sag	190	395.021
VC-19	March	13+946.855	0.305	-0.901	Crest	274	331.013
VC-20	March	14+431.889	-0.901	0.720	Sag	85	137.160
VC-20a	March	10+642.940	0.720	1.80	Sag	170 +/-	183 +/-
VC-22	Nepean	11+657.118	1.80	-2.40	Crest	122	512.064
VC-24	Nepean	12+259.799	-2.40	-1.00	Sag	69	96.317
VC-26	Nepean	12+659.300	-1.00	-3.00	Crest	85	169.469
VC-29	Nepean	13+414.503	-3.00	-0.60	Sag	122	292.608

(b) Westbound

Code	Twp	VPI Sta	G1	G2	Type	K Value	Length
VC-3	Huntley	29+306.032	-1.379	-0.380	Sag	488	487.070
VC-6	Huntley	30+756.880	-0.380	-0.620	Crest	762	182.880
VC-9	March	10+304.800	-0.620	-0.735	Crest	763	87.782
VC-11	March	10+943.966	-0.735	0.784	Sag	339	514.502
VC-12	March	11+920.240	0.784	-0.302	Crest	488	529.742
VC-14	March	12+334.769	-0.302	-1.455	Crest	190	219.456
VC-17	March	12+971.800	-1.455	0.521	Sag	191	376.733
VC-18	March	13+855.720	0.521	-0.933	Crest	339	492.557
VC-21	Nepean	10+012.077	-0.933	0.720	Sag	85	140.208
VC-21a	Nepean	10+716.085	0.720	1.80	Sag	170 +/-	183 +/-
VC-23	Nepean	11+657.118	1.80	-2.40	Crest	122	512.064
VC-25	Nepean	12+295.735	-2.40	-1.00	Sag	69	96.317
VC-27	Nepean	12+659.300	-1.00	-3.00	Crest	85	169.469
VC-28	Nepean	13+393.563	-3.00	-0.60	Sag	191	457.200

Source: Highway 417, (Ottawa Queensway), From Highway 416 Westerly to Highway 7, District 42, Ottawa, W.P. 458-98-00, Existing Conditions and Environmental Features Report, October 2001, (Revised Table)

APPENDIX. B

Results from CCMTA Truck Traffic Estimate Software Package

Truck Traffic Estimates by Load

Vehicle Type	Load	Estimation Results		Share
		# of Trips	Data reliability	
Straight truck	Empty	51289	good	23.50%
	25% full	29336	good	
	50% full	17049	good	
	75% full	15718	good	
	Full	23233	good	
	Unknown	11375		
Tractor & 1 Trailer*	Empty	105654	good	35.40%
	25% full	24221	good	
	50% full	26266	good	
	75% full	49704	good	
	Full	174180	good	29.95%
	Unknown	31542		
Tractor & 2 Trailers	Empty	14168	good	6.57%
	25% full	346	caution	
	50% full	944	good	
	75% full	3929	good	
	Full	16556	good	
	Unknown	5417		
Straight truck & 1 Trailer*	Empty	3967	good	1.00%
	25% full	452	caution	
	50% full	712	good	
	75% full	756	good	
	Full	3637	good	0.62%
	Unknown	682		
Tractor only	Empty	18072	good	2.87%
	Unknown	14		
Others**	25% full	3	POOR	0.09%
	50% full	56	POOR	
	75% full	53	POOR	
	Full	352	caution	
	Unknown	75	caution	
SUM		629758	good	100.00%

*Unknown trips are distributed among empty to full load according to the ratios.

**Others include Tractor or Straight truck pulling other tractors/straight trucks.

Truck Traffic Estimates by Weight and Distribution Developed for VISSIM

Vehicle Type	Weight (1,000 kg)	Estimation Results		Frequency*	Cumulative Frequency
		# of Trips	Data reliability		
Straight truck	03.0-	195	caution	0.1%	0.1%
	03.0-05.0	8764	good	6.5%	6.6%
	05.0-10.0	67833	good	50.1%	56.7%
	10.0-15.0	37470	good	27.6%	84.3%
	15.0-20.0	12015	good	8.9%	93.2%
	20.0-25.0	3679	good	2.7%	95.9%
	25.0-30.0	2239	good	1.7%	97.5%
	30.0-35.0	2207	good	1.6%	99.2%
	35.0-40.0	1122	caution	0.8%	100.0%
	Unknown	12475	good		
	Subtotal	147999		100.0%	
Tractor & 1 Trailer	05.0-10.0	400	good	0.1%	0.1%
	10.0-15.0	26735	good	6.8%	6.9%
	15.0-20.0	103745	good	26.4%	33.2%
	20.0-25.0	71462	good	18.2%	51.4%
	25.0-30.0	46638	good	11.8%	63.2%
	30.0-35.0	54053	good	13.7%	77.0%
	35.0-40.0	40059	good	10.2%	87.2%
	40.0-45.0	13847	good	3.5%	90.7%
	45.0-50.0	9941	good	2.5%	93.2%
	50.0-55.0	13794	good	3.5%	96.7%
	55.0-60.0	8562	good	2.2%	98.9%
	60.0-65.0	3627	good	0.9%	99.8%
	65.0-70.0	795	caution	0.2%	100.0%
	Unknown	17909	good		
	Subtotal	411567		100.0%	
Tractor & 2 Trailers	10.0-15.0	81	caution	0.2%	0.2%
	15.0-20.0	3481	good	9.4%	9.6%
	20.0-25.0	10695	good	28.7%	38.3%
	25.0-30.0	2790	good	7.5%	45.8%
	30.0-35.0	1292	good	3.5%	49.3%
	35.0-40.0	1097	caution	2.9%	52.2%
	40.0-45.0	721	good	1.9%	54.2%
	45.0-50.0	669	good	1.8%	56.0%
	50.0-55.0	1827	caution	4.9%	60.9%
	55.0-60.0	5043	good	13.6%	74.4%
	60.0-65.0	9117	good	24.5%	98.9%
	65.0-70.0	403	good	1.1%	100.0%
	Unknown	4142	caution		
	Subtotal	41358		100.0%	

(Continued)

Weight Distribution Developed for VISSIM (Continued)

Vehicle Type	Weight (1,000 kg)	Estimation Results		Frequency*	Cumulative Frequency
		# of Trips	Data reliability		
Straight truck & 1 Trailer	03.0-05.0	31	POOR		
	05.0-10.0	744	good	7.5%	7.5%
	10.0-15.0	770	good	7.7%	15.2%
	15.0-20.0	3152	good	31.6%	46.8%
	20.0-25.0	1225	good	12.3%	59.1%
	25.0-30.0	719	good	7.2%	66.3%
	30.0-35.0	695	good	7.0%	73.3%
	35.0-40.0	710	good	7.1%	80.4%
	40.0-45.0	132	caution	1.3%	81.8%
	45.0-50.0	102	caution	1.0%	82.8%
	50.0-55.0	382	caution	3.8%	86.6%
	55.0-60.0	513	caution	5.1%	91.8%
	60.0-65.0	819	caution	8.2%	100.0%
	Unknown	215	POOR		
	Subtotal	10209		100.0%	
Tractor only	03.0-05.0	76	caution	0.4%	0.4%
	05.0-10.0	16410	good	91.2%	91.6%
	10.0-15.0	1479	caution	8.2%	99.8%
	15.0-20.0	36	caution	0.2%	100.0%
	25.0-30.0	73	POOR		
	Unknown	12	POOR		
	Subtotal	18086		100.0%	

*Unknown trips and trips with poor reliability are excluded and renormalized.

Truck Traffic Estimates by Length

Vehicle Type	Length (m)	Estimation Results		Frequency*	Average Length (m)
		# of Trips	Data reliability		
Straight truck	> 4 and <= 6 metres	1146	caution	1.1%	0.1
	> 6 and <= 8 metres	18811	good	18.2%	1.3
	> 8 and <= 10 metres	37399	good	36.1%	3.3
	> 10 and <= 12 metres	42758	good	41.3%	4.5
	> 12 and <= 14 metres	3223	good	3.1%	0.4
	> 14 and <= 16 metres	394	POOR		
	> 16 and <= 18 metres	114	caution	0.1%	0.0
	> 18 and <= 20 metres	6	POOR		
	> 20 and <= 22 metres	63	good	0.1%	0.0
	> 26 metres	42	caution	0.0%	0.0
	Unknown	44044	good		
	Subtotal	148000		100.0%	9.6
Tractor & 1 Trailer	> 6 and <= 8 metres	134	POOR		
	> 10 and <= 12 metres	928	good	0.3%	0.0
	> 12 and <= 14 metres	4147	good	1.2%	0.2
	> 14 and <= 16 metres	6229	good	1.8%	0.3
	> 16 and <= 18 metres	26489	good	7.8%	1.3
	> 18 and <= 20 metres	105110	good	31.1%	5.9
	> 20 and <= 22 metres	164661	good	48.8%	10.2
	> 22 and <= 24 metres	28422	good	8.4%	1.9
	> 24 and <= 26 metres	921	good	0.3%	0.1
	> 26 metres	684	good	0.2%	0.1
	Unknown	73842	good		
	Subtotal	411567		100.0%	20.0
Tractor & 2 Trailers	> 14 and <= 16 metres	8	POOR		
	> 18 and <= 20 metres	446	caution	1.5%	0.3
	> 20 and <= 22 metres	4390	good	15.2%	3.2
	> 22 and <= 24 metres	15940	good	55.3%	12.7
	> 24 and <= 26 metres	7864	good	27.3%	6.8
	> 26 metres	174	caution	0.6%	0.2
	Unknown	12537	good		
	Subtotal	41359		100.0%	23.2

(Continued)

Weight Distribution Developed for VISSIM (Continued)

Vehicle Type	Length (m)	Estimation Results		Frequency*	Average Length (m)
		# of Trips	Data reliability		
Straight truck & 1 Trailer	> 6 and <= 8 metres	3	POOR		
	> 8 and <= 10 metres	98	POOR		
	> 10 and <= 12 metres	307	caution	3.8%	0.4
	> 12 and <= 14 metres	195	good	2.4%	0.3
	> 14 and <= 16 metres	506	caution	6.2%	0.9
	> 16 and <= 18 metres	1228	caution	15.1%	2.6
	> 18 and <= 20 metres	1483	good	18.3%	3.5
	> 20 and <= 22 metres	2516	good	31.0%	6.5
	> 22 and <= 24 metres	1836	good	22.6%	5.2
	> 24 and <= 26 metres	53	caution	0.7%	0.2
	> 26 metres	3	POOR		
	Unknown	1979	caution		
	Subtotal	10207		100.0%	19.6
Tractor only	<= 4 metres	52	POOR		
	> 4 and <= 6 metres	300	caution	2.4%	0.1
	> 6 and <= 8 metres	5427	good	44.2%	3.1
	> 8 and <= 10 metres	6234	good	50.8%	4.6
	> 10 and <= 12 metres	307	good	2.5%	0.3
	> 12 and <= 14 metres	14	good	0.1%	0.0
	> 16 and <= 18 metres	29	POOR		
	> 26 metres	11	POOR		
	Unknown	5712	good	100.0%	8.1

*Unknown trips and trips with poor reliability are excluded and renormalized.

APPENDIX. C

CORSIM and VISSIM: Model Inputs and Outputs

Note: Complete samples of inputs and outputs of all scenarios for all simulation runs completed would require thousands of pages. Therefore, only some parts of one scenario with one run (i.e. 1st run of the Base case) are included.

31	32	33	4010	2	93	401	1	19
38	52	53	9840	2			1	19
54	55	56	25100	2	93	2510	1	19
55	56	57	3350	2	93	335	1	19
56	57	58	7570	2	93	757	1	19
57	58	59	23730	2	93	2373	1	19
60	61	62	6860	2			1	19
62	63	64	1210	2	93	121	2	19
63	64	65	14270	3			1	19
65	66	67	2690	2	93	269	2	19
66	67	68	23790	3			1	19
68	69	70	6330	2			1	19
70	71	72	6750	2			1	19
72	73	74	9520	2	91	948	1	19
74	75	76	9890	2	91	919	1	19
75	76	77	10840	2			1	19
76	77	78	11280	2			1	19
78	79	80	1380	2			1	19
79	80	81	14490	2			1	19
80	81	82	5820	2			1	19
83	848004	18820	2				1	19
81	82	83	30800	2	91	1200	1	19
2	3	4	1130	2			1	19
101	3	4	1641	1			9	19
3	4	5	18710	2	91	830	1	19
201	7	8	1641	1			9	19
204	81	82	1641	1			9	19
8	9	10	11200	3			1	19
202	9	10	1641	1			9	19
82	83	84	18050	2	92	880	1 9	19
102	4	5	1641	1			9	19
77	78	79	7170	2	92	717	1 9	19
78	2032031	2391	2				1	19
13	14	15	12060	2	92	1206	1 9	19
16	17	36	1710	2			1	19
301	17	36	1641	1			9	19
19	20	21	3600	2			1	19
302	20	21	1641	1			9	19
21	22	23	27170	2	92	881	1 9	19
401	26	27	1641	1			9	19
27	28	29	11220	2	91	796	1	19
412	28	29	3261	1			9	19
410	411	412	1641	1			1	19
411	412	28	7961	1			1	19
59	60	61	12170	2	93	1217	1 9	19
60	4034031	2411	2				1	19
404	62	63	1641	1			9	19
64	65	66	3380	2			1	19
405	65	66	1641	1			9	19
67	68	69	21090	2	92	824	1 9	19
71	72	73	1140	2			1	19
304	72	73	1641	1			9	19
73	74	75	8840	2			1	19
305	74	75	1641	1			9	19

20	21-1	0	0	31065	1	1			431500	100	20
22	23	0	0	0	31065	1	1			100	20
23	24-1	0	0	31065	1	1				100	20
24	25-1	0	0	31065	1	1				100	20
25	26-1	0	0	31065	1	1				100	20
28	29	2	0	0	31065	1	1		431500	100	20
29	30-2	0	0	31065	1	1				100	20
30	31-1	0	0	31065	1	1				100	20
31	32-2	0	0	31065	1	1				100	20
38	52	1	0	0	31065	1	1			100	20
54	55	2	0	0	31065	1	1			100	20
55	56	2	0	0	31065	1	1			100	20
56	57	1	0	0	31065	1	1			100	20
57	58	2	0	0	31065	1	1			100	20
60	61-2	0	0	31065	1	1				100	20
62	63	1	0	0	31065	1	1		431500	100	20
63	64	1	0	0	31065					100	20
65	66	1	0	0	31065	1	1		431500	100	20
66	67	0	0	0	31065					100	20
68	69	1	0	0	31065	1	1			100	20
70	71-1	0	0	31065	1	1				100	20
72	73-1	0	0	31065	1	1			431500	100	20
74	75-1	0	0	31065	1	1			431500	100	20
75	76	1	0	0	31065	1	1			100	20
76	77	1	0	0	31065	1	1			100	20
78	79	1	0	0	31065	1	1			100	20
79	80	1	0	0	31065	1	1			100	20
80	81	0	0	0	31065	1	1			100	20
83	84	1	0	0	31065	1	1			100	20
81	82	0	0	0	31065	1	1		431500	100	20
2	3-1	0	0	31065	1	1				100	20
101	3-1	0	0	31044						100	20
3	4-1	0	0	31065	1	1			431500	100	20
201	7	0	0	0	31044					100	20
204	81	0	0	0	31044					100	20
8	9-1	0	0	31065						100	20
202	9-1	0	0	31044						100	20
82	83	1	0	0	31065	1	1	1640		1640	20
102	4-1	0	0	31044						100	20
77	78	1	0	0	31065	1	1	1640		1640	20
78	203	1	0	0	31065					100	20
13	14	1	0	0	31065	1	1	1640		1640	20
16	17	1	0	0	31065	1	1			100	20
301	17	1	0	0	31044					100	20
19	20-1	0	0	31065	1	1				100	20
302	20-1	0	0	31044						100	20
21	22	0	0	0	31065	1	1	1640		1640	20
401	26-1	0	0	31044						100	20
27	28	2	0	0	31065	1	1		431500	100	20
412	28	2	0	0	31065					100	20
410	411	1	0	0	31044					100	20
411	412	2	0	0	31065					100	20
59	60-2	0	0	31065	1	1	1640		1640	100	20
60	403-2	0	0	31065						100	20

404	62-1	0	0	31044					100	20		
64	65	1	0	0	31065	1	1		100	20		
405	65	1	0	0	31044				100	20		
67	68	1	0	0	31065	1	1	1640	1640	100	20	
71	72-1	0	0	31065	1	1			100	20		
304	72-1	0	0	31044					100	20		
73	74-1	0	0	31065	1	1			100	20		
305	74-1	0	0	31044					100	20		
2032031	1	0	0	31044					100	20		
83	103	1	0	0	31044				100	20		
14	300	1	0	0	31044				100	20		
22	400	0	0	0	31044				100	20		
4034031-2	0	0	0	31044					100	20		
68	303	1	0	0	31044				100	20		
33	34-2	0	0	31065	1	1	1640	1640	100	20		
34	500-1	0	0	31044					100	20		
504	52	1	0	0	31044				100	20		
6	7	0	0	0	31065	1	1		100	20		
58	59-2	0	0	31065	1	1			100	20		
32	33-2	0	0	31065	1	1			100	20		
53	54	2	0	0	31065	1	1		431500	100	20	
5	6	0	0	0	31065	1	1	1640	1640	100	20	
6	200	0	0	0	31044				100	20		
18	19	0	0	0	31065				100	20		
402	27	1	0	0	31044				100	20		
26	27	1	0	0	31065	1	1		43	500	100	20
37	35-1	0	0	31065	1	1			100	20		
52	53	1	0	0	31065	1	1		431500	100	20	
505	53	1	0	0	31044				100	20		
61	62-1	0	0	31065	1	1			100	20		
69	70	0	0	0	31065	1	1		100	20		
17	36	1	0	0	31065	1	1		431500	100	20	
34	37-2	0	0	31065	1	1			100	20		
51	38	1	0	0	31065	1	1		100	20		
8101	101-1	0	0	31044						20		
8001	1-1	0	0	31065	1	1				20		
8102	102-1	0	0	31044						20		
8201	201	0	0	0	31044					20		
8202	202-1	0	0	31044						20		
8204	204	0	0	0	31044					20		
8301	301	1	0	0	31044					20		
8302	302-1	0	0	31044						20		
8401	401-1	0	0	31044						20		
8402	402	1	0	0	31044					20		
8410	410	1	0	0	31044					20		
8404	404-1	0	0	31044						20		
8405	405	1	0	0	31044					20		
8304	304-1	0	0	31044						20		
8305	305-1	0	0	31044						20		
8003	51	1	0	0	31065	1	1			20		
8504	504	1	0	0	31044					20		
8505	505	1	0	0	31044					20		
4	5	6	100							25		
7	8	9	100							25		

9	10	11	100	25
10	11	12	100	25
11	12	13	100	25
12	13	14	100	25
14	15	16	100	25
15	16	17	100	25
1	2	3	100	25
36	18	19	100	25
20	21	22	100	25
22	23	24	100	25
23	24	25	100	25
24	25	26	100	25
25	26	27	100	25
28	29	30	100	25
29	30	31	100	25
30	31	32	100	25
31	32	33	100	25
38	52	53	100	25
54	55	56	100	25
55	56	57	100	25
56	57	58	100	25
57	58	59	100	25
60	61	62	100	25
62	63	64	100	25
63	64	65	100	25
65	66	67	100	25
66	67	68	100	25
68	69	70	100	25
70	71	72	100	25
72	73	74	100	25
74	75	76	100	25
75	76	77	100	25
76	77	78	100	25
78	79	80	100	25
79	80	81	100	25
80	81	82	100	25
83	848004	100		25
81	82	83	100	25
2	3	4	100	25
101	3	4	100	25
3	4	5	100	25
201	7	8	100	25
204	81	82	100	25
8	9	10	100	25
202	9	10	100	25
82	83	846852	1033148	25
102	4	5	100	25
77	78	799426	203 574	25
78	2032031	100		25
13	14	158723	3001277	25
16	17	36	100	25
301	17	36	100	25
19	20	21	100	25
302	20	21	100	25

21	22	239082	400	918	25
401	26	27	100		25
27	28	29	100		25
412	28	29	100		25
410	411	412	100		25
411	412	28	100		25
59	60	616496	4033504		25
60	4034031	100			25
404	62	63	100		25
64	65	66	100		25
405	65	66	100		25
67	68	697069	3032931		25
71	72	73	100		25
304	72	73	100		25
73	74	75	100		25
305	74	75	100		25
20320318203	100				25
83	1038103	100			25
14	3008300	100			25
22	4008400	100			25
40340318403	100				25
68	3038303	100			25
33	34	379453	500	547	25
34	5008500	100			25
504	52	53	100		25
6	7	8	100		25
58	59	60	100		25
32	33	34	100		25
53	54	55	100		25
5	6	79441	200	559	25
6	2008200	100			25
18	19	20	100		25
402	27	28	100		25
26	27	28	100		25
37	358002	100			25
52	53	54	100		25
505	53	54	100		25
61	62	63	100		25
69	70	71	100		25
17	36	18	100		25
34	37	35	100		25
51	38	52	100		25
8101	101	3	100		25
8001	1	2	100		25
8102	102	4	100		25
8201	201	7	100		25
8202	202	9	100		25
8204	204	81	100		25
8301	301	17	100		25
8302	302	20	100		25
8401	401	26	100		25
8402	402	27	100		25
8410	410	411	100		25
8404	404	62	100		25

4	2728	2492	195
5	4068	3714	195
6	4935	4504	195
7	6277	5729	195
8	6765	6174	195
9	7593	6928	195
10	7777	7097	195
11	8374	7589	195
12	9371	8218	195
13	10348	8736	195
14	11414	9300	195
15	11984	9602	195
16	12900	10170	195
17	13039	10270	195
18	13439	10594	195
19	14004	11081	195
20	14277	11315	195
21	15851	12670	195
22	17911	14442	195
23	17997	14516	195
24	18252	14735	195
25	19387	15548	195
26	19485	15605	195
27	21030	16510	195
28	21998	17077	195
29	24067	18289	195
30	26013	19430	195
31	26768	19872	195
32	27114	20075	195
33	29019	21192	195
34	29500	21473	195
35	30882	22282	195
36	13353	10521	195
37	29598	21530	195
38	31717	22908	195
51	32317	23169	195
52	30868	22410	195
53	29689	21719	195
54	29163	21411	195
55	26997	20142	195
56	26708	19972	195
57	26055	19589	195
58	24008	18389	195
59	22831	17699	195
60	21781	17084	195
61	21189	16737	195
62	19441	15712	195
63	19337	15651	195
64	18177	14822	195
65	17921	14602	195
66	17717	14426	195
67	15914	12874	195
68	14316	11498	195
69	13836	11085	195

70	13365	10680	195
71	12835	10263	195
72	12743	10196	195
73	11931	9701	195
74	11150	9287	195
75	10276	8825	195
76	9318	8318	195
77	8363	7720	195
78	7803	7273	195
79	7701	7180	195
80	6631	6203	195
81	6201	5811	195
82	3926	3735	195
83	2593	2518	195
84	1202	1250	195
101	1244	1103	195
102	2627	2363	195
103	2454	2431	195
200	5074	4591	195
201	6181	5596	195
202	7494	6797	195
203	7611	7130	195
204	6298	5943	195
300	11571	9347	195
301	12926	10151	195
302	14176	11186	195
303	14176	11413	195
304	12857	10314	195
305	11280	9387	195
400	18054	14523	195
401	19363	15495	195
402	20906	16403	195
403	21562	16983	195
404	19567	15817	195
405	18026	14728	195
410	20913	16390	195
411	21053	16475	195
412	21737	16882	195
500	29655	21528	195
504	30994	22515	195
505	29815	21824	195
2031	7484	7028	195
4031	21420	16901	195
10	119991		196
11	129991		196
15	169992		196
36	189990		196
24	259991		196
63	649992		196
70	719991		196
72	739991		196
76	779992		196
78	799990		196
77	789992		196

16 179990
71 729990
17 369990
51 389992
1 0 1

196
196
196
196
210

Sample Output File for CORSIM (Base Case)

INPUT FILE NAME: C:\Documents and Settings\All Users\Documents\Temp
 RUN DATE : 04/09/04

```
TTTTTTTTTT RRRRRRRR      AAAAAA  FFFFFFFFFF
TTTTTTTTTTT RRRRRRRRRR  AAAAAAAAAA FFFFFFFFFF
TTTTTTTTTTT RRRRRRRRRR  AAAAAAAAAA FFFFFFFFFF
   TTT      RRR      RRR  AAA      AAA  FFF
   TTT      RRR      RRR  AAA      AAA  FFF
   TTT      RRRRRRRRRR  AAAAAAAAAA FFFFFFFF
   TTT      RRRRRRRRRR  AAAAAAAAAA FFFFFFFF
   TTT      RRR RRR      AAA      AAA  FFF
   TTT      RRR RRR      AAA      AAA  FFF
   TTT      RRR RRR      AAA      AAA  FFF
   TTT      RRR RRR      AAA      AAA  FFF
   TTT      RRR RRR      AAA      AAA  FFF
```

VERSION 5.1 (BUILD #301)
 RELEASE DATE FEBRUARY 2003

TRAF SIMULATION MODEL

DEVELOPED FOR

U. S. DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION
 FHWA OFFICE OF OPERATIONS RESEARCH, DEVELOPMENT AND TECHNOLOGY

TRAF SIMULATION MODEL

DEVELOPED FOR

10

DATE = 3/ 9/2004
0 USER =
0 AGENCY =

RUN CONTROL DATA

```

VALUE                                RUN PARAMETERS AND OPTIONS

0      0      RUN IDENTIFICATION NUMBER

The initialization period will be extended to the time specified.

1      RUN TYPE CODE = ( 1, 2, 3) TO RUN (SIMULATION, ASSIGNMENT, BOTH)
              (-1,-2,-3) TO CHECK (SIMULATION, ASSIGNMENT, BOTH) ONLY

0      FRESIM OFFLINE INCIDENT DETECTION CODE = (0, 1) IF OFFLINE INCIDENT DETECTION
              (IS NOT, IS) BEING PERFORMED

FRESIM ENVIRONMENTAL OPTIONS
-----

0      FUEL/EMISSION RATE TABLES ARE NOT PRINTED

0      SIMULATION:   PERFORMED                                ENVIRONMENTAL MEASURES:   CALCULATED
              RATE TABLES: EMBEDDED                        TRAJECTORY FILE:        NOT WRITTEN

1      INITIALIZATION CODE (0,1) = (DO NOT, DO) FORCE FULL INITIALIZATION PERIOD

0      INPUT UNITS CODE = (0,1) IF INPUT IS IN (ENGLISH, METRIC) UNITS

0      OUTPUT UNITS CODE = (0,1,2,3) IF OUTPUT IS IN (SAME AS INPUT, ENGLISH, METRIC, BOTH) UNITS

0      CLOCK TIME AT START OF SIMULATION (HHMM)

24007  RANDOM NUMBER SEED

1800   DURATION (SEC) OF TIME PERIOD NO. 1

60     LENGTH OF A TIME INTERVAL, SECONDS

10     FRESIM TIME STEP DURATION IN TENTHS-OF-A-SECOND

25     MAXIMUM INITIALIZATION TIME, NUMBER OF TIME INTERVALS

100    NUMBER OF TIME INTERVALS BETWEEN SUCCESSIVE STANDARD OUTPUTS

0      TIME INTERMEDIATE OUTPUT WILL BEGIN AT INTERVALS OF 0 SECS. FOR 0 SECS. FOR MICROSCOPIC MODELS

```

TIME PERIOD 1 - FRESIM DATA

```
*****
1                                FRESIM LINK CHARACTERISTICS
```

— **AUXILIARY LANE** —

		ONE		TWO		THREE				G														
		T		T		T		T		R					RIGHT	FREE								
		Y	NO.	Y		Y		Y		THRU	CURV	A	PAVE	TRUCK	LANE OF	FLOW	QUEUE							
		P	LNTH	THRU	P	LNTH	P	LNTH	P	LNTH	DEST	RADIUS	D	SUPER	MENT	RESTRAINT	SEP PAIR	SPEED	HOWY					
LINK	E	(FT)	LANES	E	ID	(FT)	E	ID	(FT)	E	ID	(FT)	NODE	(FT)	E	ELEV	CODE	CODE	LANE	1	2	(MPH)	(SEC)	LINK NAME
(4, 5)	F	1814	2	A	9	736						6	0	-1	0	3	1	1				65	1.0	
(7, 8)	F	660	2	F	9	660						9	0	0	0	3	1	1				65	1.0	
(9, 10)	F	250	2	F	9	250						11	0	-1	0	3	1	1				65	1.0	
(10, 11)	F	774	3									12	0	-1	0	3	0					65	1.0	
(11, 12)	F	1180	2									13	0	-1	0	3	1	1				65	1.0	
(12, 13)	F	1106	2									14	0	-1	0	3	1	1				65	1.0	

(82, 83) F 1805 2 D 9 880	84 0 1 0 3 1 1	65 1.0
(102, 4) R 164 1	5 0 -1 0 3 0	44 1.0
(77, 78) F 717 2 D 9 717	79 0 1 0 3 1 1	65 1.0
(78, 203) R 239 2	2031 0 1 0 3 0	65 1.0
(13, 14) F 1206 2 D 9 1206	15 0 1 0 3 1 1	65 1.0
(16, 17) F 171 2	36 0 1 0 3 1 1	65 1.0
(301, 17) R 164 1	36 0 1 0 3 0	44 1.0
(19, 20) F 360 2	21 0 -1 0 3 1 1	65 1.0
(302, 20) R 164 1	21 0 -1 0 3 0	44 1.0
(21, 22) F 2717 2 D 9 881	23 0 0 0 3 1 1	65 1.0
(401, 26) R 164 1	27 0 -1 0 3 0	44 1.0
(27, 28) F 1122 2 A 9 796	29 0 2 0 3 1 1	65 1.0
(412, 28) R 326 1	29 0 2 0 3 0	65 1.0

* INDICATES THAT THE DEFAULT VALUE IS USED

LINK TYPE CODE	AUXILIARY LANE TYPE CODE	PAVEMENT CODE	TRUCK RESTRAINT CODE
F FREEWAY LINK	A ACCELERATION LANE	1 DRY CONCRETE	0 TRUCKS ARE UNRESTRICTED
R RAMP LINK	D DECELERATION LANE	2 WET CONCRETE	1 TRUCKS ARE BIASED TO CERTAIN LANE(S)
	F FULL AUXILIARY LANE	3 DRY ASPHALT	2 TRUCKS ARE RESTRICTED TO CERTAIN LANES(S)
		4 WET ASPHALT	

1

FRESIM LINK CHARACTERISTICS

----- AUXILIARY LANE -----																							
				--- ONE --- TWO --- THREE ---						G				RIGHT FREE									
		T	T	T	T					R													
		Y	NO. Y	Y	Y	Y	THRU CURV	A	PAVE	TRUCK	LANE OF	FLOW	QUEUE										
		P	LNTH	THRU	P	LNTH	P	LNTH	P	LNTH	DEST	RADIUS	D	SUPER	MENT	RESTRAINT	SEP PAIR						
LINK	E (FT)	LANES	E ID (FT)	E ID (FT)	E ID (FT)	E ID (FT)	NODE (FT)	E	ELEV	CODE	CODE	LANE	1	2	(MPH)	(SEC)	LINK NAME						
(410, 411) R	164	1					412	0	1	0	3	0				44	1.0						
(411, 412) R	796	1					28	0	2	0	3	0				65	1.0						
(59, 60) F	1217	2	F 9	1217			61	0	-2	0	3	1	1			65	1.0						
(60, 403) R	241	2					4031	0	-2	0	3	0				65	1.0						
(404, 62) R	164	1					63	0	-1	0	3	0				44	1.0						
(64, 65) F	338	2					66	0	1	0	3	1	1			65	1.0						
(405, 65) R	164	1					66	0	1	0	3	0				44	1.0						
(67, 68) F	2109	2	D 9	824			69	0	1	0	3	1	1			65	1.0						
(71, 72) F	114	2					73	0	-1	0	3	1	1			65	1.0						
(304, 72) R	164	1					73	0	-1	0	3	0				44	1.0						
(73, 74) F	884	2					75	0	-1	0	3	1	1			65	1.0						
(305, 74) R	164	1					75	0	-1	0	3	0				44	1.0						
(203, 2031) R	163	2					8203	0	1	0	3	0				44	1.0						
(83, 103) R	164	1					8103	0	1	0	3	0				44	1.0						
(14, 300) R	164	1					8300	0	1	0	3	0				44	1.0						
(22, 400) R	164	1					8400	0	0	0	3	0				44	1.0						
(403, 4031) R	164	2					8403	0	-2	0	3	0				44	1.0						
(68, 303) R	164	1					8303	0	1	0	3	0				44	1.0						
(33, 34) F	557	2	F 9	557			37	0	-2	0	3	1	1			65	1.0						
(34, 500) R	164	1					8500	0	-1	0	3	0				44	1.0						
(504, 52) R	164	1					53	0	1	0	3	0				44	1.0						
(6, 7) F	1817	2					8	0	0	0	3	1	1			65	1.0						
(58, 59) F	1364	2	F 9	1364			60	0	-2	0	3	1	1			65	1.0						
(32, 33) F	2208	2	F 9	2208			34	0	-2	0	3	1	1			65	1.0						
(53, 54) F	610	2	F 9	610			55	0	2	0	3	1	1			65	1.0						
(5, 6) F	1173	2	D 9	537			7	0	0	0	3	1	1			65	1.0						
(6, 200) R	164	1					8200	0	0	0	3	0				44	1.0						
(18, 19) F	746	3					20	0	0	0	3	0				65	1.0						

(402, 27) R 164 1 28 0 1 0 3 0 44 1.0
 (26, 27) F 1791 2 A 9 941 28 0 1 0 3 1 1 65 1.0

* INDICATES THAT THE DEFAULT VALUE IS USED

LINK TYPE CODE	AUXILIARY LANE TYPE CODE	PAVEMENT CODE	TRUCK RESTRAINT CODE
F FREEWAY LINK	A ACCELERATION LANE	1 DRY CONCRETE	0 TRUCKS ARE UNRESTRICTED
R RAMP LINK	D DECELERATION LANE	2 WET CONCRETE	1 TRUCKS ARE BIASED TO
	F FULL AUXILIARY LANE	3 DRY ASPHALT	CERTAIN LANE(S)
		4 WET ASPHALT	2 TRUCKS ARE RESTRICTED TO
			CERTAIN LANES(S)

1

FRESIM LINK CHARACTERISTICS

----- AUXILIARY LANE -----																						
----- ONE ----- TWO ----- THREE -----										G												
										R												
										RIGHT FREE												
										LANE OF FLOW QUEUE												
										PAVE TRUCK LANE OF FLOW QUEUE												
										D SUPER MENT RESTRAINT SEP PAIR SPEED HDWY												
LINK	E	(FT)	LANES	E	ID (FT)	E	ID (FT)	E	ID (FT)	THRU CURV	DEST	RADIUS	D	ELEV	CODE	CODE	LANE	1	2	(MPH)	(SEC)	LINK NAME
(37, 35) F	1488	2								8002	0	-1	0	3	1	1				65	1.0	
(52, 53) F	1367	2	A	9	759					54	0	1	0	3	1	1				65	1.0	
(505, 53) R	164	1								54	0	1	0	3	0					44	1.0	
(61, 62) F	2026	2								63	0	-1	0	3	1	1				65	1.0	
(69, 70) F	621	2								71	0	0	0	3	1	1				65	1.0	
(17, 36) F	402	2	F	9	402					18	0	1	0	3	1	1				65	1.0	
(34, 37) F	113	2								35	0	-2	0	3	1	1				65	1.0	
(51, 38) F	656	2								52	0	1	0	3	1	1				65	1.0	
(8101, 101) R	0	1								3	0	-1	0	3	0					44	1.0	
(8001, 1) F	0	2								2	0	-1	0	3	1	1				65	1.0	
(8102, 102) R	0	1								4	0	-1	0	3	0					44	1.0	
(8201, 201) R	0	1								7	0	0	0	3	0					44	1.0	
(8202, 202) R	0	1								9	0	-1	0	3	0					44	1.0	
(8204, 204) R	0	1								81	0	0	0	3	0					44	1.0	
(8301, 301) R	0	1								17	0	1	0	3	0					44	1.0	
(8302, 302) R	0	1								20	0	-1	0	3	0					44	1.0	
(8401, 401) R	0	1								26	0	-1	0	3	0					44	1.0	
(8402, 402) R	0	1								27	0	1	0	3	0					44	1.0	
(8410, 410) R	0	1								411	0	1	0	3	0					44	1.0	
(8404, 404) R	0	1								62	0	-1	0	3	0					44	1.0	
(8405, 405) R	0	1								65	0	1	0	3	0					44	1.0	
(8304, 304) R	0	1								72	0	-1	0	3	0					44	1.0	
(8305, 305) R	0	1								74	0	-1	0	3	0					44	1.0	
(8003, 51) F	0	2								38	0	1	0	3	1	1				65	1.0	
(8504, 504) R	0	1								52	0	1	0	3	0					44	1.0	
(8505, 505) R	0	1								53	0	1	0	3	0					44	1.0	

TOTAL LINKS: 126

* INDICATES THAT THE DEFAULT VALUE IS USED

LINK TYPE CODE	AUXILIARY LANE TYPE CODE	PAVEMENT CODE	TRUCK RESTRAINT CODE
F FREEWAY LINK	A ACCELERATION LANE	1 DRY CONCRETE	0 TRUCKS ARE UNRESTRICTED
R RAMP LINK	D DECELERATION LANE	2 WET CONCRETE	1 TRUCKS ARE BIASED TO
	F FULL AUXILIARY LANE	3 DRY ASPHALT	CERTAIN LANE(S)
		4 WET ASPHALT	2 TRUCKS ARE RESTRICTED TO
			CERTAIN LANES(S)

CAR FOLLOWING SENSITIVITY MULTIPLIERS

LINK ID	MULTIPLIER
---------	------------

(NO MODIFIERS WERE PROVIDED - MULTIPLIERS FOR ALL LINKS ARE DEFAULTED TO 1.0)

ANTICIPATORY LANE CHANGE PARAMETERS

LINK ID	MIN AVE SPEED	DISTANCE
(3, 4)	63.07	1500.0
(7, 8)	63.07	1500.0
(81, 82)	63.07	1500.0
(9, 10)	63.07	1500.0
(4, 5)	63.07	1500.0
(17, 36)	63.07	1500.0
(20, 21)	63.07	1500.0
(26, 27)	63.07	500.0
(28, 29)	63.07	1500.0
(62, 63)	63.07	1500.0
(65, 66)	63.07	1500.0
(72, 73)	63.07	1500.0
(74, 75)	63.07	1500.0
(52, 53)	63.07	1500.0
(27, 28)	63.07	1500.0
(53, 54)	63.07	1500.0

FRESIM TURNING MOVEMENTS

----- MAIN-LINE TRAFFIC -----			----- EXITING TRAFFIC -----	
LINK	DOWNSTREAM NODE NO. OF THE MAIN-LINE RECEIVING LINK	PERCENTAGE	DOWNSTREAM NODE NO. OF THE OFF-RAMP	PERCENTAGE
(4, 5)	6	100.0		
(7, 8)	9	100.0		
(9, 10)	11	100.0		
(10, 11)	12	100.0		
(11, 12)	13	100.0		
(12, 13)	14	100.0		
(14, 15)	16	100.0		
(15, 16)	17	100.0		
(1, 2)	3	100.0		
(36, 18)	19	100.0		
(20, 21)	22	100.0		
(22, 23)	24	100.0		
(23, 24)	25	100.0		
(24, 25)	26	100.0		
(25, 26)	27	100.0		
(28, 29)	30	100.0		
(29, 30)	31	100.0		
(30, 31)	32	100.0		
(31, 32)	33	100.0		
(38, 52)	53	100.0		
(54, 55)	56	100.0		
(55, 56)	57	100.0		
(56, 57)	58	100.0		

(57, 58)	59	100.0		
(60, 61)	62	100.0		
(62, 63)	64	100.0		
(63, 64)	65	100.0		
(65, 66)	67	100.0		
(66, 67)	68	100.0		
(68, 69)	70	100.0		
(70, 71)	72	100.0		
(72, 73)	74	100.0		
(74, 75)	76	100.0		
(75, 76)	77	100.0		
(76, 77)	78	100.0		
(78, 79)	80	100.0		
(79, 80)	81	100.0		
(80, 81)	82	100.0		
(83, 84)	8004	100.0		
(81, 82)	83	100.0		
(2, 3)	4	100.0		
(101, 3)	4	100.0		
(3, 4)	5	100.0		
(201, 7)	8	100.0		
(204, 81)	82	100.0		
(8, 9)	10	100.0		
(202, 9)	10	100.0		
(82, 83)	84	68.5	103	31.5
(102, 4)	5	100.0		
(77, 78)	79	94.3	203	5.7
(78, 203)	2031	100.0		
(13, 14)	15	87.2	300	12.8
(16, 17)	36	100.0		
(301, 17)	36	100.0		
(19, 20)	21	100.0		
(302, 20)	21	100.0		
(21, 22)	23	90.8	400	9.2
(401, 26)	27	100.0		
(27, 28)	29	100.0		
(412, 28)	29	100.0		
(410, 411)	412	100.0		
(411, 412)	28	100.0		
(59, 60)	61	65.0	403	35.0
(60, 403)	4031	100.0		
(404, 62)	63	100.0		
(64, 65)	66	100.0		
(405, 65)	66	100.0		
(67, 68)	69	70.7	303	29.3
(71, 72)	73	100.0		
(304, 72)	73	100.0		
(73, 74)	75	100.0		
(305, 74)	75	100.0		
(203, 2031)	8203	100.0		
(83, 103)	8103	100.0		
(14, 300)	8300	100.0		
(22, 400)	8400	100.0		
(403, 4031)	8403	100.0		
(68, 303)	8303	100.0		
(33, 34)	37	94.5	500	5.5
(34, 500)	8500	100.0		
(504, 52)	53	100.0		
(6, 7)	8	100.0		
(58, 59)	60	100.0		
(32, 33)	34	100.0		
(53, 54)	55	100.0		
(5, 6)	7	94.4	200	5.6
(6, 200)	8200	100.0		

(18, 19)	20	100.0
(402, 27)	28	100.0
(28, 27)	28	100.0
(37, 35)	8002	100.0
(52, 53)	54	100.0
(505, 53)	54	100.0
(61, 62)	63	100.0
(69, 70)	71	100.0
(17, 36)	18	100.0
(34, 37)	35	100.0
(51, 38)	52	100.0
(8101, 101)	3	100.0
(8001, 1)	2	100.0
(8102, 102)	4	100.0
(8201, 201)	7	100.0
(8202, 202)	9	100.0
(8204, 204)	81	100.0
(8301, 301)	17	100.0
(8302, 302)	20	100.0
(8401, 401)	26	100.0
(8402, 402)	27	100.0
(8410, 410)	411	100.0
(8404, 404)	62	100.0
(8405, 405)	65	100.0
(8304, 304)	72	100.0
(8305, 305)	74	100.0
(8003, 51)	38	100.0
(8504, 504)	52	100.0
(8505, 505)	53	100.0

FRESIM MIDLINK LANE ADD/DROP DATA

LINK	LANE ADD/DROP	LANE ID BEING ADDED/DROPPED	DISTANCE FROM UPSTREAM NODE (FEET)	DISTANCE BETWEEN WARNING SIGN AND LANE DROP (FEET)
(10, 11)	DROP	1	773	1018
(63, 64)	DROP	1	850	966
(66, 67)	DROP	1	452	716
(8, 9)	DROP	1	586	1241
(18, 19)	DROP	1	423	933

FRESIM LINK VOLUME

LINK	FLOW RATE (VEH/HOUR)	PERCENT TRUCKS	PERCENT CARPOOL	PERCENT HOV LANE VIOLATORS
(8101, 101)	370	4	0	0.00
(8001, 1)	740	4	0	0.00
(8102, 102)	320	4	0	0.00
(8201, 201)	20	4	0	0.00
(8202, 202)	40	4	0	0.00
(8204, 204)	80	5	0	0.00
(8301, 301)	240	4	0	0.00
(8302, 302)	490	4	0	0.00
(8401, 401)	1080	4	0	0.00
(8402, 402)	615	4	0	0.00
(8410, 410)	0	4	0	0.00
(8404, 404)	60	5	0	0.00

(5, 6)	F	1173.0	-	-	-	-	-	-	-	-	-	-	1	-	-	2
(102, 4)	R	164.0	9	-	-	-	-	-	-	-	-	-	-	-	-	1
(101, 3)	R	164.0	9	-	-	-	-	-	-	-	-	-	-	-	-	1

LINK TYPE	REASON CODES
CODES	1 : ALIGNMENT AT THE ON-RAMP GORE. ENTRIES IN THE TABLEAU INDICATE THE MAINLINE FREEWAY LANES WHICH RECEIVES THE TRAFFIC FROM THE UPSTREAM ON-RAMP LANES
R : RAMP	
F : FREEWAY	
	2 : ALIGNMENT AT THE OFF-RAMP GORE. ENTRIES IN THE TABLEAU INDICATE THE OFF-RAMP LANES WHICH RECEIVE THE TRAFFIC FROM THE UPSTREAM MAINLINE FREEWAY LANES
	3 : ALIGNMENT DUE TO A LANE ADD OR DROP. ENTRIES IN THE TABLEAU INDICATE THE LANES DOWNSTREAM OF THE LANE ADD OR DROP WHICH RECEIVE THE TRAFFIC FROM THE UPSTREAM LANE
	4 : ALIGNMENT AT LINK BOUNDARY. ENTRIES IN THE TABLEAU INDICATE THE DOWNSTREAM LANES WHICH RECEIVE THE TRAFFIC FROM THE UPSTREAM LANES

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FRESIM LANE ALIGNMENT TABLE

LINK	LINK TYPE	DISTANCE FROM UPST. NODE (FT)	UPSTREAM FEEDING LANE NUMBER											REASON CODE
			1	2	3	4	5	6	7	8	9	10	11	

TABLE OF FREEWAY WARNING SIGNS

TYPE OF WARNING SIGN	WARNING SIGN LINK	DISTANCE BETWEEN THE WARNING SIGN AND UPSTREAM NODE (FT)	WARNING SIGN OBJECTIVE			DISTANCE BETWEEN THE WARNING SIGN AND ITS OBJECTIVE (FT)	THRU TRAFFIC VACATES LANE(S)	EXITING TRAFFIC MOVES TO LANE(S)
			OFFRAMP NODE	LINK CONTAINING INCIDENT	LINK WITH LANE DROP			
OFFRAMP	(4, 5)	1347.0	6			1640.0		1
LANE DROP	(7, 8)	5.0			(8, 9)	1241.0	9	
LANE DROP	(9, 10)	5.0			(10, 11)	1018.0	9	
OFFRAMP	(12, 13)	672.0	14			1640.0		1
LANE DROP	(17, 36)	5.0			(18, 19)	933.0	9	
OFFRAMP	(21, 22)	1077.0	22			1640.0		1
OFFRAMP	(32, 33)	1125.0	34			1640.0	9	9
OFFRAMP	(58, 59)	941.0	60			1640.0	9	1, 9
LANE DROP	(62, 63)	5.0			(63, 64)	966.0	9	
LANE DROP	(65, 66)	5.0			(66, 67)	716.0	9	
OFFRAMP	(67, 68)	469.0	68			1640.0		1
OFFRAMP	(76, 77)	205.0	78			1640.0		1
OFFRAMP	(82, 83)	165.0	83			1640.0		1

NODE 78 DESTINATION VOLUME SPECIFIED BY ENTRY VOLUMES AND TURN PCT IS 140.0 THE OD CALIBRATED DESTINATION VOLUME IS 126.2

FRESIM ORIGIN - DESTINATION TRIP TABLE

FOR EACH ORIGIN NODE, TABLE PROVIDES LISTING OF PAIRS OF DATA : DESTINATION/ FRACTION OF ENTRY VOLUME TRAVELING TO DESTINATION

ORIGIN NODE (8204)	83/ 0.340	84/ 0.660
ORIGIN NODE (8305)	78/ 0.080	83/ 0.300 84/ 0.620
ORIGIN NODE (8304)	78/ 0.070	83/ 0.300 84/ 0.630
ORIGIN NODE (8405)	68/ 0.380	78/ 0.040 83/ 0.180 84/ 0.400
ORIGIN NODE (8404)	68/ 0.350	78/ 0.040 83/ 0.190 84/ 0.420
ORIGIN NODE (8505)	60/ 0.370	68/ 0.180 78/ 0.030 83/ 0.130 84/ 0.290
ORIGIN NODE (8504)	60/ 0.360	68/ 0.180 78/ 0.020 83/ 0.140 84/ 0.300
ORIGIN NODE (8003)	60/ 0.350	68/ 0.180 78/ 0.020 83/ 0.140 84/ 0.310
ORIGIN NODE (8410)	34/ 0.058	35/ 0.942
ORIGIN NODE (8402)	34/ 0.060	35/ 0.940
ORIGIN NODE (8401)	34/ 0.060	35/ 0.940
ORIGIN NODE (8302)	22/ 0.120	34/ 0.050 35/ 0.830
ORIGIN NODE (8301)	22/ 0.110	34/ 0.050 35/ 0.840
ORIGIN NODE (8202)	14/ 0.180	22/ 0.070 34/ 0.040 35/ 0.710
ORIGIN NODE (8201)	14/ 0.160	22/ 0.070 34/ 0.040 35/ 0.730
ORIGIN NODE (8102)	6/ 0.070	14/ 0.120 22/ 0.070 34/ 0.040 35/ 0.700
ORIGIN NODE (8101)	6/ 0.060	14/ 0.120 22/ 0.070 34/ 0.030 35/ 0.720
ORIGIN NODE (8001)	6/ 0.050	14/ 0.120 22/ 0.060 34/ 0.040 35/ 0.730

THE GRAVITY MODEL ACCURACY THRESHOLD IS 5.0E-02

GRAVITY MODEL RESULTS

ENTRY VOL/DEST	60	68	78	83	84
8204 80.0 0.0	0.0	0.0	0.0	27.2	52.8
8305 250.0 0.0	0.0	0.0	20.0	75.0	155.0
8304 170.0 0.0	0.0	0.0	11.9	51.0	107.1
8405 340.0 0.0	129.2	13.6	61.2	136.0	
8404 60.0 0.0	21.0	2.4	11.4	25.2	
8505 270.0 99.9	48.6	8.1	35.1	78.3	
8504 190.0 68.4	34.2	3.8	26.6	57.0	
8003 3321.0 1162.3	597.8	66.4	464.9	1029.5	
SUM VOL 1330.7	830.8	126.2	752.4	1640.9	
DEST VOL 1324.9	837.1	140.0	748.9	1630.1	

ENTRY VOL/DEST	6	14	22	34	35
8402 615.0 0.0	0.0	0.0	0.0	36.9	578.1
8401 1080.0 0.0	0.0	0.0	0.0	64.8	1015.2
8302 490.0 0.0	0.0	58.8	24.5	406.7	
8301 240.0 0.0	0.0	26.4	12.0	201.6	
8202 40.0 0.0	7.2	2.8	1.6	28.4	
8201 20.0 0.0	3.2	1.4	0.8	14.6	
8102 320.0 22.4	38.4	22.4	12.8	224.0	
8101 370.0 22.2	44.4	25.9	11.1	266.4	
8001 740.0 37.0	88.8	44.4	29.6	540.2	
SUM VOL 81.6	182.0	182.1	194.1	3275.2	
DEST VOL 79.9	180.1	179.9	190.1	3285.0	

FREE FLOW SPEED PERCENTAGES

DRIVER TYPE:	1	2	3	4	5	6	7	8	9	10
PERCENTAGE:	88	91	94	97	99	101	103	106	109	112

MAXIMUM ACCELERATION TABLE

PERFORMANCE	0	10	20	30	40	50	60	70	80	90	100	110
INDEX	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC
1	8.00	9.00	6.00	5.00	5.00	5.00	4.00	3.00	2.00	2.00	1.00	1.00
2	6.00	12.00	10.00	8.00	7.00	6.00	4.00	4.00	4.00	2.00	2.00	2.00
3	4.69	5.35	4.94	3.47	3.09	2.61	2.14	1.70	1.27	0.86	0.46	0.06
4	2.81	2.42	2.15	2.04	1.74	1.42	1.12	0.83	0.56	0.30	0.04	-0.23
5	2.76	2.37	1.81	1.56	1.25	0.97	0.73	0.52	0.32	0.14	-0.05	-0.23
6	2.45	2.14	1.42	1.12	0.85	0.63	0.44	0.29	0.14	0.00	-0.14	-0.27
7	7.47	5.33	3.17	2.66	2.29	1.65	1.40	0.95	0.75	0.50	-0.33	-0.35

GRADE CORRECTION FACTORS FOR ACCELERATION (USED BY FRESIM ONLY)

PERFORMANCE	0	10	20	30	40	50	60	70	80	90	100	110
INDEX	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC
1	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
2	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
3	0.21	0.21	0.21	0.22	0.23	0.25	0.26	0.27	0.28	0.28	0.30	0.31
4	0.16	0.15	0.19	0.22	0.24	0.25	0.27	0.28	0.29	0.31	0.31	0.31
5	0.18	0.17	0.20	0.23	0.25	0.27	0.28	0.30	0.31	0.31	0.31	0.31
6	0.18	0.18	0.22	0.25	0.27	0.29	0.30	0.30	0.31	0.31	0.31	0.31
7	0.27	0.27	0.27	0.27	0.27	0.29	0.29	0.30	0.30	0.30	0.30	0.30

GRADE CORRECTION FACTORS FOR FUEL CONSUMPTION (USED BY FRESIM ONLY)

PERFORMANCE	0	10	20	30	40	50	60	70	80	90	100	110
INDEX	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC	FT/SEC
1	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
2	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
3	0.26	0.26	0.26	0.28	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30
4	0.11	0.11	0.23	0.27	0.28	0.29	0.30	0.30	0.30	0.30	0.30	0.30
5	0.16	0.16	0.26	0.28	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30
6	0.20	0.20	0.28	0.29	0.30	0.30	0.30	0.30	0.31	0.31	0.31	0.31
7	0.27	0.27	0.27	0.27	0.27	0.29	0.29	0.30	0.30	0.30	0.30	0.30

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BUS ROUTE PATHS

ROUTE	SEQUENCE OF NODES DEFINING PATH											
4	8410	410	411	412	28	29	30	31	32	33	34	37 8002
5	8003	51	38	52	53	54	55	56	57	58	59	60 403 4031 8403
7	8505	505	53	54	55	56	57	58	59	60	403 4031 8403	
8	8003	51	38	52	53	54	55	56	57	58	59	60 61 62 63 64 65 66
	67	68	303	8303								
9	8003	51	38	52	53	54	55	56	57	58	59	60 61 62 63 64 65 66
	67	68	69	70	71	72	73	74	75	76	77	78 79 80 81 82 83 103
	8103											

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BUS VOLUMES

ROUTE	VOLUME (VEH/HR)	MEAN HEADWAY (SEC)	OFFSET (SEC)
4	15	240	0
5	5	720	0
7	20	180	0
8	3	1200	0
9	1	3600	0

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INITIALIZATION STATISTICS

TIME INTERVAL NUMBER	SUBNETWORK TYPE	PRIOR CONTENT (VEHICLES)	CURRENT CONTENT (VEHICLES)	PERCENT DIFFERENCE
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[illegible]

[illegible]

ALL EXISTING SUBNETWORKS REACHED EQUILIBRIUM

LINK STATISTICS

										SECONDS/VEHICLE				VEH-MIN/ VEH-MILE							
										TOTAL	MOVE	DELAY		TOTAL	DELAY	VOLUME	DENSITY				
LINK	VEHICLES		LANE	CURR	AVG	VEH-	VEH-														
	IN	OUT	CHNG	CONT	CONT	MILES	MIN		TIME	TIME	TIME	M/T	TOTAL	DELAY	VEH/LN/HR	VEH/LN-MILE		SPEED	LINK		
																		MILE/HR	TYPE		
(4, 5)	717	714	311	10	7.9	245.6	237.6		19.9	19.1	0.9	0.96	0.97	0.04	594.3	9.6		62.03	FRWY		
(7, 8)	694	695	65	4	2.8	86.8	83.5		7.2	6.9	0.3	0.96	0.96	0.04	463.0	7.4		62.36	FRWY		
(9, 10)	713	711	59	2	1.1	33.8	32.8		2.8	2.6	0.1	0.95	0.97	0.05	475.2	7.7		61.65	FRWY		
(10, 11)	711	711	55	3	3.3	104.1	100.3		8.5	8.1	0.3	0.96	0.96	0.04	473.6	7.6		62.30	FRWY		
(11, 12)	711	708	83	7	5.1	158.6	151.6		12.8	12.4	0.4	0.97	0.96	0.03	709.6	11.3		62.78	FRWY		
(12, 13)	708	711	116	4	4.7	148.5	142.4		12.0	11.6	0.4	0.96	0.96	0.03	709.1	11.3		62.59	FRWY		
(14, 15)	613	613	25	2	2.4	74.8	71.2		7.0	6.8	0.2	0.97	0.95	0.03	612.5	9.7		63.07	FRWY		
(15, 16)	613	613	94	3	4.0	125.2	120.0		11.8	11.3	0.4	0.96	0.96	0.03	612.5	9.8		62.58	FRWY		
(1, 2)	371	373	46	2	3.6	115.9	108.6		17.3	17.0	0.3	0.98	0.94	0.01	377.4	5.9		64.03	FRWY		
(36, 18)	732	732	7	1	0.5	15.7	15.9		1.3	1.2	0.1	0.91	1.01	0.09	487.6	8.2		59.14	FRWY		
(20, 21)	974	975	476	15	12.7	383.9	381.8		23.5	21.8	1.6	0.93	0.99	0.07	806.3	13.4		60.32	FRWY		
(22, 23)	890	891	13	0	0.6	19.1	18.4		1.2	1.2	0.1	0.96	0.96	0.04	890.4	14.3		62.20	FRWY		
(23, 24)	891	891	28	2	1.8	56.7	54.8		3.7	3.5	0.2	0.96	0.97	0.04	891.6	14.3		62.16	FRWY		
(24, 25)	891	884	151	12	7.6	234.9	227.1		15.4	14.7	0.7	0.96	0.97	0.04	887.1	14.3		62.05	FRWY		
(25, 26)	884	884	21	1	0.6	18.9	18.7		1.3	1.2	0.1	0.94	0.99	0.06	883.6	14.6		60.70	FRWY		
(28, 29)	1743	1754	433	32	32.4	793.8	973.1		33.4	25.2	8.2	0.76	1.23	0.30	1165.2	23.8		48.94	FRWY		
(29, 30)	1754	1750	250	26	26.1	747.6	782.7		26.8	23.7	3.1	0.88	1.05	0.12	1166.5	20.4		57.31	FRWY		

(30, 31)	1750	1752	68	5	9.8	290.1	294.7	10.1	9.2	0.9	0.91	1.02	0.09	1167.0	19.8	59.06	FRWY
(31, 32)	1752	1749	26	5	4.5	133.0	135.1	4.6	4.2	0.4	0.91	1.02	0.09	1167.2	19.8	59.06	FRWY
(38, 52)	1642	1647	182	32	28.9	307.1	867.2	31.6	10.3	21.2	0.33	2.82	1.90	1647.6	77.6	21.24	FRWY
(54, 55)	1884	1871	491	43	48.9	894.2	1467.7	46.8	26.4	20.5	0.56	1.64	0.72	1254.0	34.3	36.55	FRWY
(55, 56)	1871	1865	63	7	5.6	118.5	167.9	5.4	3.5	1.9	0.65	1.42	0.49	1245.4	29.4	42.35	FRWY
(56, 57)	1865	1873	172	13	12.3	267.8	368.2	11.8	8.0	3.8	0.67	1.37	0.45	1245.3	28.5	43.64	FRWY
(57, 58)	1873	1875	381	37	38.3	842.4	1150.0	36.8	25.0	11.8	0.68	1.37	0.44	1249.5	28.4	43.95	FRWY
(60, 61)	1181	1184	83	3	5.0	153.6	149.7	7.6	7.2	0.4	0.95	0.97	0.05	1182.3	19.2	61.56	FRWY
(62, 63)	1211	1209	51	2	0.9	27.7	27.6	1.4	1.3	0.1	0.92	1.00	0.08	806.1	13.4	60.14	FRWY
(63, 64)	1209	1216	149	7	10.9	327.6	325.7	16.1	15.0	1.2	0.93	0.99	0.07	934.0	15.5	60.36	FRWY
(65, 66)	1386	1385	262	4	2.6	70.6	76.8	3.3	2.8	0.5	0.85	1.09	0.17	923.5	16.7	55.16	FRWY
(66, 67)	1385	1388	323	24	21.3	624.8	639.0	27.6	24.9	2.7	0.90	1.02	0.10	1266.4	21.6	58.66	FRWY
(68, 69)	1012	1016	57	3	4.0	121.8	119.2	7.0	6.6	0.4	0.94	0.98	0.06	1015.7	16.6	61.31	FRWY
(70, 71)	1018	1016	59	4	4.3	129.9	128.3	7.6	7.1	0.5	0.93	0.99	0.06	1016.5	16.7	60.75	FRWY
(72, 73)	1102	1109	204	4	6.7	199.4	201.0	10.9	10.0	0.9	0.92	1.01	0.08	738.3	12.4	59.53	FRWY
(74, 75)	1240	1241	294	7	7.8	232.4	235.2	11.4	10.4	1.0	0.91	1.01	0.09	847.0	14.3	59.28	FRWY
(75, 76)	1241	1239	124	6	8.4	254.7	252.5	12.2	11.4	0.9	0.93	0.99	0.07	1240.4	20.5	60.51	FRWY
(76, 77)	1239	1233	169	9	8.8	264.1	262.5	12.7	11.8	0.9	0.93	0.99	0.07	1236.1	20.5	60.36	FRWY
(78, 79)	1167	1169	18	0	1.0	30.5	30.3	1.6	1.4	0.1	0.93	0.99	0.07	1167.6	19.3	60.50	FRWY
(79, 80)	1169	1170	114	8	10.6	320.5	317.3	16.3	15.2	1.1	0.93	0.99	0.07	1168.0	19.3	60.61	FRWY
(80, 81)	1170	1169	53	6	4.3	128.9	129.6	6.6	6.1	0.5	0.92	1.01	0.08	1169.6	19.6	59.67	FRWY
(83, 84)	849	850	143	8	9.8	303.4	295.0	20.8	19.8	1.0	0.95	0.97	0.05	851.3	13.8	61.72	FRWY
(81, 82)	1207	1213	412	22	23.5	707.2	705.0	34.9	32.3	2.5	0.93	1.00	0.07	1014.6	16.9	60.19	FRWY
(2, 3)	373	373	3	0	0.2	8.0	7.5	1.2	1.2	0.0	0.98	0.94	0.02	373.0	5.8	64.03	FRWY
(101, 3)	184	185	0	0	0.3	6.3	8.7	2.6	2.5	0.0	0.99	1.38	0.01	405.5	9.3	43.55	RAMP
(3, 4)	558	558	325	7	6.4	198.2	192.8	20.7	19.7	1.0	0.95	0.97	0.05	457.7	7.4	61.68	FRWY
(201, 7)	9	9	0	0	0.0	0.3	0.4	2.5	2.5	0.0	0.99	1.34	0.01	19.6	0.4	44.76	RAMP
(204, 81)	39	38	0	1	0.1	1.3	1.8	2.6	2.6	0.0	0.99	1.38	0.01	84.7	2.0	43.34	RAMP
(8, 9)	695	694	26	3	4.7	147.4	141.4	12.2	11.8	0.4	0.96	0.96	0.03	550.9	8.8	62.57	FRWY
(202, 9)	19	19	0	0	0.0	0.7	0.9	2.5	2.5	0.0	0.99	1.36	0.01	41.9	0.9	44.12	RAMP
(82, 83)	1213	1209	795	21	14.2	414.0	427.4	21.2	19.1	2.1	0.90	1.03	0.10	973.7	16.8	58.12	FRWY
(102, 4)	159	159	0	0	0.2	5.4	7.5	2.6	2.5	0.0	0.99	1.38	0.02	349.7	8.0	43.46	RAMP

(77, 78)	1233	1229	105	7	5.5	167.1	165.9	8.1	7.5	0.6	0.93	0.99	0.07	820.1	13.6	60.41	FRWY
(78, 203)	62	62	0	0	0.1	2.8	2.7	2.6	2.5	0.1	0.94	0.97	0.05	62.0	1.0	62.10	RAMP
(13, 14)	711	707	158	7	5.2	161.8	155.1	13.1	12.7	0.4	0.97	0.96	0.03	472.3	7.5	62.61	FRWY
(16, 17)	613	613	17	0	0.6	19.9	19.5	1.9	1.8	0.1	0.94	0.98	0.06	613.0	10.0	61.18	FRWY
(301, 17)	120	119	0	1	0.2	4.1	5.6	2.6	2.6	0.0	0.99	1.38	0.01	262.2	6.0	43.37	RAMP
(19, 20)	726	728	28	0	1.6	49.6	48.9	4.0	3.8	0.3	0.94	0.99	0.06	726.8	12.0	60.75	FRWY
(302, 20)	246	246	0	0	0.4	8.4	11.5	2.6	2.5	0.0	0.99	1.37	0.01	541.4	12.4	43.71	RAMP
(21, 22)	975	979	334	8	16.2	503.0	486.6	29.9	28.6	1.3	0.96	0.97	0.04	841.2	13.6	62.02	FRWY
(401, 26)	539	538	0	2	0.9	18.5	26.2	2.6	2.5	0.1	0.97	1.42	0.05	1190.3	28.1	42.39	RAMP
(27, 28)	1736	1736	385	16	19.2	369.2	575.4	19.9	11.8	8.0	0.60	1.56	0.63	1282.6	33.3	38.50	FRWY
(412, 28)	7	7	0	0	0.0	0.4	0.5	4.4	3.2	1.2	0.72	1.19	0.34	14.0	0.3	50.26	RAMP
(410, 411)	7	7	0	0	0.0	0.2	0.3	2.4	2.4	0.0	0.99	1.28	0.01	14.8	0.3	47.04	RAMP
(411, 412)	7	7	0	0	0.0	1.1	1.3	11.2	7.8	3.4	0.69	1.24	0.38	14.0	0.3	48.57	RAMP
(59, 60)	1868	1867	706	19	16.0	430.3	478.6	15.4	12.8	2.6	0.83	1.11	0.19	1244.5	23.1	53.94	FRWY
(60, 403)	686	686	12	1	1.0	31.3	30.8	2.7	2.5	0.2	0.94	0.99	0.06	685.5	11.3	60.88	RAMP
(404, 62)	30	29	0	1	0.0	1.0	1.4	2.6	2.6	0.0	1.00	1.38	0.01	64.5	1.5	43.63	RAMP
(64, 65)	1216	1216	69	5	2.7	77.9	80.3	4.0	3.5	0.4	0.89	1.03	0.11	1216.4	20.9	58.19	FRWY
(405, 65)	170	170	0	0	0.3	5.9	8.2	2.6	2.5	0.1	0.97	1.40	0.05	376.9	8.8	42.91	RAMP
(67, 68)	1388	1391	905	10	18.9	555.6	568.4	24.5	22.2	2.3	0.91	1.02	0.09	1163.7	19.8	58.65	FRWY
(71, 72)	1016	1017	8	1	0.7	22.0	22.0	1.3	1.2	0.1	0.92	1.00	0.08	1016.9	17.0	59.85	FRWY
(304, 72)	85	85	0	0	0.1	2.9	4.0	2.6	2.5	0.0	1.00	1.37	0.01	188.6	4.3	43.76	RAMP
(73, 74)	1109	1116	96	4	6.1	186.3	184.3	9.9	9.3	0.7	0.93	0.99	0.07	1112.8	18.3	60.66	FRWY
(305, 74)	124	124	0	0	0.2	4.2	5.8	2.5	2.5	0.0	0.99	1.36	0.01	273.5	6.2	43.96	RAMP
(203, 2031)	62	62	0	0	0.1	1.9	1.9	1.8	1.8	0.0	1.00	0.97	0.00	62.0	1.0	61.73	RAMP
(83, 103)	360	360	0	0	0.5	11.2	15.3	2.6	2.5	0.1	0.97	1.37	0.04	720.0	16.4	43.77	RAMP
(14, 300)	94	94	0	0	0.1	2.9	3.8	2.4	2.4	0.0	0.99	1.31	0.02	188.0	4.1	45.65	RAMP
(22, 400)	89	89	0	0	0.1	2.8	3.6	2.4	2.4	0.0	0.99	1.31	0.02	178.0	3.9	45.84	RAMP
(403, 4031)	686	686	0	0	0.7	21.3	21.2	1.9	1.9	0.0	1.00	0.99	0.00	686.0	11.4	60.40	RAMP
(68, 303)	379	379	0	0	0.5	11.8	15.9	2.5	2.4	0.1	0.97	1.35	0.03	758.0	17.0	44.51	RAMP
(33, 34)	1733	1732	146	8	6.2	182.7	186.0	6.4	5.9	0.6	0.91	1.02	0.09	1154.9	19.6	58.95	FRWY
(34, 500)	81	81	0	0	0.1	2.5	3.3	2.5	2.4	0.0	0.98	1.32	0.02	162.0	3.6	45.54	RAMP
(504, 52)	94	94	0	1	0.2	3.2	4.5	2.6	2.6	0.0	0.98	1.41	0.02	207.1	4.9	42.69	RAMP

(6, 7)	679	685	73	5	7.5	234.9	223.9	19.7	19.1	0.6	0.97	0.95	0.03	682.6	10.8	62.95	FRWY
(58, 59)	1875	1868	583	30	21.3	483.6	640.4	20.5	14.4	6.1	0.70	1.32	0.40	1247.9	27.5	45.31	FRWY
(32, 33)	1749	1733	248	33	24.8	727.9	745.5	25.7	23.2	2.5	0.90	1.02	0.10	1160.4	19.8	58.58	FRWY
(53, 54)	1888	1884	299	19	15.4	217.9	460.9	14.7	6.4	8.2	0.44	2.12	1.19	1257.4	44.3	28.36	FRWY
(5, 6)	714	713	85	5	5.0	158.4	149.8	12.6	12.3	0.3	0.98	0.95	0.02	580.0	9.1	63.44	FRWY
(6, 200)	34	35	0	0	0.0	1.1	1.4	2.4	2.4	0.0	0.99	1.30	0.02	68.4	1.5	46.20	RAMP
(18, 19)	732	726	56	8	3.4	102.9	102.0	8.4	7.8	0.6	0.93	0.99	0.07	567.6	9.4	60.53	FRWY
(402, 27)	307	309	0	0	0.5	10.5	14.7	2.6	2.5	0.0	0.98	1.39	0.03	677.7	15.7	43.08	RAMP
(26, 27)	1422	1427	1069	21	21.0	483.2	628.6	26.5	18.9	7.6	0.71	1.30	0.37	1128.1	24.5	46.12	FRWY
(37, 35)	1652	1659	134	13	15.7	465.9	470.9	17.1	15.6	1.4	0.92	1.01	0.09	1653.3	27.9	59.36	FRWY
(52, 53)	1741	1744	304	33	35.8	451.1	1072.7	36.9	14.4	22.5	0.39	2.38	1.45	1363.9	54.0	25.23	FRWY
(505, 53)	145	144	0	1	0.2	4.9	6.9	2.6	2.5	0.1	0.95	1.41	0.07	316.2	7.4	42.54	RAMP
(61, 62)	1184	1182	117	19	14.7	453.9	440.5	22.3	21.2	1.1	0.95	0.97	0.05	1183.0	19.1	61.83	FRWY
(69, 70)	1016	1018	34	4	3.9	119.8	116.7	6.9	6.5	0.4	0.95	0.97	0.05	1018.3	16.5	61.60	FRWY
(17, 36)	732	732	145	2	1.9	55.7	57.6	4.7	4.2	0.5	0.89	1.03	0.11	487.5	8.4	57.98	FRWY
(34, 37)	1651	1652	13	1	1.2	35.3	35.8	1.3	1.2	0.1	0.91	1.01	0.09	1651.2	27.8	59.30	FRWY
(51, 38)	1640	1642	54	18	20.1	209.2	603.2	21.5	6.9	14.6	0.32	2.88	1.96	1683.5	80.9	20.81	FRWY

NETWORK STATISTICS

VEHICLE-MILES = 17975.2, VEHICLE-MINUTES = 21564.7, MOVING/TOTAL TRIP TIME = 0.774,

AVERAGE CONTENT = 718.8, CURRENT CONTENT = 720.0, SPEED(MPH) = 50.01,

TOTAL DELAY (VEH-MIN) = 4882.77, TRAVEL TIME (MIN)/VEH-MILE = 1.20, DELAY TIME (MIN)/ VEH-MILE = 0.27

LINK STATISTICS BY LANE

(SOME STATISTICS APPLY TO HOV LANES ONLY)

LINK	LANE	TYPE	VEHICLES		CURR CONT	VOLUME VEH/HR	VOLUME OF VIOLATORS	SEC./VEHICLE			SEC./PERSON			SPEED MILES/HR
			IN	OUT				TOTAL TIME	MOVE TIME	DELAY TIME	TOTAL TIME	MOVE TIME	DELAY TIME	
(4, 5)	1	SOV	---	---	6	771.8	-----	20.2	19.1	1.0	15.6	14.8	0.8	61.31
(4, 5)	2	SOV	---	---	4	647.9	-----	19.5	19.0	0.5	15.0	14.6	0.4	63.30
(4, 5)	9	SOV	---	---	0	9.9	-----	27.9	24.0	3.9	21.6	18.6	3.0	44.37
(7, 8)	1	SOV	---	---	3	681.4	-----	7.3	7.0	0.3	5.6	5.4	0.2	61.91
(7, 8)	2	SOV	---	---	1	704.9	-----	7.2	6.9	0.3	5.5	5.3	0.2	62.85
(7, 8)	9	SOV	---	---	0	2.6	-----	8.8	7.3	1.5	6.8	5.7	1.1	51.25
(9, 10)	1	SOV	---	---	1	678.1	-----	2.8	2.7	0.1	2.2	2.1	0.1	61.20
(9, 10)	2	SOV	---	---	1	738.3	-----	2.7	2.6	0.1	2.1	2.0	0.1	62.29

(9, 10)	9	SOV	---	---	0	9.2	----	3.5	3.1	0.4	2.7	2.4	0.3	48.15
(10, 11)	1	SOV	---	---	0	41.3	----	8.4	7.8	0.5	6.5	6.0	0.4	63.10
(10, 11)	2	SOV	---	---	2	708.7	----	8.5	8.2	0.3	6.6	6.3	0.3	61.97
(10, 11)	3	SOV	---	---	1	670.2	----	8.4	8.1	0.3	6.5	6.3	0.2	62.59
(11, 12)	1	SOV	---	---	4	732.9	----	12.8	12.4	0.4	9.9	9.6	0.3	62.68
(11, 12)	2	SOV	---	---	3	686.2	----	12.8	12.4	0.4	9.8	9.5	0.3	62.88
(12, 13)	1	SOV	---	---	2	764.7	----	12.1	11.6	0.5	9.3	9.0	0.4	62.47
(12, 13)	2	SOV	---	---	2	653.5	----	12.0	11.6	0.4	9.3	9.0	0.3	62.72
(14, 15)	1	SOV	---	---	2	629.5	----	7.0	6.8	0.2	5.4	5.2	0.2	62.89
(14, 15)	2	SOV	---	---	0	595.4	----	7.0	6.8	0.2	5.3	5.2	0.1	63.26
(15, 16)	1	SOV	---	---	1	562.5	----	11.7	11.3	0.4	9.1	8.8	0.3	62.88
(15, 16)	2	SOV	---	---	2	662.4	----	11.8	11.3	0.5	9.1	8.7	0.4	62.34
(1, 2)	1	SOV	---	---	0	378.8	----	17.2	16.8	0.3	13.3	13.0	0.2	64.41
(1, 2)	2	SOV	---	---	2	376.0	----	17.4	17.1	0.2	13.4	13.2	0.2	63.66
(36, 18)	1	SOV	---	---	0	673.6	----	1.3	1.2	0.1	1.0	1.0	0.1	58.84
(36, 18)	2	SOV	---	---	1	787.1	----	1.3	1.2	0.1	1.0	0.9	0.1	59.43
(36, 18)	9	SOV	---	---	0	2.0	----	1.6	1.3	0.3	1.3	1.0	0.2	49.46
(20, 21)	1	SOV	---	---	7	983.1	----	23.8	21.8	1.9	18.4	16.9	1.5	59.59
(20, 21)	2	SOV	---	---	8	951.2	----	23.1	21.9	1.2	17.7	16.8	0.9	61.42
(20, 21)	9	SOV	---	---	0	17.4	----	30.3	26.4	3.8	23.3	20.4	3.0	46.81
(22, 23)	1	SOV	---	---	0	917.6	----	1.2	1.2	0.0	1.0	0.9	0.0	62.23
(22, 23)	2	SOV	---	---	0	863.3	----	1.2	1.2	0.1	1.0	0.9	0.0	62.16
(23, 24)	1	SOV	---	---	1	912.7	----	3.7	3.5	0.1	2.8	2.7	0.1	62.16
(23, 24)	2	SOV	---	---	1	870.6	----	3.7	3.5	0.2	2.8	2.7	0.1	62.16
(24, 25)	1	SOV	---	---	7	896.6	----	15.4	14.7	0.6	11.9	11.4	0.5	62.06
(24, 25)	2	SOV	---	---	5	877.5	----	15.4	14.7	0.7	11.8	11.3	0.5	62.04
(25, 26)	1	SOV	---	---	0	774.0	----	1.3	1.2	0.1	1.0	0.9	0.1	61.30
(25, 26)	2	SOV	---	---	1	993.1	----	1.3	1.2	0.1	1.0	0.9	0.1	60.23
(28, 29)	1	SOV	---	---	18	1601.2	----	34.0	25.2	8.8	26.3	19.5	6.8	48.09
(28, 29)	2	SOV	---	---	14	1880.3	----	32.9	25.3	7.6	25.3	19.5	5.8	49.67
(28, 29)	9	HOV	7	7	0	14.1	0.1	30.9	23.4	7.5	1.2	0.9	0.3	52.91
(29, 30)	1	SOV	---	---	13	1652.7	----	27.0	23.7	3.3	20.9	18.4	2.6	56.91
(29, 30)	2	SOV	---	---	13	1831.4	----	26.7	23.8	2.9	20.5	18.3	2.2	57.63
(29, 30)	9	HOV	7	8	0	15.2	0.0	24.3	22.0	2.3	1.0	0.9	0.1	63.31
(30, 31)	1	SOV	---	---	2	1693.9	----	10.1	9.2	0.9	7.8	7.1	0.7	59.03
(30, 31)	2	SOV	---	---	3	1791.3	----	10.1	9.2	0.9	7.8	7.1	0.7	59.02
(30, 31)	9	HOV	8	8	0	16.0	0.0	8.8	8.5	0.3	0.4	0.3	0.0	67.73
(31, 32)	1	SOV	---	---	3	1707.8	----	4.6	4.2	0.4	3.6	3.3	0.3	59.47
(31, 32)	2	SOV	---	---	2	1777.8	----	4.7	4.2	0.4	3.6	3.3	0.3	58.61
(31, 32)	9	HOV	8	8	0	16.0	0.0	4.0	3.9	0.1	0.2	0.2	0.0	67.84
(38, 52)	1	SOV	---	---	12	1822.4	----	18.9	10.4	8.5	14.7	8.0	6.6	35.48
(38, 52)	2	SOV	---	---	20	1472.9	----	47.3	10.3	37.0	33.6	7.3	26.2	14.20
(54, 55)	1	SOV	---	---	23	1748.8	----	48.9	26.3	22.5	38.0	20.5	17.5	35.01
(54, 55)	2	SOV	---	---	20	1976.3	----	45.2	26.5	18.7	34.7	20.4	14.4	37.90
(54, 55)	9	HOV	63	14	0	36.7	10.7	37.5	29.8	7.7	2.1	1.6	0.4	45.66

(55, 56)	1	SOV	---	---	3	1716.9	----	5.5	3.5	2.0	4.3	2.7	1.5	41.68
(55, 56)	2	SOV	---	---	4	1991.3	----	5.3	3.5	1.8	4.1	2.7	1.4	42.83
(55, 56)	9	HOV	14	14	0	28.0	0.0	4.4	3.4	1.1	0.2	0.1	0.0	51.68
(56, 57)	1	SOV	---	---	6	1728.8	----	11.9	7.9	4.0	9.3	6.1	3.1	43.22
(56, 57)	2	SOV	---	---	6	1978.6	----	11.7	8.0	3.7	9.0	6.2	2.9	44.02
(56, 57)	9	HOV	14	14	1	28.5	0.0	11.8	11.3	0.6	0.5	0.5	0.0	43.59
(57, 58)	1	SOV	---	---	17	1769.2	----	37.6	24.8	12.8	29.2	19.3	10.0	42.98
(57, 58)	2	SOV	---	---	20	1951.4	----	36.1	25.1	11.0	27.7	19.3	8.5	44.87
(57, 58)	9	HOV	14	14	0	28.0	0.0	37.5	36.0	1.5	1.5	1.4	0.1	43.13
(60, 61)	1	SOV	---	---	2	950.8	----	7.7	7.2	0.5	5.8	5.4	0.4	61.10
(60, 61)	2	SOV	---	---	1	1413.8	----	7.6	7.2	0.3	5.8	5.5	0.3	61.88
(62, 63)	1	SOV	---	---	1	993.8	----	1.3	1.3	0.1	1.0	1.0	0.1	61.21
(62, 63)	2	SOV	---	---	1	1396.0	----	1.4	1.3	0.1	1.0	1.0	0.1	59.80
(62, 63)	9	SOV	---	---	0	28.4	----	1.8	1.6	0.2	1.4	1.3	0.2	45.12
(63, 64)	1	SOV	---	---	2	424.5	----	15.6	14.8	0.9	11.8	11.1	0.7	62.17
(63, 64)	2	SOV	---	---	2	1229.9	----	16.2	14.9	1.4	12.2	11.2	1.0	59.88
(63, 64)	3	SOV	---	---	3	769.9	----	16.2	15.1	1.0	12.2	11.4	0.8	60.16
(65, 66)	1	SOV	---	---	1	1156.1	----	3.3	2.8	0.5	2.5	2.1	0.3	55.91
(65, 66)	2	SOV	---	---	3	1536.8	----	3.3	2.8	0.5	2.5	2.1	0.4	55.20
(65, 66)	9	SOV	---	---	0	77.6	----	4.0	3.5	0.5	3.1	2.7	0.4	45.40
(66, 67)	1	SOV	---	---	9	1099.8	----	27.3	24.7	2.6	21.2	19.2	2.0	59.41
(66, 67)	2	SOV	---	---	13	1418.8	----	27.7	25.1	2.6	20.4	18.5	1.9	58.55
(66, 67)	3	SOV	---	---	2	254.8	----	28.8	25.5	3.4	21.5	19.0	2.5	56.23
(68, 69)	1	SOV	---	---	2	957.2	----	7.0	6.6	0.4	5.5	5.1	0.3	61.44
(68, 69)	2	SOV	---	---	1	1074.3	----	7.1	6.7	0.4	5.4	5.1	0.3	61.19
(70, 71)	1	SOV	---	---	2	883.6	----	7.4	7.0	0.4	5.7	5.5	0.3	62.28
(70, 71)	2	SOV	---	---	2	1149.3	----	7.7	7.1	0.6	5.9	5.5	0.5	59.63
(72, 73)	1	SOV	---	---	2	1013.9	----	10.8	9.9	0.9	8.4	7.7	0.7	59.99
(72, 73)	2	SOV	---	---	2	1180.1	----	10.9	10.1	0.9	8.4	7.7	0.7	59.36
(72, 73)	9	SOV	---	---	0	17.7	----	13.6	11.8	1.8	10.5	9.1	1.4	47.70
(74, 75)	1	SOV	---	---	2	1178.0	----	11.3	10.3	1.1	8.8	8.0	0.8	59.49
(74, 75)	2	SOV	---	---	5	1282.9	----	11.4	10.5	0.9	8.7	8.1	0.7	59.34
(74, 75)	9	SOV	---	---	0	20.3	----	14.3	12.3	2.0	11.1	9.5	1.5	47.28
(75, 76)	1	SOV	---	---	4	1240.4	----	12.1	11.3	0.9	9.4	8.8	0.7	60.88
(75, 76)	2	SOV	---	---	2	1240.4	----	12.3	11.5	0.8	9.5	8.8	0.6	60.14
(76, 77)	1	SOV	---	---	5	1270.6	----	12.7	11.7	1.0	9.9	9.1	0.8	60.55
(76, 77)	2	SOV	---	---	4	1201.6	----	12.8	11.9	0.9	9.8	9.2	0.7	60.16
(78, 79)	1	SOV	---	---	0	1158.0	----	1.5	1.4	0.1	1.2	1.1	0.1	60.71
(78, 79)	2	SOV	---	---	0	1177.2	----	1.6	1.5	0.1	1.2	1.1	0.1	60.29
(79, 80)	1	SOV	---	---	5	1133.1	----	16.2	15.1	1.1	12.6	11.8	0.9	60.80
(79, 80)	2	SOV	---	---	3	1203.0	----	16.3	15.3	1.1	12.6	11.8	0.8	60.44
(80, 81)	1	SOV	---	---	4	1044.1	----	6.5	6.1	0.4	5.1	4.7	0.3	60.96
(80, 81)	2	SOV	---	---	2	1295.1	----	6.8	6.1	0.6	5.2	4.7	0.5	58.67
(83, 84)	1	SOV	---	---	4	842.8	----	20.8	19.6	1.2	16.2	15.3	0.9	61.57
(83, 84)	2	SOV	---	---	4	859.7	----	20.7	19.9	0.8	16.0	15.3	0.6	61.87
(81, 82)	1	SOV	---	---	11	1197.6	----	34.7	32.1	2.6	27.0	24.9	2.0	60.49

(81, 82)	2	SOV	---	---	11	1225.3	----	35.1	32.6	2.5	27.0	25.1	1.9	59.91
(81, 82)	9	SOV	---	---	0	1.6	----	45.3	40.0	5.2	34.9	30.8	4.0	46.39
(2, 3)	1	SOV	---	---	0	341.2	----	1.2	1.2	0.0	0.9	0.9	0.0	64.50
(2, 3)	2	SOV	---	---	0	404.8	----	1.2	1.2	0.0	0.9	0.9	0.0	63.65
(101, 3)	1	SOV	---	---	0	405.5	----	2.6	2.5	0.0	2.0	2.0	0.0	43.55
(3, 4)	1	SOV	---	---	5	595.6	----	20.9	19.7	1.3	16.2	15.2	1.0	60.93
(3, 4)	2	SOV	---	---	2	510.5	----	20.2	19.6	0.6	15.6	15.1	0.5	63.11
(3, 4)	9	SOV	---	---	0	12.4	----	27.7	24.8	2.9	21.3	19.1	2.3	46.04
(201, 7)	1	SOV	---	---	0	19.6	----	2.5	2.5	0.0	1.9	1.9	0.0	44.76
(204, 81)	1	SOV	---	---	1	84.7	----	2.6	2.6	0.0	2.0	2.0	0.0	43.34
(8, 9)	1	SOV	---	---	1	324.9	----	12.2	11.9	0.3	9.4	9.2	0.3	62.66
(8, 9)	2	SOV	---	---	0	712.1	----	12.2	11.8	0.5	9.4	9.1	0.4	62.45
(8, 9)	3	SOV	---	---	2	353.2	----	12.2	11.7	0.4	9.4	9.0	0.3	62.73
(202, 9)	1	SOV	---	---	0	41.9	----	2.5	2.5	0.0	2.0	1.9	0.0	44.12
(82, 83)	1	SOV	---	---	13	1124.4	----	21.5	18.9	2.6	16.7	14.7	2.0	57.19
(82, 83)	2	SOV	---	---	8	968.1	----	20.4	19.0	1.4	15.7	14.7	1.1	60.34
(82, 83)	9	SOV	---	---	0	329.5	----	22.3	20.2	2.1	17.2	15.6	1.6	55.20
(102, 4)	1	SOV	---	---	0	349.7	----	2.6	2.5	0.0	2.0	2.0	0.0	43.46
(77, 78)	1	SOV	---	---	4	1256.8	----	8.1	7.5	0.6	6.3	5.8	0.5	60.54
(77, 78)	2	SOV	---	---	2	1171.7	----	8.1	7.6	0.5	6.2	5.8	0.4	60.29
(77, 78)	9	SOV	---	---	1	32.0	----	8.1	7.3	0.9	6.3	5.6	0.7	60.18
(78, 203)	1	SOV	---	---	0	44.0	----	2.6	2.4	0.2	2.0	1.9	0.1	63.41
(78, 203)	2	SOV	---	---	0	80.0	----	2.7	2.6	0.1	2.0	2.0	0.1	61.40
(13, 14)	1	SOV	---	---	3	641.7	----	13.1	12.7	0.5	10.2	9.8	0.4	62.62
(13, 14)	2	SOV	---	---	3	594.1	----	13.0	12.7	0.3	10.0	9.8	0.3	63.09
(13, 14)	9	SOV	---	---	1	181.2	----	13.5	13.0	0.4	10.4	10.0	0.3	61.07
(16, 17)	1	SOV	---	---	0	462.5	----	1.9	1.8	0.1	1.4	1.4	0.1	62.51
(16, 17)	2	SOV	---	---	0	763.5	----	1.9	1.8	0.1	1.5	1.4	0.1	60.40
(301, 17)	1	SOV	---	---	1	262.2	----	2.6	2.6	0.0	2.0	2.0	0.0	43.37
(19, 20)	1	SOV	---	---	0	528.3	----	3.9	3.8	0.1	3.1	2.9	0.1	62.34
(19, 20)	2	SOV	---	---	0	925.3	----	4.1	3.8	0.3	3.2	2.9	0.2	59.87
(302, 20)	1	SOV	---	---	0	541.4	----	2.6	2.5	0.0	2.0	2.0	0.0	43.71
(21, 22)	1	SOV	---	---	6	996.1	----	29.9	28.6	1.3	23.1	22.1	1.0	61.94
(21, 22)	2	SOV	---	---	2	904.6	----	29.8	28.5	1.2	22.9	22.0	1.0	62.20
(21, 22)	9	SOV	---	---	0	54.4	----	30.6	29.6	1.0	23.6	22.8	0.8	60.63
(401, 26)	1	SOV	---	---	2	1190.3	----	2.6	2.5	0.1	2.0	2.0	0.1	42.39
(27, 28)	1	SOV	---	---	4	1490.3	----	16.6	11.7	4.9	12.9	9.1	3.8	46.02
(27, 28)	2	SOV	---	---	12	1924.2	----	22.5	11.9	10.6	17.3	9.1	8.1	34.06
(27, 28)	9	SOV	---	---	0	60.8	----	17.4	15.5	1.8	13.4	12.0	1.4	44.05
(412, 28)	1	SOV	---	---	0	14.0	----	4.4	3.4	1.1	0.2	0.1	0.0	50.26
(410, 411)	1	SOV	---	---	0	14.8	----	2.4	2.2	0.2	0.1	0.1	0.0	47.04
(411, 412)	1	SOV	---	---	0	14.0	----	11.2	7.7	3.4	0.4	0.3	0.1	48.57

(59, 60)	1	SOV	---	---	7	1604.9	----	16.2	13.1	3.1	12.0	9.7	2.3	51.31
(59, 60)	2	SOV	---	---	10	1563.7	----	14.6	12.8	1.8	11.3	9.9	1.4	56.74
(59, 60)	9	SOV	---	---	2	565.0	----	15.3	12.7	2.6	6.6	5.5	1.1	54.41
(60, 403)	1	SOV	---	---	0	703.7	----	2.6	2.5	0.1	1.2	1.2	0.1	62.33
(60, 403)	2	SOV	---	---	1	667.3	----	2.8	2.6	0.1	2.0	1.9	0.1	59.42
(404, 62)	1	SOV	---	---	1	64.5	----	2.6	2.6	0.0	2.0	2.0	0.0	43.63
(64, 65)	1	SOV	---	---	2	888.4	----	3.7	3.5	0.2	2.8	2.6	0.2	61.88
(64, 65)	2	SOV	---	---	3	1544.5	----	4.1	3.5	0.5	3.1	2.7	0.4	56.26
(405, 65)	1	SOV	---	---	0	376.9	----	2.6	2.5	0.1	2.0	1.9	0.1	42.91
(67, 68)	1	SOV	---	---	5	1311.6	----	24.8	22.0	2.8	18.9	16.8	2.2	57.94
(67, 68)	2	SOV	---	---	4	1193.2	----	23.9	22.3	1.7	18.1	16.8	1.3	60.04
(67, 68)	9	SOV	---	---	1	277.2	----	25.6	23.5	2.1	17.8	16.4	1.4	56.27
(71, 72)	1	SOV	---	---	0	833.4	----	1.3	1.2	0.1	1.0	0.9	0.1	62.02
(71, 72)	2	SOV	---	---	1	1200.4	----	1.3	1.2	0.1	1.0	0.9	0.1	58.42
(304, 72)	1	SOV	---	---	0	188.6	----	2.6	2.5	0.0	2.0	2.0	0.0	43.76
(73, 74)	1	SOV	---	---	1	924.5	----	9.7	9.2	0.5	7.5	7.2	0.4	62.34
(73, 74)	2	SOV	---	---	3	1301.1	----	10.1	9.3	0.8	7.8	7.2	0.6	59.52
(305, 74)	1	SOV	---	---	0	273.5	----	2.5	2.5	0.0	2.0	2.0	0.0	43.96
(203, 2031)	1	SOV	---	---	0	44.0	----	1.7	1.7	0.0	1.4	1.4	0.0	63.97
(203, 2031)	2	SOV	---	---	0	80.0	----	1.8	1.8	0.0	1.4	1.4	0.0	60.56
(83, 103)	1	SOV	---	---	0	720.0	----	2.6	2.5	0.1	2.0	1.9	0.1	43.77
(14, 300)	1	SOV	---	---	0	188.0	----	2.4	2.4	0.0	1.9	1.9	0.0	45.65
(22, 400)	1	SOV	---	---	0	178.0	----	2.4	2.4	0.0	1.9	1.9	0.0	45.84
(403, 4031)	1	SOV	---	---	0	704.0	----	1.8	1.8	0.0	0.9	0.9	0.0	61.94
(403, 4031)	2	SOV	---	---	0	668.0	----	1.9	1.9	0.0	1.4	1.4	0.0	58.85
(68, 303)	1	SOV	---	---	0	758.0	----	2.5	2.5	0.1	1.8	1.7	0.0	44.51
(33, 34)	1	SOV	---	---	3	1627.1	----	6.4	5.8	0.6	4.4	4.0	0.4	59.40
(33, 34)	2	SOV	---	---	4	1684.0	----	6.5	5.9	0.6	5.0	4.5	0.5	58.51
(33, 34)	9	SOV	---	---	1	153.6	----	6.4	6.2	0.3	3.8	3.7	0.2	59.04
(34, 500)	1	SOV	---	---	0	162.0	----	2.5	2.4	0.0	1.9	1.9	0.0	45.54
(504, 52)	1	SOV	---	---	1	207.1	----	2.6	2.6	0.0	2.0	2.0	0.0	42.69
(6, 7)	1	SOV	---	---	2	691.9	----	19.7	19.2	0.5	15.2	14.8	0.4	62.81
(6, 7)	2	SOV	---	---	3	673.3	----	19.6	19.0	0.7	15.1	14.6	0.5	63.09
(58, 59)	1	SOV	---	---	16	1823.6	----	21.7	14.2	7.5	16.9	11.0	5.8	42.77
(58, 59)	2	SOV	---	---	14	1892.2	----	19.3	14.5	4.9	14.9	11.1	3.8	48.07
(58, 59)	9	HOV	14	14	0	28.0	0.0	21.2	20.5	0.7	0.8	0.8	0.0	43.90
(32, 33)	1	SOV	---	---	16	1741.0	----	25.7	23.1	2.6	19.9	17.9	2.0	58.50
(32, 33)	2	SOV	---	---	17	1724.0	----	25.7	23.3	2.4	19.8	17.9	1.8	58.58
(32, 33)	9	HOV	8	8	0	16.0	0.0	21.7	21.4	0.3	0.9	0.9	0.0	69.23
(53, 54)	1	SOV	---	---	10	1710.1	----	15.4	6.3	9.1	11.9	4.9	7.0	27.08
(53, 54)	2	SOV	---	---	9	1894.0	----	14.6	6.5	8.1	10.9	4.8	6.0	28.58

(53, 54)	9	SOV	---	---	0	167.9	-----	8.8	6.9	1.9	1.7	1.3	0.4	47.00
(5, 6)	1	SOV	---	---	4	754.6	-----	12.7	12.4	0.3	9.8	9.6	0.2	63.04
(5, 6)	2	SOV	---	---	1	642.7	-----	12.5	12.3	0.2	9.6	9.4	0.2	64.01
(5, 6)	9	SOV	---	---	0	28.4	-----	13.1	13.0	0.1	10.1	10.0	0.1	61.10
(6, 200)	1	SOV	---	---	0	68.4	-----	2.4	2.4	0.0	1.9	1.9	0.0	46.20
(18, 19)	1	SOV	---	---	1	283.4	-----	8.2	7.9	0.3	6.3	6.1	0.3	62.06
(18, 19)	2	SOV	---	---	3	761.2	-----	8.4	7.8	0.6	6.5	6.0	0.4	60.46
(18, 19)	3	SOV	---	---	4	412.4	-----	8.5	7.9	0.6	6.6	6.1	0.5	59.65
(402, 27)	1	SOV	---	---	0	677.7	-----	2.6	2.5	0.0	2.0	2.0	0.0	43.08
(26, 27)	1	SOV	---	---	8	1312.1	-----	23.4	18.8	4.6	18.1	14.6	3.5	52.21
(26, 27)	2	SOV	---	---	12	1473.4	-----	29.2	18.6	10.6	22.5	14.3	8.2	41.85
(26, 27)	9	SOV	---	---	1	63.3	-----	27.7	24.3	3.4	21.5	18.8	2.6	44.07
(37, 35)	1	SOV	---	---	6	1665.5	-----	16.9	15.6	1.3	11.4	10.5	0.9	60.06
(37, 35)	2	SOV	---	---	7	1641.1	-----	17.3	15.8	1.5	13.0	11.9	1.1	58.67
(52, 53)	1	SOV	---	---	13	1736.6	-----	27.2	14.4	12.8	21.0	11.1	9.9	34.21
(52, 53)	2	SOV	---	---	20	1729.2	-----	46.8	14.4	32.4	33.8	10.4	23.4	19.92
(52, 53)	9	SOV	---	---	0	19.2	-----	25.2	24.8	0.4	19.5	19.2	0.3	36.99
(505, 53)	1	SOV	---	---	1	316.2	-----	2.6	2.5	0.1	0.9	0.9	0.0	42.54
(61, 62)	1	SOV	---	---	8	999.6	-----	22.0	21.1	1.0	16.7	15.9	0.7	62.76
(61, 62)	2	SOV	---	---	11	1366.5	-----	22.6	21.3	1.3	16.9	16.0	0.9	61.16
(69, 70)	1	SOV	---	---	2	951.4	-----	6.8	6.5	0.4	5.3	5.0	0.3	61.96
(69, 70)	2	SOV	---	---	2	1085.2	-----	6.9	6.6	0.4	5.3	5.0	0.3	61.28
(17, 36)	1	SOV	---	---	0	649.9	-----	4.8	4.2	0.6	3.7	3.3	0.5	56.88
(17, 36)	2	SOV	---	---	2	775.5	-----	4.6	4.2	0.4	3.5	3.3	0.3	59.71
(17, 36)	9	SOV	---	---	0	37.1	-----	6.0	5.0	0.9	4.6	3.9	0.7	45.79
(34, 37)	1	SOV	---	---	1	1639.1	-----	1.3	1.2	0.1	0.8	0.8	0.1	59.96
(34, 37)	2	SOV	---	---	0	1663.2	-----	1.3	1.2	0.1	1.0	0.9	0.1	58.65
(51, 38)	1	SOV	---	---	5	1935.9	-----	14.1	6.7	7.4	10.9	5.2	5.8	31.69
(51, 38)	2	SOV	---	---	13	1431.2	-----	31.5	6.5	25.0	22.5	4.7	17.8	14.21

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FRESIM CUMULATIVE VALUES OF FUEL CONSUMPTION

LINK	LINK TYPE	FUEL CONSUMPTION													
		GALLONS							M. P. G.						
VEHICLE TYPE-		1	2	3	4	5	6	7	1	2	3	4	5	6	7
(4, 5)	FRWY	2.76	5.06	0.80	0.21	0.02	0.00	0.00	26.12	32.98	4.75	10.99	52.27	0.00	0.00
(7, 8)	FRWY	1.45	2.36	0.48	0.18	0.04	0.03	0.00	17.89	24.67	3.08	5.83	3.81	4.82	0.00
(9, 10)	FRWY	0.32	0.56	0.09	0.02	0.01	0.00	0.00	30.99	40.89	5.75	16.02	11.13	98.78	0.00
(10, 11)	FRWY	1.03	1.84	0.32	0.10	0.02	0.00	0.00	29.51	38.26	5.46	11.42	12.49	100.69	0.00
(11, 12)	FRWY	1.45	2.47	0.50	0.17	0.04	0.00	0.00	31.73	43.39	5.42	10.81	10.35	104.12	0.00
(12, 13)	FRWY	1.33	2.42	0.45	0.11	0.00	0.00	0.00	32.90	41.39	5.65	14.84	97.82	106.65	0.00
(14, 15)	FRWY	1.12	1.97	0.47	0.12	0.06	0.03	0.00	19.70	25.58	2.84	7.31	4.26	4.29	0.00
(15, 16)	FRWY	1.78	3.14	0.73	0.21	0.09	0.04	0.00	20.21	27.04	3.08	6.90	4.44	5.40	0.00
(1, 2)	FRWY	1.26	2.04	0.62	0.08	0.01	0.00	0.00	28.27	36.42	4.46	14.76	98.02	0.00	0.00
(36, 18)	FRWY	0.31	0.57	0.08	0.05	0.01	0.00	0.00	13.86	19.65	2.83	5.00	5.22	6.63	0.00
(20, 21)	FRWY	4.32	8.68	1.31	0.62	0.14	0.05	0.00	23.97	30.81	4.38	8.15	9.68	15.08	0.00
(22, 23)	FRWY	0.29	0.51	0.10	0.05	0.01	0.00	0.00	17.54	26.39	3.15	5.98	4.35	0.00	0.00
(23, 24)	FRWY	0.50	0.92	0.16	0.04	0.00	0.00	0.00	30.81	43.25	5.28	16.53	94.70	0.00	0.00
(24, 25)	FRWY	1.98	3.89	0.66	0.16	0.01	0.00	0.00	31.75	42.34	5.35	19.31	97.46	0.00	0.00

(25, 26)	FRWY	0.15	0.30	0.04	0.01	0.00	0.00	0.00	35.82	45.42	6.94	20.92	97.36	0.00	0.00
(28, 29)	FRWY	15.12	31.00	5.57	1.66	0.68	0.11	0.42	13.19	18.12	2.62	6.01	7.39	8.45	7.61
(29, 30)	FRWY	11.09	18.46	3.92	1.37	0.72	0.18	0.25	16.76	28.73	3.48	6.83	6.37	6.77	12.85
(30, 31)	FRWY	2.42	5.74	0.79	0.31	0.12	0.02	0.01	29.52	35.92	6.72	12.21	13.70	21.20	134.32
(31, 32)	FRWY	1.28	2.77	0.41	0.18	0.14	0.04	0.00	25.72	34.29	5.93	9.29	5.60	6.02	134.48
(38, 52)	FRWY	8.02	16.64	4.14	1.58	1.27	0.27	0.22	8.28	13.28	2.34	3.53	2.79	2.10	2.55
(54, 55)	FRWY	19.56	43.11	10.07	3.10	2.71	0.34	1.00	9.84	14.91	2.52	4.46	4.12	7.59	6.64
(55, 56)	FRWY	2.31	5.09	1.36	0.42	0.23	0.06	0.11	11.01	16.74	2.47	4.43	6.43	6.19	8.16
(56, 57)	FRWY	6.00	11.56	2.88	1.10	0.87	0.16	0.29	9.63	16.67	2.63	3.79	3.73	5.28	7.18
(57, 58)	FRWY	14.71	33.68	7.98	2.00	1.39	0.32	0.85	12.46	17.94	2.99	6.34	7.20	8.46	7.37
(60, 61)	FRWY	1.84	3.36	1.50	0.39	0.26	0.08	0.02	18.86	32.75	3.13	7.02	5.14	4.82	8.63
(62, 63)	FRWY	0.31	0.74	0.30	0.09	0.07	0.02	0.00	18.84	26.34	2.99	4.55	3.69	4.06	130.32
(63, 64)	FRWY	4.50	9.41	3.48	0.92	0.71	0.20	0.01	16.62	24.69	3.10	6.17	4.60	4.19	38.03
(65, 66)	FRWY	1.26	2.39	0.76	0.15	0.14	0.03	0.01	12.91	21.05	3.03	7.10	5.60	4.48	13.08
(66, 67)	FRWY	10.93	20.81	7.96	1.93	1.64	0.24	0.18	13.23	21.28	2.51	4.90	4.10	4.53	5.08
(68, 69)	FRWY	2.08	3.68	1.66	0.35	0.17	0.05	0.00	13.59	23.46	2.37	5.38	6.46	5.11	0.00
(70, 71)	FRWY	0.95	2.10	0.97	0.24	0.20	0.00	0.00	31.45	44.11	4.35	8.52	6.59	91.62	0.00
(72, 73)	FRWY	2.02	4.45	1.51	0.32	0.24	0.00	0.00	22.90	31.78	4.31	9.65	8.21	96.47	0.00
(74, 75)	FRWY	2.43	5.49	1.52	0.25	0.12	0.06	0.00	22.66	29.77	5.06	13.50	20.05	12.70	0.00
(75, 76)	FRWY	3.95	7.35	2.78	0.55	0.48	0.18	0.00	15.28	24.37	3.02	6.68	5.61	4.61	0.00
(76, 77)	FRWY	3.78	7.61	2.95	0.55	0.48	0.17	0.00	16.52	24.41	2.97	7.02	5.71	5.07	0.00
(78, 79)	FRWY	0.44	0.88	0.35	0.07	0.06	0.02	0.00	16.32	24.32	2.98	6.88	5.60	5.23	0.00
(79, 80)	FRWY	4.50	8.83	3.59	0.69	0.62	0.20	0.00	17.18	25.31	2.99	6.73	5.75	5.55	0.00
(80, 81)	FRWY	1.70	3.35	1.43	0.33	0.30	0.08	0.00	18.58	26.89	2.85	5.68	4.94	5.57	0.00
(83, 84)	FRWY	4.60	8.62	4.01	0.88	0.62	0.24	0.00	16.34	24.20	2.67	5.48	5.70	5.98	0.00
(81, 82)	FRWY	10.65	20.62	7.46	1.83	1.49	0.43	0.00	16.16	23.91	3.00	5.35	5.20	5.33	0.00
(2, 3)	FRWY	0.07	0.11	0.03	0.00	0.00	0.00	0.00	34.47	44.77	5.37	28.52	99.68	0.00	0.00
(101, 3)	RAMP	0.06	0.10	0.00	0.00	0.00	0.00	0.00	30.15	39.06	0.00	9.47	71.77	0.00	0.00
(3, 4)	FRWY	2.58	4.10	0.54	0.13	0.06	0.00	0.00	23.87	31.85	5.91	13.38	16.80	0.00	0.00
(201, 7)	RAMP	0.00	0.01	0.00	0.00	0.00	0.00	0.00	24.36	30.55	0.00	0.00	0.00	0.00	0.00
(204, 81)	RAMP	0.02	0.02	0.00	0.00	0.00	0.00	0.00	14.76	34.96	6.20	0.00	0.00	0.00	0.00

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FRESIM CUMULATIVE VALUES OF FUEL CONSUMPTION

LINK	LINK TYPE	GALLONS							M. P. G.						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7
(8, 9)	FRWY	1.39	2.18	0.53	0.15	0.00	0.00	0.00	31.42	45.74	4.91	11.51	102.85	95.64	0.00
(202, 9)	RAMP	0.00	0.01	0.00	0.00	0.00	0.00	0.00	30.99	56.50	0.00	0.00	7.03	0.00	0.00
(82, 83)	FRWY	7.53	13.22	4.39	0.91	0.84	0.25	0.00	13.52	21.77	3.01	6.03	5.75	5.46	0.00
(102, 4)	RAMP	0.04	0.09	0.02	0.00	0.00	0.00	0.00	26.25	39.65	3.84	72.79	0.00	0.00	0.00
(77, 78)	FRWY	2.54	4.93	2.00	0.37	0.34	0.10	0.00	15.53	23.75	2.79	6.40	5.59	5.31	0.00
(78, 203)	RAMP	0.05	0.13	0.05	0.00	0.01	0.00	0.00	9.81	17.64	1.93	0.00	5.84	0.00	0.00
(13, 14)	FRWY	2.78	4.50	0.90	0.25	0.11	0.06	0.00	16.97	24.36	3.00	7.08	4.14	4.10	0.00
(16, 17)	FRWY	0.28	0.50	0.10	0.03	0.01	0.00	0.00	20.43	26.81	3.45	7.61	9.55	6.63	0.00
(301, 17)	RAMP	0.04	0.09	0.01	0.02	0.00	0.00	0.00	20.22	29.18	5.74	7.33	0.00	0.00	0.00
(19, 20)	FRWY	0.51	0.84	0.16	0.10	0.00	0.01	0.00	27.58	40.12	4.58	8.55	31.08	7.24	0.00
(302, 20)	RAMP	0.07	0.16	0.02	0.00	0.01	0.00	0.00	25.13	35.20	6.19	22.96	11.08	9.71	0.00
(21, 22)	FRWY	7.53	13.87	2.76	1.20	0.36	0.19	0.00	18.18	25.23	2.62	5.58	4.36	5.32	0.00
(401, 26)	RAMP	0.26	0.51	0.07	0.01	0.02	0.01	0.00	15.99	22.83	4.07	10.55	9.41	7.33	0.00
(27, 28)	FRWY	10.11	18.23	2.33	0.72	0.32	0.05	0.00	9.24	14.35	3.08	6.56	7.29	7.90	0.00
(412, 28)	RAMP	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	8.16
(410, 411)	RAMP	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	6.00
(411, 412)	RAMP	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	6.95
(59, 60)	FRWY	9.42	17.15	4.64	1.14	0.94	0.23	0.51	9.96	17.98	2.60	5.57	5.58	5.95	6.25
(60, 403)	RAMP	0.46	0.97	0.29	0.04	0.10	0.03	0.08	13.58	23.31	2.73	7.27	5.77	4.97	7.47
(404, 62)	RAMP	0.01	0.01	0.01	0.00	0.00	0.00	0.00	48.48	58.65	8.75	0.00	0.00	0.00	0.00
(64, 65)	FRWY	0.96	1.98	0.81	0.21	0.15	0.05	0.01	18.67	27.73	3.22	6.36	5.32	4.36	11.52
(405, 65)	RAMP	0.07	0.18	0.04	0.00	0.01	0.00	0.00	17.65	20.76	3.70	0.00	8.92	0.00	0.00
(67, 68)	FRWY	9.59	17.89	5.86	1.33	0.78	0.17	0.12	13.36	22.05	3.05	6.30	6.75	4.75	6.60
(71, 72)	FRWY	0.16	0.38	0.15	0.03	0.03	0.00	0.00	30.92	41.28	4.95	9.45	6.54	93.95	0.00
(304, 72)	RAMP	0.01	0.04	0.01	0.00	0.00	0.00	0.00	57.40	47.48	8.64	72.42	17.29	0.00	0.00
(73, 74)	FRWY	1.49	3.23	1.35	0.21	0.09	0.00	0.00	28.94	40.75	4.60	13.45	21.00	93.85	0.00

(305, 74)	RAMP	0.03	0.06	0.04	0.00	0.00	0.01	0.00	37.32	42.97	4.18	9.08	7.30	8.67	0.00
(203, 2031)	RAMP	0.02	0.06	0.02	0.00	0.00	0.00	0.00	13.50	22.26	3.62	0.00	10.50	0.00	0.00
(83, 103)	RAMP	0.16	0.28	0.10	0.02	0.02	0.00	0.00	16.65	29.11	2.16	3.61	7.35	0.00	0.00
(14, 300)	RAMP	0.02	0.04	0.01	0.01	0.00	0.00	0.00	36.58	51.68	4.47	3.24	0.00	0.00	0.00
(22, 400)	RAMP	0.02	0.03	0.00	0.00	0.00	0.01	0.00	42.30	54.72	0.00	8.58	0.00	7.14	0.00
(403, 4031)	RAMP	0.21	0.47	0.11	0.01	0.04	0.01	0.03	21.44	32.23	4.52	13.90	9.55	8.87	14.33
(68, 303)	RAMP	0.15	0.27	0.10	0.05	0.02	0.00	0.01	17.69	30.95	3.59	3.36	4.99	0.00	4.20
(33, 34)	FRWY	2.36	4.18	0.72	0.22	0.08	0.03	0.01	18.70	31.35	4.58	10.78	14.10	11.08	79.36
(34, 500)	RAMP	0.01	0.03	0.01	0.00	0.00	0.00	0.00	43.99	49.67	4.94	22.53	66.29	0.00	0.00
(504, 52)	RAMP	0.04	0.09	0.01	0.00	0.00	0.00	0.00	21.87	23.11	5.28	0.00	0.00	7.10	0.00
(6, 7)	FRWY	3.56	5.88	1.25	0.45	0.09	0.02	0.00	19.73	26.87	3.12	5.60	3.75	4.90	0.00
(58, 59)	FRWY	9.09	17.57	4.13	0.94	0.79	0.20	0.25	11.61	19.72	3.29	7.85	7.47	7.93	14.69
(32, 33)	FRWY	7.97	15.08	2.15	0.78	0.52	0.28	0.02	22.41	34.35	6.23	12.21	8.68	4.48	137.38
(53, 54)	FRWY	4.95	10.88	2.12	0.64	0.54	0.09	0.40	9.48	14.35	3.11	5.47	5.13	6.27	4.08
(5, 6)	FRWY	2.42	4.04	0.95	0.29	0.14	0.00	0.00	19.42	26.42	2.57	5.37	4.66	0.00	0.00
(6, 200)	RAMP	0.01	0.01	0.00	0.00	0.01	0.00	0.00	49.82	61.89	0.00	0.00	7.79	0.00	0.00
(18, 19)	FRWY	2.05	3.15	0.70	0.48	0.06	0.02	0.00	14.27	22.13	2.29	3.55	5.10	6.23	0.00
(402, 27)	RAMP	0.12	0.33	0.14	0.02	0.01	0.00	0.00	16.79	21.78	2.64	3.82	8.39	0.00	0.00
(26, 27)	FRWY	11.52	18.57	3.17	1.23	0.49	0.24	0.00	11.01	18.26	2.47	4.96	6.26	2.86	0.00

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FRESIM CUMULATIVE VALUES OF FUEL CONSUMPTION

LINK	LINK TYPE	FUEL CONSUMPTION							M. P. G.						
		GALLONS													
VEHICLE TYPE-		1	2	3	4	5	6	7	1	2	3	4	5	6	7
(37, 35)	FRWY	4.51	10.23	1.46	0.47	0.10	0.01	0.16	25.07	32.56	5.88	12.60	28.96	107.25	14.58
(52, 53)	FRWY	12.88	24.92	6.19	2.01	1.80	0.26	0.28	7.63	13.04	2.24	3.74	2.82	4.04	2.93
(505, 53)	RAMP	0.12	0.19	0.03	0.00	0.01	0.00	0.06	8.09	15.30	3.42	0.00	7.35	7.20	4.80
(61, 62)	FRWY	3.12	7.55	2.80	0.85	0.23	0.02	0.05	32.49	43.03	5.00	9.50	19.23	52.75	14.08
(69, 70)	FRWY	1.67	3.28	1.63	0.43	0.25	0.04	0.00	16.43	25.93	2.40	4.40	4.37	5.16	0.00
(17, 36)	FRWY	1.09	1.85	0.30	0.16	0.03	0.01	0.00	14.46	20.38	3.10	5.68	5.18	6.63	0.00
(34, 37)	FRWY	0.39	0.73	0.14	0.03	0.01	0.00	0.00	21.96	34.42	4.79	15.04	19.33	108.81	126.11
(51, 38)	FRWY	5.39	10.97	2.98	0.96	0.80	0.14	0.12	8.22	13.32	2.12	4.00	2.94	2.74	3.24
SUBNETWORK-		288.44	560.62	144.48	40.34	26.38	6.21	5.70	15.20	22.57	3.11	6.27	5.74	6.22	8.31

VEHICLE TYPES 1, 2 = AUTO, VEHICLE TYPES 3, 4, 5, 6 = TRUCK, VEHICLE TYPE 7 = TRANSIT BUS

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FRESIM CUMULATIVE VALUES OF EMISSION

LINK	LINK TYPE	VEHICLE EMISSIONS (GRAMS/ MILE)						
		HC						
VEHICLE TYPE-		1	2	3	4	5	6	7
(4, 5)	FRWY	0.18	0.20	15.20	13.43	11.85	0.00	0.00
(7, 8)	FRWY	0.13	0.13	11.88	9.01	12.59	7.00	0.00
(9, 10)	FRWY	0.12	0.12	13.35	10.33	14.36	8.40	0.00
(10, 11)	FRWY	0.14	0.15	12.80	13.69	15.05	8.89	0.00
(11, 12)	FRWY	0.11	0.11	13.47	14.65	16.90	9.70	0.00
(12, 13)	FRWY	0.10	0.12	13.02	12.04	11.70	9.49	0.00
(14, 15)	FRWY	0.09	0.11	12.86	7.12	10.56	8.30	0.00
(15, 16)	FRWY	0.10	0.09	11.65	7.45	9.65	6.66	0.00
(1, 2)	FRWY	0.15	0.16	17.26	13.32	11.25	0.00	0.00
(36, 18)	FRWY	0.23	0.30	12.78	9.64	7.79	5.51	0.00
(20, 21)	FRWY	0.21	0.23	15.94	16.83	14.13	9.41	0.00
(22, 23)	FRWY	0.13	0.11	11.63	9.09	10.00	0.00	0.00
(23, 24)	FRWY	0.13	0.11	14.36	11.25	10.19	0.00	0.00
(24, 25)	FRWY	0.12	0.12	14.14	10.69	10.61	0.00	0.00
(25, 26)	FRWY	0.10	0.13	11.18	7.14	5.30	0.00	0.00
(28, 29)	FRWY	0.18	0.32	13.58	7.13	5.03	5.02	0.00
(29, 30)	FRWY	0.31	0.26	17.04	18.69	16.38	13.44	0.00
(30, 31)	FRWY	0.16	0.19	10.96	13.32	12.22	8.27	0.00
(31, 32)	FRWY	0.18	0.20	11.95	15.78	19.17	16.69	0.00
(38, 52)	FRWY	0.30	0.32	15.22	10.15	8.48	10.43	0.00
(54, 55)	FRWY	0.26	0.40	13.42	8.49	6.52	5.13	0.00

(55, 56)	FRWY	0.24	0.36	14.09	9.06	5.18	5.40	0.00
(56, 57)	FRWY	0.39	0.40	13.69	10.89	6.89	5.47	0.00
(57, 58)	FRWY	0.21	0.33	11.58	6.96	4.82	4.80	0.00
(60, 61)	FRWY	0.25	0.20	19.31	18.44	20.09	18.84	0.00
(62, 63)	FRWY	0.12	0.12	12.44	11.66	11.14	9.87	0.00
(63, 64)	FRWY	0.16	0.16	11.58	8.78	9.48	8.92	0.00
(65, 66)	FRWY	0.27	0.27	12.02	7.49	7.45	7.91	0.00
(66, 67)	FRWY	0.25	0.25	15.35	10.22	8.31	7.86	0.00
(68, 69)	FRWY	0.23	0.17	16.07	9.22	6.06	6.58	0.00
(70, 71)	FRWY	0.13	0.11	16.87	16.88	16.90	6.89	0.00
(72, 73)	FRWY	0.23	0.22	16.31	15.52	15.32	7.95	0.00
(74, 75)	FRWY	0.25	0.25	13.91	11.57	11.33	11.14	0.00
(75, 76)	FRWY	0.19	0.17	12.21	7.88	7.40	7.54	0.00
(76, 77)	FRWY	0.17	0.17	12.34	7.48	7.19	6.84	0.00
(78, 79)	FRWY	0.17	0.16	12.11	7.49	7.27	6.68	0.00
(79, 80)	FRWY	0.15	0.14	12.14	7.78	7.01	6.28	0.00
(80, 81)	FRWY	0.13	0.12	13.16	9.17	7.75	6.22	0.00
(83, 84)	FRWY	0.16	0.15	13.96	8.93	7.04	5.74	0.00
(81, 82)	FRWY	0.17	0.18	12.35	9.60	7.84	6.43	0.00
(2, 3)	FRWY	0.07	0.09	14.12	8.91	11.77	0.00	0.00
(101, 3)	RAMP	0.11	0.12	0.00	14.13	5.87	0.00	0.00
(3, 4)	FRWY	0.20	0.21	12.68	13.82	13.76	0.00	0.00
(201, 7)	RAMP	0.04	0.05	0.00	0.00	0.00	0.00	0.00
(204, 81)	RAMP	0.15	0.03	4.66	0.00	0.00	0.00	0.00

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FRESIM CUMULATIVE VALUES OF EMISSION

LINK	LINK TYPE	VEHICLE EMISSIONS (GRAMS/ MILE)						
		HC						
VEHICLE TYPE--		1	2	3	4	5	6	7
(8, 9)	FRWY	0.12	0.09	14.92	14.21	12.80	7.79	0.00
(202, 9)	RAMP	0.08	0.04	0.00	0.00	14.85	0.00	0.00
(82, 83)	FRWY	0.25	0.25	12.17	7.89	7.07	6.25	0.00
(102, 4)	RAMP	0.13	0.11	16.72	5.06	0.00	0.00	0.00
(77, 78)	FRWY	0.19	0.18	13.12	7.94	7.28	6.59	0.00
(78, 203)	RAMP	0.40	0.36	20.67	0.00	6.83	0.00	0.00
(13, 14)	FRWY	0.14	0.15	12.17	7.48	11.34	9.22	0.00
(16, 17)	FRWY	0.10	0.11	10.44	6.76	4.28	5.51	0.00
(301, 17)	RAMP	0.09	0.07	5.06	6.57	0.00	0.00	0.00
(19, 20)	FRWY	0.17	0.14	16.66	16.13	8.91	13.47	0.00
(302, 20)	RAMP	0.14	0.14	9.41	7.97	10.72	10.01	0.00
(21, 22)	FRWY	0.13	0.14	14.85	9.62	9.87	6.45	0.00
(401, 26)	RAMP	0.27	0.30	15.72	12.29	11.20	12.37	0.00
(27, 28)	FRWY	0.29	0.44	11.35	6.68	4.94	5.03	0.00
(412, 28)	RAMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(410, 411)	RAMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(411, 412)	RAMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(59, 60)	FRWY	0.57	0.49	19.80	17.88	16.29	15.50	0.00
(60, 403)	RAMP	0.39	0.34	21.72	17.61	18.12	18.38	0.00
(404, 62)	RAMP	0.04	0.02	6.83	0.00	0.00	0.00	0.00
(64, 65)	FRWY	0.15	0.14	11.45	8.42	8.03	8.25	0.00
(405, 65)	RAMP	0.11	0.21	8.88	0.00	4.94	0.00	0.00
(67, 68)	FRWY	0.26	0.25	12.06	7.92	5.91	7.32	0.00
(71, 72)	FRWY	0.12	0.13	14.48	15.11	17.49	7.47	0.00
(304, 72)	RAMP	0.02	0.07	5.36	4.39	7.97	0.00	0.00
(73, 74)	FRWY	0.17	0.14	15.77	12.99	11.23	6.75	0.00
(305, 74)	RAMP	0.07	0.09	15.43	14.93	12.46	12.26	0.00
(203, 2031)	RAMP	0.28	0.29	11.00	0.00	3.78	0.00	0.00
(83, 103)	RAMP	0.19	0.19	16.96	11.18	4.85	0.00	0.00
(14, 300)	RAMP	0.10	0.10	7.59	12.37	0.00	0.00	0.00
(22, 400)	RAMP	0.08	0.10	0.00	6.12	0.00	4.77	0.00
(403, 4031)	RAMP	0.24	0.24	12.44	9.76	10.75	10.15	0.00
(68, 303)	RAMP	0.19	0.17	10.32	11.87	5.46	0.00	0.00

(33, 34)	FRWY	0.27	0.23	13.57	14.39	13.10	15.62	0.00
(34, 500)	RAMP	0.09	0.13	13.09	6.75	0.56	0.00	0.00
(504, 52)	RAMP	0.08	0.15	5.70	0.00	0.00	4.78	0.00
(6, 7)	FRWY	0.10	0.09	11.74	9.45	13.08	6.88	0.00
(58, 59)	FRWY	0.46	0.42	16.55	13.14	12.15	11.50	0.00
(32, 33)	FRWY	0.22	0.20	10.62	13.30	16.67	21.38	0.00
(53, 54)	FRWY	0.25	0.39	10.71	6.77	5.48	5.42	0.00
(5, 6)	FRWY	0.10	0.09	15.03	9.70	10.15	0.00	0.00
(6, 200)	RAMP	0.07	0.09	0.00	0.00	3.36	0.00	0.00
(18, 19)	FRWY	0.21	0.21	17.02	13.07	8.04	5.76	0.00
(402, 27)	RAMP	0.13	0.18	13.19	11.73	4.77	0.00	0.00
(26, 27)	FRWY	0.34	0.37	15.18	8.63	6.32	6.91	0.00

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FRESIM CUMULATIVE VALUES OF EMISSION

LINK	LINK TYPE	VEHICLE EMISSIONS (GRAMS/ MILE)						
		HC						
VEHICLE TYPE--		1	2	3	4	5	6	7
(37, 35)	FRWY	0.21	0.23	12.57	13.68	11.04	10.45	0.00
(52, 53)	FRWY	0.38	0.40	15.67	9.61	8.46	6.00	0.00
(505, 53)	RAMP	0.42	0.38	10.06	0.00	4.88	4.77	0.00
(61, 62)	FRWY	0.11	0.12	14.90	16.05	12.18	9.24	0.00
(69, 70)	FRWY	0.16	0.12	16.28	11.16	8.06	6.54	0.00
(17, 36)	FRWY	0.21	0.26	11.66	8.38	7.87	5.51	0.00
(34, 37)	FRWY	0.22	0.20	13.09	12.40	11.72	8.49	0.00
(51, 38)	FRWY	0.29	0.31	16.09	8.61	8.36	8.19	0.00
SUBNETWORK--		0.22	0.25	13.85	10.88	9.25	8.36	0.00

VEHICLE TYPES 1, 2 = AUTO, VEHICLE TYPES 3, 4, 5, 6 = TRUCK, VEHICLE TYPE 7 = TRANSIT BUS

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FRESIM CUMULATIVE VALUES OF EMISSION

LINK	LINK TYPE	VEHICLE EMISSIONS (GRAMS/ MILE)						
		CO						
VEHICLE TYPE--		1	2	3	4	5	6	7
(4, 5)	FRWY	11.83	13.76	298.77	252.09	220.16	0.00	0.00
(7, 8)	FRWY	7.19	7.63	222.90	156.89	235.06	111.96	0.00
(9, 10)	FRWY	6.34	6.38	260.26	195.89	264.37	141.57	0.00
(10, 11)	FRWY	8.62	9.06	248.55	261.49	283.88	151.82	0.00
(11, 12)	FRWY	6.35	5.37	262.06	282.55	329.78	169.56	0.00
(12, 13)	FRWY	4.86	6.85	253.66	227.00	216.52	168.69	0.00
(14, 15)	FRWY	4.06	6.15	241.48	116.91	189.20	139.42	0.00
(15, 16)	FRWY	4.42	4.08	215.25	122.15	168.90	108.82	0.00
(1, 2)	FRWY	9.82	11.04	344.75	252.29	204.73	0.00	0.00
(36, 18)	FRWY	15.80	22.47	238.19	168.55	128.30	82.18	0.00
(20, 21)	FRWY	14.82	16.74	317.31	328.05	263.25	161.62	0.00
(22, 23)	FRWY	7.82	5.74	218.23	159.08	176.65	0.00	0.00
(23, 24)	FRWY	7.62	5.94	283.04	211.89	180.59	0.00	0.00
(24, 25)	FRWY	6.67	6.60	277.98	197.19	191.44	0.00	0.00
(25, 26)	FRWY	4.58	6.86	220.87	134.90	90.93	0.00	0.00
(28, 29)	FRWY	9.98	23.73	249.21	110.40	73.45	69.11	0.00
(29, 30)	FRWY	23.55	18.81	342.43	366.69	309.32	237.00	0.00
(30, 31)	FRWY	9.60	12.61	205.41	257.31	227.89	139.86	0.00
(31, 32)	FRWY	12.04	13.66	225.46	316.30	387.24	322.81	0.00
(38, 52)	FRWY	19.77	22.12	280.26	158.24	126.30	149.44	0.00
(54, 55)	FRWY	15.51	30.17	236.49	132.15	94.57	71.07	0.00
(55, 56)	FRWY	14.11	27.31	254.55	145.63	74.07	75.61	0.00
(56, 57)	FRWY	29.72	30.84	254.23	183.99	105.79	77.20	0.00
(57, 58)	FRWY	12.04	24.01	208.17	109.70	69.11	67.28	0.00
(60, 61)	FRWY	18.98	13.85	396.65	362.19	403.40	366.46	0.00
(62, 63)	FRWY	6.86	6.73	236.44	217.91	201.05	173.51	0.00
(63, 64)	FRWY	10.42	10.41	214.45	152.44	165.78	152.62	0.00
(65, 66)	FRWY	19.58	19.93	224.82	126.84	123.63	131.08	0.00

(66, 67)	FRWY	18.52	18.50	299.81	181.67	137.60	129.93	0.00
(68, 69)	FRWY	16.40	11.82	310.80	157.06	93.19	103.98	0.00
(70, 71)	FRWY	6.83	5.49	338.37	329.08	322.49	109.94	0.00
(72, 73)	FRWY	16.11	15.88	324.45	300.06	291.39	131.67	0.00
(74, 75)	FRWY	17.63	18.69	271.63	217.26	205.95	195.65	0.00
(75, 76)	FRWY	12.75	11.09	230.97	134.34	125.08	123.65	0.00
(76, 77)	FRWY	10.86	11.01	231.77	123.61	117.41	109.11	0.00
(78, 79)	FRWY	10.69	10.60	225.01	122.47	117.76	105.63	0.00
(79, 80)	FRWY	9.11	8.67	226.77	128.43	112.97	97.36	0.00
(80, 81)	FRWY	7.14	6.58	251.54	158.77	127.10	96.26	0.00
(83, 84)	FRWY	10.09	9.68	265.72	150.46	113.87	87.66	0.00
(81, 82)	FRWY	11.19	12.04	233.93	169.90	130.38	100.96	0.00
(2, 3)	FRWY	2.76	3.82	279.36	162.30	216.45	0.00	0.00
(101, 3)	RAMP	7.63	8.94	0.00	248.87	89.17	0.00	0.00
(3, 4)	FRWY	14.27	15.00	242.52	260.54	258.15	0.00	0.00
(201, 7)	RAMP	1.25	1.39	0.00	0.00	0.00	0.00	0.00
(204, 81)	RAMP	11.20	1.08	68.42	0.00	0.00	0.00	0.00

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FRESIM CUMULATIVE VALUES OF EMISSION

LINK	LINK TYPE	VEHICLE EMISSIONS (GRAMS/ MILE)						
		CO						
VEHICLE TYPE-		1	2	3	4	5	6	7
(8, 9)	FRWY	6.45	3.70	291.79	272.56	240.12	128.30	0.00
(202, 9)	RAMP	2.68	1.09	0.00	0.00	265.61	0.00	0.00
(82, 83)	FRWY	17.85	18.54	228.44	132.08	115.70	97.83	0.00
(102, 4)	RAMP	10.38	7.72	313.44	73.76	0.00	0.00	0.00
(77, 78)	FRWY	12.28	12.13	246.19	132.39	118.20	103.61	0.00
(78, 203)	RAMP	33.24	30.40	412.92	0.00	108.37	0.00	0.00
(13, 14)	FRWY	8.48	9.32	228.05	126.93	207.24	158.83	0.00
(16, 17)	FRWY	4.69	5.95	193.53	111.25	70.77	82.18	0.00
(301, 17)	RAMP	5.76	4.65	75.31	102.43	0.00	0.00	0.00
(19, 20)	FRWY	10.83	7.94	331.07	310.38	156.83	241.73	0.00
(302, 20)	RAMP	10.91	10.71	167.29	129.65	183.30	176.93	0.00
(21, 22)	FRWY	7.31	8.23	291.64	170.54	173.67	102.98	0.00
(401, 26)	RAMP	22.53	25.40	294.48	209.54	190.61	209.25	0.00
(27, 28)	FRWY	18.07	34.58	205.80	103.98	72.91	68.88	0.00
(412, 28)	RAMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(410, 411)	RAMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(411, 412)	RAMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(59, 60)	FRWY	47.00	38.83	400.28	340.92	304.85	284.90	0.00
(404, 403)	RAMP	31.02	26.67	451.91	333.57	351.04	356.45	0.00
(404, 62)	RAMP	0.97	0.83	114.00	0.00	0.00	0.00	0.00
(64, 65)	FRWY	8.85	7.63	216.14	144.41	136.31	138.10	0.00
(405, 65)	RAMP	7.64	16.72	151.93	0.00	72.81	0.00	0.00
(67, 68)	FRWY	18.73	17.92	227.31	133.70	93.75	118.63	0.00
(71, 72)	FRWY	6.23	7.13	288.53	296.72	337.51	121.63	0.00
(304, 72)	RAMP	0.69	4.58	79.29	62.66	132.73	0.00	0.00
(73, 74)	FRWY	10.55	8.30	310.13	246.31	203.71	111.41	0.00
(305, 74)	RAMP	4.44	5.71	290.47	267.30	212.30	214.17	0.00
(203, 2031)	RAMP	22.15	22.98	219.00	0.00	58.95	0.00	0.00
(83, 103)	RAMP	12.07	11.91	318.00	188.26	70.01	0.00	0.00
(14, 300)	RAMP	2.77	3.58	133.62	210.39	0.00	0.00	0.00
(22, 400)	RAMP	1.81	2.75	0.00	104.25	0.00	69.01	0.00
(403, 4031)	RAMP	17.15	16.57	257.24	183.19	206.94	195.60	0.00
(68, 303)	RAMP	12.31	10.06	195.52	201.20	80.46	0.00	0.00
(33, 34)	FRWY	20.24	16.16	264.44	280.59	251.56	310.36	0.00
(34, 500)	RAMP	2.00	6.04	253.40	113.51	6.43	0.00	0.00
(504, 52)	RAMP	5.36	11.69	89.12	0.00	0.00	69.23	0.00
(6, 7)	FRWY	4.69	3.93	221.17	166.23	246.77	109.58	0.00
(58, 59)	FRWY	36.24	32.17	324.41	241.01	215.10	194.93	0.00
(32, 33)	FRWY	15.02	13.42	198.24	257.10	331.61	435.23	0.00
(53, 54)	FRWY	14.97	28.86	186.11	102.39	78.73	75.54	0.00

(5, 6)	FRWY	5.08	4.32	294.22	172.37	186.86	0.00	0.00
(6, 200)	RAMP	0.40	1.97	0.00	0.00	54.84	0.00	0.00
(18, 19)	FRWY	14.72	15.06	334.02	235.81	133.72	86.94	0.00
(402, 27)	RAMP	10.04	14.27	237.46	203.04	69.23	0.00	0.00
(26, 27)	FRWY	25.00	28.37	290.78	144.85	100.29	101.25	0.00

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FRESIM CUMULATIVE VALUES OF EMISSION

LINK	LINK TYPE	VEHICLE EMISSIONS (GRAMS/ MILE)						
		CO						
VEHICLE TYPE-		1	2	3	4	5	6	7
(37, 35)	FRWY	14.60	15.95	239.25	261.26	202.58	189.96	0.00
(52, 53)	FRWY	26.98	29.37	285.64	151.80	127.10	85.44	0.00
(505, 53)	RAMP	37.61	32.57	179.09	0.00	70.55	68.55	0.00
(61, 62)	FRWY	6.02	6.36	294.85	312.89	225.43	159.76	0.00
(69, 70)	FRWY	10.15	7.06	320.73	199.33	132.62	102.99	0.00
(17, 36)	FRWY	14.63	19.05	216.93	141.46	129.87	82.18	0.00
(34, 37)	FRWY	15.55	13.10	255.30	238.82	219.59	156.40	0.00
(51, 38)	FRWY	19.89	21.59	286.55	129.40	122.82	116.81	0.00
SUBNETWORK-		15.10	17.76	263.33	194.83	159.71	139.81	0.00

VEHICLE TYPES 1, 2 = AUTO, VEHICLE TYPES 3, 4, 5, 6 = TRUCK, VEHICLE TYPE 7 = TRANSIT BUS

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FRESIM CUMULATIVE VALUES OF EMISSION

LINK	LINK TYPE	VEHICLE EMISSIONS (GRAMS/ MILE)						
		NO						
VEHICLE TYPE-		1	2	3	4	5	6	7
(4, 5)	FRWY	1.01	0.98	34.95	32.66	29.54	0.00	0.00
(7, 8)	FRWY	0.88	0.85	29.03	24.05	31.09	20.36	0.00
(9, 10)	FRWY	0.86	0.83	30.89	24.57	36.81	23.48	0.00
(10, 11)	FRWY	0.89	0.86	29.76	32.76	36.78	24.46	0.00
(11, 12)	FRWY	0.85	0.78	31.28	34.58	39.59	26.03	0.00
(12, 13)	FRWY	0.81	0.81	30.21	29.25	29.36	24.88	0.00
(14, 15)	FRWY	0.84	0.82	31.54	20.24	27.49	23.26	0.00
(15, 16)	FRWY	0.78	0.77	29.11	21.24	25.83	18.69	0.00
(1, 2)	FRWY	0.97	0.95	39.11	32.36	28.82	0.00	0.00
(36, 18)	FRWY	1.10	1.11	31.47	25.81	22.21	14.46	0.00
(20, 21)	FRWY	1.04	1.00	35.67	39.22	35.22	25.75	0.00
(22, 23)	FRWY	0.86	0.77	28.21	24.27	26.59	0.00	0.00
(23, 24)	FRWY	0.83	0.77	32.86	27.34	26.91	0.00	0.00
(24, 25)	FRWY	0.81	0.77	32.44	26.53	27.38	0.00	0.00
(25, 26)	FRWY	0.64	0.65	25.11	16.65	13.84	0.00	0.00
(28, 29)	FRWY	1.23	1.22	34.09	20.05	12.11	9.21	0.00
(29, 30)	FRWY	1.10	0.97	37.80	43.37	39.98	35.79	0.00
(30, 31)	FRWY	0.79	0.80	26.65	31.30	30.27	22.82	0.00
(31, 32)	FRWY	0.80	0.81	28.93	35.16	42.79	39.85	0.00
(38, 52)	FRWY	1.45	1.30	36.96	28.40	21.92	23.21	0.00
(54, 55)	FRWY	1.51	1.47	34.01	23.50	15.79	9.66	0.00
(55, 56)	FRWY	1.38	1.33	35.34	25.17	11.59	10.77	0.00
(56, 57)	FRWY	1.47	1.33	33.27	29.90	18.18	11.30	0.00
(57, 58)	FRWY	1.20	1.22	28.76	18.82	10.76	9.41	0.00
(60, 61)	FRWY	1.02	0.89	41.49	42.76	45.02	44.28	0.00
(62, 63)	FRWY	0.77	0.74	29.81	28.82	28.70	26.33	0.00
(63, 64)	FRWY	0.88	0.81	28.82	23.57	25.31	24.49	0.00
(65, 66)	FRWY	1.09	1.01	29.41	20.56	20.44	22.43	0.00
(66, 67)	FRWY	1.08	0.99	35.63	26.81	22.90	22.33	0.00
(68, 69)	FRWY	1.08	0.90	37.88	25.59	17.09	19.52	0.00
(70, 71)	FRWY	0.80	0.74	37.65	39.38	40.76	20.18	0.00
(72, 73)	FRWY	1.06	0.95	36.69	36.61	37.05	22.51	0.00
(74, 75)	FRWY	1.06	1.00	32.03	28.13	29.03	29.82	0.00
(75, 76)	FRWY	0.95	0.83	29.46	21.26	20.12	21.53	0.00
(76, 77)	FRWY	0.86	0.83	29.97	21.16	20.41	19.90	0.00

(78, 79)	FRWY	0.88	0.83	30.05	21.30	20.80	19.51	0.00
(79, 80)	FRWY	0.84	0.79	29.87	22.09	20.11	18.25	0.00
(80, 81)	FRWY	0.76	0.72	31.35	24.81	22.22	18.21	0.00
(83, 84)	FRWY	0.92	0.87	33.54	24.90	20.02	16.12	0.00
(81, 82)	FRWY	0.89	0.85	29.73	25.24	22.07	18.79	0.00
(2, 3)	FRWY	0.81	0.81	32.20	22.43	29.75	0.00	0.00
(101, 3)	RAMP	0.56	0.53	0.00	37.63	16.50	0.00	0.00
(3, 4)	FRWY	1.08	1.00	30.26	33.81	33.90	0.00	0.00
(201, 7)	RAMP	0.38	0.41	0.00	0.00	0.00	0.00	0.00
(204, 81)	RAMP	0.81	0.23	11.73	0.00	0.00	0.00	0.00

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FRESIM CUMULATIVE VALUES OF EMISSION

LINK	LINK TYPE	VEHICLE EMISSIONS (GRAMS/ MILE)						
		NO						
VEHICLE TYPE-		1	2	3	4	5	6	7
(8, 9)	FRWY	0.85	0.76	34.57	33.82	31.44	22.18	0.00
(202, 9)	RAMP	0.83	0.27	0.00	0.00	39.56	0.00	0.00
(82, 83)	FRWY	1.06	0.97	29.55	21.80	19.74	17.97	0.00
(102, 4)	RAMP	0.65	0.55	40.11	12.12	0.00	0.00	0.00
(77, 78)	FRWY	0.93	0.85	32.18	22.33	20.81	19.19	0.00
(78, 203)	RAMP	1.42	1.23	46.60	0.00	20.03	0.00	0.00
(13, 14)	FRWY	0.93	0.87	29.84	20.43	28.84	25.09	0.00
(16, 17)	FRWY	0.75	0.77	25.85	19.08	11.57	14.46	0.00
(301, 17)	RAMP	0.49	0.42	13.31	17.34	0.00	0.00	0.00
(19, 20)	FRWY	0.92	0.80	37.76	38.35	23.57	34.70	0.00
(302, 20)	RAMP	0.70	0.68	21.64	20.72	28.19	25.98	0.00
(21, 22)	FRWY	0.84	0.82	34.11	25.26	26.30	18.77	0.00
(401, 26)	RAMP	1.16	1.15	37.43	33.56	30.06	34.41	0.00
(27, 28)	FRWY	1.68	1.56	28.62	18.53	12.53	8.98	0.00
(412, 28)	RAMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(410, 411)	RAMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(411, 412)	RAMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(59, 60)	FRWY	1.63	1.44	43.37	42.93	40.23	39.27	0.00
(60, 403)	RAMP	1.23	1.16	45.98	43.25	43.12	43.68	0.00
(404, 62)	RAMP	0.27	0.20	18.07	0.00	0.00	0.00	0.00
(64, 65)	FRWY	0.72	0.69	27.66	23.00	22.09	23.15	0.00
(405, 65)	RAMP	0.59	0.86	22.24	0.00	12.36	0.00	0.00
(67, 68)	FRWY	1.07	0.95	29.17	21.76	16.13	21.14	0.00
(71, 72)	FRWY	0.79	0.75	32.69	34.72	41.57	21.52	0.00
(304, 72)	RAMP	0.16	0.36	13.66	9.69	21.55	0.00	0.00
(73, 74)	FRWY	0.84	0.76	36.25	31.33	28.84	19.05	0.00
(305, 74)	RAMP	0.42	0.49	36.67	41.52	34.32	32.52	0.00
(203, 2031)	RAMP	0.93	0.94	24.29	0.00	10.53	0.00	0.00
(83, 103)	RAMP	0.76	0.61	41.10	30.51	11.08	0.00	0.00
(14, 300)	RAMP	0.19	0.18	19.39	34.24	0.00	0.00	0.00
(22, 400)	RAMP	0.12	0.16	0.00	15.05	0.00	10.81	0.00
(403, 4031)	RAMP	0.73	0.73	26.00	23.19	24.81	23.35	0.00
(68, 303)	RAMP	0.74	0.57	23.63	32.56	13.78	0.00	0.00
(33, 34)	FRWY	0.97	0.87	31.43	33.30	31.09	35.68	0.00
(34, 500)	RAMP	0.28	0.34	29.94	17.10	0.32	0.00	0.00
(504, 52)	RAMP	0.41	0.68	14.55	0.00	0.00	10.90	0.00
(6, 7)	FRWY	0.80	0.77	28.53	25.05	31.80	20.14	0.00
(58, 59)	FRWY	1.41	1.29	37.52	32.64	31.67	31.76	0.00
(32, 33)	FRWY	0.84	0.80	26.06	31.24	37.85	46.99	0.00
(53, 54)	FRWY	1.45	1.38	27.02	18.09	12.51	10.46	0.00
(5, 6)	FRWY	0.83	0.81	34.89	25.37	25.41	0.00	0.00
(6, 200)	RAMP	0.04	0.10	0.00	0.00	8.40	0.00	0.00
(18, 19)	FRWY	1.05	0.96	39.27	33.88	22.71	15.85	0.00
(402, 27)	RAMP	0.68	0.82	32.05	31.10	11.19	0.00	0.00
(26, 27)	FRWY	1.27	1.16	35.98	23.64	16.74	16.27	0.00

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FRESIM CUMULATIVE VALUES OF EMISSION

LINK	LINK TYPE	VEHICLE EMISSIONS (GRAMS/ MILE)						
		NO						
VEHICLE TYPE-		1	2	3	4	5	6	7
(37, 35)	FRWY	0.96	0.91	30.03	32.73	27.81	26.69	0.00
(52, 53)	FRWY	1.71	1.48	38.65	27.19	21.92	12.97	0.00
(505, 53)	RAMP	1.69	1.36	24.78	0.00	11.21	10.65	0.00
(61, 62)	FRWY	0.78	0.75	33.86	37.39	30.55	25.06	0.00
(69, 70)	FRWY	0.91	0.78	37.30	29.24	22.95	19.41	0.00
(17, 36)	FRWY	1.03	1.09	28.65	22.78	22.34	14.46	0.00
(34, 37)	FRWY	0.87	0.80	30.35	29.51	28.49	21.01	0.00
(51, 38)	FRWY	1.41	1.28	40.21	22.27	20.44	17.83	0.00
SUBNETWORK-		1.08	1.02	32.94	27.72	23.54	21.28	0.00

VEHICLE TYPES 1, 2 = AUTO, VEHICLE TYPES 3, 4, 5, 6 = TRUCK, VEHICLE TYPE 7 = TRANSIT BUS

1

CUMULATIVE NETWORK-WIDE BUS STATISTICS AT TIME 0:30: 0

ELAPSED TIME IS 0:30: 0 (1800 SECONDS), TIME PERIOD 1 ELAPSED TIME IS 1800 SECONDS

ROUTE STATISTICS

ROUTE	BUS TRIPS	TOTAL	MEAN	PERSON TRIPS	PERSON
		TRAVEL TIME (BUS-MIN.)	TRAVEL TIME (SEC/BUS)		
4	8	16.6	7269.3	200	415.4
5	3	11.8	11493.1	75	294.2
7	10	24.1	7739.8	250	601.7
8	2	8.1	16823.7	50	203.7
9	0	0.0	20262.2	0	0.0

THESE ESTIMATES ASSUME AN AVERAGE BUS OCCUPANCY OF 25.0 PASSENGERS PER BUS THROUGHOUT THE NETWORK

NETWORK-WIDE AVERAGE STATISTICS

TOTAL VEHICLE-MILE = 17975.23 VEHICLE-HOURS OF: MOVE TIME = 278.03, DELAY TIME = 81.38, TOTAL TIME = 359.41

AVERAGE SPEED (MPH)= 50.01 MOVE/TOTAL = 0.77 MINUTES/MILE OF: DELAY TIME = 0.27, TOTAL TIME = 1.20

NETWORK-WIDE STATISTICS FOR SCRIPT PROCESSING

17975.23, 278.03, 81.38, 359.41, 50.01, 0.77, 0.27, 1.20

TOTAL CPU TIME FOR SIMULATION = 16.98 SECONDS

TOTAL CPU TIME FOR THIS RUN = 16.98 SECONDS

OLAST CASE PROCESSED

Sample Input File for VISSIM (Base Case)

Please see VISSIM user manual for details.

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TITLE ""
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-- VISSIM 3.70-09

RANDOM_SEED      3
SIMULATION_DURATION 3300.0
SIMULATION_STARTTIME "00:00:00"
SIMULATION_SPEED MAX 10.0
TIME_STEP       5
UNIT            DISTANCE 1 0
UNIT            DISTANCE 2 0
UNIT            SPEED 0
UNIT            ACCELERATION 0
QUEUE SPEED UNDER 5.0 OVER 10.0 DX UNDER 20.0 LENGTH MAX 500.0
      FROM 0 UNTIL 99999 AGGREGATION_INTERVAL 99999

-- Dynamic Assignment: --
-----

DTA
TRIP_CHAIN_FILE  0 ""
MATRICES         0
COST_FILE        "" NODE YES
PATH_FILE        "" NODE YES
COST_INTERVAL    600
MAX_PATHNUMBER   -999
STRATEGY         0
ROUTE_GUIDANCE_OFFSET 999999 999999
OFFSET           0 0
KIRCHHOFF_EXPONENT 3.50
VOLUME PERCENT   -1.00
PATHEVAL PERCENT -0.75
DETOURS          -2.50
LOGIT            1.50000
UNDER 0 00100
CONVERGENCE
  PATHS
  EDGE

-- Vehicle Types: --
-----

VEHICLE_TYPE 100
NAME          "Car"
CATEGORY      CAR
COLOR_DIST    1
LENGTH        4.760
WIDTH         1.500
MASS          1
POWER         1
LAYER         0
ALLOWEDLOAD   0
MODEL_YEAR    0
MILEAGE       0
LOAD          0.0
OCCUPANCY     0.0

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KATTEMPERATURE      0
WATERTEMPERATURE    0
MAX_ACCELERATION     1
DESIRED_ACCELERATION 1
MAX_DECELERATION     1
DESIRED_DECELERATION 1
EQUIPMENT            NONE
DRIVER               UNIDENTIFIED
PASSENGERS           1.0
VEHICLE_MODEL_DIST   10
COST_COEFFICIENTS    1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 101
NAME                 "Passenger Car"
CATEGORY             CAR
COLOR_DIST           11
LENGTH               4.500
WIDTH                1.800
MASS                 1
POWER                1
LAYER                0
ALLOWEDLOAD          0
MODEL_YEAR           0
MILEAGE              0
LOAD                 0.0
OCCUPANCY            0.0
KATTEMPERATURE      0
WATERTEMPERATURE    0
MAX_ACCELERATION     1
DESIRED_ACCELERATION 1
MAX_DECELERATION     1
DESIRED_DECELERATION 1
EQUIPMENT            NONE
DRIVER               UNIDENTIFIED
PASSENGERS           1.0
VEHICLE_MODEL_DIST   11
COST_COEFFICIENTS    1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 102
NAME                 "Light Trucks"
CATEGORY             CAR
COLOR_DIST           12
LENGTH               5.300
WIDTH                1.900
MASS                 1
POWER                1
LAYER                0
ALLOWEDLOAD          0
MODEL_YEAR           0
MILEAGE              0
LOAD                 0.0
OCCUPANCY            0.0
KATTEMPERATURE      0
WATERTEMPERATURE    0
MAX_ACCELERATION     1
DESIRED_ACCELERATION 1

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MAX_DECELERATION 1
DESIRED_DECELERATION 1
EQUIPMENT NONE
DRIVER UNIDENTIFIED
PASSENGERS 1.0
VEHICLE_MODEL_DIST 12
COST_COEFFICIENTS 1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 110
NAME "PC EURO1"
CATEGORY CAR
COLOR_DIST 11
LENGTH 4.500
WIDTH 1.800
MASS 1
POWER 1
LAYER 2
ALLOWEDLOAD 0
MODEL_YEAR 0
MILEAGE 0
LOAD 0.0
OCCUPANCY 0.0
KATTEMPERATURE 0
WATERTEMPERATURE 0
MAX_ACCELERATION 1
DESIRED_ACCELERATION 1
MAX_DECELERATION 1
DESIRED_DECELERATION 1
EQUIPMENT NONE
DRIVER UNIDENTIFIED
PASSENGERS 1.0
VEHICLE_MODEL_DIST 11
COST_COEFFICIENTS 1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 111
NAME "PC EURO2"
CATEGORY CAR
COLOR_DIST 11
LENGTH 4.500
WIDTH 1.800
MASS 1
POWER 1
LAYER 3
ALLOWEDLOAD 0
MODEL_YEAR 0
MILEAGE 0
LOAD 0.0
OCCUPANCY 0.0
KATTEMPERATURE 0
WATERTEMPERATURE 0
MAX_ACCELERATION 1
DESIRED_ACCELERATION 1
MAX_DECELERATION 1
DESIRED_DECELERATION 1
EQUIPMENT NONE
DRIVER UNIDENTIFIED

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PASSENGERS          1.0
VEHICLE_MODEL_DIST  11
COST_COEFFICIENTS  1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 120
NAME                "LT EUR01"
CATEGORY            CAR
COLOR_DIST          12
LENGTH              5.300
WIDTH               1.900
MASS                1
POWER              1
LAYER              12
ALLOWEDLOAD        0
MODEL_YEAR         0
MILEAGE            0
LOAD               0.0
OCCUPANCY          0.0
KATTEMPERATURE     0
WATERTEMPERATURE   0
MAX_ACCELERATION   1
DESIRED_ACCELERATION 1
MAX_DECELERATION   1
DESIRED_DECELERATION 1
EQUIPMENT          NONE
DRIVER             UNIDENTIFIED
PASSENGERS          1.0
VEHICLE_MODEL_DIST  12
COST_COEFFICIENTS  1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 121
NAME                "LT EUR02"
CATEGORY            CAR
COLOR_DIST          12
LENGTH              5.300
WIDTH               1.900
MASS                1
POWER              1
LAYER              13
ALLOWEDLOAD        0
MODEL_YEAR         0
MILEAGE            0
LOAD               0.0
OCCUPANCY          0.0
KATTEMPERATURE     0
WATERTEMPERATURE   0
MAX_ACCELERATION   1
DESIRED_ACCELERATION 1
MAX_DECELERATION   1
DESIRED_DECELERATION 1
EQUIPMENT          NONE
DRIVER             UNIDENTIFIED
PASSENGERS          1.0
VEHICLE_MODEL_DIST  12
COST_COEFFICIENTS  1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000

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ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 200
NAME "HGV"
CATEGORY HGV
COLOR_DIST 1
LENGTH 10.215
WIDTH 2.500
MASS 2
POWER 2
LAYER 0
ALLOWEDLOAD 0
MODEL_YEAR 0
MILEAGE 0
LOAD 1.0
OCCUPANCY 0.0
KATTEMPERATURE 0
WATERTEMPERATURE 0
MAX_ACCELERATION 2
DESIRED_ACCELERATION 2
MAX_DECELERATION 2
DESIRED_DECELERATION 2
EQUIPMENT NONE
DRIVER UNIDENTIFIED
PASSENGERS 1.0
VEHICLE_MODEL_DIST 20
COST_COEFFICIENTS 1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 201
NAME "2B Truck"
CATEGORY HGV
COLOR_DIST 21
LENGTH 5.800
WIDTH 2.000
MASS 12
POWER 7
LAYER 0
ALLOWEDLOAD 0
MODEL_YEAR 0
MILEAGE 0
LOAD 1.0
OCCUPANCY 0.0
KATTEMPERATURE 0
WATERTEMPERATURE 0
MAX_ACCELERATION 2
DESIRED_ACCELERATION 2
MAX_DECELERATION 2
DESIRED_DECELERATION 2
EQUIPMENT NONE
DRIVER UNIDENTIFIED
PASSENGERS 1.0
VEHICLE_MODEL_DIST 21
COST_COEFFICIENTS 1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000

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VEHICLE_TYPE 202

NAME	"Single Unit Truck"
CATEGORY	HGV
COLOR_DIST	22
LENGTH	9.600
WIDTH	2.500
MASS	9
POWER	7
LAYER	0
ALLOWEDLOAD	0
MODEL_YEAR	0
MILEAGE	0
LOAD	1.0
OCCUPANCY	0.0
KATTEMPERATURE	0
WATERTEMPERATURE	0
MAX_ACCELERATION	2
DESIRED_ACCELERATION	2
MAX_DECELERATION	2
DESIRED_DECELERATION	2
EQUIPMENT	NONE
DRIVER	UNIDENTIFIED
PASSENGERS	1.0
VEHICLE_MODEL_DIST	22
COST_COEFFICIENTS	1.000 0.000 1.000
FEE	0.000 0.000 0.000 0.000
ATTRACTION	0.000 0.000 0.000 0.000
DESTINATION	0.000 0.000 0.000 0.000
POSITION	0.000 0.000 0.000 0.000
PARKING_AVAILABILITY	0.000 0.000 0.000 0.000

VEHICLE_TYPE 203

NAME	"Tractor Only"
CATEGORY	HGV
COLOR_DIST	23
LENGTH	8.100
WIDTH	2.500
MASS	11
POWER	8
LAYER	0
ALLOWEDLOAD	0
MODEL_YEAR	0
MILEAGE	0
LOAD	1.0
OCCUPANCY	0.0
KATTEMPERATURE	0
WATERTEMPERATURE	0
MAX_ACCELERATION	2
DESIRED_ACCELERATION	2
MAX_DECELERATION	2
DESIRED_DECELERATION	2
EQUIPMENT	NONE
DRIVER	UNIDENTIFIED
PASSENGERS	1.0
VEHICLE_MODEL_DIST	23
COST_COEFFICIENTS	1.000 0.000 1.000
FEE	0.000 0.000 0.000 0.000
ATTRACTION	0.000 0.000 0.000 0.000
DESTINATION	0.000 0.000 0.000 0.000
POSITION	0.000 0.000 0.000 0.000
PARKING_AVAILABILITY	0.000 0.000 0.000 0.000

VEHICLE_TYPE 204

NAME	"SU Truck & Trailer"
CATEGORY	HGV
COLOR_DIST	24

```

LENGTH          19.600
WIDTH            2.500
MASS             10
POWER            8
LAYER            0
ALLOWEDLOAD      0
MODEL_YEAR       0
MILEAGE          0
LOAD             1.0
OCCUPANCY        0.0
KATTEMPERATURE   0
WATERTEMPERATURE 0
MAX_ACCELERATION 2
DESIRED_ACCELERATION 2
MAX_DECELERATION 2
DESIRED_DECELERATION 2
EQUIPMENT        NONE
DRIVER           UNIDENTIFIED
PASSENGERS       1.0
VEHICLE_MODEL_DIST 24
COST_COEFFICIENTS 1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 205
NAME             "Tractor & Trailer"
CATEGORY         HGV
COLOR_DIST       25
LENGTH           20.000
WIDTH            2.500
MASS             7
POWER            8
LAYER            0
ALLOWEDLOAD      0
MODEL_YEAR       0
MILEAGE          0
LOAD             1.0
OCCUPANCY        0.0
KATTEMPERATURE   0
WATERTEMPERATURE 0
MAX_ACCELERATION 2
DESIRED_ACCELERATION 2
MAX_DECELERATION 2
DESIRED_DECELERATION 2
EQUIPMENT        NONE
DRIVER           UNIDENTIFIED
PASSENGERS       1.0
VEHICLE_MODEL_DIST 25
COST_COEFFICIENTS 1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 206
NAME             "Tractor & D Trailer"
CATEGORY         HGV
COLOR_DIST       26
LENGTH           23.200
WIDTH            2.500
MASS             8
POWER            8

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LAYER 0
ALLOWEDLOAD 0
MODEL_YEAR 0
MILEAGE 0
LOAD 1.0
OCCUPANCY 0.0
KATTEMPERATURE 0
WATERTEMPERATURE 0
MAX_ACCELERATION 2
DESIRED_ACCELERATION 2
MAX_DECELERATION 2
DESIRED_DECELERATION 2
EQUIPMENT NONE
DRIVER UNIDENTIFIED
PASSENGERS 1.0
VEHICLE_MODEL_DIST 26
COST_COEFFICIENTS 1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 300
NAME "Bus"
CATEGORY BUS
COLOR_DIST 1
LENGTH 11.541
WIDTH 2.500
MASS 3
POWER 3
LAYER 0
ALLOWEDLOAD 0
MODEL_YEAR 0
MILEAGE 0
LOAD 0.0
OCCUPANCY 0.0
KATTEMPERATURE 0
WATERTEMPERATURE 0
MAX_ACCELERATION 3
DESIRED_ACCELERATION 3
MAX_DECELERATION 3
DESIRED_DECELERATION 3
EQUIPMENT NONE
DRIVER UNIDENTIFIED
PASSENGERS 1.0
VEHICLE_MODEL_DIST 30
ALIGHTING_TIME 0.00 BOARDING_TIME 0.00 ADDITION YES
DELAY_TIME 0.00 CAPACITY 999
COST_COEFFICIENTS 1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 301
NAME "OC Transpo"
CATEGORY BUS
COLOR_DIST 1
LENGTH 12.200
WIDTH 2.500
MASS 3
POWER 3
LAYER 0
ALLOWEDLOAD 0

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MODEL_YEAR      0
MILEAGE         0
LOAD            0.0
OCCUPANCY       0.0
KATTEMPERATURE 0
WATERTEMPERATURE 0
MAX_ACCELERATION 3
DESIRED_ACCELERATION 3
MAX_DECELERATION 3
DESIRED_DECELERATION 3
EQUIPMENT       NONE
DRIVER          UNIDENTIFIED
PASSENGERS      1.0
VEHICLE_MODEL_DIST 31
ALIGHTING_TIME 0.00 BOARDING_TIME 0.00 ADDITION YES
DELAY_TIME 0.00 CAPACITY 60
COST_COEFFICIENTS 1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 400
NAME            "Tram"
CATEGORY        TRAM
COLOR_DIST      1
LENGTH          15.698
WIDTH           2.500
MASS            4
POWER           4
LAYER           0
ALLOWEDLOAD     0
MODEL_YEAR      0
MILEAGE         0
LOAD            0.0
OCCUPANCY       0.0
KATTEMPERATURE 0
WATERTEMPERATURE 0
MAX_ACCELERATION 4
DESIRED_ACCELERATION 4
MAX_DECELERATION 4
DESIRED_DECELERATION 4
EQUIPMENT       NONE
DRIVER          UNIDENTIFIED
PASSENGERS      1.0
VEHICLE_MODEL_DIST 40
ALIGHTING_TIME 0.00 BOARDING_TIME 0.00 ADDITION YES
DELAY_TIME 0.00 CAPACITY 9999
COST_COEFFICIENTS 1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 500
NAME            "Pedestrian"
CATEGORY        PEDESTRIAN
COLOR_DIST      1
LENGTH          0.342
WIDTH           0.500
MASS            5
POWER           5
LAYER           0
ALLOWEDLOAD     0

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MODEL_YEAR      0
MILEAGE         0
LOAD           0.0
OCCUPANCY       0.0
KATTEMPERATURE 0
WATERTEMPERATURE 0
MAX_ACCELERATION 5
DESIRED_ACCELERATION 5
MAX_DECELERATION 5
DESIRED_DECELERATION 5
EQUIPMENT       NONE
DRIVER          UNIDENTIFIED
PASSENGERS      1.0
VEHICLE_MODEL_DIST 50
COST_COEFFICIENTS 1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000
VEHICLE_TYPE 600
NAME           "Bike"
CATEGORY       BICYCLE
COLOR_DIST     1
LENGTH        1.607
WIDTH         0.500
MASS          6
POWER         6
LAYER         0
ALLOWEDLOAD   0
MODEL_YEAR     0
MILEAGE        0
LOAD          0.0
OCCUPANCY      0.0
KATTEMPERATURE 0
WATERTEMPERATURE 0
MAX_ACCELERATION 6
DESIRED_ACCELERATION 6
MAX_DECELERATION 6
DESIRED_DECELERATION 6
EQUIPMENT      NONE
DRIVER         UNIDENTIFIED
PASSENGERS     1.0
VEHICLE_MODEL_DIST 60
COST_COEFFICIENTS 1.000 0.000 1.000
FEE 0.000 0.000 0.000 0.000
ATTRACTION 0.000 0.000 0.000 0.000
DESTINATION 0.000 0.000 0.000 0.000
POSITION 0.000 0.000 0.000 0.000
PARKING_AVAILABILITY 0.000 0.000 0.000 0.000

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-- Vehicle Classes: --

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VEHICLE_CLASS 10
NAME          "Car"
COLOR         NONE
VEHICLE_TYPES 100 101 102 110 111 120 121
VEHICLE_CLASS 20
NAME          "HGV"
COLOR         NONE
VEHICLE_TYPES 200 201 202 203 204 205 206
VEHICLE_CLASS 30

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NAME      "Bus"
COLOR     NONE
VEHICLE_TYPES 300 301
VEHICLE_CLASS 40
NAME      "Tram"
COLOR     NONE
VEHICLE_TYPES 400
VEHICLE_CLASS 50
NAME      "Pedestrian"
COLOR     NONE
VEHICLE_TYPES 500
VEHICLE_CLASS 60
NAME      "Bike"
COLOR     NONE
VEHICLE_TYPES 600

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-- Driving Behavior: --
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DRIVING_BEHAVIOR 1 NAME "Urban (motorized)"
LANE_CHANGE_BEHAVIOR FREE_LANESEL
  T_DISAPPEAR 60.00 MIN_LC_GAP 0.50 MIN_FREEFLOW 11.00
  MIN_ACCELERATION OWN MIN -4.00 DISTANCE 100.00 MAX -1.00
  TRAILING_VEHICLE MIN -3.00 DISTANCE 100.00 MAX -1.00
CAR_FOLLOW_MODEL WIEDEMANN74
  NUMB_PRECED 2 OBS_DISTANCE MIN 0.00 MAX 250.00
  AX_AVERAGE 2.00 BX_ADD 2.00 BX_MULT 3.00
  CC0 1.50 CC1 0.90 CC2 4.00 CC3 -8.00 CC4 -0.35
  CC5 0.35 CC6 11.44 CC7 0.25 CC8 3.50 CC9 1.50
LATERAL_BEHAVIOR MIDDLE
  OVERTAKE RIGHT VEHICLE_CLASSES
  OVERTAKE LEFT VEHICLE_CLASSES
  LAT_DISTANCE DEFAULT DY_STAND 1.00 DY_50KMH 1.00
AMBER_BEHAVIOR CONT_CHECK
  AMBER_ALPHA 1.58858105 AMBER_BETA1 -0.26198070 AMBER_BETA2 0.26945295
DRIVING_BEHAVIOR 2 NAME "Right-side rule (motorized)"
LANE_CHANGE_BEHAVIOR RIGHT_HAND_RULE
  T_DISAPPEAR 60.00 MIN_LC_GAP 0.50 MIN_FREEFLOW 11.00
  MIN_ACCELERATION OWN MIN -4.00 DISTANCE 200.00 MAX -1.00
  TRAILING_VEHICLE MIN -3.00 DISTANCE 200.00 MAX -0.50
CAR_FOLLOW_MODEL WIEDEMANN99
  NUMB_PRECED 2 OBS_DISTANCE MIN 0.00 MAX 250.00
  AX_AVERAGE 2.00 BX_ADD 2.00 BX_MULT 3.00
  CC0 1.50 CC1 0.90 CC2 4.00 CC3 -8.00 CC4 -0.35
  CC5 0.35 CC6 11.44 CC7 0.25 CC8 3.50 CC9 1.50
LATERAL_BEHAVIOR MIDDLE
  OVERTAKE RIGHT VEHICLE_CLASSES
  OVERTAKE LEFT VEHICLE_CLASSES
  LAT_DISTANCE DEFAULT DY_STAND 1.00 DY_50KMH 1.00
AMBER_BEHAVIOR CONT_CHECK
  AMBER_ALPHA 1.58858105 AMBER_BETA1 -0.26198070 AMBER_BETA2 0.26945295
DRIVING_BEHAVIOR 3 NAME "Freeway (free lane selection)"
LANE_CHANGE_BEHAVIOR FREE_LANESEL
  T_DISAPPEAR 60.00 MIN_LC_GAP 0.50 MIN_FREEFLOW 11.00
  MIN_ACCELERATION OWN MIN -4.00 DISTANCE 200.00 MAX -1.00
  TRAILING_VEHICLE MIN -3.00 DISTANCE 200.00 MAX -0.50
CAR_FOLLOW_MODEL WIEDEMANN99
  NUMB_PRECED 2 OBS_DISTANCE MIN 0.00 MAX 250.00
  AX_AVERAGE 2.00 BX_ADD 2.00 BX_MULT 3.00
  CC0 3.70 CC1 1.31 CC2 4.00 CC3 -8.00 CC4 -0.35
  CC5 0.35 CC6 11.44 CC7 0.25 CC8 3.50 CC9 1.50
LATERAL_BEHAVIOR MIDDLE
  OVERTAKE RIGHT VEHICLE_CLASSES

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OVERTAKE LEFT VEHICLE_CLASSES
LAT_DISTANCE DEFAULT DY_STAND 1.00 DY_50KMH 1.00
AMBER_BEHAVIOR CONT_CHECK
  AMBER_ALPHA 1.58858105 AMBER_BETA1 -0.26198070 AMBER_BETA2 0.26945295
DRIVING_BEHAVIOR 4 NAME "Footpath (no interaction)"
LANE_CHANGE_BEHAVIOR FREE_LANESEL
  T_DISAPPEAR 60.00 MIN_LC_GAP 0.50 MIN_FREEFLOW 11.00
  MIN_ACCELERATION OWN MIN -4.00 DISTANCE 100.00 MAX -1.00
  TRAILING_VEHICLE MIN -3.00 DISTANCE 100.00 MAX -1.00
CAR_FOLLOW_MODEL NO_INTERACTION
  NUMB_PRECED 2 OBS_DISTANCE MIN 0.00 MAX 250.00
  AX_AVERAGE 2.00 BX_ADD 2.00 BX_MULT 3.00
  CC0 1.50 CC1 0.90 CC2 4.00 CC3 -8.00 CC4 -0.35
  CC5 0.35 CC6 11.44 CC7 0.25 CC8 3.50 CC9 1.50
LATERAL_BEHAVIOR ANY
  OVERTAKE RIGHT VEHICLE_CLASSES
  OVERTAKE LEFT VEHICLE_CLASSES
  LAT_DISTANCE DEFAULT DY_STAND 1.00 DY_50KMH 1.00
  AMBER_BEHAVIOR CONT_CHECK
    AMBER_ALPHA 1.58858105 AMBER_BETA1 -0.26198070 AMBER_BETA2 0.26945295
DRIVING_BEHAVIOR 5 NAME "Cycle-Path (free overtaking)"
LANE_CHANGE_BEHAVIOR FREE_LANESEL
  T_DISAPPEAR 60.00 MIN_LC_GAP 0.50 MIN_FREEFLOW 11.00
  MIN_ACCELERATION OWN MIN -4.00 DISTANCE 100.00 MAX -1.00
  TRAILING_VEHICLE MIN -3.00 DISTANCE 100.00 MAX -1.00
CAR_FOLLOW_MODEL WIEDEMANN99
  NUMB_PRECED 2 OBS_DISTANCE MIN 10.00 MAX 250.00 DIAMOND_SHAPE
  AX_AVERAGE 2.00 BX_ADD 2.00 BX_MULT 3.00
  CC0 0.50 CC1 0.50 CC2 0.00 CC3 -8.00 CC4 -0.35
  CC5 0.35 CC6 11.44 CC7 0.25 CC8 3.50 CC9 1.50
LATERAL_BEHAVIOR RIGHT
  OVERTAKE RIGHT VEHICLE_CLASSES ALL
  OVERTAKE LEFT VEHICLE_CLASSES ALL
  LAT_DISTANCE DEFAULT DY_STAND 0.10 DY_50KMH 0.30
  AMBER_BEHAVIOR CONT_CHECK
    AMBER_ALPHA 1.58858105 AMBER_BETA1 -0.26198070 AMBER_BETA2 0.26945295

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-- Link Types: --
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LINKTYPE 1 NAME "Urban (motorized)" COLOR GRAY
  DEFAULT DRIVING_BEHAVIOR 1
LINKTYPE 2 NAME "Right-side rule (motorized)" COLOR GRAY
  DEFAULT DRIVING_BEHAVIOR 2
LINKTYPE 3 NAME "Freeway (free lane selection)" COLOR GRAY
  DEFAULT DRIVING_BEHAVIOR 3
LINKTYPE 4 NAME "Footpath (no interaction)" COLOR GRAY
  DEFAULT DRIVING_BEHAVIOR 4
LINKTYPE 5 NAME "Cycle-Path (free overtaking)" COLOR GRAY
  DEFAULT DRIVING_BEHAVIOR 5

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-- Links: --
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LINK      1 NAME "" LABEL 0.00 0.00
  TYPE      3 LENGTH 499.999 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
  FROM -369.436 -336.922
  TO 0.000 0.000
LINK      2 NAME "" LABEL 0.00 0.00
  TYPE      3 LENGTH 27.638 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION

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FROM 0.000 0.000
TO 20.421 18.624
LINK 3 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 193.170 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.00300 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 850.724 775.852
TO 993.452 906.018
LINK 4 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 543.082 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.00440 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 1122.776 1023.960
TO 1524.044 1389.913
LINK 5 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 201.240 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00440 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
LENGTH 1000.000 EVALUATION
FROM 1525.277 1388.561
TO 1673.968 1524.165
LINK 6 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 178.370 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00560 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
LENGTH 1000.000 EVALUATION
FROM 1673.968 1524.165
TO 1805.761 1644.359
LINK 7 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 235.102 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00560 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
LENGTH 1000.000 EVALUATION
FROM 1982.523 1805.565
OVER 1988.560 1810.982 0.000 OVER 1994.613 1816.381 0.000 OVER 2000.682 1821.764 0.000 OVER 2006.767 1827.130 0.000 OVER 2012.867 1832.478 0.000
OVER 2018.983 1837.809 0.000 OVER 2025.115 1843.122 0.000 OVER 2031.263 1848.418 0.000 OVER 2037.426 1853.695 0.000 OVER 2043.606 1858.954 0.000
OVER 2049.801 1864.195 0.000 OVER 2056.012 1869.417 0.000 OVER 2062.239 1874.620 0.000 OVER 2068.481 1879.805 0.000 OVER 2074.739 1884.970 0.000
OVER 2081.013 1890.116 0.000 OVER 2087.303 1895.243 0.000 OVER 2093.609 1900.349 0.000 OVER 2099.930 1905.437 0.000 OVER 2106.268 1910.504 0.000
OVER 2112.621 1915.551 0.000 OVER 2118.989 1920.577 0.000 OVER 2125.374 1925.583 0.000 OVER 2131.774 1930.569 0.000 OVER 2138.190 1935.533 0.000
OVER 2144.622 1940.477 0.000 OVER 2151.070 1945.399 0.000 OVER 2157.533 1950.300 0.000
TO 2163.866 1955.069
LINK 8 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 20.420 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00670 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
LENGTH 1000.000 EVALUATION
FROM 2163.866 1955.069
OVER 2174.686 1962.975 0.000
TO 2180.358 1967.110
LINK 9 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 334.117 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.00670 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 2466.336 2148.173
TO 2761.638 2304.476
LINK 10 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 367.475 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.00640 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 2765.068 2304.220
TO 3089.653 2476.129
LINK 11 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 329.110 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00640 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 3262.837 2569.762
OVER 3272.798 2575.189 0.000 OVER 3282.732 2580.666 0.000 OVER 3292.639 2586.192 0.000 OVER 3302.520 2591.766 0.000 OVER 3312.375 2597.387 0.000
OVER 3322.204 2603.053 0.000 OVER 3332.008 2608.764 0.000 OVER 3341.788 2614.517 0.000 OVER 3351.544 2620.313 0.000 OVER 3361.276 2626.149 0.000
OVER 3370.985 2632.025 0.000 OVER 3380.672 2637.939 0.000 OVER 3390.337 2643.890 0.000 OVER 3399.981 2649.877 0.000 OVER 3409.603 2655.899 0.000
OVER 3419.205 2661.953 0.000 OVER 3428.787 2668.041 0.000 OVER 3438.350 2674.159 0.000 OVER 3447.893 2680.306 0.000 OVER 3457.419 2686.483 0.000
OVER 3466.926 2692.687 0.000 OVER 3476.415 2698.916 0.000 OVER 3485.888 2705.171 0.000 OVER 3495.344 2711.450 0.000 OVER 3504.785 2717.751 0.000
OVER 3514.210 2724.073 0.000 OVER 3523.619 2730.415 0.000 OVER 3533.015 2736.776 0.000
TO 3542.396 2743.155
LINK 12 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 52.438 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00640 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 3542.396 2743.155

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OVER 3552.368 2750.477 0.000 OVER 3562.321 2757.828 0.000 OVER 3572.252 2785.210 0.000 OVER 3582.159 2772.626 0.000
 TO 3584.509 2774.399
 LINK 13 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 24.031 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00370 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
 LENGTH 1000.000 EVALUATION
 FROM 3689.938 2855.834
 TO 3708.232 2871.417
 LINK 14 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 128.910 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00370 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
 LENGTH 1000.000 EVALUATION
 FROM 3708.232 2871.417
 TO 3805.945 2955.500
 LINK 15 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 109.779 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.01160 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 3879.280 3021.020
 TO 3962.492 3092.625
 LINK 16 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 560.097 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00280 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 4442.179 3505.402
 TO 4866.729 3870.732
 LINK 17 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 104.733 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.00650 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 5094.450 4066.689
 TO 5173.836 4135.003
 LINK 18 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 428.333 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.00650 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 5173.836 4135.003
 OVER 5180.485 4140.659 0.000 OVER 5187.153 4146.297 0.000 OVER 5193.838 4151.918 0.000 OVER 5200.540 4157.521 0.000 OVER 5207.261 4163.105 0.000
 OVER 5214.000 4168.670 0.000 OVER 5220.757 4174.215 0.000 OVER 5227.532 4179.741 0.000 OVER 5234.325 4185.246 0.000 OVER 5241.137 4190.730 0.000
 OVER 5247.967 4196.193 0.000 OVER 5254.815 4201.634 0.000 OVER 5261.682 4207.053 0.000 OVER 5268.568 4212.449 0.000 OVER 5275.472 4217.823 0.000
 OVER 5282.395 4223.172 0.000 OVER 5289.337 4228.498 0.000 OVER 5296.298 4233.800 0.000 OVER 5303.278 4239.076 0.000 OVER 5310.276 4244.327 0.000
 OVER 5317.294 4249.553 0.000 OVER 5324.331 4254.752 0.000 OVER 5331.388 4259.924 0.000 OVER 5338.463 4265.070 0.000 OVER 5345.558 4270.188 0.000
 OVER 5352.673 4275.278 0.000 OVER 5359.807 4280.339 0.000 OVER 5366.961 4285.372 0.000 OVER 5374.134 4290.375 0.000 OVER 5381.327 4295.349 0.000
 OVER 5388.540 4300.292 0.000 OVER 5395.773 4305.205 0.000 OVER 5403.026 4310.086 0.000 OVER 5410.299 4314.937 0.000 OVER 5417.592 4319.755 0.000
 OVER 5424.905 4324.540 0.000 OVER 5432.239 4329.293 0.000 OVER 5439.593 4334.012 0.000 OVER 5446.967 4338.698 0.000 OVER 5454.362 4343.349 0.000
 OVER 5461.777 4347.966 0.000 OVER 5469.213 4352.548 0.000 OVER 5476.670 4357.094 0.000 OVER 5484.148 4361.604 0.000 OVER 5491.646 4366.078 0.000
 OVER 5499.166 4370.515 0.000 OVER 5506.706 4374.914 0.000 OVER 5514.267 4379.276 0.000
 TO 5521.850 4383.599
 LINK 19 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 31.699 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.00650 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 5521.850 4383.599
 TO 5549.201 4399.623
 LINK 20 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 9.787 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00650 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
 LENGTH 1000.000 EVALUATION
 FROM 5550.126 4398.044
 TO 5558.570 4402.992
 LINK 21 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 277.227 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.00680 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 5558.570 4402.992
 TO 5797.765 4543.137
 LINK 22 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 239.662 LANES 4 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.01520 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
 LENGTH 1000.000 EVALUATION
 FROM 6025.196 4674.268
 TO 6231.979 4795.423
 CLOSED
 LANE 1 VEHICLE_CLASSES 10 20

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      LANE 2      VEHICLE_CLASSES 30
LINK 23 NAME "" LABEL 0.00 0.00
      TYPE      3 LENGTH 687.416 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.01790 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
LENGTH 1000.000 EVALUATION
      FROM 6946.705 5216.304
      TO 7539.816 5563.809
      CLOSED
      LANE 1      VEHICLE_CLASSES 10 20
      LANE 2      VEHICLE_CLASSES 30
      LANE 3      VEHICLE_CLASSES 30
LINK 24 NAME "" LABEL 0.00 0.00
      TYPE      3 LENGTH 266.608 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.01000 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
LENGTH 1000.000 EVALUATION
      FROM 7539.816 5563.809
      TO 7769.849 5698.586
      CLOSED
      LANE 1      VEHICLE_CLASSES 10 20
      LANE 2      VEHICLE_CLASSES 30
      LANE 3      VEHICLE_CLASSES 30
LINK 25 NAME "" LABEL 0.00 0.00
      TYPE      3 LENGTH 122.354 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.02469 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
LENGTH 1000.000 EVALUATION
      FROM 7769.849 5698.586
      TO 7875.418 5760.439
      CLOSED
      LANE 1      VEHICLE_CLASSES 10 20
      LANE 2      VEHICLE_CLASSES 30
      LANE 3      VEHICLE_CLASSES 30
LINK 26 NAME "" LABEL 0.00 0.00
      TYPE      3 LENGTH 671.106 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.02469 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
LENGTH 1000.000 EVALUATION
      FROM 7875.418 5760.439
      TO 8454.457 6099.699
      CLOSED
      LANE 1      VEHICLE_CLASSES 10 20
      LANE 2      VEHICLE_CLASSES 30
      LANE 3      VEHICLE_CLASSES 30
LINK 27 NAME "" LABEL 0.00 0.00
      TYPE      3 LENGTH 467.143 LANES 2 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00560 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
      FROM 8619.865 6198.733
      TO 9022.922 6434.885
LINK 28 NAME "" LABEL 0.00 0.00
      TYPE      3 LENGTH 253.256 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
LENGTH 1000.000 EVALUATION
      FROM 21.654 17.272
      TO 208.778 187.927
LINK 29 NAME "" LABEL 0.00 0.00
      TYPE      3 LENGTH 317.261 LANES 2 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
      FROM 207.545 189.279
      TO 441.960 403.064
LINK 30 NAME "" LABEL 0.00 0.00
      TYPE      3 LENGTH 224.070 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
LENGTH 1000.000 EVALUATION
      FROM 443.193 401.712
      TO 608.753 552.700
LINK 31 NAME "" LABEL 0.00 0.00
      TYPE      3 LENGTH 329.156 LANES 2 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
      FROM 607.520 554.052
      TO 850.724 775.852
LINK 32 NAME "" LABEL 0.00 0.00
      TYPE      3 LENGTH 163.990 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00300 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT

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LENGTH 1000.000 EVALUATION
 FROM 994.885 904.666
 TO 1115.853 1015.170
 LINK 33 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 11.038 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.00300 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 1114.620 1016.522
 TO 1122.776 1023.960
 LINK 34 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 163.396 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.00560 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 1804.528 1645.711
 TO 1925.256 1755.815
 LINK 35 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 75.837 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00560 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
 LENGTH 1000.000 EVALUATION
 FROM 1926.489 1754.463
 TO 1982.523 1805.565
 LINK 36 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 338.872 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.00670 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 2179.282 1968.584
 OVER 2184.127 1972.123 0.000 OVER 2194.827 1979.883 0.000 OVER 2206.970 1988.642 0.000 OVER 2219.143 1997.360 0.000 OVER 2231.399 2005.957 0.000
 OVER 2243.962 2014.541 0.000 OVER 2256.608 2023.002 0.000 OVER 2269.326 2031.355 0.000 OVER 2282.807 2040.034 0.000 OVER 2296.362 2048.598 0.000
 OVER 2309.962 2057.091 0.000 OVER 2323.577 2065.513 0.000 OVER 2337.236 2073.865 0.000 OVER 2350.936 2082.149 0.000 OVER 2364.438 2090.238 0.000
 OVER 2377.978 2098.260 0.000 OVER 2391.572 2106.192 0.000 OVER 2404.515 2113.595 0.000 OVER 2417.508 2120.912 0.000 OVER 2430.514 2128.203 0.000
 OVER 2442.446 2134.875 0.000 OVER 2454.391 2141.524 0.000
 TO 2466.336 2148.173
 LINK 37 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 2.911 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00670 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
 LENGTH 1000.000 EVALUATION
 FROM 2762.495 2302.858
 TO 2765.068 2304.220
 LINK 38 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 196.691 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00640 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 3088.996 2477.747
 TO 3262.837 2569.762
 LINK 39 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 133.269 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.00640 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 3585.612 2772.939
 OVER 3593.232 2778.692 0.000 OVER 3603.082 2786.184 0.000 OVER 3612.899 2793.719 0.000 OVER 3622.681 2801.298 0.000 OVER 3632.425 2808.926 0.000
 OVER 3642.129 2816.603 0.000 OVER 3651.790 2824.334 0.000 OVER 3661.404 2832.120 0.000 OVER 3670.971 2839.965 0.000 OVER 3680.486 2847.871 0.000
 TO 3689.938 2855.834
 LINK 40 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 98.323 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.00370 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 3804.752 2956.887
 TO 3879.280 3021.020
 LINK 41 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 265.683 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.01160 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
 LENGTH 1000.000 EVALUATION
 FROM 3963.685 3091.238
 TO 4165.071 3264.533
 LINK 42 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 367.155 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.01160 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 4163.878 3265.920
 TO 4442.179 3505.402
 LINK 43 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 268.428 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.00280 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 4867.923 3869.344

TO 5071.389 4044.430
 LINK 44 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 31.998 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00280 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 5070.195 4045.818
 TO 5094.450 4066.689
 LINK 45 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 259.373 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00680 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 5796.840 4544.716
 TO 6020.630 4675.835
 LINK 46 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 3.147 LANES 4 LANE_WIDTH 3.66 3.66 3.66 3.66 GRADIENT 0.00680 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
 LENGTH 1000.000 EVALUATION
 FROM 6022.481 4672.677
 TO 6025.196 4674.268
 CLOSED
 LANE 1 VEHICLE_CLASSES 10 20
 LANE 2 VEHICLE_CLASSES 30
 LINK 47 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 98.542 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.01520 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 6230.128 4798.581
 TO 6315.151 4848.396
 LINK 48 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 730.899 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.01520 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 6316.076 4846.817
 TO 6946.705 5216.304
 CLOSED
 LANE 1 VEHICLE_CLASSES 10 20
 LINK 49 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 169.977 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.02469 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
 LENGTH 1000.000 EVALUATION
 FROM 8454.457 6099.699
 TO 8601.115 6185.626
 LINK 50 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 22.804 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.02469 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 8600.190 6187.205
 TO 8619.865 6198.733
 LINK 51 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
 FROM 409.432 364.546
 TO 445.660 399.007
 LINK 52 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT -0.00300 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
 FROM 1118.321 1012.465
 TO 1156.814 1044.375
 LINK 53 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 50.001 LANES 1 LANE_WIDTH 3.66 GRADIENT -0.00440 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
 FROM 1492.921 1349.976
 TO 1527.744 1385.857
 LINK 54 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT -0.00560 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
 FROM 1893.699 1716.304
 TO 1928.956 1751.757
 LINK 55 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT 0.00640 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
 FROM 3091.565 2472.894
 TO 3136.468 2494.887
 LINK 56 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT 0.00640 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
 FROM 3548.480 2739.153

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TO      3587.817 2770.018
LINK    57 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 49.999 LANES 1 LANE_WIDTH 3.66 GRADIENT -0.01160 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    3929.799 3054.053
TO      3966.073 3088.464
LINK    58 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT 0.00280 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    5073.778 4041.655
TO      5112.502 4073.285
LINK    59 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT -0.00650 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    5509.833 4367.980
TO      5551.977 4394.885
LINK    60 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 98.608 LANES 1 LANE_WIDTH 3.66 GRADIENT 0.01520 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    6234.754 4790.687
TO      6317.926 4843.659
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LINK    61 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT 0.00680 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    5980.944 4644.698
TO      6023.406 4671.098
LINK    62 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT 0.00680 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    5982.957 4641.281
TO      6025.257 4667.940
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LINK    63 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT -0.02469 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    8602.967 6182.468
TO      8647.456 6205.287
LINK    64 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT 0.01040 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    391.963 420.514
TO      354.007 387.967
LINK    65 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 49.999 LANES 1 LANE_WIDTH 3.66 GRADIENT 0.00380 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    1526.730 1460.716
TO      1492.324 1424.437
LINK    66 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 50.000 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000
FROM    1925.732 1822.385
TO      1887.287 1790.417
LINK    67 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 49.999 LANES 1 LANE_WIDTH 3.66 GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    3045.486 2510.170
TO      3002.159 2485.216
LINK    68 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    3525.849 2792.843
TO      3486.811 2761.602
LINK    69 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT 0.01060 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    3965.870 3158.178
TO      3926.700 3127.102
LINK    70 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    5571.298 4470.505
TO      5529.265 4443.426
LINK    71 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 50.000 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.01500 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH

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1000.000
FROM 6178.432 4826.117
TO 6134.458 4802.318
LINK 72 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT 0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM 8693.552 6299.748
TO 8651.088 6273.354
LINK 73 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT 0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM 9054.490 6511.601
TO 9012.153 6485.001
LINK 74 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 50.000 LANES 1 LANE_WIDTH 3.66 GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM 5101.224 4137.734
TO 5064.424 4103.885
LINK 101 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 282.280 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.01036 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 802.570 787.701
TO 594.039 597.446
LINK 102 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 365.806 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.00380 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 1494.792 1421.732
TO 1224.557 1175.182
LINK 103 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 177.170 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00380 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 1626.908 1539.791
TO 1496.026 1420.380
LINK 104 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 441.737 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 1953.236 1837.518
TO 1626.908 1539.791
LINK 105 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 218.713 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 2154.097 2004.015
OVER 2146.768 1998.521 0.000 OVER 2139.587 1993.107 0.000 OVER 2132.421 1987.672 0.000 OVER 2125.270 1982.216 0.000 OVER 2118.133 1976.740 0.000
OVER 2111.012 1971.243 0.000 OVER 2103.907 1965.726 0.000 OVER 2096.817 1960.188 0.000 OVER 2089.744 1954.629 0.000 OVER 2082.687 1949.049 0.000
OVER 2075.646 1943.447 0.000 OVER 2068.622 1937.825 0.000 OVER 2061.616 1932.181 0.000 OVER 2054.626 1926.516 0.000 OVER 2047.654 1920.829 0.000
OVER 2040.700 1915.121 0.000 OVER 2033.764 1909.390 0.000 OVER 2026.847 1903.638 0.000 OVER 2019.948 1897.865 0.000 OVER 2013.068 1892.069 0.000
OVER 2006.207 1886.251 0.000 OVER 1999.365 1880.410 0.000 OVER 1992.542 1874.548 0.000 OVER 1985.740 1868.663 0.000
TO 1983.745 1866.925
LINK 106 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 332.154 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 2446.747 2184.878
OVER 2438.997 2180.671 0.000 OVER 2431.257 2176.441 0.000 OVER 2423.528 2172.189 0.000 OVER 2415.811 2167.914 0.000 OVER 2408.105 2163.616 0.000
OVER 2400.411 2159.296 0.000 OVER 2392.729 2154.952 0.000 OVER 2385.059 2150.584 0.000 OVER 2377.402 2146.193 0.000 OVER 2369.759 2141.779 0.000
OVER 2362.129 2137.340 0.000 OVER 2354.512 2132.877 0.000 OVER 2346.910 2128.389 0.000 OVER 2339.321 2123.877 0.000 OVER 2331.748 2119.340 0.000
OVER 2324.189 2114.779 0.000 OVER 2316.646 2110.192 0.000 OVER 2309.118 2105.580 0.000 OVER 2301.606 2100.942 0.000 OVER 2294.110 2096.279 0.000
OVER 2286.630 2091.589 0.000 OVER 2279.168 2086.874 0.000 OVER 2271.722 2082.132 0.000 OVER 2264.294 2077.364 0.000 OVER 2256.883 2072.569 0.000
OVER 2249.491 2067.748 0.000 OVER 2242.117 2062.899 0.000 OVER 2234.761 2058.023 0.000 OVER 2227.424 2053.119 0.000 OVER 2220.107 2048.189 0.000
OVER 2212.809 2043.230 0.000 OVER 2205.531 2038.243 0.000 OVER 2198.273 2033.228 0.000 OVER 2191.035 2028.185 0.000 OVER 2183.818 2023.113 0.000
OVER 2176.623 2018.012 0.000 OVER 2169.448 2012.883 0.000
TO 2164.884 2009.591
LINK 107 NAME "" LABEL 0.00 0.00
TYPE 3 LENGTH 330.561 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 2738.874 2339.578
TO 2446.747 2184.878
LINK 108 NAME "" LABEL 0.00 0.00

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TYPE      3 LENGTH  269.808 LANES  2 LANE_WIDTH  3.66  3.66 GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 3243.166 2606.632
TO 3004.728 2480.364
LINK 109 NAME "" LABEL 0.00 0.00
TYPE      3 LENGTH  29.897 LANES  2 LANE_WIDTH  3.66  3.66 GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 3514.287 2774.518
OVER 3505.387 2768.061 0.000 OVER 3496.441 2761.669 0.000
TO 3489.975 2757.119
LINK 110 NAME "" LABEL 0.00 0.00
TYPE      3 LENGTH  210.420 LANES  2 LANE_WIDTH  3.66  3.66 GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 3679.660 2904.544
OVER 3671.237 2897.358 0.000 OVER 3662.775 2890.216 0.000 OVER 3654.277 2883.118 0.000 OVER 3645.743 2876.061 0.000 OVER 3637.175 2869.046 0.000
OVER 3628.574 2862.070 0.000 OVER 3619.940 2855.133 0.000 OVER 3611.276 2848.234 0.000 OVER 3602.582 2841.372 0.000 OVER 3593.860 2834.545 0.000
OVER 3585.111 2827.752 0.000 OVER 3576.336 2820.993 0.000 OVER 3567.536 2814.266 0.000 OVER 3558.713 2807.570 0.000 OVER 3549.868 2800.904 0.000
OVER 3541.001 2794.267 0.000 OVER 3532.115 2787.657 0.000 OVER 3523.210 2781.075 0.000
TO 3514.287 2774.518
LINK 111 NAME "" LABEL 0.00 0.00
TYPE      3 LENGTH  1.920 LANES  2 LANE_WIDTH  3.66  3.66 GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 3681.115 2905.797
TO 3679.660 2904.544
LINK 112 NAME "" LABEL 0.00 0.00
TYPE      3 LENGTH  187.243 LANES  2 LANE_WIDTH  3.66  3.66 GRADIENT 0.00180 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 3823.019 3027.957
TO 3681.115 2905.797
LINK 113 NAME "" LABEL 0.00 0.00
TYPE      3 LENGTH  391.000 LANES  2 LANE_WIDTH  3.66  3.66 GRADIENT 0.01060 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 4456.435 3573.243
TO 4160.111 3318.148
LINK 114 NAME "" LABEL 0.00 0.00
TYPE      3 LENGTH  137.393 LANES  3 LANE_WIDTH  3.66  3.66  3.66 GRADIENT -0.00420 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
LENGTH 1000.000 EVALUATION
FROM 5004.766 4047.697
TO 4900.641 3958.060
LINK 115 NAME "" LABEL 0.00 0.00
TYPE      3 LENGTH  103.180 LANES  2 LANE_WIDTH  3.66  3.66 GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 5146.203 4167.040
TO 5068.007 4099.724
LINK 116 NAME "" LABEL 0.00 0.00
TYPE      3 LENGTH  259.618 LANES  3 LANE_WIDTH  3.66  3.66  3.66 GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 5499.324 4421.632
OVER 5491.677 4417.114 0.000 OVER 5484.044 4412.569 0.000 OVER 5476.425 4407.998 0.000 OVER 5468.820 4403.400 0.000 OVER 5461.229 4398.776 0.000
OVER 5453.653 4394.126 0.000 OVER 5446.092 4389.448 0.000 OVER 5438.545 4384.744 0.000 OVER 5431.015 4380.014 0.000 OVER 5423.499 4375.257 0.000
OVER 5416.000 4370.473 0.000 OVER 5408.517 4365.662 0.000 OVER 5401.050 4360.825 0.000 OVER 5393.600 4355.960 0.000 OVER 5386.166 4351.069 0.000
OVER 5378.750 4346.151 0.000 OVER 5371.351 4341.207 0.000 OVER 5363.970 4336.235 0.000 OVER 5356.606 4331.237 0.000 OVER 5349.261 4326.211 0.000
OVER 5341.934 4321.159 0.000 OVER 5334.626 4316.079 0.000 OVER 5327.337 4310.972 0.000 OVER 5320.067 4305.839 0.000 OVER 5312.816 4300.678 0.000
OVER 5305.585 4295.490 0.000 OVER 5298.374 4290.275 0.000 OVER 5291.183 4285.033 0.000 OVER 5284.012 4279.764 0.000
TO 5282.683 4278.779
LINK 117 NAME "" LABEL 0.00 0.00
TYPE      3 LENGTH  36.852 LANES  3 LANE_WIDTH  3.66  3.66  3.66 GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 5531.117 4440.268
TO 5499.324 4421.632
LINK 118 NAME "" LABEL 0.00 0.00
TYPE      3 LENGTH  14.054 LANES  2 LANE_WIDTH  3.66  3.66 GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM 5544.167 4445.796

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TO 5532 042 4438.689
 LINK 119 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 603.475 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.00680 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 6064.791 4750.972
 TO 5544.167 4445.796
 LINK 120 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 415.400 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.01500 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 6923.088 5256.203
 TO 6564.718 5046.136
 CLOSED
 LANE 1 VEHICLE_CLASSES 10 20
 LANE 2 VEHICLE_CLASSES 30
 LANE 3 VEHICLE_CLASSES 30
 LINK 121 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 723.352 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.01820 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 7547.131 5622.001
 TO 6923.088 5256.203
 CLOSED
 LANE 1 VEHICLE_CLASSES 10 20
 LANE 2 VEHICLE_CLASSES 30
 LANE 3 VEHICLE_CLASSES 30
 LINK 122 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 230.672 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.01000 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 7746.134 5738.651
 TO 7547.131 5622.001
 CLOSED
 LANE 1 VEHICLE_CLASSES 10 20
 LANE 2 VEHICLE_CLASSES 30
 LANE 3 VEHICLE_CLASSES 30
 LINK 123 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 102.285 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.02320 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 7834.376 5790.376
 TO 7746.134 5738.651
 CLOSED
 LANE 1 VEHICLE_CLASSES 10 20
 LANE 2 VEHICLE_CLASSES 30
 LANE 3 VEHICLE_CLASSES 30
 LINK 124 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 182.456 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.02320 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 8649.908 6268.419
 TO 8492.501 6176.151
 LINK 125 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 231.301 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 9014.004 6481.843
 TO 8814.458 6364.875
 LINK 126 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 499.999 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 9456.684 6712.000
 OVER 9444.498 6707.937 0.000 OVER 9433.913 6704.293 0.000 OVER 9423.363 6700.531 0.000 OVER 9412.851 6696.652 0.000 OVER 9402.378 6692.656 0.000
 OVER 9391.947 6688.542 0.000 OVER 9381.561 6684.313 0.000 OVER 9371.221 6679.967 0.000 OVER 9360.929 6675.506 0.000 OVER 9350.688 6670.929 0.000
 OVER 9340.500 6666.237 0.000 OVER 9330.367 6661.431 0.000 OVER 9320.291 6656.510 0.000 OVER 9310.275 6651.475 0.000 OVER 9300.321 6646.326 0.000
 OVER 9290.430 6641.064 0.000 OVER 9280.606 6635.689 0.000 OVER 9270.850 6630.201 0.000 OVER 9261.165 6624.601 0.000
 TO 9014.929 6480.264
 LINK 127 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 573.175 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.01036 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION

FROM 395.664 416.458
 TO -27.762 30.142
 LINK 128 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 268.532 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.01040 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 592.806 598.798
 TO 394.431 417.810
 LINK 129 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 572.898 LANES 2 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.00380 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 1225.791 1173.830
 TO 802.570 787.701
 LINK 130 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 42.322 LANES 2 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 1984.947 1865.545
 OVER 1980.160 1861.375 0.000 OVER 1973.398 1855.445 0.000 OVER 1966.656 1849.492 0.000 OVER 1959.936 1843.517 0.000
 TO 1953.236 1837.518
 LINK 131 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 12.010 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 2163.816 2011.070
 OVER 2161.228 2009.203 0.000
 TO 2154.097 2004.015
 LINK 132 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 73.049 LANES 2 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000
 FROM 1982.542 1868.306
 TO 1925.732 1822.385
 LINK 133 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 21.129 LANES 2 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 2757.546 2349.466
 TO 2738.874 2339.578
 LINK 134 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 279.702 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
 LENGTH 1000.000 EVALUATION
 FROM 3003.872 2481.981
 TO 2756.690 2351.083
 LINK 135 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 288.977 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
 LENGTH 1000.000 EVALUATION
 FROM 3488.925 2758.612
 OVER 3486.584 2756.957 0.000 OVER 3477.549 2750.691 0.000 OVER 3468.473 2744.485 0.000 OVER 3459.356 2738.337 0.000 OVER 3450.201 2732.244 0.000
 OVER 3441.009 2726.206 0.000 OVER 3431.782 2720.219 0.000 OVER 3422.520 2714.281 0.000 OVER 3413.227 2708.392 0.000 OVER 3403.904 2702.548 0.000
 OVER 3394.551 2696.748 0.000 OVER 3385.172 2690.990 0.000 OVER 3375.766 2685.271 0.000 OVER 3366.337 2679.590 0.000 OVER 3356.885 2673.944 0.000
 OVER 3347.412 2668.333 0.000 OVER 3337.921 2662.752 0.000 OVER 3328.411 2657.202 0.000 OVER 3318.886 2651.679 0.000 OVER 3309.346 2646.182 0.000
 OVER 3299.794 2640.708 0.000 OVER 3290.230 2635.256 0.000 OVER 3280.657 2629.823 0.000 OVER 3271.076 2624.408 0.000 OVER 3261.488 2619.009 0.000
 OVER 3251.896 2613.623 0.000
 TO 3242.301 2608.248
 LINK 136 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 193.219 LANES 2 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.01060 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 3969.452 3154.016
 TO 3823.019 3027.957
 LINK 137 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 251.575 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.01060 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 4158.917 3319.535
 TO 3968.258 3155.403
 LINK 138 NAME "" LABEL 0.00 0.00
 TYPE 3 LENGTH 587.707 LANES 2 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.00420 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
 1000.000 EVALUATION
 FROM 4901.835 3956.673

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TO      4456.435 3573.243
LINK    139 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 81.871 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM    5066.813 4101.111
TO      5004.766 4047.697
LINK    140 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 176.356 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM    5283.766 4277.317
OVER 5277.788 4272.888 0.000 OVER 5270.659 4267.564 0.000 OVER 5263.551 4262.213 0.000 OVER 5256.464 4256.835 0.000 OVER 5249.400 4251.429 0.000
OVER 5242.357 4245.996 0.000 OVER 5235.336 4240.535 0.000 OVER 5228.338 4235.047 0.000 OVER 5221.363 4229.531 0.000 OVER 5214.410 4223.988 0.000
OVER 5207.481 4218.418 0.000 OVER 5200.575 4212.820 0.000 OVER 5193.693 4207.194 0.000 OVER 5186.835 4201.541 0.000 OVER 5180.001 4195.860 0.000
OVER 5173.191 4190.151 0.000 OVER 5166.407 4184.415 0.000 OVER 5159.647 4178.651 0.000 OVER 5152.912 4172.859 0.000
TO      5146.203 4167.040
LINK    141 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 209.741 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.01500 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM    6245.737 4857.038
TO      6064.791 4750.972
LINK    142 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 73.793 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT -0.01500 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000
FROM    6243.886 4860.195
TO      6178.432 4826.118
LINK    143 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 370.815 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT -0.01500 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT
LENGTH 1000.000 EVALUATION
FROM    6564.718 5046.136
TO      6244.812 4858.616
LINK    144 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 762.857 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.02320 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM    8492.501 6176.151
TO      7834.376 5790.376
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LANE 2 VEHICLE_CLASSES 30
LANE 3 VEHICLE_CLASSES 30
LINK    145 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 3.512 LANES 3 LANE_WIDTH 3.66 3.66 3.66 GRADIENT 0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM    8652.938 6270.195
TO      8649.908 6268.419
LINK    146 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 187.224 LANES 2 LANE_WIDTH 3.66 3.66 GRADIENT 0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH
1000.000 EVALUATION
FROM    8815.383 6363.296
TO      8653.863 6268.617
LINK    1001 NAME "" LABEL 0.00 0.00
TYPE    3 LENGTH 50.001 LANES 1 LANE_WIDTH 3.66 GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000 SEGMENT LENGTH 1000.000
FROM    -11.776 -20.239
TO      24.121 14.567

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-- Connectors: --

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CONNECTOR 10000 NAME "" LABEL 0.00 0.00
FROM LINK 1 LANES 1 2 AT 499.930
OVER -0.051 -0.047 0.000 OVER -0.014 -0.013 0.000 OVER 0.015 0.014 0.000 OVER 0.052 0.047 0.000
TO LINK 2 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000

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SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10001 NAME "" LABEL 0.00 0.00
FROM LINK 31 LANES 1 2 AT 329.086
OVER 850.672 775.805 0.000 OVER 850.710 775.839 0.000 OVER 850.739 775.866 0.000 OVER 850.776 775.899 0.000
TO LINK 3 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10002 NAME "" LABEL 0.00 0.00
FROM LINK 33 LANES 1 2 AT 10.968
OVER 1122.724 1023.913 0.000 OVER 1122.761 1023.946 0.000 OVER 1122.791 1023.973 0.000 OVER 1122.828 1024.007 0.000
TO LINK 4 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00370 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10003 NAME "" LABEL 0.00 0.00
FROM LINK 4 LANES 1 2 AT 543.012
OVER 1523.993 1389.866 0.000 OVER 1524.030 1389.900 0.000 OVER 1524.059 1389.927 0.000 OVER 1524.096 1389.960 0.000
TO LINK 5 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00440 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10004 NAME "" LABEL 0.00 0.00
FROM LINK 5 LANES 1 2 3 AT 201.170
OVER 1673.917 1524.118 0.000 OVER 1673.954 1524.152 0.000 OVER 1673.983 1524.178 0.000 OVER 1674.020 1524.212 0.000
TO LINK 6 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00500 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10005 NAME "" LABEL 0.00 0.00
FROM LINK 35 LANES 1 2 3 AT 75.767
OVER 1982.471 1805.518 0.000 OVER 1982.509 1805.552 0.000 OVER 1982.538 1805.578 0.000 OVER 1982.575 1805.612 0.000
TO LINK 7 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00560 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10006 NAME "" LABEL 0.00 0.00
FROM LINK 7 LANES 1 2 3 AT 235.032
OVER 2163.810 1955.027 0.000 OVER 2163.849 1955.057 0.000 OVER 2163.882 1955.080 0.000 OVER 2163.922 1955.110 0.000
TO LINK 8 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00620 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10007 NAME "" LABEL 0.00 0.00
FROM LINK 36 LANES 1 2 AT 338.802
OVER 2466.275 2148.139 0.000 OVER 2466.319 2148.163 0.000 OVER 2466.354 2148.183 0.000 OVER 2466.398 2148.206 0.000
TO LINK 9 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00670 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10008 NAME "" LABEL 0.00 0.00
FROM LINK 37 LANES 1 2 3 AT 2.841
OVER 2765.005 2304.188 0.000 OVER 2765.050 2304.211 0.000 OVER 2765.085 2304.230 0.000 OVER 2765.129 2304.253 0.000
TO LINK 10 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10009 NAME "" LABEL 0.00 0.00
FROM LINK 38 LANES 1 2 AT 196.621
OVER 3262.775 2569.729 0.000 OVER 3262.819 2569.752 0.000 OVER 3262.855 2569.772 0.000 OVER 3262.899 2569.796 0.000
TO LINK 11 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00640 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION

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CONNECTOR 10010 NAME "" LABEL 0.00 0.00
FROM LINK 11 LANES 1 2 AT 329.040
OVER 3542.338 2743.116 0.000 OVER 3542.380 2743.144 0.000 OVER 3542.412 2743.167 0.000 OVER 3542.452 2743.196 0.000
TO LINK 12 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00640 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10011 NAME "" LABEL 0.00 0.00
FROM LINK 39 LANES 1 2 3 AT 133.198
OVER 3689.884 2855.788 0.000 OVER 3689.922 2855.821 0.000 OVER 3689.953 2855.847 0.000 OVER 3689.991 2855.879 0.000
TO LINK 13 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00130 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10012 NAME "" LABEL 0.00 0.00
FROM LINK 13 LANES 1 2 3 AT 23.961
OVER 3708.178 2871.372 0.000 OVER 3708.217 2871.404 0.000 OVER 3708.247 2871.430 0.000 OVER 3708.285 2871.463 0.000
TO LINK 14 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00370 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10013 NAME "" LABEL 0.00 0.00
FROM LINK 40 LANES 1 2 AT 98.253
OVER 3879.227 3020.974 0.000 OVER 3879.264 3021.007 0.000 OVER 3879.295 3021.033 0.000 OVER 3879.333 3021.066 0.000
TO LINK 15 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00760 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10014 NAME "" LABEL 0.00 0.00
FROM LINK 42 LANES 1 2 AT 367.086
OVER 4442.126 3505.356 0.000 OVER 4442.164 3505.389 0.000 OVER 4442.194 3505.415 0.000 OVER 4442.232 3505.448 0.000
TO LINK 16 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00440 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10015 NAME "" LABEL 0.00 0.00
FROM LINK 44 LANES 1 2 AT 31.928
OVER 5094.397 4066.643 0.000 OVER 5094.435 4066.676 0.000 OVER 5094.465 4066.702 0.000 OVER 5094.503 4066.735 0.000
TO LINK 17 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00180 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10016 NAME "" LABEL 0.00 0.00
FROM LINK 17 LANES 1 2 AT 104.663
OVER 5173.783 4134.958 0.000 OVER 5173.821 4134.990 0.000 OVER 5173.851 4135.016 0.000 OVER 5173.890 4135.049 0.000
TO LINK 18 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00650 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10017 NAME "" LABEL 0.00 0.00
FROM LINK 18 LANES 1 2 AT 428.263
OVER 5521.790 4383.565 0.000 OVER 5521.833 4383.589 0.000 OVER 5521.868 4383.609 0.000 OVER 5521.911 4383.635 0.000
TO LINK 19 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00650 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10018 NAME "" LABEL 0.00 0.00
FROM LINK 19 LANES 1 2 AT 31.629
OVER 5549.141 4399.587 0.000 OVER 5549.184 4399.613 0.000 OVER 5549.218 4399.632 0.000 OVER 5549.261 4399.658 0.000
TO LINK 20 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00650 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10019 NAME "" LABEL 0.00 0.00

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FROM LINK 20 LANES 1 2 3 AT 9.717
OVER 5558.510 4402.956 0.000 OVER 5558.553 4402.981 0.000 OVER 5558.588 4403.002 0.000 OVER 5558.631 4403.027 0.000
TO LINK 21 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00010 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10020 NAME "" LABEL 0.00 0.00
FROM LINK 46 LANES 1 2 3 4 AT 3.077
OVER 6025.136 4674.233 0.000 OVER 6025.179 4674.258 0.000 OVER 6025.213 4674.278 0.000 OVER 6025.256 4674.303 0.000
TO LINK 22 LANES 1 2 3 4 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.01100 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LANE 2 VEHICLE_CLASSES 30
CONNECTOR 10021 NAME "" LABEL 0.00 0.00
FROM LINK 48 LANES 1 2 3 AT 730.829
OVER 6946.644 5216.269 0.000 OVER 6946.688 5216.294 0.000 OVER 6946.722 5216.315 0.000 OVER 6946.765 5216.340 0.000
TO LINK 23 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 800.000
GRADIENT -0.00140 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LANE 2 VEHICLE_CLASSES 30
LANE 3 VEHICLE_CLASSES 30
CONNECTOR 10022 NAME "" LABEL 0.00 0.00
FROM LINK 23 LANES 1 2 3 AT 687.346
OVER 7539.756 5563.774 0.000 OVER 7539.799 5563.799 0.000 OVER 7539.833 5563.820 0.000 OVER 7539.876 5563.845 0.000
TO LINK 24 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.01400 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LANE 2 VEHICLE_CLASSES 30
LANE 3 VEHICLE_CLASSES 30
CONNECTOR 10023 NAME "" LABEL 0.00 0.00
FROM LINK 24 LANES 1 2 3 AT 266.538
OVER 7769.788 5698.551 0.000 OVER 7769.832 5698.576 0.000 OVER 7769.866 5698.597 0.000 OVER 7769.909 5698.622 0.000
TO LINK 25 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.01740 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LANE 2 VEHICLE_CLASSES 30
LANE 3 VEHICLE_CLASSES 30
CONNECTOR 10024 NAME "" LABEL 0.00 0.00
FROM LINK 25 LANES 1 2 3 AT 122.284
OVER 7875.357 5760.404 0.000 OVER 7875.401 5760.429 0.000 OVER 7875.435 5760.450 0.000 OVER 7875.478 5760.475 0.000
TO LINK 26 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.02469 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LANE 2 VEHICLE_CLASSES 30
LANE 3 VEHICLE_CLASSES 30
CONNECTOR 10025 NAME "" LABEL 0.00 0.00
FROM LINK 50 LANES 1 2 AT 22.733
OVER 8619.805 6198.698 0.000 OVER 8619.848 6198.723 0.000 OVER 8619.882 6198.743 0.000 OVER 8619.925 6198.768 0.000
TO LINK 27 LANES 1 2 AT 0.070 ALL

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DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.01520 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10026 NAME "" LABEL 0.00 0.00
FROM LINK 129 LANES 1 2 AT 572.827
OVER 802.622 787.748 0.000 OVER 802.585 787.715 0.000 OVER 802.555 787.688 0.000 OVER 802.518 787.654 0.000
TO LINK 101 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00710 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10027 NAME "" LABEL 0.00 0.00
FROM LINK 103 LANES 1 2 AT 177.100
OVER 1496.077 1420.427 0.000 OVER 1496.040 1420.393 0.000 OVER 1496.011 1420.367 0.000 OVER 1495.974 1420.333 0.000
TO LINK 102 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00380 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10028 NAME "" LABEL 0.00 0.00
FROM LINK 104 LANES 1 2 AT 441.667
OVER 1626.960 1539.838 0.000 OVER 1626.923 1539.804 0.000 OVER 1626.893 1539.777 0.000 OVER 1626.856 1539.744 0.000
TO LINK 103 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00480 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10029 NAME "" LABEL 0.00 0.00
FROM LINK 130 LANES 1 2 AT 42.252
OVER 1953.289 1837.565 0.000 OVER 1953.251 1837.532 0.000 OVER 1953.221 1837.504 0.000 OVER 1953.184 1837.471 0.000
TO LINK 104 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10030 NAME "" LABEL 0.00 0.00
FROM LINK 131 LANES 1 2 3 AT 11.940
OVER 2154.154 2004.056 0.000 OVER 2154.113 2004.026 0.000 OVER 2154.081 2004.003 0.000 OVER 2154.041 2003.973 0.000
TO LINK 105 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10031 NAME "" LABEL 0.00 0.00
FROM LINK 107 LANES 1 2 AT 330.491
OVER 2446.808 2184.910 0.000 OVER 2446.764 2184.887 0.000 OVER 2446.729 2184.868 0.000 OVER 2446.685 2184.845 0.000
TO LINK 106 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10032 NAME "" LABEL 0.00 0.00
FROM LINK 133 LANES 1 2 AT 21.058
OVER 2738.937 2339.611 0.000 OVER 2738.892 2339.588 0.000 OVER 2738.857 2339.569 0.000 OVER 2738.812 2339.545 0.000
TO LINK 107 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10033 NAME "" LABEL 0.00 0.00
FROM LINK 135 LANES 2 3 AT 288.908
OVER 3243.257 2606.686 0.000 OVER 3243.213 2606.662 0.000 OVER 3243.149 2606.623 0.000 OVER 3243.104 2606.599 0.000
TO LINK 108 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 309.000
GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10034 NAME "" LABEL 0.00 0.00
FROM LINK 110 LANES 1 2 AT 210.350
OVER 3514.344 2774.560 0.000 OVER 3514.304 2774.530 0.000 OVER 3514.271 2774.506 0.000 OVER 3514.230 2774.477 0.000
TO LINK 109 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000

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GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10035 NAME "" LABEL 0.00 0.00
FROM LINK 111 LANES 1 2 AT 1.850
OVER 3679.713 2904.590 0.000 OVER 3679.675 2904.557 0.000 OVER 3679.645 2904.531 0.000 OVER 3679.607 2904.498 0.000
TO LINK 110 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10036 NAME "" LABEL 0.00 0.00
FROM LINK 112 LANES 1 2 AT 187.173
OVER 3681.168 2905.842 0.000 OVER 3681.130 2905.810 0.000 OVER 3681.100 2905.784 0.000 OVER 3681.062 2905.751 0.000
TO LINK 111 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00190 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10037 NAME "" LABEL 0.00 0.00
FROM LINK 136 LANES 1 2 AT 193.149
OVER 3823.072 3028.002 0.000 OVER 3823.034 3027.970 0.000 OVER 3823.004 3027.944 0.000 OVER 3822.966 3027.911 0.000
TO LINK 112 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00620 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10038 NAME "" LABEL 0.00 0.00
FROM LINK 138 LANES 1 2 AT 587.637
OVER 4456.488 3573.289 0.000 OVER 4456.450 3573.256 0.000 OVER 4456.420 3573.230 0.000 OVER 4456.382 3573.197 0.000
TO LINK 113 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00320 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10039 NAME "" LABEL 0.00 0.00
FROM LINK 139 LANES 1 2 3 AT 81.801
OVER 5004.819 4047.743 0.000 OVER 5004.781 4047.710 0.000 OVER 5004.752 4047.684 0.000 OVER 5004.713 4047.651 0.000
TO LINK 114 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00120 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10040 NAME "" LABEL 0.00 0.00
FROM LINK 140 LANES 1 2 AT 176.286
OVER 5146.256 4167.086 0.000 OVER 5146.218 4167.053 0.000 OVER 5146.188 4167.027 0.000 OVER 5146.150 4166.994 0.000
TO LINK 115 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10041 NAME "" LABEL 0.00 0.00
FROM LINK 117 LANES 1 2 3 AT 36.782
OVER 5499.384 4421.668 0.000 OVER 5499.341 4421.642 0.000 OVER 5499.307 4421.622 0.000 OVER 5499.263 4421.597 0.000
TO LINK 116 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10042 NAME "" LABEL 0.00 0.00
FROM LINK 118 LANES 1 2 AT 13.984
OVER 5532.103 4438.725 0.000 OVER 5532.060 4438.699 0.000 OVER 5532.025 4438.679 0.000 OVER 5531.982 4438.654 0.000
TO LINK 117 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10043 NAME "" LABEL 0.00 0.00
FROM LINK 119 LANES 1 2 AT 603.405
OVER 5544.227 4445.831 0.000 OVER 5544.184 4445.806 0.000 OVER 5544.150 4445.786 0.000 OVER 5544.106 4445.761 0.000
TO LINK 118 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00010 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000

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SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10044 NAME "" LABEL 0.00 0.00
FROM LINK 141 LANES 1 2 AT 209.671
OVER 6064.852 4751.008 0.000 OVER 6064.808 4750.982 0.000 OVER 6064.774 4750.962 0.000 OVER 6064.730 4750.937 0.000
TO LINK 119 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.01090 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10045 NAME "" LABEL 0.00 0.00
FROM LINK 121 LANES 1 2 3 AT 723.282
OVER 6923.148 5256.239 0.000 OVER 6923.105 5256.214 0.000 OVER 6923.070 5256.193 0.000 OVER 6923.027 5256.168 0.000
TO LINK 120 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00160 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LANE 2 VEHICLE_CLASSES 30
LANE 3 VEHICLE_CLASSES 30
CONNECTOR 10046 NAME "" LABEL 0.00 0.00
FROM LINK 122 LANES 1 2 3 AT 230.602
OVER 7547.191 5622.037 0.000 OVER 7547.148 5622.012 0.000 OVER 7547.113 5621.991 0.000 OVER 7547.070 5621.966 0.000
TO LINK 121 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.01410 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LANE 2 VEHICLE_CLASSES 30
LANE 3 VEHICLE_CLASSES 30
CONNECTOR 10047 NAME "" LABEL 0.00 0.00
FROM LINK 123 LANES 1 2 3 AT 102.215
OVER 7746.194 5738.687 0.000 OVER 7746.151 5738.661 0.000 OVER 7746.116 5738.641 0.000 OVER 7746.073 5738.616 0.000
TO LINK 122 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.01660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LANE 2 VEHICLE_CLASSES 30
LANE 3 VEHICLE_CLASSES 30
CONNECTOR 10048 NAME "" LABEL 0.00 0.00
FROM LINK 144 LANES 1 2 3 AT 762.787
OVER 7834.436 5790.412 0.000 OVER 7834.393 5790.386 0.000 OVER 7834.358 5790.366 0.000 OVER 7834.315 5790.341 0.000
TO LINK 123 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.02320 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LANE 2 VEHICLE_CLASSES 30
LANE 3 VEHICLE_CLASSES 30
CONNECTOR 10049 NAME "" LABEL 0.00 0.00
FROM LINK 145 LANES 1 2 3 AT 3.442
OVER 8649.968 6268.455 0.000 OVER 8649.925 6268.430 0.000 OVER 8649.890 6268.409 0.000 OVER 8649.847 6268.384 0.000
TO LINK 124 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.01440 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10050 NAME "" LABEL 0.00 0.00
FROM LINK 126 LANES 1 2 AT 499.929
OVER 9014.990 6480.300 0.000 OVER 9014.947 6480.274 0.000 OVER 9014.913 6480.254 0.000 OVER 9014.869 6480.229 0.000
TO LINK 125 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000

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GRADIENT 0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10051 NAME "" LABEL 0.00 0.00
FROM LINK 2 LANES 1 2 AT 27.568
OVER 20.369 18.577 0.000 OVER 20.406 18.611 0.000 OVER 20.436 18.637 0.000 OVER 20.473 18.671 0.000
TO LINK 28 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10052 NAME "" LABEL 0.00 0.00
FROM LINK 28 LANES 2 3 AT 253.186
OVER 207.494 189.231 0.000 OVER 207.531 189.265 0.000 OVER 207.560 189.293 0.000 OVER 207.597 189.327 0.000
TO LINK 29 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 273.000
GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10053 NAME "" LABEL 0.00 0.00
FROM LINK 29 LANES 1 2 AT 317.191
OVER 441.909 403.017 0.000 OVER 441.945 403.051 0.000 OVER 441.974 403.078 0.000 OVER 442.011 403.112 0.000
TO LINK 30 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10054 NAME "" LABEL 0.00 0.00
FROM LINK 30 LANES 2 3 AT 224.000
OVER 607.468 554.005 0.000 OVER 607.505 554.038 0.000 OVER 607.535 554.068 0.000 OVER 607.571 554.100 0.000
TO LINK 31 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 244.000
GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10055 NAME "" LABEL 0.00 0.00
FROM LINK 3 LANES 1 2 AT 193.100
OVER 993.400 905.971 0.000 OVER 993.437 906.005 0.000 OVER 993.466 906.032 0.000 OVER 993.503 906.065 0.000
TO LINK 32 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00300 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10056 NAME "" LABEL 0.00 0.00
FROM LINK 32 LANES 2 3 AT 163.920
OVER 1114.568 1016.475 0.000 OVER 1114.605 1016.508 0.000 OVER 1114.634 1016.536 0.000 OVER 1114.671 1016.569 0.000
TO LINK 33 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00300 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10057 NAME "" LABEL 0.00 0.00
FROM LINK 6 LANES 2 3 AT 178.300
OVER 1804.476 1645.664 0.000 OVER 1804.513 1645.698 0.000 OVER 1804.543 1645.725 0.000 OVER 1804.579 1645.759 0.000
TO LINK 34 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 400.000
GRADIENT -0.00560 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10058 NAME "" LABEL 0.00 0.00
FROM LINK 34 LANES 1 2 AT 163.326
OVER 1925.205 1755.768 0.000 OVER 1925.242 1755.802 0.000 OVER 1925.270 1755.829 0.000 OVER 1925.307 1755.862 0.000
TO LINK 35 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00560 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10059 NAME "" LABEL 0.00 0.00
FROM LINK 8 LANES 2 3 AT 20.350
OVER 2179.223 1968.547 0.000 OVER 2179.264 1968.577 0.000 OVER 2179.299 1968.596 0.000 OVER 2179.339 1968.625 0.000
TO LINK 36 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 351.000
GRADIENT -0.00670 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000

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SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10060 NAME "" LABEL 0.00 0.00
FROM LINK 9 LANES 1 2 AT 334.047
OVER 2761.576 2304.443 0.000 OVER 2761.621 2304.467 0.000 OVER 2761.656 2304.485 0.000 OVER 2761.700 2304.508 0.000
TO LINK 37 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00670 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10061 NAME "" LABEL 0.00 0.00
FROM LINK 10 LANES 2 3 AT 367.405
OVER 3088.934 2477.714 0.000 OVER 3088.978 2477.738 0.000 OVER 3089.014 2477.757 0.000 OVER 3089.058 2477.780 0.000
TO LINK 38 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 390.000
GRADIENT 0.00640 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10062 NAME "" LABEL 0.00 0.00
FROM LINK 12 LANES 1 2 AT 52.368
OVER 3584.453 2774.357 0.000 OVER 3584.493 2774.387 0.000 OVER 3584.525 2774.412 0.000 OVER 3584.565 2774.442 0.000
TO LINK 39 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00640 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10063 NAME "" LABEL 0.00 0.00
FROM LINK 14 LANES 2 3 AT 128.840
OVER 3804.698 2956.841 0.000 OVER 3804.736 2956.873 0.000 OVER 3804.767 2956.900 0.000 OVER 3804.805 2956.932 0.000
TO LINK 40 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 306.000
GRADIENT -0.00370 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10064 NAME "" LABEL 0.00 0.00
FROM LINK 15 LANES 1 2 AT 109.709
OVER 3962.438 3092.579 0.000 OVER 3962.476 3092.612 0.000 OVER 3962.506 3092.638 0.000 OVER 3962.544 3092.671 0.000
TO LINK 41 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.01160 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10065 NAME "" LABEL 0.00 0.00
FROM LINK 41 LANES 2 3 AT 265.613
OVER 4163.825 3265.874 0.000 OVER 4163.863 3265.907 0.000 OVER 4163.893 3265.933 0.000 OVER 4163.931 3265.966 0.000
TO LINK 42 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 286.000
GRADIENT -0.01160 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10066 NAME "" LABEL 0.00 0.00
FROM LINK 16 LANES 1 2 AT 560.027
OVER 4866.676 3870.687 0.000 OVER 4866.714 3870.719 0.000 OVER 4866.744 3870.744 0.000 OVER 4866.782 3870.777 0.000
TO LINK 43 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00280 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10067 NAME "" LABEL 0.00 0.00
FROM LINK 43 LANES 2 3 AT 268.358
OVER 5070.142 4045.772 0.000 OVER 5070.180 4045.804 0.000 OVER 5070.210 4045.831 0.000 OVER 5070.248 4045.864 0.000
TO LINK 44 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 288.000
GRADIENT 0.00280 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10068 NAME "" LABEL 0.00 0.00
FROM LINK 21 LANES 2 3 AT 277.157
OVER 5796.780 4544.680 0.000 OVER 5796.823 4544.705 0.000 OVER 5796.857 4544.726 0.000 OVER 5796.901 4544.751 0.000
TO LINK 45 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 307.000
GRADIENT 0.00680 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION

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CONNECTOR 10069 NAME "" LABEL 0.00 0.00
FROM LINK 45 LANES 1 2 AT 259.303
OVER 6020.570 4675.799 0.000 OVER 6020.613 4675.825 0.000 OVER 6020.647 4675.845 0.000 OVER 6020.691 4675.870 0.000
TO LINK 46 LANES 3 4 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00680 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10070 NAME "" LABEL 0.00 0.00
FROM LINK 22 LANES 3 4 AT 239.592
OVER 6230.069 4798.546 0.000 OVER 6230.112 4798.571 0.000 OVER 6230.145 4798.591 0.000 OVER 6230.188 4798.616 0.000
TO LINK 47 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 263.000
GRADIENT 0.01520 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10071 NAME "" LABEL 0.00 0.00
FROM LINK 47 LANES 1 2 AT 98.472
OVER 6315.091 4848.381 0.000 OVER 6315.134 4848.386 0.000 OVER 6315.168 4848.406 0.000 OVER 6315.211 4848.431 0.000
TO LINK 48 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.01520 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10072 NAME "" LABEL 0.00 0.00
FROM LINK 26 LANES 1 2 3 AT 671.036
OVER 8454.397 6099.664 0.000 OVER 8454.440 6099.689 0.000 OVER 8454.474 6099.709 0.000 OVER 8454.517 6099.734 0.000
TO LINK 49 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.02469 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LANE 2 VEHICLE_CLASSES 30
LANE 3 VEHICLE_CLASSES 30
CONNECTOR 10073 NAME "" LABEL 0.00 0.00
FROM LINK 49 LANES 2 3 AT 169.907
OVER 8600.129 6187.170 0.000 OVER 8600.173 6187.195 0.000 OVER 8600.207 6187.215 0.000 OVER 8600.250 6187.240 0.000
TO LINK 50 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.02469 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10074 NAME "" LABEL 0.00 0.00
FROM LINK 128 LANES 2 3 AT 268.462
OVER 395.716 416.505 0.000 OVER 395.679 416.472 0.000 OVER 395.650 416.444 0.000 OVER 395.613 416.410 0.000
TO LINK 127 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 289.000
GRADIENT 0.01040 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10075 NAME "" LABEL 0.00 0.00
FROM LINK 101 LANES 1 2 AT 282.210
OVER 594.091 597.493 0.000 OVER 594.054 597.460 0.000 OVER 594.024 597.433 0.000 OVER 593.987 597.399 0.000
TO LINK 128 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.01040 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10076 NAME "" LABEL 0.00 0.00
FROM LINK 102 LANES 2 3 AT 365.736
OVER 1225.842 1173.876 0.000 OVER 1225.805 1173.843 0.000 OVER 1225.777 1173.816 0.000 OVER 1225.740 1173.782 0.000
TO LINK 129 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 386.000
GRADIENT 0.00380 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10077 NAME "" LABEL 0.00 0.00
FROM LINK 105 LANES 2 3 AT 218.643
OVER 1985.000 1865.591 0.000 OVER 1984.962 1865.558 0.000 OVER 1984.931 1865.532 0.000 OVER 1984.894 1865.499 0.000
TO LINK 130 LANES 1 2 AT 0.070 ALL

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DX_EMERG_STOP 5.000 DX_LANE_CHANGE 251.000
GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10078 NAME "" LABEL 0.00 0.00
FROM LINK 106 LANES 1 2 AT 332.084
OVER 2164.941 2009.632 0.000 OVER 2164.900 2009.603 0.000 OVER 2164.871 2009.574 0.000 OVER 2164.830 2009.545 0.000
TO LINK 131 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10079 NAME "" LABEL 0.00 0.00
FROM LINK 105 LANES 1 2 AT 218.643
OVER 1982.595 1868.351 0.000 OVER 1982.558 1868.318 0.000 OVER 1982.527 1868.293 0.000 OVER 1982.488 1868.262 0.000
TO LINK 132 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 500.000
GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10080 NAME "" LABEL 0.00 0.00
FROM LINK 134 LANES 2 3 AT 279.632
OVER 2757.608 2349.498 0.000 OVER 2757.564 2349.475 0.000 OVER 2757.529 2349.457 0.000 OVER 2757.484 2349.433 0.000
TO LINK 133 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 300.000
GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10081 NAME "" LABEL 0.00 0.00
FROM LINK 108 LANES 1 2 AT 269.738
OVER 3004.790 2480.397 0.000 OVER 3004.746 2480.374 0.000 OVER 3004.710 2480.355 0.000 OVER 3004.666 2480.331 0.000
TO LINK 134 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10082 NAME "" LABEL 0.00 0.00
FROM LINK 109 LANES 1 2 AT 29.827
OVER 3490.032 2757.159 0.000 OVER 3489.991 2757.131 0.000 OVER 3489.965 2757.106 0.000 OVER 3489.924 2757.077 0.000
TO LINK 135 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10083 NAME "" LABEL 0.00 0.00
FROM LINK 137 LANES 2 3 AT 251.505
OVER 3969.506 3154.062 0.000 OVER 3969.468 3154.030 0.000 OVER 3969.437 3154.003 0.000 OVER 3969.399 3153.970 0.000
TO LINK 136 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 272.000
GRADIENT 0.01060 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10084 NAME "" LABEL 0.00 0.00
FROM LINK 113 LANES 1 2 AT 390.930
OVER 4160.165 3318.194 0.000 OVER 4160.127 3318.162 0.000 OVER 4160.096 3318.135 0.000 OVER 4160.058 3318.103 0.000
TO LINK 137 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.01060 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10085 NAME "" LABEL 0.00 0.00
FROM LINK 114 LANES 2 3 AT 137.323
OVER 4901.888 3956.719 0.000 OVER 4901.851 3956.686 0.000 OVER 4901.820 3956.660 0.000 OVER 4901.782 3956.627 0.000
TO LINK 138 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 239.000
GRADIENT -0.00420 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10086 NAME "" LABEL 0.00 0.00
FROM LINK 115 LANES 1 2 AT 103.110
OVER 5068.060 4099.769 0.000 OVER 5068.022 4099.737 0.000 OVER 5067.992 4099.711 0.000 OVER 5067.954 4099.679 0.000
TO LINK 139 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000

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GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10087 NAME "" LABEL 0.00 0.00
FROM LINK 116 LANES 2 3 AT 259.548
OVER 5283.829 4277.351 0.000 OVER 5283.789 4277.321 0.000 OVER 5283.750 4277.305 0.000 OVER 5283.710 4277.275 0.000
TO LINK 140 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 316.000
GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10088 NAME "" LABEL 0.00 0.00
FROM LINK 143 LANES 2 3 AT 370.745
OVER 6245.798 4857.073 0.000 OVER 6245.754 4857.048 0.000 OVER 6245.720 4857.028 0.000 OVER 6245.677 4857.003 0.000
TO LINK 141 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 391.000
GRADIENT -0.01500 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10089 NAME "" LABEL 0.00 0.00
FROM LINK 143 LANES 1 2 AT 370.745
OVER 6243.946 4860.230 0.000 OVER 6243.903 4860.205 0.000 OVER 6243.868 4860.186 0.000 OVER 6243.824 4860.163 0.000
TO LINK 142 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 375.000
GRADIENT -0.01500 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10090 NAME "" LABEL 0.00 0.00
FROM LINK 120 LANES 1 2 3 AT 415.330
OVER 6564.779 5046.172 0.000 OVER 6564.735 5046.147 0.000 OVER 6564.700 5046.126 0.000 OVER 6564.657 5046.101 0.000
TO LINK 143 LANES 1 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.01500 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
LANE 2 VEHICLE_CLASSES 30
LANE 3 VEHICLE_CLASSES 30
CONNECTOR 10091 NAME "" LABEL 0.00 0.00
FROM LINK 124 LANES 2 3 AT 182.386
OVER 8493.486 6174.607 0.000 OVER 8493.443 6174.582 0.000 OVER 8493.408 6174.563 0.000 OVER 8493.365 6174.538 0.000
TO LINK 144 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 206.000
GRADIENT 0.02320 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 30
LANE 2 VEHICLE_CLASSES 30
CONNECTOR 10092 NAME "" LABEL 0.00 0.00
FROM LINK 148 LANES 1 2 AT 187.154
OVER 8653.923 6268.652 0.000 OVER 8653.880 6268.627 0.000 OVER 8653.846 6268.607 0.000 OVER 8653.803 6268.581 0.000
TO LINK 145 LANES 2 3 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10093 NAME "" LABEL 0.00 0.00
FROM LINK 125 LANES 2 3 AT 231.231
OVER 8815.444 6363.332 0.000 OVER 8815.401 6363.306 0.000 OVER 8815.366 6363.286 0.000 OVER 8815.323 6363.261 0.000
TO LINK 146 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 251.000
GRADIENT 0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10094 NAME "" LABEL 0.00 0.00
FROM LINK 1001 LANES 1 AT 49.930
OVER 24.070 14.518 0.000 OVER 24.106 14.553 0.000 OVER 24.135 14.581 0.000 OVER 24.172 14.615 0.000
TO LINK 28 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000

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SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10095 NAME "" LABEL 0.00 0.00
FROM LINK 51 LANES 1 AT 49.930
OVER 445.609 398.980 0.000 OVER 445.645 398.994 0.000 OVER 445.674 399.021 0.000 OVER 445.711 399.055 0.000
TO LINK 30 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.01020 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10096 NAME "" LABEL 0.00 0.00
FROM LINK 32 LANES 1 AT 163.920
OVER 1118.267 1012.418 0.000 OVER 1118.304 1012.452 0.000 OVER 1118.336 1012.477 0.000 OVER 1118.375 1012.509 0.000
TO LINK 52 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 500.000
GRADIENT -0.00300 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10097 NAME "" LABEL 0.00 0.00
FROM LINK 53 LANES 1 AT 49.930
OVER 1527.695 1385.806 0.000 OVER 1527.730 1385.842 0.000 OVER 1527.759 1385.871 0.000 OVER 1527.796 1385.904 0.000
TO LINK 5 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00440 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10098 NAME "" LABEL 0.00 0.00
FROM LINK 54 LANES 1 AT 49.930
OVER 1928.907 1751.707 0.000 OVER 1928.942 1751.743 0.000 OVER 1928.970 1751.772 0.000 OVER 1929.007 1751.806 0.000
TO LINK 35 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00560 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10099 NAME "" LABEL 0.00 0.00
FROM LINK 10 LANES 1 AT 367.405
OVER 3091.502 2472.862 0.000 OVER 3091.547 2472.885 0.000 OVER 3091.583 2472.903 0.000 OVER 3091.628 2472.925 0.000
TO LINK 55 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 500.000
GRADIENT 0.00640 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10100 NAME "" LABEL 0.00 0.00
FROM LINK 56 LANES 1 AT 49.930
OVER 3587.762 2769.975 0.000 OVER 3587.801 2770.005 0.000 OVER 3587.833 2770.030 0.000 OVER 3587.873 2770.060 0.000
TO LINK 39 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00640 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10101 NAME "" LABEL 0.00 0.00
FROM LINK 57 LANES 1 AT 49.930
OVER 3966.022 3088.416 0.000 OVER 3966.058 3088.450 0.000 OVER 3966.087 3088.477 0.000 OVER 3966.125 3088.509 0.000
TO LINK 41 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.01160 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10102 NAME "" LABEL 0.00 0.00
FROM LINK 43 LANES 1 AT 268.358
OVER 5073.723 4041.610 0.000 OVER 5073.761 4041.643 0.000 OVER 5073.793 4041.668 0.000 OVER 5073.832 4041.700 0.000
TO LINK 58 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 500.000
GRADIENT 0.00280 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10103 NAME "" LABEL 0.00 0.00
FROM LINK 59 LANES 1 AT 49.930
OVER 5551.918 4394.847 0.000 OVER 5551.960 4394.874 0.000 OVER 5551.994 4394.896 0.000 OVER 5552.037 4394.921 0.000
TO LINK 20 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00650 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION

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CONNECTOR 10104 NAME "" LABEL 0.00 0.00
FROM LINK 22 LANES 1 AT 239.592
OVER 6234.694 4790.651 0.000 OVER 6234.738 4790.677 0.000 OVER 6234.771 4790.698 0.000 OVER 6234.813 4790.725 0.000
TO LINK 60 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.01520 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
CONNECTOR 10105 NAME "" LABEL 0.00 0.00
FROM LINK 60 LANES 1 AT 98.538
OVER 6317.867 4843.621 0.000 OVER 6317.909 4843.648 0.000 OVER 6317.943 4843.670 0.000 OVER 6317.987 4843.695 0.000
TO LINK 48 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.01520 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
CONNECTOR 10106 NAME "" LABEL 0.00 0.00
FROM LINK 61 LANES 1 AT 49.930
OVER 6023.346 4671.061 0.000 OVER 6023.389 4671.087 0.000 OVER 6023.423 4671.108 0.000 OVER 6023.466 4671.133 0.000
TO LINK 46 LANES 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00680 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10107 NAME "" LABEL 0.00 0.00
FROM LINK 62 LANES 1 AT 49.930
OVER 6025.198 4667.903 0.000 OVER 6025.240 4667.929 0.000 OVER 6025.274 4667.951 0.000 OVER 6025.317 4667.976 0.000
TO LINK 46 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00680 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20
CONNECTOR 10108 NAME "" LABEL 0.00 0.00
FROM LINK 49 LANES 1 AT 169.907
OVER 8602.906 6182.434 0.000 OVER 8602.949 6182.459 0.000 OVER 8602.984 6182.477 0.000 OVER 8603.029 6182.500 0.000
TO LINK 63 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 500.000
GRADIENT -0.02469 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10109 NAME "" LABEL 0.00 0.00
FROM LINK 128 LANES 1 AT 268.462
OVER 392.015 420.561 0.000 OVER 391.978 420.527 0.000 OVER 391.948 420.502 0.000 OVER 391.910 420.469 0.000
TO LINK 64 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 500.000
GRADIENT 0.01040 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10110 NAME "" LABEL 0.00 0.00
FROM LINK 65 LANES 1 AT 49.930
OVER 1492.372 1424.487 0.000 OVER 1492.337 1424.451 0.000 OVER 1492.311 1424.422 0.000 OVER 1492.273 1424.389 0.000
TO LINK 102 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00380 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10111 NAME "" LABEL 0.00 0.00
FROM LINK 132 LANES 1 2 AT 72.979
OVER 1925.787 1822.429 0.000 OVER 1925.748 1822.398 0.000 OVER 1925.716 1822.372 0.000 OVER 1925.678 1822.340 0.000
TO LINK 66 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00590 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10112 NAME "" LABEL 0.00 0.00
FROM LINK 67 LANES 1 AT 49.930

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OVER 3002.219 2485.250 0.000 OVER 3002.176 2485.225 0.000 OVER 3002.141 2485.206 0.000 OVER 3002.097 2485.183 0.000
TO LINK 134 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10113 NAME "" LABEL 0.00 0.00
FROM LINK 68 LANES 1 AT 49.930
OVER 3486.865 2761.645 0.000 OVER 3486.826 2761.614 0.000 OVER 3486.796 2761.589 0.000 OVER 3486.755 2761.560 0.000
TO LINK 135 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10114 NAME "" LABEL 0.00 0.00
FROM LINK 137 LANES 1 AT 251.505
OVER 3965.924 3158.223 0.000 OVER 3965.886 3158.190 0.000 OVER 3965.854 3158.165 0.000 OVER 3965.815 3158.134 0.000
TO LINK 69 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 500.000
GRADIENT 0.01060 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10115 NAME "" LABEL 0.00 0.00
FROM LINK 70 LANES 1 AT 49.930
OVER 5529.324 4443.464 0.000 OVER 5529.282 4443.437 0.000 OVER 5529.248 4443.415 0.000 OVER 5529.205 4443.390 0.000
TO LINK 117 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10116 NAME "" LABEL 0.00 0.00
FROM LINK 142 LANES 1 2 AT 73.723
OVER 6178.495 4826.150 0.000 OVER 6178.450 4826.127 0.000 OVER 6178.414 4826.108 0.000 OVER 6178.370 4826.084 0.000
TO LINK 71 LANES 1 2 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT -0.01500 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10117 NAME "" LABEL 0.00 0.00
FROM LINK 72 LANES 1 AT 49.930
OVER 8651.146 6273.391 0.000 OVER 8651.103 6273.364 0.000 OVER 8651.069 6273.343 0.000 OVER 8651.026 6273.318 0.000
TO LINK 145 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10118 NAME "" LABEL 0.00 0.00
FROM LINK 73 LANES 1 AT 49.930
OVER 9012.212 6485.038 0.000 OVER 9012.170 6485.011 0.000 OVER 9012.136 6484.990 0.000 OVER 9012.093 6484.965 0.000
TO LINK 125 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00550 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10119 NAME "" LABEL 0.00 0.00
FROM LINK 74 LANES 1 AT 49.930
OVER 5064.476 4103.932 0.000 OVER 5064.439 4103.899 0.000 OVER 5064.410 4103.872 0.000 OVER 5064.372 4103.839 0.000
TO LINK 139 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 200.000
GRADIENT 0.00660 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CONNECTOR 10120 NAME "" LABEL 0.00 0.00
FROM LINK 124 LANES 1 AT 182.386
OVER 8490.711 6179.344 0.000 OVER 8490.668 6179.319 0.000 OVER 8490.633 6179.300 0.000 OVER 8490.590 6179.275 0.000
TO LINK 144 LANES 1 AT 0.070 ALL
DX_EMERG_STOP 5.000 DX_LANE_CHANGE 206.000
GRADIENT 0.02320 COST 0.00000 SURCHARGE 0.00000 SURCHARGE 0.00000
SEGMENT LENGTH 10.000 ANIMATION
CLOSED
LANE 1 VEHICLE_CLASSES 10 20

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-- Direction Decisions: --

-- Routing Decisions: --

ROUTING_DECISION 1 NAME "From Westend" LABEL 0.00 0.00

LINK 1 AT 20.000

TIME FROM 0.0 UNTIL 99999.0

NODE 0

VEHICLE_CLASSES 10 20

ROUTE 5 DESTINATION LINK 27 AT 450.000

FRACTION 7282

OVER 10000	2	10051	28	10052	29	10053	30	10054	31
10001	3	10055	32	10056	33	10002	4	10003	5
10004	6	10057	34	10058	35	10005	7	10006	8
10059	36	10007	9	10060	37	10008	10	10061	38
10009	11	10010	12	10062	39	10011	13	10012	14
10063	40	10013	15	10064	41	10065	42	10014	16
10066	43	10067	44	10015	17	10016	18	10017	19
10018	20	10019	21	10068	45	10069	46	10020	22
10070	47	10071	48	10021	23	10022	24	10023	25
10024	26	10072	49	10073	50	10025			

ROUTE 4 DESTINATION LINK 63 AT 30.000

FRACTION 411

OVER 10000	2	10051	28	10052	29	10053	30	10054	31
10001	3	10055	32	10056	33	10002	4	10003	5
10004	6	10057	34	10058	35	10005	7	10006	8
10059	36	10007	9	10060	37	10008	10	10061	38
10009	11	10010	12	10062	39	10011	13	10012	14
10063	40	10013	15	10064	41	10065	42	10014	16
10066	43	10067	44	10015	17	10016	18	10017	19
10018	20	10019	21	10068	45	10069	46	10020	22
10070	47	10071	48	10021	23	10022	24	10023	25
10024	26	10072	49	10108					

ROUTE 3 DESTINATION LINK 58 AT 30.000

FRACTION 649

OVER 10000	2	10051	28	10052	29	10053	30	10054	31
10001	3	10055	32	10056	33	10002	4	10003	5
10004	6	10057	34	10058	35	10005	7	10006	8
10059	36	10007	9	10060	37	10008	10	10061	38
10009	11	10010	12	10062	39	10011	13	10012	14
10063	40	10013	15	10064	41	10065	42	10014	16
10066	43	10102							

ROUTE 2 DESTINATION LINK 55 AT 30.000

FRACTION 1159

OVER 10000	2	10051	28	10052	29	10053	30	10054	31
10001	3	10055	32	10056	33	10002	4	10003	5
10004	6	10057	34	10058	35	10005	7	10006	8
10059	36	10007	9	10060	37	10008	10	10099	

ROUTE 1 DESTINATION LINK 52 AT 30.000

FRACTION 499

OVER 10000	2	10051	28	10052	29	10053	30	10054	31
10001	3	10055	32	10096					

ROUTING_DECISION 2 NAME "From Carp inner-loop EB" LABEL 0.00 0.00

LINK 1001 AT 20.000

TIME FROM 0.0 UNTIL 99999.0

NODE 0

VEHICLE_CLASSES 10 20

ROUTE 5 DESTINATION LINK 27 AT 450.000

FRACTION 7192

OVER 10094	28	10052	29	10053	30	10054	31	10001	3
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10055 32 10056 33 10002 4 10003 5 10004 6
10057 34 10058 35 10005 7 10006 8 10059 36
10007 9 10060 37 10008 10 10061 38 10009 11
10010 12 10062 39 10011 13 10012 14 10063 40
10013 15 10064 41 10065 42 10014 16 10066 43
10067 44 10015 17 10016 18 10017 19 10018 20
10019 21 10068 45 10069 46 10020 22 10070 47
10071 48 10021 23 10022 24 10023 25 10024 26
10072 49 10073 50 10025

ROUTE 4 DESTINATION LINK 63 AT 30.000
FRACTION 405
OVER 10094 28 10052 29 10053 30 10054 31 10001 3
10055 32 10056 33 10002 4 10003 5 10004 6
10057 34 10058 35 10005 7 10006 8 10059 36
10007 9 10060 37 10008 10 10061 38 10009 11
10010 12 10062 39 10011 13 10012 14 10063 40
10013 15 10064 41 10065 42 10014 16 10066 43
10067 44 10015 17 10016 18 10017 19 10018 20
10019 21 10068 45 10069 46 10020 22 10070 47
10071 48 10021 23 10022 24 10023 25 10024 26
10072 49 10108

ROUTE 3 DESTINATION LINK 58 AT 30.000
FRACTION 651
OVER 10094 28 10052 29 10053 30 10054 31 10001 3
10055 32 10056 33 10002 4 10003 5 10004 6
10057 34 10058 35 10005 7 10006 8 10059 36
10007 9 10060 37 10008 10 10061 38 10009 11
10010 12 10062 39 10011 13 10012 14 10063 40
10013 15 10064 41 10065 42 10014 16 10066 43
10102

ROUTE 2 DESTINATION LINK 55 AT 30.000
FRACTION 1192
OVER 10094 28 10052 29 10053 30 10054 31 10001 3
10055 32 10056 33 10002 4 10003 5 10004 6
10057 34 10058 35 10005 7 10006 8 10059 36
10007 9 10060 37 10008 10 10099

ROUTE 1 DESTINATION LINK 52 AT 30.000
FRACTION 562
OVER 10094 28 10052 29 10053 30 10054 31 10001 3
10055 32 10096

ROUTING_DECISION 3 NAME "From Carp EB" LABEL 0.00 0.00
LINK 51 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 5 DESTINATION LINK 27 AT 450.000
FRACTION 7044
OVER 10095 30 10054 31 10001 3 10055 32 10056 33
10002 4 10003 5 10004 6 10057 34 10058 35
10005 7 10006 8 10059 36 10007 9 10060 37
10008 10 10061 38 10009 11 10010 12 10062 39
10011 13 10012 14 10063 40 10013 15 10064 41
10065 42 10014 16 10066 43 10067 44 10015 17
10016 18 10017 19 10018 20 10019 21 10068 45
10069 46 10020 22 10070 47 10071 48 10021 23
10022 24 10023 25 10024 26 10072 49 10073 50
10025

ROUTE 4 DESTINATION LINK 63 AT 30.000
FRACTION 397
OVER 10095 30 10054 31 10001 3 10055 32 10056 33
10002 4 10003 5 10004 6 10057 34 10058 35
10005 7 10006 8 10059 36 10007 9 10060 37
10008 10 10061 38 10009 11 10010 12 10062 39
10011 13 10012 14 10063 40 10013 15 10064 41

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10065 42 10014 16 10066 43 10067 44 10015 17
10016 18 10017 19 10018 20 10019 21 10068 45
10069 46 10020 22 10070 47 10071 48 10021 23
10022 24 10023 25 10024 26 10072 49 10108
ROUTE 3 DESTINATION LINK 58 AT 30.000
FRACTION 650
OVER 10095 30 10054 31 10001 3 10055 32 10056 33
10002 4 10003 5 10004 6 10057 34 10058 35
10005 7 10006 8 10059 36 10007 9 10060 37
10008 10 10061 38 10009 11 10010 12 10062 39
10011 13 10012 14 10063 40 10013 15 10064 41
10065 42 10014 16 10066 43 10102
ROUTE 2 DESTINATION LINK 55 AT 30.000
FRACTION 1228
OVER 10095 30 10054 31 10001 3 10055 32 10056 33
10002 4 10003 5 10004 6 10057 34 10058 35
10005 7 10006 8 10059 36 10007 9 10060 37
10008 10 10099
ROUTE 1 DESTINATION LINK 52 AT 30.000
FRACTION 681
OVER 10095 30 10054 31 10001 3 10055 32 10096
ROUTING_DECISION 4 NAME "From Palladium inner-loop EB" LABEL 0.00 0.00
LINK 53 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 4 DESTINATION LINK 27 AT 450.000
FRACTION 7300
OVER 10097 5 10004 6 10057 34 10058 35 10005 7
10006 8 10059 36 10007 9 10060 37 10008 10
10061 38 10009 11 10010 12 10062 39 10011 13
10012 14 10063 40 10013 15 10064 41 10065 42
10014 16 10066 43 10067 44 10015 17 10016 18
10017 19 10018 20 10019 21 10068 45 10069 46
10020 22 10070 47 10071 48 10021 23 10022 24
10023 25 10024 26 10072 49 10073 50 10025
ROUTE 3 DESTINATION LINK 63 AT 30.000
FRACTION 400
OVER 10097 5 10004 6 10057 34 10058 35 10005 7
10006 8 10059 36 10007 9 10060 37 10008 10
10061 38 10009 11 10010 12 10062 39 10011 13
10012 14 10063 40 10013 15 10064 41 10065 42
10014 16 10066 43 10067 44 10015 17 10016 18
10017 19 10018 20 10019 21 10068 45 10069 46
10020 22 10070 47 10071 48 10021 23 10022 24
10023 25 10024 26 10072 49 10108
ROUTE 2 DESTINATION LINK 58 AT 30.000
FRACTION 700
OVER 10097 5 10004 6 10057 34 10058 35 10005 7
10006 8 10059 36 10007 9 10060 37 10008 10
10061 38 10009 11 10010 12 10062 39 10011 13
10012 14 10063 40 10013 15 10064 41 10065 42
10014 16 10066 43 10102
ROUTE 1 DESTINATION LINK 55 AT 30.000
FRACTION 1550
OVER 10097 5 10004 6 10057 34 10058 35 10005 7
10006 8 10059 36 10007 9 10060 37 10008 10
10099
ROUTING_DECISION 5 NAME "From Palladium EB" LABEL 0.00 0.00
LINK 54 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 4 DESTINATION LINK 27 AT 450.000

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FRACTION 7125
OVER 10098 35 10005 7 10006 8 10059 36 10007 9
      10060 37 10008 10 10061 38 10009 11 10010 12
      10062 39 10011 13 10012 14 10063 40 10013 15
      10064 41 10065 42 10014 16 10066 43 10067 44
      10015 17 10016 18 10017 19 10018 20 10019 21
      10068 45 10069 46 10020 22 10070 47 10071 48
      10021 23 10022 24 10023 25 10024 26 10072 49
      10073 50 10025

ROUTE 3 DESTINATION LINK 63 AT 30.000
FRACTION 400
OVER 10098 35 10005 7 10006 8 10059 36 10007 9
      10060 37 10008 10 10061 38 10009 11 10010 12
      10062 39 10011 13 10012 14 10063 40 10013 15
      10064 41 10065 42 10014 16 10066 43 10067 44
      10015 17 10016 18 10017 19 10018 20 10019 21
      10068 45 10069 46 10020 22 10070 47 10071 48
      10021 23 10022 24 10023 25 10024 26 10072 49
      10108

ROUTE 2 DESTINATION LINK 58 AT 30.000
FRACTION 725
OVER 10098 35 10005 7 10006 8 10059 36 10007 9
      10060 37 10008 10 10061 38 10009 11 10010 12
      10062 39 10011 13 10012 14 10063 40 10013 15
      10064 41 10065 42 10014 16 10066 43 10102

ROUTE 1 DESTINATION LINK 55 AT 30.000
FRACTION 1750
OVER 10098 35 10005 7 10006 8 10059 36 10007 9
      10060 37 10008 10 10099

ROUTING_DECISION 6 NAME "From Terry Fox inner-loop EB" LABEL 0.00 0.00
LINK 56 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 3 DESTINATION LINK 27 AT 450.000
FRACTION 8446
OVER 10100 39 10011 13 10012 14 10063 40 10013 15
      10064 41 10065 42 10014 16 10066 43 10067 44
      10015 17 10016 18 10017 19 10018 20 10019 21
      10068 45 10069 46 10020 22 10070 47 10071 48
      10021 23 10022 24 10023 25 10024 26 10072 49
      10073 50 10025

ROUTE 2 DESTINATION LINK 63 AT 30.000
FRACTION 483
OVER 10100 39 10011 13 10012 14 10063 40 10013 15
      10064 41 10065 42 10014 16 10066 43 10067 44
      10015 17 10016 18 10017 19 10018 20 10019 21
      10068 45 10069 46 10020 22 10070 47 10071 48
      10021 23 10022 24 10023 25 10024 26 10072 49
      10108

ROUTE 1 DESTINATION LINK 58 AT 30.000
FRACTION 1071
OVER 10100 39 10011 13 10012 14 10063 40 10013 15
      10064 41 10065 42 10014 16 10066 43 10102

ROUTING_DECISION 7 NAME "From Terry Fox EB" LABEL 0.00 0.00
LINK 57 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 3 DESTINATION LINK 27 AT 450.000
FRACTION 8343
OVER 10101 41 10065 42 10014 16 10066 43 10067 44
      10015 17 10016 18 10017 19 10018 20 10019 21
      10068 45 10069 46 10020 22 10070 47 10071 48

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10021 23 10022 24 10023 25 10024 26 10072 49
10073 50 10025
ROUTE 2 DESTINATION LINK 63 AT 30.000
FRACTION 480
OVER 10101 41 10065 42 10014 16 10066 43 10067 44
10015 17 10016 18 10017 19 10018 20 10019 21
10068 45 10069 46 10020 22 10070 47 10071 48
10021 23 10022 24 10023 25 10024 26 10072 49
10108
ROUTE 1 DESTINATION LINK 58 AT 30.000
FRACTION 1178
OVER 10101 41 10065 42 10014 16 10066 43 10102
ROUTING_DECISION 8 NAME "From Eagleson inner-loop EB" LABEL 0.00 0.00
LINK 59 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 2 DESTINATION LINK 27 AT 450.000
FRACTION 9444
OVER 10103 20 10019 21 10068 45 10069 46 10020 22
10070 47 10071 48 10021 23 10022 24 10023 25
10024 26 10072 49 10073 50 10025
ROUTE 1 DESTINATION LINK 63 AT 30.000
FRACTION 556
OVER 10103 20 10019 21 10068 45 10069 46 10020 22
10070 47 10071 48 10021 23 10022 24 10023 25
10024 26 10072 49 10108
ROUTING_DECISION 9 NAME "From Eagleson EB" LABEL 0.00 0.00
LINK 61 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 2 DESTINATION LINK 27 AT 450.000
FRACTION 9439
OVER 10106 46 10020 22 10070 47 10071 48 10021 23
10022 24 10023 25 10024 26 10072 49 10073 50
10025
ROUTE 1 DESTINATION LINK 63 AT 30.000
FRACTION 561
OVER 10106 46 10020 22 10070 47 10071 48 10021 23
10022 24 10023 25 10024 26 10072 49 10108
ROUTING_DECISION 10 NAME "Eastend" LABEL 0.00 0.00
LINK 126 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 5 DESTINATION LINK 127 AT 550.000
FRACTION 3071
OVER 10050 125 10093 146 10092 145 10049 124 10091 144
10048 123 10047 122 10046 121 10045 120 10090 143
10088 141 10044 119 10043 118 10042 117 10041 116
10087 140 10040 115 10086 139 10039 114 10085 138
10038 113 10084 137 10083 136 10037 112 10036 111
10035 110 10034 109 10082 135 10033 108 10081 134
10080 133 10032 107 10031 106 10078 131 10030 105
10077 130 10029 104 10028 103 10027 102 10076 129
10026 101 10075 128 10074
ROUTE 4 DESTINATION LINK 64 AT 30.000
FRACTION 1390
OVER 10050 125 10093 146 10092 145 10049 124 10091 144
10048 123 10047 122 10046 121 10045 120 10090 143
10088 141 10044 119 10043 118 10042 117 10041 116
10087 140 10040 115 10086 139 10039 114 10085 138
10038 113 10084 137 10083 136 10037 112 10036 111

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10035 110 10034 109 10082 135 10033 108 10081 134
10080 133 10032 107 10031 106 10078 131 10030 105
10077 130 10029 104 10028 103 10027 102 10076 129
10026 101 10075 128 10109
ROUTE 3 DESTINATION LINK 66 AT 30.000
FRACTION 248
OVER 10050 125 10093 146 10092 145 10049 124 10091 144
10048 123 10047 122 10046 121 10045 120 10090 143
10088 141 10044 119 10043 118 10042 117 10041 116
10087 140 10040 115 10086 139 10039 114 10085 138
10038 113 10084 137 10083 136 10037 112 10036 111
10035 110 10034 109 10082 135 10033 108 10081 134
10080 133 10032 107 10031 106 10078 131 10030 105
10079 132 10111
ROUTE 2 DESTINATION LINK 69 AT 30.000
FRACTION 1822
OVER 10050 125 10093 146 10092 145 10049 124 10091 144
10048 123 10047 122 10046 121 10045 120 10090 143
10088 141 10044 119 10043 118 10042 117 10041 116
10087 140 10040 115 10086 139 10039 114 10085 138
10038 113 10084 137 10114
ROUTE 1 DESTINATION LINK 71 AT 30.000
FRACTION 3469
OVER 10050 125 10093 146 10092 145 10049 124 10091 144
10048 123 10047 122 10046 121 10045 120 10090 143
10089 142 10116
ROUTING_DECISION 11 NAME "From Moodie inner-loop W" LABEL 0.00 0.00
LINK 73 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
MODE 0
VEHICLE_CLASSES 10 20
ROUTE 5 DESTINATION LINK 127 AT 550.000
FRACTION 3005
OVER 10118 125 10093 146 10092 145 10049 124 10091 144
10048 123 10047 122 10046 121 10045 120 10090 143
10088 141 10044 119 10043 118 10042 117 10041 116
10087 140 10040 115 10086 139 10039 114 10085 138
10038 113 10084 137 10083 136 10037 112 10036 111
10035 110 10034 109 10082 135 10033 108 10081 134
10080 133 10032 107 10031 106 10078 131 10030 105
10077 130 10029 104 10028 103 10027 102 10076 129
10026 101 10075 128 10074
ROUTE 4 DESTINATION LINK 64 AT 30.000
FRACTION 1363
OVER 10118 125 10093 146 10092 145 10049 124 10091 144
10048 123 10047 122 10046 121 10045 120 10090 143
10088 141 10044 119 10043 118 10042 117 10041 116
10087 140 10040 115 10086 139 10039 114 10085 138
10038 113 10084 137 10083 136 10037 112 10036 111
10035 110 10034 109 10082 135 10033 108 10081 134
10080 133 10032 107 10031 106 10078 131 10030 105
10077 130 10029 104 10028 103 10027 102 10076 129
10026 101 10075 128 10109
ROUTE 3 DESTINATION LINK 66 AT 30.000
FRACTION 242
OVER 10118 125 10093 146 10092 145 10049 124 10091 144
10048 123 10047 122 10046 121 10045 120 10090 143
10088 141 10044 119 10043 118 10042 117 10041 116
10087 140 10040 115 10086 139 10039 114 10085 138
10038 113 10084 137 10083 136 10037 112 10036 111
10035 110 10034 109 10082 135 10033 108 10081 134
10080 133 10032 107 10031 106 10078 131 10030 105
10079 132 10111
ROUTE 2 DESTINATION LINK 69 AT 30.000

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FRACTION 1816
OVER 10118 125 10093 146 10092 145 10049 124 10091 144
10048 123 10047 122 10046 121 10045 120 10090 143
10088 141 10044 119 10043 118 10042 117 10041 116
10087 140 10040 115 10086 139 10039 114 10085 138
10038 113 10084 137 10114
ROUTE 1 DESTINATION LINK 71 AT 30.000
FRACTION 3574
OVER 10118 125 10093 146 10092 145 10049 124 10091 144
10048 123 10047 122 10046 121 10045 120 10090 143
10089 142 10116
ROUTING_DECISION 12 NAME "From Moodie W" LABEL 0.00 0.00
LINK 72 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 5 DESTINATION LINK 127 AT 550.000
FRACTION 2941
OVER 10117 145 10049 124 10091 144 10048 123 10047 122
10046 121 10045 120 10090 143 10088 141 10044 119
10043 118 10042 117 10041 116 10087 140 10040 115
10086 139 10039 114 10085 138 10038 113 10084 137
10083 136 10037 112 10036 111 10035 110 10034 109
10082 135 10033 108 10081 134 10080 133 10032 107
10031 106 10078 131 10030 105 10077 130 10029 104
10028 103 10027 102 10076 129 10026 101 10075 128
10074
ROUTE 4 DESTINATION LINK 64 AT 30.000
FRACTION 1333
OVER 10117 145 10049 124 10091 144 10048 123 10047 122
10046 121 10045 120 10090 143 10088 141 10044 119
10043 118 10042 117 10041 116 10087 140 10040 115
10086 139 10039 114 10085 138 10038 113 10084 137
10083 136 10037 112 10036 111 10035 110 10034 109
10082 135 10033 108 10081 134 10080 133 10032 107
10031 106 10078 131 10030 105 10077 130 10029 104
10028 103 10027 102 10076 129 10026 101 10075 128
10109
ROUTE 3 DESTINATION LINK 66 AT 30.000
FRACTION 241
OVER 10117 145 10049 124 10091 144 10048 123 10047 122
10046 121 10045 120 10090 143 10088 141 10044 119
10043 118 10042 117 10041 116 10087 140 10040 115
10086 139 10039 114 10085 138 10038 113 10084 137
10083 136 10037 112 10036 111 10035 110 10034 109
10082 135 10033 108 10081 134 10080 133 10032 107
10031 106 10078 131 10030 105 10079 132 10111
ROUTE 2 DESTINATION LINK 69 AT 30.000
FRACTION 1807
OVER 10117 145 10049 124 10091 144 10048 123 10047 122
10046 121 10045 120 10090 143 10088 141 10044 119
10043 118 10042 117 10041 116 10087 140 10040 115
10086 139 10039 114 10085 138 10038 113 10084 137
10114
ROUTE 1 DESTINATION LINK 71 AT 30.000
FRACTION 3678
OVER 10117 145 10049 124 10091 144 10048 123 10047 122
10046 121 10045 120 10090 143 10089 142 10116
ROUTING_DECISION 13 NAME "From Eagleson inner-loop W" LABEL 0.00 0.00
LINK 70 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 4 DESTINATION LINK 127 AT 550.000

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FRACTION 4200
OVER 10115 117 10041 116 10087 140 10040 115 10086 139
10039 114 10085 138 10038 113 10084 137 10083 136
10037 112 10036 111 10035 110 10034 109 10082 135
10033 108 10081 134 10080 133 10032 107 10031 106
10078 131 10030 105 10077 130 10029 104 10028 103
10027 102 10076 129 10026 101 10075 128 10074

ROUTE 3 DESTINATION LINK 64 AT 30.000
FRACTION 1933
OVER 10115 117 10041 116 10087 140 10040 115 10086 139
10039 114 10085 138 10038 113 10084 137 10083 136
10037 112 10036 111 10035 110 10034 109 10082 135
10033 108 10081 134 10080 133 10032 107 10031 106
10078 131 10030 105 10077 130 10029 104 10028 103
10027 102 10076 129 10026 101 10075 128 10109

ROUTE 2 DESTINATION LINK 66 AT 30.000
FRACTION 383
OVER 10115 117 10041 116 10087 140 10040 115 10086 139
10039 114 10085 138 10038 113 10084 137 10083 136
10037 112 10036 111 10035 110 10034 109 10082 135
10033 108 10081 134 10080 133 10032 107 10031 106
10078 131 10030 105 10079 132 10111

ROUTE 1 DESTINATION LINK 69 AT 30.000
FRACTION 3500
OVER 10115 117 10041 116 10087 140 10040 115 10086 139
10039 114 10085 138 10038 113 10084 137 10114

ROUTING_DECISION 14 NAME "From Eagleson W" LABEL 0.00 0.00
LINK 74 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 4 DESTINATION LINK 127 AT 550.000
FRACTION 4000
OVER 10119 139 10039 114 10085 138 10038 113 10084 137
10083 136 10037 112 10036 111 10035 110 10034 109
10082 135 10033 108 10081 134 10080 133 10032 107
10031 106 10078 131 10030 105 10077 130 10029 104
10028 103 10027 102 10076 129 10026 101 10075 128
10074

ROUTE 3 DESTINATION LINK 64 AT 30.000
FRACTION 1847
OVER 10119 139 10039 114 10085 138 10038 113 10084 137
10083 136 10037 112 10036 111 10035 110 10034 109
10082 135 10033 108 10081 134 10080 133 10032 107
10031 106 10078 131 10030 105 10077 130 10029 104
10028 103 10027 102 10076 129 10026 101 10075 128
10109

ROUTE 2 DESTINATION LINK 66 AT 30.000
FRACTION 371
OVER 10119 139 10039 114 10085 138 10038 113 10084 137
10083 136 10037 112 10036 111 10035 110 10034 109
10082 135 10033 108 10081 134 10080 133 10032 107
10031 106 10078 131 10030 105 10079 132 10111

ROUTE 1 DESTINATION LINK 69 AT 30.000
FRACTION 3782
OVER 10119 139 10039 114 10085 138 10038 113 10084 137
10114

ROUTING_DECISION 15 NAME "From Terry Fox inner-loop W" LABEL 0.00 0.00
LINK 68 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 3 DESTINATION LINK 127 AT 550.000
FRACTION 6306

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OVER 10113 135 10033 108 10081 134 10080 133 10032 107
10031 106 10078 131 10030 105 10077 130 10029 104
10028 103 10027 102 10076 129 10026 101 10075 128
10074
ROUTE 2 DESTINATION LINK 64 AT 30.000
FRACTION 2982
OVER 10113 135 10033 108 10081 134 10080 133 10032 107
10031 106 10078 131 10030 105 10077 130 10029 104
10028 103 10027 102 10076 129 10026 101 10075 128
10109
ROUTE 1 DESTINATION LINK 66 AT 30.000
FRACTION 712
OVER 10113 135 10033 108 10081 134 10080 133 10032 107
10031 106 10078 131 10030 105 10079 132 10111
ROUTING_DECISION 16 NAME "From Terry Fox W" LABEL 0.00 0.00
LINK 67 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 3 DESTINATION LINK 127 AT 550.000
FRACTION 6228
OVER 10112 134 10080 133 10032 107 10031 106 10078 131
10030 105 10077 130 10029 104 10028 103 10027 102
10076 129 10026 101 10075 128 10074
ROUTE 2 DESTINATION LINK 64 AT 30.000
FRACTION 2976
OVER 10112 134 10080 133 10032 107 10031 106 10078 131
10030 105 10077 130 10029 104 10028 103 10027 102
10076 129 10026 101 10075 128 10109
ROUTE 1 DESTINATION LINK 66 AT 30.000
FRACTION 796
OVER 10112 134 10080 133 10032 107 10031 106 10078 131
10030 105 10079 132 10111
ROUTING_DECISION 17 NAME "From Palladium W" LABEL 0.00 0.00
LINK 65 AT 20.000
TIME FROM 0.0 UNTIL 99999.0
NODE 0
VEHICLE_CLASSES 10 20
ROUTE 2 DESTINATION LINK 127 AT 550.000
FRACTION 6575
OVER 10110 102 10076 129 10026 101 10075 128 10074
ROUTE 1 DESTINATION LINK 64 AT 30.000
FRACTION 3425
OVER 10110 102 10076 129 10026 101 10075 128 10109

-- Desired Speed Decisions: --
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DESIRED_SPEED_DECISION 1 NAME "Carp on inner-loop EB" LABEL 0.00 0.00
POSITION LINK 28 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 2 NAME "Carp on EB" LABEL 0.00 0.00
POSITION LINK 30 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 3 NAME "Palladium on inner-loop EB" LABEL 0.00 0.00
POSITION LINK 5 LANE 1 AT 0.100

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VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 4 NAME "Palladium on EB" LABEL 0.00 0.00
POSITION LINK 35 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 5 NAME "Terry Fox on inner-loop EB" LABEL 0.00 0.00
POSITION LINK 39 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 6 NAME "Terry Fox on EB" LABEL 0.00 0.00
POSITION LINK 41 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 7 NAME "Eagleson on inner-loop EB" LABEL 0.00 0.00
POSITION LINK 20 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 8 NAME "Eagleson on EB" LABEL 0.00 0.00
POSITION LINK 46 LANE 2 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 9 NAME "Eagleson on buslane EB" LABEL 0.00 0.00
POSITION LINK 46 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 10 NAME "Moodie on inner-loop WB" LABEL 0.00 0.00
POSITION LINK 125 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 11 NAME "Moodie on WB" LABEL 0.00 0.00
POSITION LINK 145 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 12 NAME "Eagleson on inner-loop WB" LABEL 0.00 0.00
POSITION LINK 117 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100

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VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 13 NAME "Eagleson on WB" LABEL 0.00 0.00
POSITION LINK 139 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 14 NAME "Terry Fox on inner-loop WB" LABEL 0.00 0.00
POSITION LINK 135 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 15 NAME "Terry Fox on WB" LABEL 0.00 0.00
POSITION LINK 134 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

DESIRED_SPEED_DECISION 16 NAME "Palladium on WB" LABEL 0.00 0.00
POSITION LINK 102 LANE 1 AT 0.100
VEHICLE_CLASS 10 DESIRED_SPEED 100
VEHICLE_CLASS 20 DESIRED_SPEED 100
VEHICLE_CLASS 30 DESIRED_SPEED 100
TIME FROM 0.0 UNTIL 999999.0

-- Reduced Speed Areas: --
-----

REDUCED_SPEED_AREA 1
NAME "Palladium off EB" LABEL 0.00 0.00
POSITION LINK 52 LANE 1 AT 0.100 LENGTH 49.890
VEHICLE_CLASS 10 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 20 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 30 DESIRED_SPEED 70 MAX_DECELERATION 2.000
TIME FROM 0.0 UNTIL 999999.0

REDUCED_SPEED_AREA 2
NAME "Terry Fox off EB" LABEL 0.00 0.00
POSITION LINK 55 LANE 1 AT 0.100 LENGTH 49.890
VEHICLE_CLASS 10 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 20 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 30 DESIRED_SPEED 70 MAX_DECELERATION 2.000
TIME FROM 0.0 UNTIL 999999.0

REDUCED_SPEED_AREA 3
NAME "Eagleson off EB" LABEL 0.00 0.00
POSITION LINK 58 LANE 1 AT 0.100 LENGTH 49.890
VEHICLE_CLASS 10 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 20 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 30 DESIRED_SPEED 70 MAX_DECELERATION 2.000
TIME FROM 0.0 UNTIL 999999.0

REDUCED_SPEED_AREA 4
NAME "Moodie off EB" LABEL 0.00 0.00
POSITION LINK 63 LANE 1 AT 0.100 LENGTH 49.890
VEHICLE_CLASS 10 DESIRED_SPEED 70 MAX_DECELERATION 2.000

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VEHICLE_CLASS 20 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 30 DESIRED_SPEED 70 MAX_DECELERATION 2.000
TIME FROM 0.0 UNTIL 999999.0

REDUCED_SPEED_AREA 5
NAME "Carp off WB" LABEL 0.00 0.00
POSITION LINK 64 LANE 1 AT 0.100 LENGTH 49.890
VEHICLE_CLASS 10 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 20 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 30 DESIRED_SPEED 70 MAX_DECELERATION 2.000
TIME FROM 0.0 UNTIL 999999.0

REDUCED_SPEED_AREA 6
NAME "Palladium off1 WB" LABEL 0.00 0.00
POSITION LINK 66 LANE 1 AT 0.100 LENGTH 49.890
VEHICLE_CLASS 10 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 20 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 30 DESIRED_SPEED 70 MAX_DECELERATION 2.000
TIME FROM 0.0 UNTIL 999999.0

REDUCED_SPEED_AREA 7
NAME "Palladium off2 WB" LABEL 0.00 0.00
POSITION LINK 66 LANE 2 AT 0.100 LENGTH 49.890
VEHICLE_CLASS 10 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 20 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 30 DESIRED_SPEED 70 MAX_DECELERATION 2.000
TIME FROM 0.0 UNTIL 999999.0

REDUCED_SPEED_AREA 8
NAME "Terry Fox off WB" LABEL 0.00 0.00
POSITION LINK 69 LANE 1 AT 0.100 LENGTH 49.890
VEHICLE_CLASS 10 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 20 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 30 DESIRED_SPEED 70 MAX_DECELERATION 2.000
TIME FROM 0.0 UNTIL 999999.0

REDUCED_SPEED_AREA 9
NAME "Eagleson off1 WB" LABEL 0.00 0.00
POSITION LINK 71 LANE 1 AT 0.100 LENGTH 49.890
VEHICLE_CLASS 10 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 20 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 30 DESIRED_SPEED 70 MAX_DECELERATION 2.000
TIME FROM 0.0 UNTIL 999999.0

REDUCED_SPEED_AREA 10
NAME "Eagleson off2 WB" LABEL 0.00 0.00
POSITION LINK 71 LANE 2 AT 0.100 LENGTH 49.890
VEHICLE_CLASS 10 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 20 DESIRED_SPEED 70 MAX_DECELERATION 2.000
VEHICLE_CLASS 30 DESIRED_SPEED 70 MAX_DECELERATION 2.000
TIME FROM 0.0 UNTIL 999999.0

-- inputs: --
-----

INPUT 1
NAME "Eastbound Mainline" LABEL 0.00 0.00
LINK 1 Q EXACT 740.000 COMPOSITION 2
TIME FROM 0.0 UNTIL 4500.0

INPUT 2
NAME "Carp Eastbound(inner-loop)" LABEL 0.00 0.00

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LINK 1001 Q EXACT 370.000 COMPOSITION 4
TIME FROM 0.0 UNTIL 4500.0

INPUT 3
NAME "Carp Eastbound" LABEL 0.00 0.00
LINK 51 Q EXACT 320.000 COMPOSITION 4
TIME FROM 0.0 UNTIL 4500.0

INPUT 4
NAME "Palladium Eastbound(inner-loop)" LABEL 0.00 0.00
LINK 53 Q EXACT 20.000 COMPOSITION 4
TIME FROM 0.0 UNTIL 4500.0

INPUT 5
NAME "Palladium Eastbound" LABEL 0.00 0.00
LINK 54 Q EXACT 40.000 COMPOSITION 4
TIME FROM 0.0 UNTIL 4500.0

INPUT 6
NAME "Terry Fox Eastbound(inner-loop)" LABEL 0.00 0.00
LINK 56 Q EXACT 240.000 COMPOSITION 4
TIME FROM 0.0 UNTIL 4500.0

INPUT 7
NAME "Terry Fox Eastbound" LABEL 0.00 0.00
LINK 57 Q EXACT 490.000 COMPOSITION 4
TIME FROM 0.0 UNTIL 4500.0

INPUT 8
NAME "Eagleson Eastbound(inner-loop)" LABEL 0.00 0.00
LINK 59 Q EXACT 1080.000 COMPOSITION 4
TIME FROM 0.0 UNTIL 4500.0

INPUT 9
NAME "Eagleson Eastbound" LABEL 0.00 0.00
LINK 61 Q EXACT 615.000 COMPOSITION 4
TIME FROM 0.0 UNTIL 4500.0

INPUT 10
NAME "Westbound Mainline" LABEL 0.00 0.00
LINK 126 Q EXACT 3321.000 COMPOSITION 3
TIME FROM 0.0 UNTIL 4500.0

INPUT 11
NAME "Moodie Westbound(inner-loop)" LABEL 0.00 0.00
LINK 73 Q EXACT 190.000 COMPOSITION 5
TIME FROM 0.0 UNTIL 4500.0

INPUT 12
NAME "Moodie Westbound" LABEL 0.00 0.00
LINK 72 Q EXACT 270.000 COMPOSITION 5
TIME FROM 0.0 UNTIL 4500.0

INPUT 13
NAME "Eagleson Westbound(inner-loop)" LABEL 0.00 0.00
LINK 70 Q EXACT 60.000 COMPOSITION 5
TIME FROM 0.0 UNTIL 4500.0

INPUT 14
NAME "Eagleson Westbound" LABEL 0.00 0.00
LINK 74 Q EXACT 340.000 COMPOSITION 5
TIME FROM 0.0 UNTIL 4500.0

INPUT 15

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NAME "Terry Fox Westbound(inner-loop)" LABEL 0.00 0.00
LINK 68 Q EXACT 170.000 COMPOSITION 5
TIME FROM 0.0 UNTIL 4500.0

```

INPUT 16

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NAME "Terry Fox Westbound" LABEL 0.00 0.00
LINK 67 Q EXACT 250.000 COMPOSITION 5
TIME FROM 0.0 UNTIL 4500.0

```

INPUT 17

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NAME "Palladium Westbound" LABEL 0.00 0.00
LINK 65 Q EXACT 80.000 COMPOSITION 5
TIME FROM 0.0 UNTIL 4500.0

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-- Traffic Compositions: --
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COMPOSITION 1 NAME "Default"

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KATTEMPERATURE 1
WATERTEMPERATURE 2
VEHICLE_TYPE 100 FRACTION 0.980 DESIRED_SPEED 50
VEHICLE_TYPE 200 FRACTION 0.020 DESIRED_SPEED 50

```

COMPOSITION 2 NAME "PM East Mainline"

```

VEHICLE_TYPE 110 FRACTION 0.351 DESIRED_SPEED 100
VEHICLE_TYPE 111 FRACTION 0.351 DESIRED_SPEED 100
VEHICLE_TYPE 120 FRACTION 0.127 DESIRED_SPEED 100
VEHICLE_TYPE 121 FRACTION 0.127 DESIRED_SPEED 100
VEHICLE_TYPE 201 FRACTION 0.013 DESIRED_SPEED 100
VEHICLE_TYPE 202 FRACTION 0.007 DESIRED_SPEED 100
VEHICLE_TYPE 203 FRACTION 0.001 DESIRED_SPEED 100
VEHICLE_TYPE 204 FRACTION 0.001 DESIRED_SPEED 100
VEHICLE_TYPE 205 FRACTION 0.019 DESIRED_SPEED 100
VEHICLE_TYPE 206 FRACTION 0.002 DESIRED_SPEED 100

```

COMPOSITION 3 NAME "PM West Mainline"

```

VEHICLE_TYPE 110 FRACTION 0.324 DESIRED_SPEED 100
VEHICLE_TYPE 111 FRACTION 0.324 DESIRED_SPEED 100
VEHICLE_TYPE 120 FRACTION 0.157 DESIRED_SPEED 100
VEHICLE_TYPE 121 FRACTION 0.157 DESIRED_SPEED 100
VEHICLE_TYPE 201 FRACTION 0.012 DESIRED_SPEED 100
VEHICLE_TYPE 202 FRACTION 0.008 DESIRED_SPEED 100
VEHICLE_TYPE 203 FRACTION 0.001 DESIRED_SPEED 100
VEHICLE_TYPE 205 FRACTION 0.016 DESIRED_SPEED 100
VEHICLE_TYPE 206 FRACTION 0.002 DESIRED_SPEED 100

```

COMPOSITION 4 NAME "PM East Ramp"

```

VEHICLE_TYPE 110 FRACTION 0.351 DESIRED_SPEED 70
VEHICLE_TYPE 111 FRACTION 0.351 DESIRED_SPEED 70
VEHICLE_TYPE 120 FRACTION 0.127 DESIRED_SPEED 70
VEHICLE_TYPE 121 FRACTION 0.127 DESIRED_SPEED 70
VEHICLE_TYPE 201 FRACTION 0.013 DESIRED_SPEED 70
VEHICLE_TYPE 202 FRACTION 0.007 DESIRED_SPEED 70
VEHICLE_TYPE 203 FRACTION 0.001 DESIRED_SPEED 70
VEHICLE_TYPE 204 FRACTION 0.001 DESIRED_SPEED 70
VEHICLE_TYPE 205 FRACTION 0.019 DESIRED_SPEED 70
VEHICLE_TYPE 206 FRACTION 0.002 DESIRED_SPEED 70

```

COMPOSITION 5 NAME "PM West Ramp"

```

VEHICLE_TYPE 110 FRACTION 0.324 DESIRED_SPEED 70
VEHICLE_TYPE 111 FRACTION 0.324 DESIRED_SPEED 70
VEHICLE_TYPE 120 FRACTION 0.157 DESIRED_SPEED 70

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VEHICLE_TYPE 121 FRACTION 0.157 DESIRED_SPEED 70
VEHICLE_TYPE 201 FRACTION 0.012 DESIRED_SPEED 70
VEHICLE_TYPE 202 FRACTION 0.006 DESIRED_SPEED 70
VEHICLE_TYPE 203 FRACTION 0.001 DESIRED_SPEED 70
VEHICLE_TYPE 205 FRACTION 0.016 DESIRED_SPEED 70
VEHICLE_TYPE 206 FRACTION 0.002 DESIRED_SPEED 70

-- Distributions: --
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DESIRED_SPEED 70 62.00 0.000 78.00 1.000
DESIRED_SPEED 140 80.00 0.000 99.00 0.030 109.00 0.100 121.00 0.260 131.00 0.470 149.00 0.800 165.00 0.930 185.00 0.990 205.00 1.000
DESIRED_SPEED 130 80.00 0.000 98.00 0.030 110.00 0.100 130.00 0.680 135.00 0.720 143.00 0.910 155.00 0.970 170.00 1.000
DESIRED_SPEED 120 85.00 0.000 105.00 0.030 110.00 0.100 125.00 0.680 140.00 0.910 155.00 1.000
DESIRED_SPEED 100 88.00 0.000 95.00 0.030 100.00 0.100 110.00 0.700 120.00 0.910 130.00 1.000
DESIRED_SPEED 90 85.00 0.000 90.00 0.050 100.00 0.800 110.00 0.950 120.00 1.000
DESIRED_SPEED 85 84.00 0.000 88.00 1.000
DESIRED_SPEED 80 75.00 0.000 80.00 0.050 90.00 0.800 100.00 0.950 110.00 1.000
DESIRED_SPEED 60 58.00 0.000 68.00 1.000
DESIRED_SPEED 50 48.00 0.000 58.00 1.000
DESIRED_SPEED 40 40.00 0.000 45.00 1.000
DESIRED_SPEED 30 30.00 0.000 35.00 1.000
DESIRED_SPEED 25 25.00 0.000 30.00 1.000
DESIRED_SPEED 20 20.00 0.000 25.00 1.000
DESIRED_SPEED 15 15.00 0.000 20.00 1.000
DESIRED_SPEED 12 12.00 0.000 15.00 1.000
DESIRED_SPEED 5 4.00 0.000 6.00 1.000
MODEL_YEARS 1 1990.00 0.000 2003.00 1.000
MILEAGE 1 0.00 0.000 200000.00 1.000
MASSES 3 15000.00 0.000 16000.00 1.000
MASSES 12 2500.00 0.000 4500.00 1.000
MASSES 11 3000.00 0.000 5000.00 0.004 10000.00 0.916 15000.00 0.998 20000.00 1.000
MASSES 10 5000.00 0.000 10000.00 0.075 15000.00 0.152 20000.00 0.468 25000.00 0.591 30000.00 0.663 35000.00 0.733 40000.00 0.804 45000.00
0.818 50000.00 0.828 55000.00 0.866 60000.00 0.918 65000.00 1.000
MASSES 9 3000.00 0.000 5000.00 0.086 10000.00 0.567 15000.00 0.843 20000.00 0.932 25000.00 0.959 30000.00 0.975 35000.00 0.992 40000.00
1.000
MASSES 8 10000.00 0.000 15000.00 0.002 20000.00 0.096 25000.00 0.383 30000.00 0.458 35000.00 0.493 40000.00 0.522 45000.00 0.542 50000.00
0.560 55000.00 0.609 60000.00 0.744 65000.00 0.989 70000.00 1.000
MASSES 7 5000.00 0.000 10000.00 0.001 15000.00 0.069 20000.00 0.332 25000.00 0.514 30000.00 0.632 35000.00 0.770 40000.00 0.872 45000.00
0.907 50000.00 0.932 55000.00 0.967 60000.00 0.989 65000.00 0.998 70000.00 1.000
MASSES 6 40.00 0.000 130.00 1.000
MASSES 5 30.00 0.000 120.00 1.000
MASSES 4 23000.00 0.000 58000.00 1.000
MASSES 2 2800.00 0.000 40000.00 1.000
MASSES 1 800.00 0.000 2000.00 1.000
POWER 3 150.00 0.000 170.00 0.000 170.00 1.000 190.00 1.000
POWER 8 260.00 0.000 410.00 1.000
POWER 7 150.00 0.000 220.00 1.000
POWER 6 0.50 0.000 0.70 1.000
POWER 5 0.50 0.000 0.70 1.000
POWER 4 300.00 0.000 600.00 1.000
POWER 2 150.00 0.000 400.00 1.000
POWER 1 55.00 0.000 160.00 1.000
TEMPERATURE 2 0.00 0.000 100.00 1.000
TEMPERATURE 1 0.00 0.000 400.00 1.000
TIMES 1 MEAN 20.0 STANDARD_DEVIATION 2.0

-- Color Distributions: --
-----

COLOR_DIST 26 NAME "T & DT"
FRACTION 1.000 COLOR 255 255 0

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COLOR_DIST 25 NAME "T & T"
  FRACTION 1.000 COLOR 255 0 0
COLOR_DIST 24 NAME "SU & T"
  FRACTION 1.000 COLOR 128 128 0
COLOR_DIST 23 NAME "T only"
  FRACTION 1.000 COLOR 128 0 255
COLOR_DIST 22 NAME "SU"
  FRACTION 1.000 COLOR 255 128 128
COLOR_DIST 21 NAME "2B"
  FRACTION 1.000 COLOR 255 128 0
COLOR_DIST 12 NAME "LT"
  FRACTION 1.000 COLOR 255 255 255
COLOR_DIST 11 NAME "PC"
  FRACTION 1.000 COLOR 0 0 255
COLOR_DIST 1 NAME "Default"
  FRACTION 1.000 COLOR 0 0 0
  FRACTION 1.000 COLOR 255 0 0
  FRACTION 1.000 COLOR 255 255 255
  FRACTION 1.000 COLOR 0 0 185
  FRACTION 1.000 COLOR 209 209 209
  FRACTION 0.500 COLOR 95 95 95
  FRACTION 0.250 COLOR 0 128 0
  FRACTION 0.250 COLOR 0 128 255
  FRACTION 0.100 COLOR 255 255 0
  FRACTION 0.100 COLOR 255 128 0

```

-- Vehicle Model Distributions: --

VEHICLE_MODEL_DIST 31 NAME "OC Transpo"

FRACTION 1.000

FILE "" LENGTH 12.200 AXLE FRONT 2.200 AXLE REAR 9.300 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 12.200

VEHICLE_MODEL_DIST 26 NAME "Tractor & D Trailer"

FRACTION 1.000

FILE "" LENGTH 8.100 AXLE FRONT 1.000 AXLE REAR 6.800 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 6.600

FILE "" LENGTH 8.500 AXLE FRONT 7.500 AXLE REAR 7.500 SHAFT 0.000 CLUTCH FRONT 1.000 CLUTCH REAR 8.600

FILE "" LENGTH 8.000 AXLE FRONT 1.000 AXLE REAR 7.000 SHAFT 2.000 CLUTCH FRONT 1.000 CLUTCH REAR 8.000

VEHICLE_MODEL_DIST 25 NAME "Tractor & Trailer"

FRACTION 1.000

FILE "" LENGTH 8.100 AXLE FRONT 1.000 AXLE REAR 6.800 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 6.500

FILE "" LENGTH 14.500 AXLE FRONT 12.500 AXLE REAR 13.700 SHAFT 0.000 CLUTCH FRONT 1.000 CLUTCH REAR 14.500

VEHICLE_MODEL_DIST 24 NAME "SU Truck & Trailer"

FRACTION 1.000

FILE "" LENGTH 9.600 AXLE FRONT 1.000 AXLE REAR 7.700 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 9.700

FILE "" LENGTH 9.000 AXLE FRONT 1.000 AXLE REAR 8.000 SHAFT 1.900 CLUTCH FRONT 1.000 CLUTCH REAR 9.000

VEHICLE_MODEL_DIST 23 NAME "Tractor Only"

FRACTION 1.000

FILE "" LENGTH 8.100 AXLE FRONT 1.000 AXLE REAR 6.800 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 6.500

VEHICLE_MODEL_DIST 22 NAME "Single Unit Truck"

FRACTION 1.000

FILE "" LENGTH 9.600 AXLE FRONT 1.000 AXLE REAR 7.700 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 9.600

VEHICLE_MODEL_DIST 21 NAME "2B Truck"

FRACTION 1.000

FILE "" LENGTH 5.800 AXLE FRONT 0.800 AXLE REAR 4.600 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 5.800

VEHICLE_MODEL_DIST 12 NAME "Light Truck"

FRACTION 0.200

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FILE "" LENGTH 4.300 AXLE FRONT 0.700 AXLE REAR 3.200 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 4.300
FRACTION 0.410
FILE "" LENGTH 5.300 AXLE FRONT 0.800 AXLE REAR 3.900 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 5.300
FRACTION 0.390
FILE "" LENGTH 4.900 AXLE FRONT 0.800 AXLE REAR 3.600 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 4.900

VEHICLE_MODEL_DIST 11 NAME "Passenger car"
FRACTION 1.000
FILE "" LENGTH 4.500 AXLE FRONT 0.700 AXLE REAR 3.300 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 4.500

VEHICLE_MODEL_DIST 60 NAME "Bike"
FRACTION 0.100
FILE "#3dmodels#vehicles#bike.v3d" LENGTH 1.607 AXLE FRONT 0.324 AXLE REAR 1.296 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 1.607

VEHICLE_MODEL_DIST 50 NAME "Pedestrian"
FRACTION 0.100
FILE "#3dmodels#vehicles#man.v3d" LENGTH 0.342 AXLE FRONT 0.016 AXLE REAR 0.054 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 0.342

VEHICLE_MODEL_DIST 40 NAME "Tram"
FRACTION 0.100
FILE "#3dmodels#vehicles#tram.v3d" LENGTH 15.698 AXLE FRONT 3.385 AXLE REAR 12.346 SHAFT 1.224 CLUTCH FRONT 0.144 CLUTCH REAR 15.819

VEHICLE_MODEL_DIST 30 NAME "Bus"
FRACTION 0.100
FILE "#3dmodels#vehicles#bus.v3d" LENGTH 11.541 AXLE FRONT 2.567 AXLE REAR 8.446 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 11.262

VEHICLE_MODEL_DIST 20 NAME "HGV"
FRACTION 0.100
FILE "#3dmodels#vehicles#truck.v3d" LENGTH 10.215 AXLE FRONT 1.559 AXLE REAR 7.333 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 9.940

VEHICLE_MODEL_DIST 10 NAME "Car"
FRACTION 0.260
FILE "#3dmodels#vehicles#car1.v3d" LENGTH 4.110 AXLE FRONT 0.850 AXLE REAR 3.336 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 4.026
FRACTION 0.180
FILE "#3dmodels#vehicles#car2.v3d" LENGTH 4.550 AXLE FRONT 0.808 AXLE REAR 3.494 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 4.550
FRACTION 0.180
FILE "#3dmodels#vehicles#car3.v3d" LENGTH 4.610 AXLE FRONT 0.935 AXLE REAR 3.695 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 4.600
FRACTION 0.180
FILE "#3dmodels#vehicles#car4.v3d" LENGTH 4.760 AXLE FRONT 0.910 AXLE REAR 3.695 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 4.713
FRACTION 0.160
FILE "#3dmodels#vehicles#car5.v3d" LENGTH 4.400 AXLE FRONT 0.800 AXLE REAR 3.298 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 4.400
FRACTION 0.020
FILE "#3dmodels#vehicles#car6.v3d" LENGTH 4.340 AXLE FRONT 0.873 AXLE REAR 3.212 SHAFT 0.000 CLUTCH FRONT 0.000 CLUTCH REAR 4.340

-- Functions: --
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MAX_ACCELERATION 6 NAME "Bike" 0.0 250.0 0.0 7.0
BASE_POINT 0.000 3.500 1.960 3.500 10.000 3.200 1.493 3.500 20.000 2.786 1.300 3.500 30.000 2.468 1.152 3.500 40.000 2.200 1.027 3.500 50.000
1.964 0.917 3.273 60.000 1.751 0.817 2.918 70.000 1.554 0.725 2.590 80.000 1.372 0.640 2.286 90.000 1.200 0.560 2.000 100.000 1.038 0.484 1.730
110.000 0.969 0.452 1.614 120.000 0.899 0.420 1.499 130.000 0.830 0.387 1.384 140.000 0.761 0.355 1.268 150.000 0.692 0.323 1.153 160.000 0.623
0.291 1.038 170.000 0.553 0.258 0.922 180.000 0.484 0.226 0.807 190.000 0.415 0.194 0.692 200.000 0.346 0.161 0.577 210.000 0.277 0.129 0.461
220.000 0.208 0.097 0.346 230.000 0.138 0.065 0.231 240.000 0.069 0.032 0.115 250.000 0.000 0.000 0.000
MAX_ACCELERATION 5 NAME "Pedestrian" 0.0 250.0 0.0 7.0
BASE_POINT 0.000 3.000 3.000 3.000 10.000 3.000 3.000 3.000 20.000 0.000 0.000 0.000 30.000 0.000 0.000 0.000 40.000 0.000 0.000 0.000 50.000
0.000 0.000 0.000 60.000 0.000 0.000 0.000 70.000 0.000 0.000 0.000 80.000 0.000 0.000 0.000 90.000 0.000 0.000 0.000 100.000 0.000 0.000 0.000
110.000 0.000 0.000 0.000 120.000 0.000 0.000 0.000 130.000 0.000 0.000 0.000 140.000 0.000 0.000 0.000 150.000 0.000 0.000 0.000 160.000 0.000
0.000 0.000 170.000 0.000 0.000 0.000 180.000 0.000 0.000 0.000 190.000 0.000 0.000 0.000 200.000 0.000 0.000 0.000 210.000 0.000 0.000 0.000
220.000 0.000 0.000 0.000 230.000 0.000 0.000 0.000 240.000 0.000 0.000 0.000 250.000 0.000 0.000 0.000
MAX_ACCELERATION 4 NAME "Tram" 0.0 250.0 0.0 7.0
BASE_POINT 0.000 1.000 1.000 1.000 10.000 1.000 1.000 1.000 20.000 1.000 1.000 1.000 30.000 1.000 1.000 1.000 40.000 1.000 1.000 1.000 50.000
1.000 1.000 1.000 60.000 1.000 1.000 1.000 70.000 1.000 1.000 1.000 80.000 1.000 1.000 1.000 90.000 1.000 1.000 1.000 100.000 1.000 1.000 1.000
110.000 1.000 1.000 1.000 120.000 1.000 1.000 1.000 130.000 1.000 1.000 1.000 140.000 1.000 1.000 1.000 150.000 1.000 1.000 1.000 160.000 1.000

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1.000 1.000 170.000 1.000 1.000 1.000 180.000 1.000 1.000 1.000 190.000 1.000 1.000 1.000 200.000 1.000 1.000 1.000 210.000 1.000 1.000 1.000
220.000 1.000 1.000 1.000 230.000 1.000 1.000 1.000 240.000 1.000 1.000 1.000 250.000 0.000 0.000 0.000
MAX_ACCELERATION 3 NAME "Bus" 0.0 250.0 0.0 7.0
BASE_POINT 0.000 3.500 1.960 3.500 10.000 3.200 1.493 3.500 20.000 2.786 1.300 3.500 30.000 2.468 1.152 3.500 40.000 2.200 1.027 3.500 50.000
1.964 0.917 3.273 60.000 1.751 0.817 2.918 70.000 1.554 0.725 2.590 80.000 1.372 0.640 2.286 90.000 1.200 0.560 2.000 100.000 1.038 0.484 1.730
110.000 0.883 0.412 1.472 120.000 0.736 0.343 1.226 130.000 0.594 0.277 0.991 140.000 0.458 0.214 0.764 150.000 0.327 0.153 0.545 160.000 0.000
0.000 0.000 170.000 0.000 0.000 0.000 180.000 0.000 0.000 0.000 190.000 0.000 0.000 0.000 200.000 0.000 0.000 0.000 210.000 0.000 0.000 0.000
220.000 0.000 0.000 0.000 230.000 0.000 0.000 0.000 240.000 0.000 0.000 0.000 250.000 0.000 0.000 0.000 0.000
MAX_ACCELERATION 2 NAME "HGV" 0.0 250.0 0.0 7.0
BASE_POINT 0.000 2.166 0.613 2.500 10.000 1.689 0.508 2.500 20.000 1.317 0.421 2.000 30.000 1.027 0.349 1.467 40.000 0.801 0.290 1.076 50.000
0.625 0.240 0.789 60.000 0.487 0.199 0.579 70.000 0.380 0.165 0.425 80.000 0.296 0.137 0.311 90.000 0.231 0.114 0.228 100.000 0.180 0.094 0.167
110.000 0.140 0.078 0.123 120.000 0.110 0.065 0.090 130.000 0.085 0.054 0.066 140.000 0.067 0.045 0.048 150.000 0.052 0.037 0.036 160.000 0.041
0.031 0.026 170.000 0.032 0.025 0.019 180.000 0.025 0.021 0.014 190.000 0.019 0.017 0.010 200.000 0.015 0.014 0.008 210.000 0.012 0.012 0.006
220.000 0.009 0.010 0.004 230.000 0.007 0.008 0.003 240.000 0.006 0.007 0.002 250.000 0.000 0.000 0.000 0.000
MAX_ACCELERATION 1 NAME "Car" 0.0 250.0 0.0 7.0
BASE_POINT 0.000 3.500 1.960 3.500 10.000 3.200 1.493 3.500 20.000 2.786 1.300 3.500 30.000 2.468 1.152 3.500 40.000 2.200 1.027 3.500 50.000
1.964 0.917 3.273 60.000 1.751 0.817 2.918 70.000 1.554 0.725 2.590 80.000 1.372 0.640 2.286 90.000 1.200 0.560 2.000 100.000 1.038 0.484 1.730
110.000 0.969 0.452 1.614 120.000 0.899 0.420 1.499 130.000 0.830 0.387 1.384 140.000 0.761 0.355 1.268 150.000 0.692 0.323 1.153 160.000 0.623
0.291 1.038 170.000 0.553 0.258 0.922 180.000 0.484 0.226 0.807 190.000 0.415 0.194 0.692 200.000 0.346 0.161 0.577 210.000 0.277 0.129 0.461
220.000 0.208 0.097 0.346 230.000 0.138 0.065 0.231 240.000 0.069 0.032 0.115 250.000 0.000 0.000 0.000 0.000
DESIRED_ACCELERATION 6 NAME "Bike" 0.0 250.0 0.0 7.0
BASE_POINT 0.000 3.000 3.000 3.000 10.000 3.000 3.000 3.000 20.000 2.786 1.300 3.500 30.000 2.468 1.152 3.500 40.000 2.200 1.027 3.500 50.000
1.964 0.917 3.273 60.000 1.751 0.817 2.918 70.000 1.554 0.725 2.590 80.000 1.372 0.640 2.286 90.000 1.200 0.560 2.000 100.000 1.038 0.484 1.730
110.000 0.969 0.452 1.614 120.000 0.899 0.420 1.499 130.000 0.830 0.387 1.384 140.000 0.761 0.355 1.268 150.000 0.692 0.323 1.153 160.000 0.623
0.291 1.038 170.000 0.553 0.258 0.922 180.000 0.484 0.226 0.807 190.000 0.415 0.194 0.692 200.000 0.346 0.161 0.577 210.000 0.277 0.129 0.461
220.000 0.208 0.097 0.346 230.000 0.138 0.065 0.231 240.000 0.069 0.032 0.115 250.000 0.000 0.000 0.000 0.000
DESIRED_ACCELERATION 5 NAME "Pedestrian" 0.0 250.0 0.0 7.0
BASE_POINT 0.000 3.000 3.000 3.000 10.000 3.000 3.000 3.000 20.000 0.000 0.000 0.000 30.000 0.000 0.000 0.000 40.000 0.000 0.000 0.000 50.000
0.000 0.000 0.000 60.000 0.000 0.000 0.000 70.000 0.000 0.000 0.000 80.000 0.000 0.000 0.000 90.000 0.000 0.000 0.000 100.000 0.000 0.000 0.000
110.000 0.000 0.000 0.000 120.000 0.000 0.000 0.000 130.000 0.000 0.000 0.000 140.000 0.000 0.000 0.000 150.000 0.000 0.000 0.000 160.000 0.000
0.000 0.000 170.000 0.000 0.000 0.000 180.000 0.000 0.000 0.000 190.000 0.000 0.000 0.000 200.000 0.000 0.000 0.000 210.000 0.000 0.000 0.000
220.000 0.000 0.000 0.000 230.000 0.000 0.000 0.000 240.000 0.000 0.000 0.000 250.000 0.000 0.000 0.000 0.000
DESIRED_ACCELERATION 4 NAME "Tram" 0.0 250.0 0.0 7.0
BASE_POINT 0.000 1.000 1.000 1.000 10.000 1.000 1.000 1.000 20.000 1.000 1.000 1.000 30.000 1.000 1.000 1.000 40.000 1.000 1.000 1.000 50.000
1.000 1.000 1.000 60.000 1.000 1.000 1.000 70.000 1.000 1.000 1.000 80.000 1.000 1.000 1.000 90.000 1.000 1.000 1.000 100.000 1.000 1.000 1.000
110.000 1.000 1.000 1.000 120.000 1.000 1.000 1.000 130.000 1.000 1.000 1.000 140.000 1.000 1.000 1.000 150.000 1.000 1.000 1.000 160.000 1.000
1.000 1.000 170.000 1.000 1.000 1.000 180.000 1.000 1.000 1.000 190.000 1.000 1.000 1.000 200.000 1.000 1.000 1.000 210.000 1.000 1.000 1.000
220.000 1.000 1.000 1.000 230.000 1.000 1.000 1.000 240.000 1.000 1.000 1.000 250.000 0.000 0.000 0.000 0.000
DESIRED_ACCELERATION 3 NAME "Bus" 0.0 250.0 0.0 7.0
BASE_POINT 0.000 3.500 1.960 3.500 10.000 3.200 1.493 3.500 20.000 2.786 1.300 3.500 30.000 2.468 1.152 3.500 40.000 2.200 1.027 3.500 50.000
1.964 0.917 3.273 60.000 1.751 0.817 2.918 70.000 1.554 0.725 2.590 80.000 1.372 0.640 2.286 90.000 1.200 0.560 2.000 100.000 1.038 0.484 1.730
110.000 0.883 0.412 1.472 120.000 0.736 0.343 1.226 130.000 0.594 0.277 0.991 140.000 0.458 0.214 0.764 150.000 0.327 0.153 0.545 160.000 0.000
0.000 0.000 170.000 0.000 0.000 0.000 180.000 0.000 0.000 0.000 190.000 0.000 0.000 0.000 200.000 0.000 0.000 0.000 210.000 0.000 0.000 0.000
220.000 0.000 0.000 0.000 230.000 0.000 0.000 0.000 240.000 0.000 0.000 0.000 250.000 0.000 0.000 0.000 0.000
DESIRED_ACCELERATION 2 NAME "HGV" 0.0 250.0 0.0 7.0
BASE_POINT 0.000 2.166 0.613 2.500 10.000 1.689 0.508 2.500 20.000 1.317 0.421 2.000 30.000 1.027 0.349 1.467 40.000 0.801 0.290 1.076 50.000
0.625 0.240 0.789 60.000 0.487 0.199 0.579 70.000 0.380 0.165 0.425 80.000 0.296 0.137 0.311 90.000 0.231 0.114 0.228 100.000 0.180 0.094 0.167
110.000 0.140 0.078 0.123 120.000 0.110 0.065 0.090 130.000 0.085 0.054 0.066 140.000 0.067 0.045 0.048 150.000 0.052 0.037 0.036 160.000 0.041
0.031 0.026 170.000 0.032 0.025 0.019 180.000 0.025 0.021 0.014 190.000 0.019 0.017 0.010 200.000 0.015 0.014 0.008 210.000 0.012 0.012 0.006
220.000 0.009 0.010 0.004 230.000 0.007 0.008 0.003 240.000 0.006 0.007 0.002 250.000 0.000 0.000 0.000 0.000
DESIRED_ACCELERATION 1 NAME "Car" 0.0 250.0 0.0 7.0
BASE_POINT 0.000 3.500 1.960 3.500 10.000 3.200 1.493 3.500 20.000 2.786 1.300 3.500 30.000 2.468 1.152 3.500 40.000 2.200 1.027 3.500 50.000
1.964 0.917 3.273 60.000 1.751 0.817 2.918 70.000 1.554 0.725 2.590 80.000 1.372 0.640 2.286 90.000 1.200 0.560 2.000 100.000 1.038 0.484 1.730
110.000 0.969 0.452 1.614 120.000 0.899 0.420 1.499 130.000 0.830 0.387 1.384 140.000 0.761 0.355 1.268 150.000 0.692 0.323 1.153 160.000 0.623
0.291 1.038 170.000 0.553 0.258 0.922 180.000 0.484 0.226 0.807 190.000 0.415 0.194 0.692 200.000 0.346 0.161 0.577 210.000 0.277 0.129 0.461
220.000 0.208 0.097 0.346 230.000 0.138 0.065 0.231 240.000 0.069 0.032 0.115 250.000 0.000 0.000 0.000 0.000
MAX_DECELERATION 6 NAME "Bike" 0.0 250.0 -10.0 0.0
BASE_POINT 0.000 -7.500 -8.500 -6.500 10.000 -7.400 -8.400 -6.400 20.000 -7.300 -8.300 -6.300 30.000 -7.200 -8.200 -6.200 40.000 -7.100 -8.100
-6.100 50.000 -7.000 -8.000 -6.000 60.000 -6.900 -7.900 -5.900 70.000 -6.800 -7.800 -5.800 80.000 -6.700 -7.700 -5.700 90.000 -6.600 -7.600 -5.600
100.000 -6.500 -7.500 -5.500 110.000 -6.400 -7.400 -5.400 120.000 -6.300 -7.300 -5.300 130.000 -6.200 -7.200 -5.200 140.000 -6.100 -7.100 -5.100
150.000 -6.000 -7.000 -5.000 160.000 -5.900 -6.900 -4.900 170.000 -5.800 -6.800 -4.800 180.000 -5.700 -6.700 -4.700 190.000 -5.600 -6.600 -4.600
200.000 -5.500 -6.500 -4.500 210.000 -5.400 -6.400 -4.400 220.000 -5.300 -6.300 -4.300 230.000 -5.200 -6.200 -4.200 240.000 -5.100 -6.100 -4.100
MAX_DECELERATION 5 NAME "Pedestrian" 0.0 250.0 -10.0 0.0
BASE_POINT 0.000 -9.000 -9.500 -8.500 10.000 -9.000 -9.500 -8.500 20.000 -9.000 -9.500 -8.500 30.000 -9.000 -9.500 -8.500 40.000 -9.000 -9.500

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-8.500 50.000-9.000-9.500-8.500 60.000-9.000-9.500-8.500 70.000-9.000-9.500-8.500 80.000-9.000-9.500-8.500 90.000-9.000-9.500-8.500
100.000-9.000-9.500-8.500 110.000-9.000-9.500-8.500 120.000-9.000-9.500-8.500 130.000-9.000-9.500-8.500 140.000-9.000-9.500-8.500
150.000-9.000-9.500-8.500 160.000-9.000-9.500-8.500 170.000-9.000-9.500-8.500 180.000-9.000-9.500-8.500 190.000-9.000-9.500-8.500
200.000-9.000-9.500-8.500 210.000-9.000-9.500-8.500 220.000-9.000-9.500-8.500 230.000-9.000-9.500-8.500 240.000-9.000-9.500-8.500
MAX_DECELERATION 4 NAME "Tram" 0.0 250.0 -10.0 0.0
BASE_POINT 0.000 -5.000 -6.000 -4.000 10.000 -4.900 -5.900 -3.900 20.000 -4.800 -5.800 -3.800 30.000 -4.700 -5.700 -3.700 40.000 -4.600 -5.600
-3.600 50.000 -4.500 -5.500 -3.500 60.000 -4.400 -5.400 -3.400 70.000 -4.300 -5.300 -3.300 80.000 -4.200 -5.200 -3.200 90.000 -4.100 -5.100 -3.100
100.000 -4.000 -5.000 -3.000 110.000 -3.900 -4.900 -2.900 120.000 -3.800 -4.800 -2.800 130.000 -3.700 -4.700 -2.700 140.000 -3.600 -4.600 -2.600
150.000 -3.500 -4.500 -2.500 160.000 -3.400 -4.400 -2.400 170.000 -3.300 -4.300 -2.300 180.000 -3.200 -4.200 -2.200 190.000 -3.100 -4.100 -2.100
200.000 -3.000 -4.000 -2.000 210.000 -2.900 -3.900 -1.900 220.000 -2.800 -3.800 -1.800 230.000 -2.700 -3.700 -1.700 240.000 -2.600 -3.600 -1.600
MAX_DECELERATION 3 NAME "Bus" 0.0 250.0 -10.0 0.0
BASE_POINT 0.000 -7.500 -8.500 -6.500 10.000 -7.400 -8.400 -6.400 20.000 -7.300 -8.300 -6.300 30.000 -7.200 -8.200 -6.200 40.000 -7.100 -8.100
-6.100 50.000 -7.000 -8.000 -6.000 60.000 -6.900 -7.900 -5.900 70.000 -6.800 -7.800 -5.800 80.000 -6.700 -7.700 -5.700 90.000 -6.600 -7.600 -5.600
100.000 -6.500 -7.500 -5.500 110.000 -6.400 -7.400 -5.400 120.000 -6.300 -7.300 -5.300 130.000 -6.200 -7.200 -5.200 140.000 -6.100 -7.100 -5.100
150.000 -6.000 -7.000 -5.000 160.000 -5.900 -6.900 -4.900 170.000 -5.800 -6.800 -4.800 180.000 -5.700 -6.700 -4.700 190.000 -5.600 -6.600 -4.600
200.000 -5.500 -6.500 -4.500 210.000 -5.400 -6.400 -4.400 220.000 -5.300 -6.300 -4.300 230.000 -5.200 -6.200 -4.200 240.000 -5.100 -6.100 -4.100
MAX_DECELERATION 2 NAME "HGV" 0.0 250.0 -10.0 0.0
BASE_POINT 0.000 -6.000 -7.000 -5.000 10.000 -5.722 -6.722 -4.722 20.000 -5.444 -6.444 -4.444 30.000 -5.167 -6.167 -4.167 40.000 -4.889 -5.889
-3.889 50.000 -4.611 -5.611 -3.611 60.000 -4.333 -5.333 -3.333 70.000 -4.056 -5.056 -3.056 80.000 -3.778 -4.778 -2.778 90.000 -3.500 -4.500 -2.500
100.000 -3.222 -4.222 -2.222 110.000 -2.944 -3.944 -1.944 120.000 -2.667 -3.667 -1.667 130.000 -2.389 -3.389 -1.389 140.000 -2.111 -3.111 -1.111
150.000 -1.833 -2.833 -0.833 160.000 -1.556 -2.556 -0.556 170.000 -1.278 -2.278 -0.278 180.000 -1.000 -2.000 -0.100 190.000 -0.722 -1.722 -0.100
200.000 -0.444 -1.444 -0.100 210.000 -0.167 -1.167 -0.100 220.000 -0.100 -0.889 -0.100 230.000 -0.100 -0.611 -0.100 240.000 -0.100 -0.333 -0.100
MAX_DECELERATION 1 NAME "Car" 0.0 250.0 -10.0 0.0
BASE_POINT 0.000 -7.500 -8.500 -6.500 10.000 -7.400 -8.400 -6.400 20.000 -7.300 -8.300 -6.300 30.000 -7.200 -8.200 -6.200 40.000 -7.100 -8.100
-6.100 50.000 -7.000 -8.000 -6.000 60.000 -6.900 -7.900 -5.900 70.000 -6.800 -7.800 -5.800 80.000 -6.700 -7.700 -5.700 90.000 -6.600 -7.600 -5.600
100.000 -6.500 -7.500 -5.500 110.000 -6.400 -7.400 -5.400 120.000 -6.300 -7.300 -5.300 130.000 -6.200 -7.200 -5.200 140.000 -6.100 -7.100 -5.100
150.000 -6.000 -7.000 -5.000 160.000 -5.900 -6.900 -4.900 170.000 -5.800 -6.800 -4.800 180.000 -5.700 -6.700 -4.700 190.000 -5.600 -6.600 -4.600
200.000 -5.500 -6.500 -4.500 210.000 -5.400 -6.400 -4.400 220.000 -5.300 -6.300 -4.300 230.000 -5.200 -6.200 -4.200 240.000 -5.100 -6.100 -4.100
DESIRED_DECELERATION 6 NAME "Bike" 0.0 250.0 -10.0 0.0
BASE_POINT 0.000 -2.750 -3.000 -2.550 10.000 -2.750 -3.000 -2.550 20.000 -2.750 -3.000 -2.550 30.000 -2.750 -3.000 -2.550 40.000 -2.750 -3.000
-2.550 50.000 -2.750 -3.000 -2.550 60.000 -2.750 -3.000 -2.550 70.000 -2.750 -3.000 -2.550 80.000 -2.750 -3.000 -2.550 90.000 -2.750 -3.000 -2.550
100.000 -2.750 -3.000 -2.550 110.000 -2.750 -3.000 -2.550 120.000 -2.750 -3.000 -2.550 130.000 -2.750 -3.000 -2.550 140.000 -2.750 -3.000 -2.550
150.000 -2.750 -3.000 -2.550 160.000 -2.750 -3.000 -2.550 170.000 -2.750 -3.000 -2.550 180.000 -2.750 -3.000 -2.550 190.000 -2.750 -3.000 -2.550
200.000 -2.750 -3.000 -2.550 210.000 -2.750 -3.000 -2.550 220.000 -2.750 -3.000 -2.550 230.000 -2.750 -3.000 -2.550 240.000 -2.750 -3.000 -2.550
DESIRED_DECELERATION 5 NAME "Pedestrian" 0.0 250.0 -10.0 0.0
BASE_POINT 0.000 -9.000 -9.500 -8.600 10.000 -9.000 -9.500 -8.600 20.000 -9.000 -9.500 -8.600 30.000 -9.000 -9.500 -8.600 40.000 -9.000 -9.500
-8.600 50.000 -9.000 -9.500 -8.600 60.000 -9.000 -9.500 -8.600 70.000 -9.000 -9.500 -8.600 80.000 -9.000 -9.500 -8.600 90.000 -9.000 -9.500 -8.600
100.000 -9.000 -9.500 -8.600 110.000 -9.000 -9.500 -8.600 120.000 -9.000 -9.500 -8.600 130.000 -9.000 -9.500 -8.600 140.000 -9.000 -9.500 -8.600
150.000 -9.000 -9.500 -8.600 160.000 -9.000 -9.500 -8.600 170.000 -9.000 -9.500 -8.600 180.000 -9.000 -9.500 -8.600 190.000 -9.000 -9.500 -8.600
200.000 -9.000 -9.500 -8.600 210.000 -9.000 -9.500 -8.600 220.000 -9.000 -9.500 -8.600 230.000 -9.000 -9.500 -8.600 240.000 -9.000 -9.500 -8.600
DESIRED_DECELERATION 4 NAME "Tram" 0.0 250.0 -10.0 0.0
BASE_POINT 0.000 -0.850 -1.000 -0.730 10.000 -0.850 -1.000 -0.730 20.000 -0.850 -1.000 -0.730 30.000 -0.850 -1.000 -0.730 40.000 -0.850 -1.000
-0.730 50.000 -0.850 -1.000 -0.730 60.000 -0.850 -1.000 -0.730 70.000 -0.850 -1.000 -0.730 80.000 -0.850 -1.000 -0.730 90.000 -0.850 -1.000 -0.730
100.000 -0.850 -1.000 -0.730 110.000 -0.850 -1.000 -0.730 120.000 -0.850 -1.000 -0.730 130.000 -0.850 -1.000 -0.730 140.000 -0.850 -1.000 -0.730
150.000 -0.850 -1.000 -0.730 160.000 -0.850 -1.000 -0.730 170.000 -0.850 -1.000 -0.730 180.000 -0.850 -1.000 -0.730 190.000 -0.850 -1.000 -0.730
200.000 -0.850 -1.000 -0.730 210.000 -0.850 -1.000 -0.730 220.000 -0.850 -1.000 -0.730 230.000 -0.850 -1.000 -0.730 240.000 -0.850 -1.000 -0.730
DESIRED_DECELERATION 3 NAME "Bus" 0.0 250.0 -10.0 0.0
BASE_POINT 0.000 -0.850 -1.000 -0.730 10.000 -0.850 -1.000 -0.730 20.000 -0.850 -1.000 -0.730 30.000 -0.850 -1.000 -0.730 40.000 -0.850 -1.000
-0.730 50.000 -0.850 -1.000 -0.730 60.000 -0.850 -1.000 -0.730 70.000 -0.850 -1.000 -0.730 80.000 -0.850 -1.000 -0.730 90.000 -0.850 -1.000 -0.730
100.000 -0.850 -1.000 -0.730 110.000 -0.850 -1.000 -0.730 120.000 -0.850 -1.000 -0.730 130.000 -0.850 -1.000 -0.730 140.000 -0.850 -1.000 -0.730
150.000 -0.850 -1.000 -0.730 160.000 -0.850 -1.000 -0.730 170.000 -0.850 -1.000 -0.730 180.000 -0.850 -1.000 -0.730 190.000 -0.850 -1.000 -0.730
200.000 -0.850 -1.000 -0.730 210.000 -0.850 -1.000 -0.730 220.000 -0.850 -1.000 -0.730 230.000 -0.850 -1.000 -0.730 240.000 -0.850 -1.000 -0.730
DESIRED_DECELERATION 2 NAME "HGV" 0.0 250.0 -10.0 0.0
BASE_POINT 0.000 -1.250 -1.500 -1.050 10.000 -1.250 -1.500 -1.050 20.000 -1.250 -1.500 -1.050 30.000 -1.250 -1.500 -1.050 40.000 -1.250 -1.500
-1.050 50.000 -1.250 -1.500 -1.050 60.000 -1.250 -1.500 -1.050 70.000 -1.250 -1.500 -1.050 80.000 -1.250 -1.500 -1.050 90.000 -1.250 -1.500 -1.050
100.000 -1.250 -1.500 -1.050 110.000 -1.250 -1.500 -1.050 120.000 -1.250 -1.500 -1.050 130.000 -1.250 -1.500 -1.050 140.000 -1.250 -1.500 -1.050
150.000 -1.250 -1.500 -1.050 160.000 -1.250 -1.500 -1.050 170.000 -1.250 -1.500 -1.050 180.000 -1.250 -1.500 -1.050 190.000 -1.250 -1.500 -1.050
200.000 -1.250 -1.500 -1.050 210.000 -1.250 -1.500 -1.050 220.000 -1.250 -1.500 -1.050 230.000 -1.250 -1.500 -1.050 240.000 -1.250 -1.500 -1.050
DESIRED_DECELERATION 1 NAME "Car" 0.0 250.0 -10.0 0.0
BASE_POINT 0.000 -2.750 -3.000 -2.550 10.000 -2.750 -3.000 -2.550 20.000 -2.750 -3.000 -2.550 30.000 -2.750 -3.000 -2.550 40.000 -2.750 -3.000
-2.550 50.000 -2.750 -3.000 -2.550 60.000 -2.750 -3.000 -2.550 70.000 -2.750 -3.000 -2.550 80.000 -2.750 -3.000 -2.550 90.000 -2.750 -3.000 -2.550
100.000 -2.750 -3.000 -2.550 110.000 -2.750 -3.000 -2.550 120.000 -2.750 -3.000 -2.550 130.000 -2.750 -3.000 -2.550 140.000 -2.750 -3.000 -2.550
150.000 -2.750 -3.000 -2.550 160.000 -2.750 -3.000 -2.550 170.000 -2.750 -3.000 -2.550 180.000 -2.750 -3.000 -2.550 190.000 -2.750 -3.000 -2.550
200.000 -2.750 -3.000 -2.550 210.000 -2.750 -3.000 -2.550 220.000 -2.750 -3.000 -2.550 230.000 -2.750 -3.000 -2.550 240.000 -2.750 -3.000 -2.550

KATTEMPERATURE 1 NAME "" 0.0 1080.0 -10.0 400.2

BASE_POINT 0.000 -10.000 -10.000 -10.000 36.000 -4.500 -4.500 -4.500 72.000 1.000 1.000 1.000 108.000 6.500 6.500 6.500 144.000 12.000 12.000
12.000 180.000 17.500 17.500 17.500 216.000 23.000 23.000 23.000 252.000 50.000 50.000 50.000 288.000 53.000 53.000 53.000 324.000 56.000 56.000
56.000 360.000 79.000 79.000 79.000 396.000 121.600 121.600 121.600 432.000 175.000 175.000 175.000 468.000 233.000 233.000 233.000 504.000
291.000 291.000 291.000 540.000 342.400 342.400 342.400 576.000 347.760 347.760 347.760 612.000 353.120 353.120 353.120 648.000 358.480 358.480
358.480 684.000 363.840 363.840 363.840 720.000 369.200 369.200 369.200 756.000 374.560 374.560 374.560 792.000 379.920 379.920 379.920 828.000
385.280 385.280 385.280 864.000 390.640 390.640 390.640 900.000 396.000 396.000 396.000 925.200 400.200 400.200 400.200 1080.000 400.200 400.200
400.200

WATERTemperature 1 NAME "" 0.0 1080.0 -10.0 91.0

BASE_POINT 0.000 -10.000 -10.000 -10.000 36.000 -5.600 -5.600 -5.600 72.000 -1.200 -1.200 -1.200 108.000 3.200 3.200 3.200 144.000 7.600 7.600
7.600 180.000 12.000 12.000 12.000 216.000 16.400 16.400 16.400 252.000 20.800 20.800 20.800 288.000 26.000 26.000 26.000 324.000 32.000 32.000
32.000 360.000 39.500 39.500 39.500 396.000 47.000 47.000 47.000 432.000 53.000 53.000 53.000 468.000 59.000 59.000 59.000 504.000 65.000 65.000
65.000 540.000 69.345 69.345 69.345 576.000 73.708 73.708 73.708 612.000 78.071 78.071 78.071 648.000 82.434 82.434 82.434 684.000 86.797 86.797
86.797 720.000 91.000 91.000 91.000 1080.000 91.000 91.000 91.000

-- Priority Rules: --

PRIORITY_RULE ONLY_OWN_LINK NO

-- Stop Signs: --

-- Signal Controllers (SC): --

-- Detectors: --

-- Public Transport: --

LINE 4 NAME "Egleson -> EB" LINE 0 ROUTE 0 PRIORITY 0 LENGTH 0 MDN 0
SOURCE LINK 62 DESIRED_SPEED 70 VEHICLE_TYPE 301
COLOR GREEN TIME_OFFSET 0.0
DESTINATION LINK 27 AT 450.000
OVER 10107 46 10020 22 10104 60 10105 48 10021 23
10022 24 10023 25 10024 26 10072 49 10073 50
10025
START_TIMES 0.0 COURSE 0 OCCUPANCY 50.0 240.0 COURSE 0 OCCUPANCY 50.0 480.0 COURSE 0 OCCUPANCY 50.0 720.0 COURSE 0 OCCUPANCY
50.0 960.0 COURSE 0 OCCUPANCY 50.0
1200.0 COURSE 0 OCCUPANCY 50.0 1440.0 COURSE 0 OCCUPANCY 50.0 1680.0 COURSE 0 OCCUPANCY 50.0 1920.0 COURSE 0 OCCUPANCY
50.0 2160.0 COURSE 0 OCCUPANCY 50.0
2400.0 COURSE 0 OCCUPANCY 50.0 2640.0 COURSE 0 OCCUPANCY 50.0 2880.0 COURSE 0 OCCUPANCY 50.0 3120.0 COURSE 0 OCCUPANCY
50.0 3360.0 COURSE 0 OCCUPANCY 50.0
3600.0 COURSE 0 OCCUPANCY 50.0 3840.0 COURSE 0 OCCUPANCY 50.0 4080.0 COURSE 0 OCCUPANCY 50.0

LINE 5 NAME "Eastend -> Egleson" LINE 0 ROUTE 0 PRIORITY 0 LENGTH 0 MDN 0
SOURCE LINK 126 DESIRED_SPEED 100 VEHICLE_TYPE 301
COLOR GREEN TIME_OFFSET 0.0
DESTINATION LINK 71 AT 30.000
OVER 10050 125 10093 146 10092 145 10049 124 10120 144
10048 123 10047 122 10046 121 10045 120 10090 143
10089 142 10116
START_TIMES 0.0 COURSE 0 OCCUPANCY 50.0 720.0 COURSE 0 OCCUPANCY 50.0 1440.0 COURSE 0 OCCUPANCY 50.0 2160.0 COURSE 0 OCCUPANCY
50.0 2880.0 COURSE 0 OCCUPANCY 50.0

3600.0 COURSE 0 OCCUPANCY 50.0

```

LINE 7 NAME "Moodie -> Eagleson" LINE 0 ROUTE 0 PRIORITY 0 LENGTH 0 MDN 0
SOURCE LINK 72 DESIRED_SPEED 70 VEHICLE_TYPE 301
COLOR GREEN TIME_OFFSET 0.0
DESTINATION LINK 71 AT 30.000
OVER 10117 145 10049 124 10120 144 10048 123 10047 122
10046 121 10045 120 10090 143 10089 142 10116
START_TIMES 0.0 COURSE 0 OCCUPANCY 50.0 180.0 COURSE 0 OCCUPANCY 50.0 360.0 COURSE 0 OCCUPANCY 50.0 540.0 COURSE 0 OCCUPANCY
50.0 720.0 COURSE 0 OCCUPANCY 50.0
900.0 COURSE 0 OCCUPANCY 50.0 1080.0 COURSE 0 OCCUPANCY 50.0 1260.0 COURSE 0 OCCUPANCY 50.0 1440.0 COURSE 0 OCCUPANCY
50.0 1620.0 COURSE 0 OCCUPANCY 50.0
1800.0 COURSE 0 OCCUPANCY 50.0 1980.0 COURSE 0 OCCUPANCY 50.0 2160.0 COURSE 0 OCCUPANCY 50.0 2340.0 COURSE 0 OCCUPANCY
50.0 2520.0 COURSE 0 OCCUPANCY 50.0
2700.0 COURSE 0 OCCUPANCY 50.0 2880.0 COURSE 0 OCCUPANCY 50.0 3060.0 COURSE 0 OCCUPANCY 50.0 3240.0 COURSE 0 OCCUPANCY
50.0 3420.0 COURSE 0 OCCUPANCY 50.0
3600.0 COURSE 0 OCCUPANCY 50.0 3780.0 COURSE 0 OCCUPANCY 50.0 3960.0 COURSE 0 OCCUPANCY 50.0 4140.0 COURSE 0 OCCUPANCY
50.0

```

```

LINE 8 NAME "Eastend -> Terry Fox" LINE 0 ROUTE 0 PRIORITY 0 LENGTH 0 MDN 0
SOURCE LINK 126 DESIRED_SPEED 100 VEHICLE_TYPE 301
COLOR GREEN TIME_OFFSET 0.0
DESTINATION LINK 69 AT 30.000
OVER 10050 125 10093 146 10092 145 10049 124 10120 144
10048 123 10047 122 10046 121 10045 120 10090 143
10088 141 10044 119 10043 118 10042 117 10041 116
10087 140 10040 115 10086 139 10039 114 10085 138
10038 113 10084 137 10114
START_TIMES 0.0 COURSE 0 OCCUPANCY 50.0 1200.0 COURSE 0 OCCUPANCY 50.0 2400.0 COURSE 0 OCCUPANCY 50.0 3600.0 COURSE 0 OCCUPANCY
50.0

```

```

LINE 9 NAME "Eastend -> Carp" LINE 0 ROUTE 0 PRIORITY 0 LENGTH 0 MDN 0
SOURCE LINK 126 DESIRED_SPEED 100 VEHICLE_TYPE 301
COLOR GREEN TIME_OFFSET 0.0
DESTINATION LINK 64 AT 30.000
OVER 10050 125 10093 146 10092 145 10049 124 10120 144
10048 123 10047 122 10046 121 10045 120 10090 143
10088 141 10044 119 10043 118 10042 117 10041 116
10087 140 10040 115 10086 139 10039 114 10085 138
10038 113 10084 137 10083 136 10037 112 10036 111
10035 110 10034 109 10082 135 10033 108 10081 134
10080 133 10032 107 10031 106 10078 131 10030 105
10077 130 10029 104 10028 103 10027 102 10076 129
10026 101 10075 128 10109
START_TIMES 0.0 COURSE 0 OCCUPANCY 50.0 3600.0 COURSE 0 OCCUPANCY 50.0

```

-- Travel Times: --

TRAVEL_TIME AGGREGATION_INTERVAL 99999 FROM 0 UNTIL 99999 RAW NO AGGREGATE YES

-- Delays: --

-- Data Collection: --

CROSS_SEC_MEASUREMENT FROM 1500 UNTIL 3300 AGGREGATION_INTERVAL 1800

RAW NO AGGREGATE YES VISUM_ONLINE NO

CONFIG_FILE "network.qmk"

```

CROSS_SEC_MEASUREMENT      1  COLLECTION_POINT 1 2
CROSS_SEC_MEASUREMENT      3  COLLECTION_POINT 3 4
CROSS_SEC_MEASUREMENT      5  COLLECTION_POINT 5 6
CROSS_SEC_MEASUREMENT      7  COLLECTION_POINT 7 8 9
CROSS_SEC_MEASUREMENT     10  COLLECTION_POINT 10 11 12
CROSS_SEC_MEASUREMENT     13  COLLECTION_POINT 13 14
CROSS_SEC_MEASUREMENT     15  COLLECTION_POINT 15 16
CROSS_SEC_MEASUREMENT     17  COLLECTION_POINT 17 18
CROSS_SEC_MEASUREMENT     19  COLLECTION_POINT 19
CROSS_SEC_MEASUREMENT     20  COLLECTION_POINT 20
CROSS_SEC_MEASUREMENT     21  COLLECTION_POINT 21
CROSS_SEC_MEASUREMENT     22  COLLECTION_POINT 22
CROSS_SEC_MEASUREMENT     23  COLLECTION_POINT 23
CROSS_SEC_MEASUREMENT     24  COLLECTION_POINT 24
CROSS_SEC_MEASUREMENT     25  COLLECTION_POINT 25
CROSS_SEC_MEASUREMENT     26  COLLECTION_POINT 26
CROSS_SEC_MEASUREMENT     27  COLLECTION_POINT 27
CROSS_SEC_MEASUREMENT     28  COLLECTION_POINT 28
CROSS_SEC_MEASUREMENT     29  COLLECTION_POINT 29
CROSS_SEC_MEASUREMENT     30  COLLECTION_POINT 30
CROSS_SEC_MEASUREMENT     31  COLLECTION_POINT 31
CROSS_SEC_MEASUREMENT     32  COLLECTION_POINT 32
CROSS_SEC_MEASUREMENT     33  COLLECTION_POINT 33 34
CROSS_SEC_MEASUREMENT     35  COLLECTION_POINT 35
CROSS_SEC_MEASUREMENT     36  COLLECTION_POINT 36
CROSS_SEC_MEASUREMENT     37  COLLECTION_POINT 37
CROSS_SEC_MEASUREMENT     38  COLLECTION_POINT 38
CROSS_SEC_MEASUREMENT     39  COLLECTION_POINT 39
CROSS_SEC_MEASUREMENT     40  COLLECTION_POINT 40 41
CROSS_SEC_MEASUREMENT     42  COLLECTION_POINT 42
CROSS_SEC_MEASUREMENT     43  COLLECTION_POINT 43
CROSS_SEC_MEASUREMENT     44  COLLECTION_POINT 44
CROSS_SEC_MEASUREMENT     45  COLLECTION_POINT 7
CROSS_SEC_MEASUREMENT     46  COLLECTION_POINT 10

-- Queue Counters: --
-----

-- Data Collection Points: --
-----

COLLECTION_POINT      3  POSITION LINK 9 LANE 1 AT 3.000
COLLECTION_POINT      4  POSITION LINK 9 LANE 2 AT 3.000
COLLECTION_POINT     19  POSITION LINK 1001 LANE 1 AT 25.000
COLLECTION_POINT     20  POSITION LINK 51 LANE 1 AT 25.000
COLLECTION_POINT     21  POSITION LINK 52 LANE 1 AT 25.000
COLLECTION_POINT     22  POSITION LINK 53 LANE 1 AT 25.000
COLLECTION_POINT     23  POSITION LINK 54 LANE 1 AT 25.000
COLLECTION_POINT     24  POSITION LINK 55 LANE 1 AT 25.000
COLLECTION_POINT     25  POSITION LINK 56 LANE 1 AT 25.000
COLLECTION_POINT     26  POSITION LINK 57 LANE 1 AT 25.000
COLLECTION_POINT     27  POSITION LINK 58 LANE 1 AT 25.000
COLLECTION_POINT     28  POSITION LINK 59 LANE 1 AT 25.000
COLLECTION_POINT     29  POSITION LINK 61 LANE 1 AT 25.000
COLLECTION_POINT     30  POSITION LINK 63 LANE 1 AT 25.000
COLLECTION_POINT     31  POSITION LINK 73 LANE 1 AT 25.000
COLLECTION_POINT     32  POSITION LINK 72 LANE 1 AT 25.000
COLLECTION_POINT     33  POSITION LINK 71 LANE 1 AT 25.000
COLLECTION_POINT     34  POSITION LINK 71 LANE 2 AT 25.000
COLLECTION_POINT     35  POSITION LINK 70 LANE 1 AT 25.000

```



```

COLLECTION_POINT 36 POSITION LINK 74 LANE 1 AT 25.000
COLLECTION_POINT 37 POSITION LINK 69 LANE 1 AT 25.000
COLLECTION_POINT 38 POSITION LINK 68 LANE 1 AT 25.000
COLLECTION_POINT 39 POSITION LINK 67 LANE 1 AT 25.000
COLLECTION_POINT 40 POSITION LINK 66 LANE 1 AT 25.000
COLLECTION_POINT 41 POSITION LINK 66 LANE 2 AT 25.000
COLLECTION_POINT 42 POSITION LINK 65 LANE 1 AT 25.000
COLLECTION_POINT 43 POSITION LINK 64 LANE 1 AT 25.000
COLLECTION_POINT 44 POSITION LINK 62 LANE 1 AT 25.000
COLLECTION_POINT 17 POSITION LINK 101 LANE 1 AT 75.000
COLLECTION_POINT 18 POSITION LINK 101 LANE 2 AT 75.000
COLLECTION_POINT 5 POSITION LINK 16 LANE 1 AT 115.000
COLLECTION_POINT 6 POSITION LINK 16 LANE 2 AT 115.000
COLLECTION_POINT 1 POSITION LINK 31 LANE 1 AT 225.000
COLLECTION_POINT 2 POSITION LINK 31 LANE 2 AT 225.000
COLLECTION_POINT 15 POSITION LINK 107 LANE 1 AT 327.000
COLLECTION_POINT 16 POSITION LINK 107 LANE 2 AT 327.000
COLLECTION_POINT 10 POSITION LINK 121 LANE 1 AT 332.000
COLLECTION_POINT 11 POSITION LINK 121 LANE 2 AT 332.000
COLLECTION_POINT 12 POSITION LINK 121 LANE 3 AT 332.000
COLLECTION_POINT 7 POSITION LINK 23 LANE 1 AT 390.000
COLLECTION_POINT 8 POSITION LINK 23 LANE 2 AT 390.000
COLLECTION_POINT 9 POSITION LINK 23 LANE 3 AT 390.000
COLLECTION_POINT 13 POSITION LINK 138 LANE 1 AT 525.000
COLLECTION_POINT 14 POSITION LINK 138 LANE 2 AT 525.000

```

```

-- Evaluations: --
-----

```

```

EVALUATION DATABASE "" CONFIRM_OVERWRITE YES

```

```

EVALUATION TYPE VEHICLE_RECORD VEH_CLASSES CONFIG_FILE "network.fzk" FILTER_FILE "network.fil"
TIME FROM 1500.0 UNTIL 3300.0

```

```

EVALUATION TYPE SEGMENT LINK CONFIG_FILE "network.sak" AGGREGATION_INTERVAL 1800.0
TIME FROM 1500.0 UNTIL 3300.0

```

```

EVALUATION TYPE CONVERGENCE EDGE LENGTH 20.000
TIME FROM 0.0 UNTIL 999999.0

```

```

WINDOW TYPE LDP SIGNAL_GROUP NUMBER DETECTOR NUMBER
SCJ
WINDOW TYPE SZP SIGNAL_GROUP NUMBER DETECTOR NUMBER
SCJ

```

```

-- Parking Lots: --
-----

```

```

-- Nodes: --
-----

```

```

-- Edge Closure: --
-----

```

```

-- TEAPAC: --
-----

```

```

-- Emissions: --

```

```
-----  
EMISSION  
  LAYERS "emission_e.sch"  
  AIR_DENSITY 1.200  
  TEMPERATURE 20.000
```

```
-- Static 3D Models: --  
-----
```

```
-- Pavement Markers: --  
-----
```

```
-- Keyframes: --  
-----
```

Sample Output File for VISSIM (Base Case)

1. Second-by-Second Vehicle State

(File is extremely large, therefore only a part of it is shown.)

Evaluation table

t: Simulation Time [s]
 VehNr: Number of Vehicle
 Type: Number of Vehicle Type
 v: Speed [km/h] at the end of the simulation step
 a: Acceleration [m/s²] during the simulation step
 vDes: Desired Speed [km/h]
 abx: Desired headway [m] during the simulation step
 Link: Number of the Active Link
 x: Link Coordinate [m] at the end of the simulation step
 Slope: Slope [%] of the current link

t;	VehNr;	Type;	v;	a;	vDes;	abx;	Link;	x;	Slope;
1500.0;	3592;	111;	68.92;	1.07;	104.24;	28.5;	10019;	0.0;	0.0;
1500.0;	3587;	121;	99.86;	0.00;	99.86;	40.0;	1;	136.4;	-1.0;
1500.0;	3567;	206;	111.28;	0.12;	127.70;	48.7;	1;	462.7;	-1.0;
1500.0;	3584;	111;	121.10;	0.00;	121.10;	47.8;	1;	210.0;	-1.0;
1500.0;	3565;	110;	109.93;	0.00;	109.93;	42.5;	1;	472.2;	-1.0;
1500.0;	3563;	110;	116.65;	0.00;	116.65;	45.8;	2;	19.4;	-1.0;
1500.0;	3486;	110;	100.92;	0.00;	100.92;	45.6;	3;	171.4;	-0.3;
1500.0;	3433;	111;	105.52;	0.00;	105.52;	46.2;	4;	152.8;	-0.4;
1500.0;	3426;	111;	104.54;	0.00;	104.54;	41.7;	4;	202.3;	-0.4;
1500.0;	3457;	110;	96.62;	0.00;	96.62;	43.4;	4;	19.6;	-0.4;
.	.	.	.	.	.	.	.	.	.

2. Volume

Data Collection (Compiled Data)

Measurement	1: Data Collection Point(s) 1, 2
Measurement	3: Data Collection Point(s) 3, 4
Measurement	5: Data Collection Point(s) 5, 6
Measurement	7: Data Collection Point(s) 7, 8, 9
Measurement	10: Data Collection Point(s) 10, 11, 12
Measurement	13: Data Collection Point(s) 13, 14
Measurement	15: Data Collection Point(s) 15, 16
Measurement	17: Data Collection Point(s) 17, 18

Measurement 19: Data Collection Point(s) 19
 Measurement 20: Data Collection Point(s) 20
 Measurement 21: Data Collection Point(s) 21
 Measurement 22: Data Collection Point(s) 22
 Measurement 23: Data Collection Point(s) 23
 Measurement 24: Data Collection Point(s) 24
 Measurement 25: Data Collection Point(s) 25
 Measurement 26: Data Collection Point(s) 26
 Measurement 27: Data Collection Point(s) 27
 Measurement 28: Data Collection Point(s) 28
 Measurement 29: Data Collection Point(s) 29
 Measurement 30: Data Collection Point(s) 30
 Measurement 31: Data Collection Point(s) 31
 Measurement 32: Data Collection Point(s) 32
 Measurement 33: Data Collection Point(s) 33, 34
 Measurement 35: Data Collection Point(s) 35
 Measurement 36: Data Collection Point(s) 36
 Measurement 37: Data Collection Point(s) 37
 Measurement 38: Data Collection Point(s) 38
 Measurement 39: Data Collection Point(s) 39
 Measurement 40: Data Collection Point(s) 40, 41
 Measurement 42: Data Collection Point(s) 42
 Measurement 43: Data Collection Point(s) 43
 Measurement 44: Data Collection Point(s) 44
 Measurement 45: Data Collection Point(s) 7
 Measurement 46: Data Collection Point(s) 10

Measur.: Data Collection Number
 From: Start time of the Aggregation interval
 To: End time of the Aggregation interval
 Number Veh: Number of Vehicles

Measur.;From;To;Number Veh
 ; ; ;
 ; ; ;all veh. types
 1;1500;3300;687
 3;1500;3300;670
 5;1500;3300;933
 7;1500;3300;1723
 10;1500;3300;1809
 13;1500;3300;1356
 15;1500;3300;1158
 17;1500;3300;1147
 19;1500;3300;178
 20;1500;3300;141
 21;1500;3300;49
 22;1500;3300;8
 23;1500;3300;18
 24;1500;3300;89
 25;1500;3300;131
 26;1500;3300;228
 27;1500;3300;77
 28;1500;3300;525
 29;1500;3300;314

30;1500;3300;98
 31;1500;3300;96
 32;1500;3300;139
 33;1500;3300;640
 35;1500;3300;26
 36;1500;3300;170
 37;1500;3300;401
 38;1500;3300;71
 39;1500;3300;140
 40;1500;3300;76
 42;1500;3300;41
 43;1500;3300;369
 44;1500;3300;7
 45;1500;3300;8
 46;1500;3300;15

3. Speed

Evaluation table

Vehicle Class: 0 = All Vehicle Types
 Vehicle Class: 10 = Car
 Vehicle Class: 20 = HGV
 Vehicle Class: 30 = Bus
 Vehicle Class: 40 = Tram
 Vehicle Class: 50 = Pedestrian
 Vehicle Class: 60 = Bike

Link: Link Number

SegLen: Segment length [m]

v: Average speed [km/h] (Vehicle Class 0)

t: Simulation Time [s]

Link;	SegLen;	v(0);	t;
1;	500.0;	107.11;	3300.0;
2;	27.6;	106.95;	3300.0;
3;	193.2;	104.97;	3300.0;
4;	543.1;	105.31;	3300.0;
5;	201.2;	104.97;	3300.0;
6;	178.4;	105.17;	3300.0;
7;	235.1;	104.39;	3300.0;
8;	20.4;	104.58;	3300.0;
9;	334.1;	104.11;	3300.0;
10;	367.5;	103.68;	3300.0;
11;	329.1;	104.63;	3300.0;
12;	52.4;	104.36;	3300.0;
13;	24.0;	101.08;	3300.0;
14;	128.9;	102.79;	3300.0;
15;	109.8;	103.84;	3300.0;
16;	560.1;	102.83;	3300.0;

17;	104. 7;	103. 49;	3300. 0;
18;	428. 3;	103. 19;	3300. 0;
19;	31. 7;	101. 66;	3300. 0;
20;	9. 8;	85. 00;	3300. 0;
21;	277. 2;	88. 80;	3300. 0;
22;	239. 7;	68. 48;	3300. 0;
23;	687. 4;	83. 03;	3300. 0;
24;	266. 6;	81. 22;	3300. 0;
25;	122. 4;	81. 50;	3300. 0;
26;	671. 1;	80. 82;	3300. 0;
27;	467. 1;	84. 49;	3300. 0;
28;	253. 3;	100. 13;	3300. 0;
29;	317. 3;	106. 14;	3300. 0;
30;	224. 1;	100. 63;	3300. 0;
31;	329. 2;	105. 10;	3300. 0;
32;	164. 0;	103. 90;	3300. 0;
33;	11. 0;	105. 52;	3300. 0;
34;	163. 4;	104. 98;	3300. 0;
35;	75. 8;	103. 76;	3300. 0;
36;	338. 9;	104. 33;	3300. 0;
37;	2. 9;	104. 05;	3300. 0;
38;	196. 7;	104. 63;	3300. 0;
39;	133. 3;	97. 94;	3300. 0;
40;	98. 3;	103. 69;	3300. 0;
41;	265. 7;	97. 38;	3300. 0;
42;	367. 2;	102. 60;	3300. 0;
43;	268. 4;	102. 70;	3300. 0;
44;	32. 0;	103. 33;	3300. 0;
45;	259. 4;	89. 82;	3300. 0;
46;	3. 1;	72. 49;	3300. 0;
47;	98. 5;	77. 54;	3300. 0;
48;	730. 9;	80. 95;	3300. 0;
49;	170. 0;	83. 40;	3300. 0;
50;	22. 8;	85. 31;	3300. 0;
101;	282. 3;	85. 25;	3300. 0;
102;	365. 8;	97. 51;	3300. 0;
103;	177. 2;	99. 02;	3300. 0;
104;	441. 7;	99. 31;	3300. 0;
105;	218. 7;	98. 56;	3300. 0;
106;	332. 2;	97. 44;	3300. 0;
107;	330. 6;	97. 23;	3300. 0;
108;	269. 8;	99. 20;	3300. 0;
109;	29. 9;	99. 35;	3300. 0;
110;	210. 4;	99. 60;	3300. 0;
111;	1. 9;	98. 82;	3300. 0;
112;	187. 2;	100. 02;	3300. 0;
113;	391. 0;	91. 11;	3300. 0;
114;	137. 4;	89. 33;	3300. 0;
115;	103. 2;	97. 85;	3300. 0;
116;	259. 6;	98. 65;	3300. 0;
117;	36. 9;	99. 17;	3300. 0;
118;	14. 1;	100. 34;	3300. 0;
119;	603. 5;	101. 31;	3300. 0;
120;	415. 4;	85. 76;	3300. 0;

121;	723.4;	77.54;	3300.0;
122;	230.7;	76.45;	3300.0;
123;	102.3;	71.28;	3300.0;
124;	182.5;	49.96;	3300.0;
125;	231.3;	42.47;	3300.0;
126;	500.0;	38.86;	3300.0;
127;	573.2;	102.19;	3300.0;
128;	268.5;	96.44;	3300.0;
129;	572.9;	95.50;	3300.0;
130;	42.3;	97.70;	3300.0;
131;	12.0;	97.79;	3300.0;
133;	21.1;	96.30;	3300.0;
134;	279.7;	93.05;	3300.0;
135;	289.0;	97.15;	3300.0;
136;	193.2;	101.18;	3300.0;
137;	251.6;	95.00;	3300.0;
138;	587.7;	95.22;	3300.0;
139;	81.9;	91.21;	3300.0;
140;	176.4;	99.03;	3300.0;
141;	209.7;	100.74;	3300.0;
143;	370.8;	95.73;	3300.0;
144;	762.9;	67.56;	3300.0;
145;	3.5;	46.05;	3300.0;
146;	187.2;	44.70;	3300.0;

APPENDIX. D

Origin-Destination (OD) Data

(Used by Microscopic Traffic Simulator)

CORSIM OD Table

(a) A.M. Peak Hour Eastbound

Origin*		Destination**									
Interchange	Vol.	Palladium		Terry Fox		Eagleson		Moodie		Highway 417	
		Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%
Eagleson D.	525							42.0	8	483.0	92
Eagleson I.	740							59.2	8	680.8	92
Terry Fox D.	597					167.2	28	35.8	6	394.0	66
Terry Fox I.	200					52.0	26	12.0	6	136.0	68
Palladium D.	50			5.5	11	9.5	19	3.0	6	32.0	64
Palladium I.	20			2.0	10	3.8	19	1.2	6	13.0	65
Carp D.	388	23.3	6	31.0	8	66.0	17	23.3	6	244.4	63
Carp I.	300	15.0	5	24.0	8	51.0	17	15.0	5	195.0	65
Highway 417	2,030	81.2	4	142.1	7	365.4	18	121.8	6	1,319.5	65
SUM		119.5		204.6		714.8		313.3		3,497.8	
Actual Volume		120		210		710		310		3500	

*D.: Direct on-ramp, I.: Inner-loop on-ramp

Vol.: Volume in veh/h, %: Fraction in percent, **Bold: Adjusted 1 % to make total to 100 %.

(b) A.M. Peak Hour Westbound

Origin*		Destination**									
Interchange	Vol.	Eagleson		Terry Fox		Palladium		Carp		Highway417	
		Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%
Palladium I.	30							14.7	49	15.3	51
Terry Fox D.	80					8.8	11	33.6	42	37.6	47
Terry Fox I.	70					7.0	10	29.4	42	33.6	48
Eagleson D.	80			40.0	50	3.2	4	16.8	21	20.0	25
Eagleson I.	20			9.6	48	0.8	4	4.4	22	5.2	26
Moodie D.	70	45.5	65	9.8	14	0.7	1	6.3	9	7.7	11
Moodie I.	80	51.2	64	11.2	14	1.6	2	7.2	9	8.8	11
Highway 417	3,409	2,147.7	63	511.4	15	68.2	2	306.8	9	375.0	11
SUM		2244.4		582.0		90.3	***	419.2		503.2	
Actual Volume		2249		570		80	***	430		510	

*D.: Direct on-ramp, I.: Inner-loop on-ramp

Vol.: Volume in veh/h, %: Fraction in percent, **Bold: Adjusted 1 % to make total to 100 %.

***At Palladium exit, approximately 13% error (10 veh/h) is expected due to rounding the OD percentage.

CORSIM OD Table

(c) P.M. Peak Hour Eastbound

Origin*		Destination**									
Interchange	Vol.	Palladium		Terry Fox		Eagleson		Moodie		Highway 417	
		Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%
Eagleson D.	615							36.9	6	578.1	94
Eagleson I.	1,080							64.8	6	1,015.2	94
Terry Fox D.	490					58.8	12	24.5	5	406.7	83
Terry Fox I.	240					26.4	11	12.0	5	201.6	84
Palladium D.	40			7.2	18	2.8	7	1.6	4	28.4	71
Palladium I.	20			3.2	16	1.4	7	0.8	4	14.6	73
Carp D.	320	22.4	7	38.4	12	22.4	7	12.8	4	224.0	70
Carp I.	370	22.4	6	44.4	12	25.9	7	11.1	3	266.4	72
Highway 417	740	37.0	5	88.8	12	44.4	6	29.6	4	540.2	73
SUM		81.6		182.0		182.1		194.1		3,275.2	
Actual Volume		80		180		180		190		3,285	

*D.: Direct on-ramp, I.: Inner-loop on-ramp

Vol.: Volume in veh/h, %: Fraction in percent, **Bold: Adjusted 1 % to make total to 100 %.

(d) P.M. Peak Hour Westbound

Origin*		Destination**									
Interchange	Vol.	Eagleson		Terry Fox		Palladium		Carp		Highway417	
		Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%
Palladium I.	80							27.2	34	52.8	66
Terry Fox D.	250					20.0	8	75.0	30	155.0	62
Terry Fox I.	170					11.9	7	51.0	30	107.1	63
Eagleson D.	340			129.2	38	13.6	4	61.2	18	136.0	40
Eagleson I.	60			21.0	35	2.4	4	11.4	19	25.2	42
Moodie D.	270	99.9	37	48.6	18	8.1	3	35.1	13	78.3	29
Moodie I.	190	68.4	36	34.2	18	3.8	2	26.6	14	57.0	30
Highway 417	3,321	1,162.4	35	597.8	18	66.4	2	464.9	14	1,029.5	31
SUM		1,330.7		830.8		126.2	***	752.4		1,640.9	
Actual Volume		1325		837		140	***	749		1630	

*D.: Direct on-ramp, I.: Inner-loop on-ramp

Vol.: Volume in veh/h, %: Fraction in percent, **Bold: Adjusted 1 % to make total to 100 %.

***At Palladium exit, approximately 10% error (14 veh/h) is expected due to rounding the OD percentage.

VISSIM OD Table

(a) A.M. Peak Hour Eastbound

Origin*		Destination**									
Interchange	Vol.	Palladium		Terry Fox		Eagleson		Moodie		Highway 417	
		Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%
Eagleson D.	525							44.1	8.40	480.9	91.60
Eagleson I.	740							61.6	8.32	678.4	91.68
Terry Fox D.	597					168.1	28.16	34.9	5.85	393.9	65.98
Terry Fox I.	200					52.1	26.05	12.0	6.00	135.9	67.95
Palladium D.	50			5.5	11.00	9.8	19.60	2.8	5.60	31.8	63.60
Palladium I.	20			2.0	10.00	3.9	19.50	1.1	5.50	13.0	65.00
Carp D.	388	22.0	5.67	30.3	7.81	68.6	17.68	21.4	5.52	245.7	63.32
Carp I.	300	13.9	4.63	22.6	7.53	53.0	17.67	16.8	5.60	193.6	64.53
Highway 417	2,030	83.9	4.13	149.0	7.34	357.0	17.59	115.2	5.67	1,325.0	65.27
SUM		119.8		209.4		712.6		310.0		3,498.2	
Actual Volume		120		210		710		310		3,500	

*D.: Direct on-ramp, I.: Inner-loop on-ramp

Vol.: Volume in veh/h, %: Fraction in percent, **Bold: Adjusted 1 % to make total to 100 %.

(b) A.M. Peak Hour Westbound

Origin*		Destination**									
Interchange	Vol.	Eagleson		Terry Fox		Palladium		Carp		Highway 417	
		Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%
Palladium I.	30							14.7	49.00	15.3	51.00
Terry Fox D.	80					9.0	11.25	33.2	41.50	37.8	47.25
Terry Fox I.	70					7.1	10.14	29.3	41.86	33.7	48.14
Eagleson D.	80			40.4	50.50	3.4	4.25	16.6	20.75	19.6	24.50
Eagleson I.	20			9.5	47.50	0.9	4.50	4.4	22.00	5.2	26.00
Moodie D.	70	45.4	64.86	9.9	14.14	1.1	1.57	6.2	8.86	7.4	10.57
Moodie I.	80	51.1	63.88	11.5	14.38	1.3	1.63	7.3	9.13	8.7	10.88
Highway 417	3,409	2,145.1	62.92	499.2	14.64	57.9	1.70	321.2	9.42	385.6	11.31
SUM		2,241.6		570.5		80.6		432.9		513.3	
Actual Volume		2249		570		80		430		510	

*D.: Direct on-ramp, I.: Inner-loop on-ramp

Vol.: Volume in veh/h, %: Fraction in percent, **Bold: Adjusted 1 % to make total to 100 %.

VISSIM OD Table

(c) P.M. Peak Hour Eastbound

Origin*		Destination**									
Interchange	Vol.	Palladium		Terry Fox		Eagleson		Moodie		Highway 417	
		Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%
Eagleson D.	615							34.5	5.61	580.5	94.39
Eagleson I.	1,080							60.0	5.56	1,020.0	94.44
Terry Fox D.	490					57.7	11.78	23.5	4.80	408.8	83.43
Terry Fox I.	240					25.7	10.71	11.6	4.83	202.7	84.46
Palladium D.	40			7.0	17.50	2.9	7.25	1.6	4.00	28.5	71.25
Palladium I.	20			3.1	15.50	1.4	7.00	0.8	4.00	14.6	73.00
Carp D.	320	21.8	6.81	39.3	12.28	20.8	6.50	12.7	3.97	225.4	70.44
Carp I.	370	20.8	5.62	44.1	11.92	24.1	6.51	15.0	4.05	266.1	71.92
Highway 417	740	36.9	4.99	85.8	11.59	48.0	6.49	30.4	4.11	538.9	72.82
SUM		79.5		179.2		180.7		190.1		3,285.4	
Actual Volume		80		180		180		190		3,285	

*D.: Direct on-ramp, I.: Inner-loop on-ramp

Vol.: Volume in veh/h, %: Fraction in percent, **Bold: Adjusted 1 % to make total to 100 %.

(d) P.M. Peak Hour Westbound

Origin*		Destination**									
Interchange	Vol.	Eagleson		Terry Fox		Palladium		Carp		Highway 417	
		Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%
Palladium I.	80							27.4	34.25	52.6	65.75
Terry Fox D.	250					19.9	7.96	74.4	29.76	155.7	62.28
Terry Fox I.	170					12.1	7.12	50.7	29.82	107.2	63.06
Eagleson D.	340			128.6	37.82	12.6	3.71	62.8	18.47	136.0	40.00
Eagleson I.	60			21.0	35.00	2.3	3.83	11.6	19.33	25.2	42.00
Moodie D.	270	99.3	36.78	48.8	18.07	6.5	2.41	36.0	13.33	79.4	29.41
Moodie I.	190	67.9	35.74	34.5	18.16	4.6	2.42	25.9	13.63	57.1	30.05
Highway417	3,321	1,152.2	34.69	605.1	18.22	82.4	2.48	461.6	13.90	1,019.8	30.71
SUM		1,319.3		837.9		140.4		750.4		1,633.0	
Actual Volume		1325		837		140		749		1630	

*D.: Direct on-ramp, I.: Inner-loop on-ramp

Vol.: Volume in veh/h, %: Fraction in percent, **Bold: Adjusted 1 % to make total to 100 %.

APPENDIX. E

Calibration and Validation of CORSIM and VISSIM

In the tables in this Appendix, shaded cells show the value exceeded or below the targets developed in Chapter 5.

Following notation is used in the tables in this Appendix:

EB: Eastbound

WB: Westbound

Volume: Average volume (in vehicles per hour)

Time: Average travel time (in seconds)

StDev. : Standard Deviation

GEH: GEH statistic

SE: Square Error

E: Error

SPE: Square percent error (in 1/100)

PE: Percent error

CORSIM CFSF Calibration

CFSF	# of Runs	Volume				Travel Time			
		RMSE	ME	RMSPE	MPE	RMSE	ME	RMSPE	MPE
0.80	20	8.3	-1.4	3.3%	-0.1%	50.3	-33.4	27.2%	-19.9%
1.15	80	27.2	-6.6	2.8%	-0.5%	17.2	-10.8	9.9%	-7.3%
1.18	70	30.4	-7.3	2.6%	-0.6%	11.8	-8.2	7.4%	-5.9%
1.19	60	32.7	-8.1	3.1%	-0.5%	7.7	-5.9	5.6%	-4.6%
1.20	50	34.4	-8.4	3.1%	-0.4%	5.2	-4.0	4.7%	-3.5%
1.21	80	36.6	-9.2	2.8%	-0.6%	5.7	-2.4	4.9%	-2.8%
1.23	40	38.8	-10.6	2.6%	-0.7%	8.8	0.0	6.0%	-1.4%
1.28	50	51.7	-14.4	3.4%	-0.8%	29.3	9.9	15.9%	3.9%
1.37	50	78.4	-24.2	3.9%	-1.4%	67.9	31.6	37.1%	17.9%
1.50	30	127.4	-50.5	5.5%	-2.8%	118.1	68.8	79.8%	48.5%

Calibration (CFSF = 1.19)**Volume**

Section			Balanced Volume	Simulation					60 runs	
				Volume	StDev	GEH	SE	E	SPE	PE
Mainline	EB	Carp Rd. - Palladium Dr.	2720	2718.1	4.2	0.0	3.6	-1.9	0.0	-0.1
		Palladium Dr. - Terry Fox Dr.	2670	2668.9	13.0	0.0	1.2	-1.1	0.0	0.0
		Terry Fox Dr. - Eagleson Rd.	3260	3255.0	21.5	0.1	24.8	-5.0	0.0	-0.2
		Eagleson Rd. - Moodie Dr.	3840	3663.4	28.1	2.9	31193.5	-176.6	0.2	-4.6
	WB	Moodie Dr. - Eagleson Rd.	3570	3564.2	15.9	0.1	33.3	-5.8	0.0	-0.2
		Eagleson Rd. - Terry Fox Dr.	1410	1418.0	26.7	0.2	64.3	8.0	0.0	0.6
		Terry Fox Dr. - Palladium Dr.	990	978.0	28.7	0.4	144.4	-12.0	0.0	-1.2
		Palladium Dr. - Carp Rd.	940	915.3	24.5	0.8	612.6	-24.8	0.1	-2.6
Ramp	EB	Carp on (inner loop)	300	299.8	0.8	0.0	0.0	-0.2	0.0	-0.1
		Carp on (direct)	390	389.8	0.8	0.0	0.1	-0.2	0.0	-0.1
		Palladium off	120	120.2	12.3	0.0	0.0	0.2	0.0	0.1
		Palladium on (inner loop)	20	19.5	0.5	0.1	0.3	-0.5	0.1	-2.7
		Palladium on (direct)	50	49.4	0.5	0.1	0.4	-0.6	0.0	-1.3
		Terry Fox off	210	201.8	14.7	0.6	67.5	-8.2	0.2	-3.9
		Terry Fox on (inner loop)	200	198.8	0.6	0.1	1.5	-1.2	0.0	-0.6
		Terry Fox on (direct)	600	599.7	0.9	0.0	0.1	-0.3	0.0	0.0
		Eagleson off	710	707.2	28.9	0.1	7.7	-2.8	0.0	-0.4
		Eagleson on (inner loop)	740	738.8	1.0	0.0	1.4	-1.2	0.0	-0.2
		Eagleson on (direct) *	525	524.8	0.8	0.0	0.0	-0.2	0.0	0.0
		Moodie off	310	297.6	16.8	0.7	154.2	-12.4	0.2	-4.0
	WB	Moodie on (inner loop)	80	78.9	0.8	0.1	1.1	-1.1	0.0	-1.3
		Moodie on (direct)	80	79.9	0.7	0.0	0.0	-0.1	0.0	-0.1
		Eagleson off	2260	2245.2	26.9	0.3	220.0	-14.8	0.0	-0.7
		Eagleson on (inner loop)	20	19.4	0.5	0.1	0.4	-0.6	0.1	-3.1
		Eagleson on (direct)	80	79.2	0.7	0.1	0.7	-0.8	0.0	-1.1
		Terry Fox off	570	585.9	19.3	0.7	253.9	15.9	0.1	2.8
		Terry Fox on (inner loop)	70	69.8	0.7	0.0	0.0	-0.2	0.0	-0.3
		Terry Fox on (direct)	80	79.0	0.7	0.1	1.0	-1.0	0.0	-1.3
		Palladium off	80	90.9	11.2	1.2	119.5	10.9	1.9	13.7
		Palladium on (inner loop)	30	29.9	0.7	0.0	0.0	-0.1	0.0	-0.3
		Carp off	430	416.1	19.5	0.7	191.8	-13.9	0.1	-3.2
Goodness of Fit						RMSE 32.7	ME -8.1	RMSPE 3.1	MPE -0.5	

* Buses (15 buses per hour) are counted separately and not included in the number for this ramp

Speed

Section			Distance (m)	Travel Time	Simulation				60 runs	
					Time	StDev	SE	E	SPE	PE
Mainline	EB	Carp Rd. - Palladium Dr.	2069	79.1	77.0	0.2	4.1	-2.0	0.1	-2.5
		Palladium Dr. - Terry Fox Dr.	2444	90.5	90.9	0.2	0.1	0.3	0.0	0.4
		Terry Fox Dr. - Eagleson Rd.	2605	189.9	177.8	33.1	145.8	-12.1	0.4	-6.4
		Eagleson Rd. - CNR Overpass	2695	185.5	174.4	6.3	121.5	-11.0	0.4	-5.9
		CNR Overpass - Moodie Dr.	1331	56.1	51.2	0.5	23.7	-4.9	0.8	-8.7
		Total Section	11144	601.1	571.4	38.3	882.9	-29.7	0.2	-4.9
	Goodness of Fit						RMSE 7.7	ME -5.9	RMSPE 5.6	MPE -4.6

Calibration (CFSF = 1.20)**Volume**

Section			Balanced Volume	Simulation					50 runs	
				Volume	StDev	GEH	SE	E	SPE	PE
Mainline	EB	Carp Rd. - Palladium Dr.	2720	2718.3	3.8	0.0	2.9	-1.7	0.0	-0.1
		Palladium Dr. - Terry Fox Dr.	2670	2667.7	10.8	0.0	5.5	-2.3	0.0	-0.1
		Terry Fox Dr. - Eagleson Rd.	3260	3250.4	23.0	0.2	91.8	-9.6	0.0	-0.3
		Eagleson Rd. - Moodie Dr.	3840	3652.6	28.7	3.1	35133.7	-187.4	0.2	-4.9
	WB	Moodie Dr. - Eagleson Rd.	3570	3567.2	14.2	0.0	7.7	-2.8	0.0	-0.1
		Eagleson Rd. - Terry Fox Dr.	1410	1416.7	28.0	0.2	45.4	6.7	0.0	0.5
		Terry Fox Dr. - Palladium Dr.	990	981.7	25.1	0.3	68.2	-8.3	0.0	-0.8
		Palladium Dr. - Carp Rd.	940	919.1	24.6	0.7	438.5	-20.9	0.0	-2.2
Ramp	EB	Carp on (inner loop)	300	299.8	0.8	0.0	0.0	-0.2	0.0	-0.1
		Carp on (direct)	390	389.7	0.8	0.0	0.1	-0.3	0.0	-0.1
		Palladium off	120	121.1	10.4	0.1	1.3	1.1	0.0	0.9
		Palladium on (inner loop)	20	19.5	0.5	0.1	0.2	-0.5	0.1	-2.4
		Palladium on (direct)	50	49.4	0.5	0.1	0.4	-0.6	0.0	-1.2
		Terry Fox off	210	204.0	11.9	0.4	36.5	-6.0	0.1	-2.9
		Terry Fox on (inner loop)	200	198.7	0.7	0.1	1.6	-1.3	0.0	-0.6
		Terry Fox on (direct)	600	599.7	0.9	0.0	0.1	-0.3	0.0	0.0
		Eagleson off	710	704.5	24.7	0.2	30.3	-5.5	0.0	-0.8
		Eagleson on (inner loop)	740	738.9	1.0	0.0	1.3	-1.1	0.0	-0.2
		Eagleson on (direct) *	525	524.8	0.9	0.0	0.0	-0.2	0.0	0.0
		Moodie off	310	297.6	16.1	0.7	154.3	-12.4	0.2	-4.0
	WB	Moodie on (inner loop)	80	78.9	0.7	0.1	1.1	-1.1	0.0	-1.3
		Moodie on (direct)	80	79.9	0.7	0.0	0.0	-0.1	0.0	-0.2
		Eagleson off	2260	2243.4	29.8	0.4	276.2	-16.6	0.0	-0.7
		Eagleson on (inner loop)	20	19.4	0.5	0.1	0.4	-0.6	0.1	-3.0
		Eagleson on (direct)	80	79.2	0.7	0.1	0.6	-0.8	0.0	-1.0
		Terry Fox off	570	582.5	19.0	0.5	156.8	12.5	0.0	2.2
		Terry Fox on (inner loop)	70	69.8	0.8	0.0	0.0	-0.2	0.0	-0.3
		Terry Fox on (direct)	80	79.0	0.7	0.1	1.0	-1.0	0.0	-1.3
		Palladium off	80	91.7	11.0	1.3	137.8	11.7	2.2	14.7
		Palladium on (inner loop)	30	29.9	0.7	0.0	0.0	-0.1	0.0	-0.3
		Carp off	430	420.7	21.3	0.4	85.7	-9.3	0.0	-2.2
Goodness of Fit						RMSE 34.4	ME -8.4	RMSPE 3.1	MPE -0.4	

* Buses (15 buses per hour) are counted separately and not included in the number for this ramp

Speed

Section			Distance	Travel	Simulation						50 runs
			(m)	Time	Time	StDev	SE	E	SPE	PE	
Mainline	EB	Carp Rd. - Palladium Dr.	2069	79.1	77.1	0.2	3.9	-2.0	0.1	-2.5	
		Palladium Dr. - Terry Fox Dr.	2444	90.5	90.9	0.2	0.2	0.4	0.0	0.4	
		Terry Fox Dr. - Eagleson Rd.	2605	189.9	186.0	30.4	15.2	-3.9	0.0	-2.1	
		Eagleson Rd. -CNR Overpass	2695	185.5	175.9	4.1	91.5	-9.6	0.3	-5.2	
		CNR Overpass - Moodie Dr.	1331	56.1	51.4	0.6	22.5	-4.7	0.7	-8.5	
		Total Section	11144	601.1	581.2	33.5	394.8	-19.9	0.1	-3.3	
	Goodness of Fit						RMSE 5.2	ME -4.0	RMSPE 4.7	MPE -3.5	

CORSIM Validation

CFSF	# of Runs	Volume				Travel Time			
		RMSE	ME	RMSPE	MPE	RMSE	ME	RMSPE	MPE
1.19	30	21.7	-10.2	2.4%	-1.0%	5.1	-0.9	5.3%	-1.2%
1.20	30	20.8	-10.2	2.8%	-1.1%	5.0	-0.9	5.3%	-1.3%

Validation (CFSF = 1.19)**Volume**

Section			Balanced	Simulation					30 runs	
			Volume	Volume	StDev	GEH	SE	E	SPE	PE
Mainline	EB	Carp Rd. - Palladium Dr.	1430	1428.0	3.2	0.1	4.1	-2.0	0.0	-0.1
		Palladium Dr. - Terry Fox Dr.	1410	1408.7	10.5	0.0	1.8	-1.3	0.0	-0.1
		Terry Fox Dr. - Eagleson Rd.	1960	1953.1	17.3	0.2	48.1	-6.9	0.0	-0.4
		Eagleson Rd. - Moodie Dr.	3490	3474.4	23.1	0.3	243.4	-15.6	0.0	-0.4
	WB	Moodie Dr. - Eagleson Rd.	3810	3734.6	19.1	1.2	5690.2	-75.4	0.0	-2.0
		Eagleson Rd. - Terry Fox Dr.	2860	2793.7	34.1	1.2	4391.3	-66.3	0.1	-2.3
		Terry Fox Dr. - Palladium Dr.	2440	2397.3	37.7	0.9	1823.3	-42.7	0.0	-1.7
		Palladium Dr. - Carp Rd.	2380	2348.2	33.9	0.7	1009.1	-31.8	0.0	-1.3
Ramp	EB	Carp on (inner loop)	370	368.9	1.0	0.1	1.2	-1.1	0.0	-0.3
		Carp on (direct)	320	319.1	0.8	0.1	0.9	-0.9	0.0	-0.3
		Palladium off	80	79.9	8.6	0.0	0.0	-0.1	0.0	-0.2
		Palladium on (inner loop)	20	19.4	0.5	0.1	0.4	-0.6	0.1	-3.2
		Palladium on (direct)	40	39.4	0.5	0.1	0.4	-0.6	0.0	-1.6
		Terry Fox off	180	181.0	12.8	0.1	1.1	1.0	0.0	0.6
		Terry Fox on (inner loop)	240	239.7	0.8	0.0	0.1	-0.3	0.0	-0.1
		Terry Fox on (direct)	490	489.0	0.9	0.0	1.1	-1.0	0.0	-0.2
		Eagleson off	180	179.6	13.4	0.0	0.2	-0.4	0.0	-0.2
		Eagleson on (inner loop)	1080	1079.5	1.4	0.0	0.3	-0.5	0.0	0.0
		Eagleson on (direct) *	615	614.7	0.9	0.0	0.1	-0.3	0.0	0.0
		Moodie off	190	194.6	17.1	0.3	20.9	4.6	0.1	2.4
	WB	Moodie on (inner loop)	190	190.0	0.8	0.0	0.0	0.0	0.0	0.0
		Moodie on (direct)	290	289.8	0.8	0.0	0.0	-0.2	0.0	-0.1
		Eagleson off	1350	1331.7	30.5	0.5	336.1	-18.3	0.0	-1.4
		Eagleson on (inner loop)	60	59.9	0.7	0.0	0.0	-0.1	0.0	-0.1
		Eagleson on (direct)	340	339.0	1.0	0.1	1.1	-1.0	0.0	-0.3
		Terry Fox off	840	814.5	22.0	0.9	652.0	-25.5	0.1	-3.0
		Terry Fox on (inner loop)	170	169.0	0.7	0.1	0.9	-1.0	0.0	-0.6
		Terry Fox on (direct)	250	250.0	0.8	0.0	0.0	0.0	0.0	0.0
		Palladium off	140	124.5	12.0	1.4	241.3	-15.5	1.2	-11.1
		Palladium on (inner loop)	80	79.0	0.7	0.1	1.1	-1.0	0.0	-1.3
		Carp off	750	739.4	23.1	0.4	112.4	-10.6	0.0	-1.4
Goodness of Fit						RMSE 21.7	ME -10.2	RMSPE 2.4	MPE -1.0	

* Buses (15 buses per hour) are counted separately and not included in the number for this ramp

Speed

Section			Distance	Travel	Simulation						30 runs
			(m)	Time	Time	StDev	SE	E	SPE	PE	
Mainline	WB	Moodie Dr. - CNR Overpass	1368	98.9	97.6	3.4	1.8	-1.3	0.0	-1.3	
		CNR Overpass - Eagleson Rd.	2669	111.3	118.7	2.7	55.2	7.4	0.4	6.7	
		Eagleson Rd. - Terry Fox Dr.	2613	103.3	98.6	0.5	22.3	-4.7	0.2	-4.6	
		Terry Fox Dr. - Palladium Dr.	2450	89.5	91.0	0.3	2.2	1.5	0.0	1.7	
		Palladium Dr. - Carp Rd.	2063	83.7	76.5	0.2	51.0	-7.1	0.7	-8.5	
		Section Total	11162	486.1	482.4	5.4	13.9	-3.7	0.0	-0.8	
	Goodness of Fit						RMSE 5.1	ME -0.9	RMSPE 5.3	MPE -1.2	

Validation (CFSF = 1.20)**Volume**

Section			Balanced	Simulation					30 runs	
			Volume	Volume	StDev	GEH	SE	E	SPE	PE
Mainline	EB	Carp Rd. - Palladium Dr.	1430	1427.5	2.7	0.1	6.1	-2.5	0.0	-0.2
		Palladium Dr. - Terry Fox Dr.	1410	1408.3	10.9	0.0	2.9	-1.7	0.0	-0.1
		Terry Fox Dr. - Eagleson Rd.	1960	1950.7	17.4	0.2	85.9	-9.3	0.0	-0.5
		Eagleson Rd. - Moodie Dr.	3490	3477.5	18.1	0.2	155.4	-12.5	0.0	-0.4
	WB	Moodie Dr. - Eagleson Rd.	3810	3738.6	21.8	1.2	5093.2	-71.4	0.0	-1.9
		Eagleson Rd. - Terry Fox Dr.	2860	2802.1	28.4	1.1	3356.3	-57.9	0.0	-2.0
		Terry Fox Dr. - Palladium Dr.	2440	2392.4	31.6	1.0	2265.8	-47.6	0.0	-2.0
		Palladium Dr. - Carp Rd.	2380	2347.1	33.0	0.7	1080.2	-32.9	0.0	-1.4
Ramp	EB	Carp on (inner loop)	370	368.8	0.9	0.1	1.4	-1.2	0.0	-0.3
		Carp on (direct)	320	319.1	0.8	0.0	0.8	-0.9	0.0	-0.3
		Palladium off	80	81.4	9.6	0.2	2.0	1.4	0.0	1.8
		Palladium on (inner loop)	20	19.4	0.5	0.1	0.4	-0.6	0.1	-3.2
		Palladium on (direct)	40	39.4	0.5	0.1	0.4	-0.6	0.0	-1.6
		Terry Fox off	180	183.0	11.5	0.2	9.2	3.0	0.0	1.7
		Terry Fox on (inner loop)	240	239.8	0.8	0.0	0.1	-0.2	0.0	-0.1
		Terry Fox on (direct)	490	489.0	0.9	0.0	0.9	-1.0	0.0	-0.2
		Eagleson off	180	178.3	14.8	0.1	2.9	-1.7	0.0	-0.9
		Eagleson on (inner loop)	1080	1079.5	1.3	0.0	0.3	-0.5	0.0	0.0
		Eagleson on (direct) *	615	614.7	0.9	0.0	0.1	-0.3	0.0	0.0
		Moodie off	190	187.4	13.2	0.2	6.6	-2.6	0.0	-1.4
	WB	Moodie on (inner loop)	190	190.0	0.9	0.0	0.0	0.0	0.0	0.0
		Moodie on (direct)	290	289.8	0.8	0.0	0.0	-0.2	0.0	-0.1
		Eagleson off	1350	1326.5	26.5	0.6	553.8	-23.5	0.0	-1.7
		Eagleson on (inner loop)	60	59.9	0.7	0.0	0.0	-0.1	0.0	-0.1
		Eagleson on (direct)	340	338.9	1.0	0.1	1.1	-1.1	0.0	-0.3
		Terry Fox off	840	829.1	23.6	0.4	118.1	-10.9	0.0	-1.3
		Terry Fox on (inner loop)	170	169.0	0.7	0.1	0.9	-1.0	0.0	-0.6
		Terry Fox on (direct)	250	250.0	0.8	0.0	0.0	0.0	0.0	0.0
		Palladium off	140	120.4	9.7	1.7	382.9	-19.6	2.0	-14.0
		Palladium on (inner loop)	80	79.0	0.7	0.1	1.1	-1.0	0.0	-1.3
		Carp off	750	733.0	25.7	0.6	290.1	-17.0	0.1	-2.3
Goodness of Fit						RMSE 20.8	ME -10.2	RMSPE 2.8	MPE -1.1	

* Buses (15 buses per hour) are counted separately and not included in the number for this ramp

Speed

Section			Distance (m)	Travel Time	Simulation					30 runs	
					Time	StDev	SE	E	SPE	PE	
Mainline	WB	Moodie Dr. -CNR Overpass	1368	98.9	97.3	3.0	2.7	-1.6	0.0	-1.7	
		CNR Overpass - Eagleson Rd.	2669	111.3	118.3	3.2	50.1	7.1	0.4	6.4	
		Eagleson Rd. - Terry Fox Dr.	2613	103.3	98.8	0.4	20.3	-4.5	0.2	-4.4	
		Terry Fox Dr. - Palladium Dr.	2450	89.5	91.0	0.3	2.3	1.5	0.0	1.7	
		Palladium Dr. - Carp Rd.	2063	83.7	76.5	0.3	51.5	-7.2	0.7	-8.6	
		Section Total	11162	486.1	481.9	5.0	17.5	-4.2	0.0	-0.9	
	Goodness of Fit						RMSE 5.0	ME -0.9	RMSPE 5.3	MPE -1.3	

VISSIM CC1 Calibration

CC1	# of Runs	Volume				Travel Time			
		RMSE	ME	RMSPE	MPE	RMSE	ME	RMSPE	MPE
0.90	35	4.9	1.2	1.0%	0.1%	55.5	-37.3	29.8%	-21.7%
1.20	40	9.8	-0.5	1.0%	-0.1%	43.6	-27.6	23.3%	-15.4%
1.27	85	24.4	-5.8	1.2%	-0.5%	21.6	-14.4	11.9%	-8.2%
1.30	70	34.7	-9.9	1.6%	-0.7%	11.1	-6.9	6.6%	-4.0%
1.31	55	38.5	-10.7	1.6%	-0.6%	10.2	-3.3	6.2%	-1.8%
1.32	70	42.6	-12.8	1.8%	-0.9%	12.0	-0.6	7.2%	-0.1%
1.34	40	54.8	-19.4	2.3%	-1.2%	21.3	6.9	13.1%	5.0%
1.39	60	78.5	-31.0	3.3%	-1.9%	45.8	24.8	34.0%	19.3%
1.50	60	147.4	-69.9	6.5%	-4.4%	104.5	71.4	93.8%	63.0%

Calibration (CC1 = 1.31)**Volume**

Section			Balanced Volume	Simulation					55 runs	
				Volume	StDev	GEH	SE	E	SPE	PE
Mainline	EB	Carp Rd. - Palladium Dr.	2720	2719.6	20.2	0.0	0.1	-0.4	0.0	0.0
		Palladium Dr. - Terry Fox Dr.	2670	2673.0	21.8	0.1	9.1	3.0	0.0	0.1
		Terry Fox Dr. - Eagleson Rd.	3260	3175.6	50.4	1.5	7129.5	-84.4	0.1	-2.6
		Eagleson Rd. - Moodie Dr.	3840	3646.4	30.0	3.2	37466.9	-193.6	0.3	-5.0
	WB	Moodie Dr. - Eagleson Rd.	3570	3553.5	34.0	0.3	273.8	-16.5	0.0	-0.5
		Eagleson Rd. - Terry Fox Dr.	1410	1413.7	31.2	0.1	13.6	3.7	0.0	0.3
		Terry Fox Dr. - Palladium Dr.	990	996.1	23.6	0.2	36.9	6.1	0.0	0.6
		Palladium Dr. - Carp Rd.	940	944.9	26.8	0.2	24.3	4.9	0.0	0.5
Ramp	EB	Carp on (inner loop)	300	299.9	6.5	0.0	0.0	-0.1	0.0	0.0
		Carp on (direct)	390	390.3	7.8	0.0	0.1	0.3	0.0	0.1
		Palladium off	120	118.1	11.1	0.2	3.5	-1.9	0.0	-1.6
		Palladium on (inner loop)	20	19.7	1.6	0.1	0.1	-0.3	0.0	-1.7
		Palladium on (direct)	50	49.8	2.5	0.0	0.1	-0.2	0.0	-0.5
		Terry Fox off	210	206.4	12.5	0.3	13.2	-3.6	0.0	-1.7
		Terry Fox on (inner loop)	200	202.0	5.8	0.1	4.1	2.0	0.0	1.0
		Terry Fox on (direct)	600	601.2	11.4	0.0	1.4	1.2	0.0	0.2
		Eagleson off	710	696.9	33.9	0.5	171.4	-13.1	0.0	-1.8
		Eagleson on (inner loop)	740	739.5	11.0	0.0	0.3	-0.5	0.0	-0.1
		Eagleson on (direct) *	525	525.2	9.5	0.0	0.0	0.2	0.0	0.0
		Moodie off	310	294.6	15.8	0.9	238.3	-15.4	0.2	-5.0
	WB	Moodie on (inner loop)	80	79.3	3.6	0.1	0.5	-0.7	0.0	-0.9
		Moodie on (direct)	80	79.2	3.1	0.1	0.6	-0.8	0.0	-1.0
		Eagleson off	2260	2237.7	43.2	0.5	497.7	-22.3	0.0	-1.0
		Eagleson on (inner loop)	20	20.4	1.9	0.1	0.1	0.4	0.0	1.8
		Eagleson on (direct)	80	80.5	3.9	0.1	0.2	0.5	0.0	0.6
		Terry Fox off	570	567.6	18.8	0.1	5.8	-2.4	0.0	-0.4
		Terry Fox on (inner loop)	70	70.4	3.2	0.0	0.2	0.4	0.0	0.6
		Terry Fox on (direct)	80	80.0	3.9	0.0	0.0	0.0	0.0	0.0
		Palladium off	80	79.0	8.6	0.1	1.0	-1.0	0.0	-1.3
		Palladium on (inner loop)	30	29.5	2.6	0.1	0.2	-0.5	0.0	-1.5
		Carp off	430	432.7	18.4	0.1	7.4	2.7	0.0	0.6
Goodness of Fit						RMSE 38.5	ME -10.7	RMSPE 1.6	MPE -0.6	

* Buses (15 buses per hour) are counted separately and not included in the number for this ramp

Speed

Section			Distance (m)	Travel Time	Simulation					55 runs	
					Time	StDev	SE	E	SPE	PE	
Mainline	EB	Carp Rd. - Palladium Dr.	2063	78.8	74.1	0.3	22.1	-4.7	0.4	-6.0	
		Palladium Dr. - Terry Fox Dr.	2444	90.5	92.1	9.4	2.7	1.6	0.0	1.8	
		Terry Fox Dr. - Eagleson Rd.	2605	189.9	195.9	33.8	36.6	6.1	0.1	3.2	
		Eagleson Rd. - CNR Overpass	2695	185.4	164.2	4.8	452.5	-21.3	1.3	-11.5	
		CNR Overpass - Moodie Dr.	1331	56.1	57.9	0.7	3.2	1.8	0.1	3.2	
		Section Total	11137	600.7	584.2	43.5	271.1	-16.5	0.1	-2.7	
	Goodness of Fit						RMSE 10.2	ME -3.3	RMSPE 6.2	MPE -1.8	

VISSIM Validation

CC1	# of Runs	Volume				Travel Time			
		RMSE	ME	RMSPE	MPE	RMSE	ME	RMSPE	MPE
1.31	20	46.1	-18.7	2.2%	-0.9%	6.5	-5.2	6.9%	-5.5%

Validation (CC1 = 1.20)**Volume**

Section			Balanced	Simulation					20 runs	
			Volume	Volume	StDev	GEH	SE	E	SPE	PE
Mainline	EB	Carp Rd. - Palladium Dr.	1430	1431.7	12.7	0.0	2.7	1.7	0.0	0.1
		Palladium Dr. - Terry Fox Dr.	1410	1412.9	14.0	0.1	8.4	2.9	0.0	0.2
		Terry Fox Dr. - Eagleson Rd.	1960	1965.8	19.7	0.1	33.1	5.8	0.0	0.3
		Eagleson Rd. - Moodie Dr.	3490	3482.1	31.7	0.1	61.6	-7.9	0.0	-0.2
	WB	Moodie Dr. - Eagleson Rd.	3810	3631.3	30.7	2.9	31933.7	-178.7	0.2	-4.7
		Eagleson Rd. - Terry Fox Dr.	2860	2741.3	42.9	2.2	14101.6	-118.8	0.2	-4.2
		Terry Fox Dr. - Palladium Dr.	2440	2356.9	39.2	1.7	6913.9	-83.1	0.1	-3.4
		Palladium Dr. - Carp Rd.	2380	2294.4	33.7	1.8	7327.4	-85.6	0.1	-3.6
Ramp	EB	Carp on (inner loop)	370	370.4	7.0	0.0	0.1	0.4	0.0	0.1
		Carp on (direct)	320	319.5	5.8	0.0	0.2	-0.5	0.0	-0.1
		Palladium off	80	76.8	7.7	0.4	10.2	-3.2	0.2	-4.0
		Palladium on (inner loop)	20	20.0	1.5	0.0	0.0	0.0	0.0	-0.2
		Palladium on (direct)	40	40.8	2.8	0.1	0.6	0.8	0.0	1.9
		Terry Fox off	180	177.4	13.0	0.2	7.0	-2.6	0.0	-1.5
		Terry Fox on (inner loop)	240	242.2	5.9	0.1	4.8	2.2	0.0	0.9
		Terry Fox on (direct)	490	490.6	9.3	0.0	0.4	0.6	0.0	0.1
		Eagleson off	180	183.3	11.9	0.2	10.6	3.3	0.0	1.8
		Eagleson on (inner loop)	1080	1082.1	12.7	0.1	4.4	2.1	0.0	0.2
		Eagleson on (direct) *	615	614.8	10.5	0.0	0.1	-0.3	0.0	0.0
		Moodie off	190	189.0	10.9	0.1	1.0	-1.0	0.0	-0.5
	WB	Moodie on (inner loop)	190	189.9	6.4	0.0	0.0	-0.1	0.0	-0.1
		Moodie on (direct)	290	287.4	7.2	0.2	7.0	-2.6	0.0	-0.9
		Eagleson off	1350	1286.5	24.5	1.8	4038.6	-63.6	0.2	-4.7
		Eagleson on (inner loop)	60	61.6	2.8	0.2	2.6	1.6	0.1	2.7
		Eagleson on (direct)	340	341.3	8.8	0.1	1.6	1.3	0.0	0.4
		Terry Fox off	840	815.0	29.2	0.9	625.0	-25.0	0.1	-3.0
		Terry Fox on (inner loop)	170	170.0	5.0	0.0	0.0	0.0	0.0	0.0
		Terry Fox on (direct)	250	251.4	5.9	0.1	1.8	1.4	0.0	0.5
		Palladium off	140	138.0	12.7	0.2	4.0	-2.0	0.0	-1.4
		Palladium on (inner loop)	80	78.3	3.6	0.2	2.7	-1.7	0.0	-2.1
		Carp off	750	724.2	23.1	1.0	668.2	-25.8	0.1	-3.4
Goodness of Fit						RMSE 46.1	ME -18.7	RMSPE 2.2	MPE -0.9	

* Buses (15 buses per hour) are counted separately and not included in the number for this ramp

Speed

Section			Distance (m)	Travel Time	Simulation					20	runs
					Time	StDev	SE	E	SPE	PE	
Mainline	WB	Moodie Dr. -CNR Overpass	1368	98.9	88.5	2.8	108.2	-10.4	1.1	-10.5	
		CNR Overpass - Eagleson Rd.	2669	111.3	110.2	1.2	1.2	-1.1	0.0	-1.0	
		Eagleson Rd. - Terry Fox Dr.	2613	103.3	97.5	0.9	34.1	-5.8	0.3	-5.7	
		Terry Fox Dr. - Palladium Dr.	2450	89.5	89.0	0.6	0.2	-0.4	0.0	-0.5	
		Palladium Dr. - Carp Rd.	2063	83.7	75.4	0.8	68.3	-8.3	1.0	-9.9	
		Section Total	11162	486.1	460.6	2.9	649.7	-25.5	0.3	-5.2	
	Goodness of Fit						RMSE 6.5	ME -5.2	RMSPE 6.9	MPE -5.5	

APPENDIX. F

CMEM, CORSIM Built-in Model, MOBILE6/6C: Model Inputs and Outputs

CMEM

1. List of Input/Parameters and Output for CMEM

Input/Parameters*	Output**
Vehicle Definition (model default were used)	Fuel consumption
Vehicle Activity (second-by-second vehicle state)	HC emission
- Speed	CO emission
- Grade	NOx emission
- Air Conditioning use	
Humidity Ratio (76.8 grains per pound, same as used for MOBILE)	

* Default values were used for the parameters not listed here.

** Only the output used in this study were listed.

2. Sample Input for CMEM (Base Case, Data converted from CORSIM output)

(File is extremely large, therefore only a part of it is shown.)

Please see CMEM user manual for details.

Vehicle Definition:

```
3418, 1, Fleet One, 0.00, 4.75, 7.00, 3000.00, 1363.63, 13.28, 25.39, 1766.00, 250.35, 119.58, 3259.00, 29.08, 967.00, 4, 3.22672, 0, English, English, 0
3445, 17, Fleet Two, 0.00, 3.42, 6.00, 3937.50, 1789.77, 17.99, 33.56, 2953.00, 193.78, 149.98, 4603.00, 20.76, 850.00, 4, 5.967503, 0, English, English, 0
3451, 18, Fleet Two, 0.00, 5.14, 8.00, 4375.00, 1988.63, 21.00, 23.03, 2121.00, 276.27, 182.60, 3763.00, 25.58, 817.00, 4, 3.756932, 0, English, English, 0
3441, 8, Fleet One, 0.00, 2.37, 5.00, 3170.45, 1441.11, 11.36, 36.16, 3619.00, 139.00, 119.61, 5127.00, 32.78, 855.00, 4, 4.620147, 0, English, English, 0
3460, 11, Fleet One, 0.00, 2.76, 5.00, 3288.46, 1494.75, 12.82, 36.81, 3908.00, 170.08, 153.54, 5404.00, 24.31, 846.00, 4, 4.773903, 0, English, English, 0
3502, 5, Fleet One, 0.00, 2.45, 5.00, 3158.33, 1435.60, 12.35, 40.91, 4027.00, 151.27, 140.13, 5520.00, 24.91, 880.00, 4, 3.577786, 0, English, English, 0
3506, 10, Fleet One, 0.00, 2.14, 4.00, 2955.36, 1343.34, 11.51, 38.15, 3218.00, 125.42, 108.21, 5011.00, 27.56, 871.00, 4, 3.423368, 0, English, English, 0
3303, 17, Fleet Two, 0.00, 3.42, 6.00, 3937.50, 1789.77, 17.99, 33.56, 2953.00, 193.78, 149.98, 4603.00, 20.76, 850.00, 4, 5.967503, 0, English, English, 0
3348, 9, Fleet One, 0.00, 2.04, 5.00, 2912.50, 1323.86, 11.40, 39.63, 4150.00, 128.30, 130.00, 5650.00, 29.64, 900.00, 5, 4.395798, 0, English, English, 0
3405, 21, Fleet Three, 0.00, 2.76, 5.00, 3107.14, 1412.33, 14.19, 40.51, 2943.00, 155.07, 117.46, 4804.00, 25.34, 971.00, 4, 2.191648, 0, English, English, 0
```

Vehicle Activity:

```
1, 3418, 58.63, , -0.0102, 1
1, 3445, 68.86, , -0.0102, 0
1, 3451, 68.86, , -0.0102, 0
1, 3441, 58.63, , -0.0102, 1
1, 3460, 56.59, , -0.0102, 1
1, 3502, 56.59, , -0.0102, 1
1, 3506, 56.59, , -0.0102, 1
1, 3490, 62.73, , -0.0102, 1
1, 3508, 72.27, , -0.0102, 0
1, 3533, 66.13, , -0.0102, 1
```

3. Sample Output for CMEM (Base Case, Data converted from CORSIM output)

Please see CMEM user manual for details.

Second-by-Second Output:

time	VehID	vel	acc	thcgs	tcogs	tnoxgs	tco2gs	Fuel
1	3418	58.63	0.00	0.05	0.69	0.02	4.69	1.88
1	3445	68.86	0.00	0.00	0.02	0.00	6.61	2.10
1	3451	68.86	0.00	0.00	0.03	0.00	8.04	2.55
1	3441	58.63	0.00	0.00	0.01	0.00	3.80	1.21
1	3460	56.59	0.00	0.00	0.00	0.00	4.00	1.26
1	3502	56.59	0.00	0.00	0.04	0.00	3.86	1.24
1	3506	56.59	0.00	0.00	0.01	0.00	3.46	1.10
1	3490	62.73	0.00	0.00	0.01	0.00	4.77	1.51
1	3508	72.27	0.00	0.04	0.18	0.01	5.89	1.99
1	3533	66.13	0.00	0.00	0.07	0.00	4.90	1.58

...

Total Output:

VehID	vehicle	Tsoak	distance	eCO2	eCO	eHC	eNOx	CO	HC	NOx	CO2	Fuel
3418	1	0	0.602	312.979	47.321	3.833	1.241	46.248	3.823	1.241	314.697	126.189
3445	17	0	0.639	363.248	39.252	2.557	4.322	24.663	0.214	0.346	394.104	136.677
3451	18	0	0.666	421.765	16.501	1.521	3.255	5.221	0.138	0.428	444.173	142.748
3441	8	0	0.7	244.005	7.345	0.988	2.428	1.005	0.027	0.042	257.220	81.609
3460	11	0	0.849	259.777	6.866	1.013	2.284	0.359	0.01	0.043	273.396	86.371
3502	5	0	0.865	240.477	11.218	2.796	1.898	3.036	0.14	0.159	262.325	84.345
3506	10	0	0.896	224.212	6.81	0.891	2.033	0.738	0.024	0.07	236.687	75.001
3490	11	0	1.012	324.455	40.527	1.51	3.94	31.688	0.287	0.301	342.486	123.964
3508	21	0	1.047	259.820	49.687	8.342	2.28	46.782	3.486	0.828	280.820	115.415
3533	4	0	1.066	307.639	40.955	2.333	3.787	29.773	0.449	0.879	331.587	119.752

...

CORSIM Built-in Model

1. List of Input/Parameters and Output for CORSIM Built-in Model

Input/Parameters*	Output**
Same as CORSIM input (i.e. no additional data is required.)	Fuel consumption HC emission CO emission NOx emission

* Default values were used for the parameters not listed here.

** Only the output used in this study were listed.

2. Sample Input for CORSIM Built-in Model

Same as CORSIM input (see Appendix C).

3. Sample Output for CORSIM Built-in Model

Included in CORSIM text output file (see Appendix C).

MOBILE6/MOBILE6C

1. List of Input/Parameters and Output for MOBILE6/MOBILE6C

Input/Parameters*	Output**
Min/Max Temperature	Text and Database output for
Humidity Ratio	Fuel Economy
Age Distribution of Vehicle fleet in Ontario 2000	HC emission factor
Speed	CO emission factor
VMT Fraction by Facility (Non-ramp and ramp)	NOx emission factor

* Default values were used for the parameters not listed here.

** Only the output used in this study were listed.

2. Sample Input for MOBILE6/MOBILE6C (Section E1)

Please see MOBILE6 user manual for details.

MOBILE6 INPUT FILE :

*123456789012345678:

DATABASE OUTPUT :

* ////////// RUN //////////////////////////////////////
RUN DATA

EXPRESS HC AS THC :
NO REFUELING :

EXPAND BUS EFS :
EXPAND HDDV EFS :
EXPAND HDGV EFS :
EXPAND LDT EFS :

EXPAND EVAPORATIVE :
EXPAND EXHAUST :

REG DIST : AgeDist. IN

*----- TEMPERATURE & HUMIDITY ETC. -----
ABSOLUTE HUMIDITY : 76.8
MIN/MAX TEMPERATURE: 63.1 88.6

* ////////// SCENARIO //////////////////////////////////////
SCENARIO REC :

CALENDAR YEAR : 2000
EVALUATION MONTH : 7
AVERAGE SPEED : 59.7 freeway 94.3 0.0 0.0 5.7

```

*----- FUEL -----
FUEL RVP          : 8.9
FUEL PROGRAM      : 4
  456.0  456.0  456.0  158.0   42.0   30.0   30.0   30.0
    30.0   30.0   30.0   30.0   30.0   30.0   30.0   30.0
1000.0 1000.0 1000.0 1000.0  300.0   80.0   80.0   80.0
    80.0   80.0   80.0   80.0   80.0   80.0   80.0   80.0
OXYGENATED FUELS  : 0.000 0.143 0.000 0.035 1
END OF RUN

```

3. Sample Output for MOBILE6/MOBILE6C

Please see MOBILE6 user manual for details.

Text Format:

```
*****
* MOBILE6.2.03 (24-Sep-2003) *
* Input file: HWY417E1.IN (file 1, run 1). *
*****
M603 Comment:
      User has disabled the calculation of REFUELING emissions.
```

```
* Reading Registration Distributions from the following external
* data file: AGEDIST.IN
```

[illegible]

* * * * *

*

* File 1, Run 1, Scenario 1.

* * * * *

M582 Warning:

The user supplied freeway average speed of 59.7 will be used for all hours of the day. 100% of VMT has been assigned to a fixed combination of freeways and freeway ramps for all hours of the day and all vehicle types.

M616 Comment:

User has supplied post-1999 sulfur levels.

M 48 Warning:

there are no sales for vehicle class HDGV8b

Calendar Year:	2000
Month:	July
Altitude:	Low
Minimum Temperature:	63.1 (F)
Maximum Temperature:	88.6 (F)
Absolute Humidity:	77. grains/lb
Nominal Fuel RVP:	8.9 psi
Weathered RVP:	8.6 psi
Fuel Sulfur Content:	456. ppm

Exhaust I/M Program: No
Evap I/M Program: No
ATP Program: No
Reformulated Gas: No

Ether Blend Market Share: 0.000	Alcohol Blend Market Share: 0.143
Ether Blend Oxygen Content: 0.000	Alcohol Blend Oxygen Content: 0.035
	Alcohol Blend RVP Waiver: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.4680	0.2979	0.1076		0.0340	0.0007	0.0016	0.0842	0.0060	1.0000

Composite Emission Factors (g/mi):

Composite THC :	1.382	1.296	1.598	1.376	1.328	0.545	0.529	0.477	2.68	1.307
Composite CO :	21.97	24.11	28.18	25.19	23.25	1.467	1.116	3.274	19.09	21.677
Composite NOX :	1.320	1.419	1.605	1.468	6.446	2.353	2.153	26.459	1.60	3.674

Exhaust emissions (g/mi):

THC Start:	0.389	0.367	0.499	0.402		0.271	0.218		0.389	
THC Running:	0.491	0.585	0.661	0.605		0.273	0.311		1.382	
THC Total Exhaust:	0.879	0.952	1.160	1.007	0.539	0.545	0.529	0.477	1.77	0.890
CO Start:	3.87	5.30	7.66	5.92		0.765	0.482		3.250	
CO Running:	18.09	18.81	20.52	19.26		0.702	0.634		15.844	
CO Total Exhaust:	21.97	24.11	28.18	25.19	23.25	1.467	1.116	3.274	19.09	21.677
NOx Start:	0.248	0.254	0.278	0.261		0.074	0.047		0.377	
NOx Running:	1.072	1.164	1.327	1.207		2.279	2.106		1.219	
NOx Total Exhaust:	1.320	1.419	1.605	1.468	6.446	2.353	2.153	26.459	1.60	3.674

Non-Exhaust Emissions (g/mi):

[illegible]

Total Non-Exhaust:	0.502	0.344	0.438	0.369	0.789	0.000	0.000	0.000	0.911	0.417
Veh. Type:	LDGT1	LDGT2	LDGT3	LDGT4	LDDT12	LDDT34				
VMT Mix:	0.0688	0.2291	0.0737	0.0339	0.0001	0.0015				
Composite Emission Factors (g/mi):										
Composite THC :	1.266	1.305	1.590	1.614	1.839	0.427				
Composite CO :	23.42	24.32	28.11	28.32	3.530	0.929				
Composite NOX :	1.225	1.477	1.533	1.760	4.138	1.999				
Exhaust emissions (g/mi):										
THC Start:	0.353	0.372	0.495	0.508	1.202	0.141				
THC Running:	0.569	0.589	0.657	0.668	0.637	0.286				
THC Total Exhaust:	0.922	0.961	1.153	1.177	1.839	0.427				
CO Start:	4.99	5.39	7.63	7.73	2.425	0.331				
CO Running:	18.43	18.93	20.48	20.59	1.106	0.597				
CO Total Exhaust:	23.42	24.32	28.11	28.32	3.530	0.929				
NOx Start:	0.232	0.261	0.270	0.295	0.243	0.032				
NOx Running:	0.993	1.216	1.263	1.465	3.894	1.967				
NOx Total Exhaust:	1.225	1.477	1.533	1.760	4.138	1.999				
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.130	0.130	0.172	0.172	0.000	0.000				
Diurnal Loss:	0.036	0.036	0.044	0.044	0.000	0.000				
Resting Loss:	0.081	0.081	0.109	0.109	0.000	0.000				
Running Loss:	0.088	0.088	0.103	0.103	0.000	0.000				
Crankcase Loss:	0.010	0.010	0.011	0.011	0.000	0.000				
Refueling Loss:	0.000	0.000	0.000	0.000	0.000	0.000				
Total Non-Exhaust:	0.344	0.344	0.438	0.438	0.000	0.000				
Veh. Type:	HDGV2B	HDGV3	HDGV4	HDGV5	HDGV6	HDGV7	HDGV8A	HDGV8B		
VMT Mix:	0.0271	0.0009	0.0006	0.0012	0.0026	0.0012	0.0000	0.0000		
Composite Emission Factors (g/mi):										
Composite THC :	1.139	1.922	2.899	1.689	1.698	2.293	2.589	0.000		
Composite CO :	19.25	42.97	49.09	28.66	29.51	44.37	49.47	0.00		
Composite NOX :	6.100	7.245	8.072	7.449	7.388	8.627	9.576	0.000		
Exhaust emissions (g/mi):										
THC Total Exhaust:	0.456	0.909	1.104	0.674	0.680	0.979	1.097	0.000		
CO Total Exhaust:	19.25	42.97	49.09	28.66	29.51	44.37	49.47	0.00		
NOx Total Exhaust:	6.100	7.245	8.072	7.449	7.388	8.627	9.576	0.000		
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.266	0.409	0.716	0.393	0.402	0.537	0.610	0.000		
Diurnal Loss:	0.074	0.107	0.234	0.136	0.134	0.166	0.188	0.000		
Resting Loss:	0.182	0.292	0.560	0.305	0.309	0.408	0.462	0.000		
Running Loss:	0.150	0.190	0.269	0.167	0.161	0.188	0.217	0.000		
Crankcase Loss:	0.012	0.015	0.017	0.013	0.013	0.014	0.015	0.000		
Refueling Loss:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
Total Non-Exhaust:	0.684	1.013	1.795	1.014	1.018	1.314	1.492	0.000		
Veh. Type:	HDDV2B	HDDV3	HDDV4	HDDV5	HDDV6	HDDV7	HDDV8A	HDDV8B		
VMT Mix:	0.0089	0.0026	0.0024	0.0010	0.0061	0.0091	0.0114	0.0403		
Composite Emission Factors (g/mi):										
Composite THC :	0.211	0.244	0.260	0.254	0.383	0.479	0.484	0.577		
Composite CO :	0.997	1.209	1.216	1.175	1.693	2.142	3.414	4.559		
Composite NOX :	7.116	8.378	9.234	9.552	15.058	18.636	31.244	35.685		

Exhaust emissions (g/mi):

THC Total Exhaust:	0.211	0.244	0.260	0.254	0.383	0.479	0.484	0.577
CO Total Exhaust:	0.997	1.209	1.216	1.175	1.693	2.142	3.414	4.559
NOx Total Exhaust:	7.116	8.378	9.234	9.552	15.058	18.636	31.244	35.685

Non-Exhaust Emissions (g/mi):

Hot Soak Loss:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Diurnal Loss:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Resting Loss:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Running Loss:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Crankcase Loss:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Refueling Loss:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Non-Exhaust:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Veh. Type: GasBUS URBAN SCHOOL

VMT Mix: 0.0004 0.0010 0.0014

Composite Emission Factors (g/mi):

Composite THC :	4.055	0.487	0.570
Composite CO :	90.72	4.089	2.383
Composite NOX :	9.971	29.242	20.366

Exhaust emissions (g/mi):

THC Total Exhaust:	1.879	0.487	0.570
CO Total Exhaust:	90.72	4.089	2.383
NOx Total Exhaust:	9.971	29.242	20.366

Non-Exhaust Emissions (g/mi):

Hot Soak Loss:	0.882	0.000	0.000
Diurnal Loss:	0.232	0.000	0.000
Resting Loss:	0.584	0.000	0.000
Running Loss:	0.452	0.000	0.000
Crankcase Loss:	0.027	0.000	0.000
Refueling Loss:	0.000	0.000	0.000
Total Non-Exhaust:	2.176	0.000	0.000

Database Format:

(File is extremely large, therefore only a part of it is shown.)

```

1 1 1 1 1 1 1 24 1 2.6647 1.8628 0.1486 0.1254 0.6991 14.80 0.0569 0.9430 0.0094 112.9103 63.1 63.1 1976
1 1 1 1 1 1 1 24 2 2.6569 2.4155 0.4034 0.3255 0.9091 14.80 0.0740 0.9430 0.0094 112.9103 63.6 63.6 1976
1 1 1 1 1 1 1 24 3 2.6126 2.1056 0.4389 0.3389 0.8059 14.80 0.0656 0.9430 0.0094 112.9103 66.8 66.8 1976
1 1 1 1 1 1 1 24 4 2.5493 1.7382 0.3440 0.2486 0.6819 14.80 0.0555 0.9430 0.0094 112.9103 71.9 71.9 1976
1 1 1 1 1 1 1 24 5 2.6528 1.7599 0.3760 0.2733 0.6634 14.80 0.0540 0.9430 0.0094 112.9103 77.1 77.1 1976

```

APPENDIX. G

Computer Program Source Codes

Note: These programs were developed for the use in this specific study, and they are not suitable for the general use. To apply these programs in other contexts, modifications to the original code will be required.

CMEM Input File Generator

CORSIM Output to CMEM Input: Vehicle Activity

Input to the program: Animation file ("network_(run#).tsd" file).

Output of the program: Vehicle activity data ("network_(run#)act_(section#).txt" file).

Source Code:

```
#include <stdio.h>
#include <math.h>
#include <stdlib.h>
#include <string.h>

//Global Variables
unsigned int Message_Name = 0;
unsigned int Message_Length = 0;
    //length of this message in bytes, excluding the first three fields
unsigned int Simulation_Time = 0;
    //the simulation time in seconds that the data in this message represents
unsigned int Request_Type = 0;
unsigned int Request_Handle = 0;
unsigned int Class_ID_1 = 0;
short unsigned int Action_ID_1 = 0;
short unsigned int Attribute_ID_Count_1 = 0;
short unsigned int Number_of_Aggregate_Classes_1 = 0;
unsigned int Class_ID_2 = 0;
short unsigned int Action_ID_2 = 0;
short unsigned int Attribute_ID_Count_2 = 0;
short unsigned int Attribute_ID = 0;
short unsigned int Number_of_Aggregate_Classes_2 = 0;
short unsigned int Instance_ID_Count_1 = 0;
unsigned int Instance_ID = 0;
    //ID of link containing vehicles for which this message is reporting
short unsigned int Instance_ID_Count_2 = 0;
    //number of vehicles on the specified link at the specified simulation time
unsigned int Global_Vehicle_ID = 0;
    //global vehicle ID of first vehicle in this message
short unsigned int Fleet = 0;
    //0 = Auto, 1 = truck, 2 = carpool, 3 = bus
short unsigned int Vehicle_Type = 0;
short unsigned int Vehicle_Length = 0;
short unsigned int Driver_Type = 0;
short unsigned int Lane_ID = 0;
    //CORSIM ID of lane in which vehicle is traveling
```

Comment (Values)

//LG_Data_GP (3001)

//DR_TS_VEHICLE (14000)

//(1)

//Link (18000)

//UPDATE (1)

//(0)

// (1)

//Vehicle (33000)

//SEARCH (2)

//(1)

//V_InputAndAnimate (33500)

// (0)

//(1)

```

int Vehicle_Position = 0;
    //vehicle's distance from up-stream node of link in feet
short unsigned int Previous_USN = 0;
    //up-stream node ID of the previous link the vehicle traveled
short unsigned int Turn_Code = 0;
    //vehicle turn code: 0=left, 1=through, 2=right, 3=left diagonal,
    // 4=right diagonal, 5=source emission
short unsigned int Queue_Status = 0;
    //0 = vehicle is currently not in queue, 1 = vehicle is currently in queue
short int Acceleration = 0;
    //vehicle's instantaneous acceleration in feet/second/second
short unsigned int Velocity = 0;
    //vehicle's instantaneous velocity in feet/second
short unsigned int Lane_Change_Status = 0;
    //0 = vehicle does not want to change lanes, 1 = vehicle wants to change lanes
short unsigned int Target_Lane = 0;
    //CORSIM ID of lane vehicle would like to occupy
short unsigned int Destination_Node = 0;
    //node ID of the vehicles destination node
unsigned int Leader_Vehicle_ID = 0;
    //global ID of vehicle's leader vehicle
unsigned int Follower_Vehicle_ID = 0;
    //global ID of vehicle's follower vehicle
short unsigned int Previous_Lane_ID = 0;
    //lane ID of lane the lane that the vehicle was previously in

// FUNCTIONS //////////////////////////////////////////////////////////////////////
void get_filename(char *fullname, const char *fileextension, int i);
void read_and_calculate(const int num_run, const float ac_use);
float grade_angle(const int link_ID);
void read_file_header(FILE *fptr);
void read_mesg_header(FILE *fptr);
void read_link_data(FILE *fptr);
void read_veh_data(FILE *fptr);
int section(const int link_ID);

// MAIN //////////////////////////////////////////////////////////////////////
main ()
{
    int num_run;
    float ac_use;
    char ch[2];
    //Get Number of Runs
    printf("Input # of Runs:");
    scanf("%d", &num_run);
    //Get AC usage
    printf("Input %AC use (0~100):");
    scanf("%f", &ac_use);
    //Data Reading Loop

```

```

    read_and_calculate(num_run, ac_use);
    //Wait in key
    scanf("%s", ch);

    return 0;
}

// FUNCTIONS ////////////////////////////////////////
//Read and Calculate Fuel Consumption and Emissions -----
void read_and_calculate(const int num_run, const float ac_use)
{
    const unsigned int rampID[29] = {
        10002,  510038,  380052,
        1010003, 1020004,  830103,
        60200,  2010007, 2020009, 2032031, 2040081,
        140300, 3010017, 3020020, 680303, 3040072, 3050074,
        220400, 4010026, 4020027, 4034031, 4040062, 4050065,
        4100411, 4110412, 4120028,
        340500,                                     5040052, 5050053};

    FILE *fptr_i, *fptr_e1, *fptr_e2, *fptr_e3, *fptr_e4, *fptr_e5,
        *fptr_w1, *fptr_w2, *fptr_w3, *fptr_w4, *fptr_w5;
    int runID, j, acf[30000], end_flag, link_flag;
    unsigned int i, time_prev;
    float ac_on, ac_off, speed, grade;
    char filename[20], buff_out[300], num_string[20];
    int dummy_buff;

    for (runID=0; runID<num_run; runID++){

        for (j=0; j<30000; j++){
            acf[j] = 0;
        }
        time_prev = 0.0;
        ac_on = 0.0;
        ac_off = 0.0;
        end_flag = 0;
        //Open files
        get_filename(filename, ".tsd", runID+1);
        fptr_i = fopen(filename, "rb");
        get_filename(filename, "act_e1.txt", runID+1);
        fptr_e1 = fopen(filename, "w");
        get_filename(filename, "act_e2.txt", runID+1);
        fptr_e2 = fopen(filename, "w");
        get_filename(filename, "act_e3.txt", runID+1);
        fptr_e3 = fopen(filename, "w");
        get_filename(filename, "act_e4.txt", runID+1);
        fptr_e4 = fopen(filename, "w");
        get_filename(filename, "act_e5.txt", runID+1);
    }
}

```

```

    fptr_e5 = fopen(filename, "w");
    get_filename(filename, "act_w1.txt", runID+1);
    fptr_w1 = fopen(filename, "w");
    get_filename(filename, "act_w2.txt", runID+1);
    fptr_w2 = fopen(filename, "w");
    get_filename(filename, "act_w3.txt", runID+1);
    fptr_w3 = fopen(filename, "w");
    get_filename(filename, "act_w4.txt", runID+1);
    fptr_w4 = fopen(filename, "w");
    get_filename(filename, "act_w5.txt", runID+1);
    fptr_w5 = fopen(filename, "w");

    read_file_header(fptr_i);
    read_mesg_header(fptr_i);
    printf("Run %3d    Simulation Time:    ", runID+1);

    do {
        if ((Simulation_Time+1)>time_prev){
            printf("%b%b%b%b%4d", Simulation_Time+1);
            time_prev = Simulation_Time;
        }
        if ((Message_Name==3001)&&(Request_Type==14000)){
            read_link_data(fptr_i);
            link_flag = 0;
            for (j=0; j<29; j++){
                if (Instance_ID==rampID[j]){
                    link_flag = 1;
                }
            }
            grade = 0.0;
            if (link_flag==0){
                grade = grade_angle(Instance_ID);
            }
            for (i=0; i<(Message_Length-38)/32; i++){
                read_veh_data(fptr_i);
if (Fleet==0){
                    if (link_flag==0){
                        buff_out[0] = '%0';

                        itoa((Simulation_Time+1), num_string, 10);
                        strcat(buff_out, num_string);
                        strcat(buff_out, ",");

                        itoa(Global_Vehicle_ID, num_string, 10);
                        strcat(buff_out, num_string);
                        strcat(buff_out, ",");

                        speed = Velocity*0.6818;
                        gcvt(speed, 4, num_string);

```

```

strcat(buff_out, num_string);
strcat(buff_out, ", ,");

gcvt(grade, 4, num_string);
strcat(buff_out, num_string);
strcat(buff_out, ",");

if (acf[Global_Vehicle_ID]==2) {
    strcat(buff_out, "1");
}
else{
    if (acf[Global_Vehicle_ID]==0) {
        if ((1.0*random(1000000))<(ac_use*10000.0)) {
            acf[Global_Vehicle_ID] = 2;
            strcat(buff_out, "1");
            ac_on += 1.0;
        }
        else{
            acf[Global_Vehicle_ID] = 1;
            strcat(buff_out, "0");
            ac_off += 1.0;
        }
    }
    else{
        strcat(buff_out, "0");
    }
}
strcat(buff_out, "\n");
switch (section(Instance_ID)) {
    case 0:
        fputs(buff_out, fptr_e1);
        break;
    case 1:
        fputs(buff_out, fptr_e2);
        break;
    case 2:
        fputs(buff_out, fptr_e3);
        break;
    case 3:
        fputs(buff_out, fptr_e4);
        break;
    case 4:
        fputs(buff_out, fptr_e5);
        break;
    case 5:
        fputs(buff_out, fptr_w1);
        break;
    case 6:
        fputs(buff_out, fptr_w2);

```

```

        break;
    case 7:
        fputs(buff_out, fptr_w3);
        break;
    case 8:
        fputs(buff_out, fptr_w4);
        break;
    case 9:
        fputs(buff_out, fptr_w5);
        break;
    default:
        printf("Data Reading Error!\n");
        break;
    }
}

}

}

else{ //if not Vehicle Message
    for (i=0; i<Message_Length-4; i++){
        fread(&dummy_buff, 1, 1, fptr_i);
    }
}

if (feof(fptr_i)==0) {
    read_mesg_header(fptr_i); //read Message Header
}

else{
    end_flag = 1;
}

} while (end_flag!=1);
printf("\n          AC use: %3.1f%\n\n", 100.0*ac_on/(ac_on+ac_off));

fclose(fptr_i);
fclose(fptr_e1);
fclose(fptr_e2);
fclose(fptr_e3);
fclose(fptr_e4);
fclose(fptr_e5);
fclose(fptr_w1);
fclose(fptr_w2);
fclose(fptr_w3);
fclose(fptr_w4);
fclose(fptr_w5);
}

printf("\n");
}

//Generate filename -----
void get_filename(char *fullname, const char *fileextension, int i)

```



```

{
    char runID[5], extension[10];

    fullname[0] = '¥0';
    itoa(i, runID, 10);
    extension[0] = '_';
    extension[1] = '¥0';
    strcat(extension, runID);
    strcat(extension, fileextension);
    strcat(fullname, "network");
    strcat(fullname, extension);
}

//Get Link Gradient -----
float grade_angle(const int link_ID)
{
    const int link_grade[69*2]={
        20003,-1020,    30004,-1020,    40005,-1020,
        50006, -300,
        60007, -439,    70008, -439,
        80009, -562,    90010, -562,    100011, -562,
        110012, -672,    120013, -672,
        130014, 636,    140015, 636,    150016, 636,    160017, 636,    170036, 636,
        360018, -370,    180019, -370,
        190020,-1158,    200021,-1158,
        210022, 280,    220023, 280,
        230024, -647,    240025, -647,    250026, -647,
        260027, 679,
        270028, 1523,    280029, 1523,
        290030,-1791,
        300031,-1000,
        310032,-2472,    320033,-2472,    330034,-2472,    340037,-2472,
        370035, -561,

        520053, 545,
        530054, 2315,    540055, 2315,    550056, 2315,
        560057, 1000,
        570058, 1821,
        580059,-1502,    590060,-1502,    600061,-1502,    600403,-1502,
        610062, -684,
        620063, 659,    630064, 659,    640065, 659,    650066, 659,
        660067, -422,
        670068, 1062,    680069, 1062,
        690070, 183,
        700071, -554,    710072, -554,    720073, -554,    730074, -554,    740075, -554,
        750076, 592,    760077, 592,
        770078, 589,    780079, 589,    790080, 589,    780203, 589,
        800081, 380,    810082, 380,
        820083, 1036,    830084, 1036};

```

```

int i;
float g;

i=0;
while (link_grade[i*2]!=link_ID){i++;}
g = atan(link_grade[i*2+1]/100000.0);
return g;
}

//Get Section ID from Instance ID -----
int section(const int link_ID)
{
const int link_info[69*2]={
    20003, 0, 30004, 0, 40005, 0, 50006, 0, 60007, 0,
    70008, 1, 80009, 1, 90010, 1, 100011, 1, 110012, 1, 120013, 1, 130014, 1,
    140015, 1, 150016, 1,
    160017, 2, 170036, 2, 360018, 2, 180019, 2, 190020, 2, 200021, 2, 210022, 2,
    220023, 2, 230024, 2, 240025, 2, 250026, 2,
    260027, 3, 270028, 3, 280029, 3, 290030, 3, 300031, 3, 310032, 3,
    320033, 4, 330034, 4, 340037, 4, 370035, 4,

    520053, 5, 530054, 5, 540055, 5,
    550056, 6, 560057, 6, 570058, 6, 580059, 6, 590060, 6, 600061, 6, 600403, 6,
    610062, 6,
    620063, 7, 630064, 7, 640065, 7, 650066, 7, 660067, 7, 670068, 7, 680069, 7,
    690070, 7, 700071, 7,
    710072, 8, 720073, 8, 730074, 8, 740075, 8, 750076, 8, 760077, 8, 770078, 8,
    780079, 8, 790080, 8, 780203, 8, 800081, 8,
    810082, 9, 820083, 9, 830084, 9];
int i;

i=0;
while (link_info[i*2]!=link_ID){i++;}
return link_info[i*2+1];
}

//Read and Print 16bytes of File Header -----
void read_file_header(FILE *fptr)
{
    short unsigned int file_header;
    int i;

    printf("File Header... ");
    for (i=0; i<16; i++){
        fread(&file_header, 1, 1, fptr);
        file_header = (file_header & 0x00FF); //mask upper byte
        printf("%c", file_header);
    }
}

```

```

    printf("%n");
}

//Read the 1st 4 fields of Message Header -----
void read_mesg_header(FILE *fptr)
{
    fread(&Message_Name, 4, 1, fptr);
    fread(&Message_Length, 4, 1, fptr);
    fread(&Simulation_Time, 4, 1, fptr);
    fread(&Request_Type, 4, 1, fptr);
}

//Read Link Specific Data -----
void read_link_data(FILE *fptr)
{
    fread(&Request_Handle, 4, 1, fptr);
    fread(&Class_ID_1, 4, 1, fptr);
    fread(&Action_ID_1, 2, 1, fptr);
    fread(&Attribute_ID_Count_1, 2, 1, fptr);
    fread(&Number_of_Aggregate_Classes_1, 2, 1, fptr);
    fread(&Class_ID_2, 4, 1, fptr);
    fread(&Action_ID_2, 2, 1, fptr);
    fread(&Attribute_ID_Count_2, 2, 1, fptr);
    fread(&Attribute_ID, 2, 1, fptr);
    fread(&Number_of_Aggregate_Classes_2, 2, 1, fptr);
    fread(&Instance_ID_Count_1, 2, 1, fptr);
    fread(&Instance_ID, 4, 1, fptr);
    fread(&Instance_ID_Count_2, 2, 1, fptr);
}

//Read Vehicle Specific Data -----
void read_veh_data(FILE *fptr)
{
    //Read Data
    fread(&Global_Vehicle_ID, 4, 1, fptr);
    fread(&Fleet, 1, 1, fptr);
    fread(&Vehicle_Type, 1, 1, fptr);
    fread(&Vehicle_Length, 1, 1, fptr);
    fread(&Driver_Type, 1, 1, fptr);
    fread(&Lane_ID, 1, 1, fptr);
    fread(&Vehicle_Position, 4, 1, fptr);
    fread(&Previous_USN, 2, 1, fptr);
    fread(&Turn_Code, 1, 1, fptr);
    fread(&Queue_Status, 1, 1, fptr);
    fread(&Acceleration, 1, 1, fptr);
    fread(&Velocity, 1, 1, fptr);
    fread(&Lane_Change_Status, 1, 1, fptr);
    fread(&Target_Lane, 1, 1, fptr);
    fread(&Destination_Node, 2, 1, fptr);
}

```

```

fread(&Leader_Vehicle_ID, 4, 1, fptr);
fread(&Follower_Vehicle_ID, 4, 1, fptr);
fread(&Previous_Lane_ID, 1, 1, fptr);

//Mask upper byte
Fleet = (Fleet & 0x00FF);
Vehicle_Type = (Vehicle_Type & 0x00FF);
Vehicle_Length = (Vehicle_Length & 0x00FF);
Driver_Type = (Driver_Type & 0x00FF);
Lane_ID = (Lane_ID & 0x00FF);
Turn_Code = (Turn_Code & 0x00FF);
Queue_Status = (Queue_Status & 0x00FF);
Acceleration = (Acceleration & 0x00FF)-256*((Acceleration & 0x0080)==0x0080);
Velocity = (Velocity & 0x00FF);
Lane_Change_Status = (Lane_Change_Status & 0x00FF);
Target_Lane = (Target_Lane & 0x00FF);
Previous_Lane_ID = (Previous_Lane_ID & 0x00FF);
}

```

CORSIM Output to CMEM Input: Vehicle Definition

Input to the program: Animation file ("network_(run#).tsd" file).

Output of the program: Vehicle activity data ("network_(run#)def.txt" file).

Source Code:

```
#include <stdio.h>
#include <math.h>
#include <stdlib.h>
#include <string.h>

enum {max_len_in = 200, sig_digit = 8, data_digit = 8};

const char def_data[23][153]={
//"vehicle ID, vehicle category, Fleet, Tsoak, Ed, Nc, Masslb, Masskg, Trlhp, S, Nm, Qm,
Zmax, Np, Mpgc, Idle, ng, sload, updated, in_units_English, out_units_English, CO2_out",
", 1, Fleet One, 0.00, 4.75, 7.00, 3000.00, 1363.63, 13.28, 25.39, 1766.00, 250.35, 119.58,
3259.00, 29.08, 967.00, 4, 3.22672, 0, English, English, 0",
", 2, Fleet One, 0.00, 3.20, 6.00, 3031.25, 1377.84, 12.80, 35.40, 2856.00, 168.00, 119.95,
4560.00, 25.08, 900.00, 4, 3.22672, 0, English, English, 0",
", 3, Fleet One, 0.00, 1.68, 4.00, 2437.50, 1107.95, 11.32, 44.59, 3323.00, 95.21, 77.06,
5261.00, 33.58, 950.00, 4, 3.583865, 0, English, English, 0",
", 4, Fleet One, 0.00, 2.51, 5.00, 3066.18, 1393.71, 11.89, 39.32, 3307.00, 143.30, 110.84,
4908.00, 27.76, 871.00, 4, 4.515261, 0, English, English, 0",
", 5, Fleet One, 0.00, 2.45, 5.00, 3158.33, 1435.60, 12.35, 40.91, 4027.00, 151.27, 140.13,
5520.00, 24.91, 880.00, 4, 3.577786, 0, English, English, 0",
", 6, Fleet One, 0.00, 2.21, 4.00, 3031.25, 1377.84, 12.09, 39.60, 3215.00, 126.11, 100.48,
4754.00, 29.44, 825.00, 4, 3.687098, 0, English, English, 0",
", 7, Fleet One, 0.00, 2.35, 5.00, 2921.88, 1328.12, 12.28, 39.98, 4288.00, 148.38, 141.00,
5650.00, 25.54, 900.00, 5, 3.022606, 0, English, English, 0",
", 8, Fleet One, 0.00, 2.37, 5.00, 3170.45, 1441.11, 11.36, 36.16, 3619.00, 139.00, 119.61,
5127.00, 32.78, 855.00, 4, 4.620147, 0, English, English, 0",
", 9, Fleet One, 0.00, 2.04, 5.00, 2912.50, 1323.86, 11.40, 39.63, 4150.00, 128.30, 130.00,
5650.00, 29.64, 900.00, 5, 4.395798, 0, English, English, 0",
", 10, Fleet One, 0.00, 2.14, 4.00, 2955.36, 1343.34, 11.51, 38.15, 3218.00, 125.42, 108.21,
5011.00, 27.56, 871.00, 4, 3.423368, 0, English, English, 0",
", 11, Fleet One, 0.00, 2.76, 5.00, 3288.46, 1494.75, 12.82, 36.81, 3908.00, 170.08, 153.54,
5404.00, 24.31, 846.00, 4, 4.773903, 0, English, English, 0",
", 12, Fleet Two, 0.00, 6.10, 8.00, 4000.00, 1818.18, 18.30, 16.78, 1286.00, 319.62, 165.63,
2783.00, 28.00, 1000.00, 3, 0.856984, 0, English, English, 0",
", 13, Fleet Two, 0.00, 4.62, 6.00, 3900.00, 1772.72, 17.60, 25.85, 1959.00, 238.18, 143.16,
3607.00, 25.30, 920.00, 3, 0.856984, 0, English, English, 0",
", 14, Fleet Two, 0.00, 2.94, 5.00, 3152.78, 1433.08, 14.64, 40.48, 2689.00, 162.84, 118.47,
4615.00, 22.20, 867.00, 4, 2.775692, 0, English, English, 0",
", 15, Fleet Two, 0.00, 2.77, 5.00, 3351.19, 1523.26, 15.19, 39.02, 3029.00, 157.75, 128.65,
```

```

4847.00, 22.52, 895.00, 4, 3.429243, 0, English, English, 0",
", 16, Fleet Two, 0.00, 4.87, 7.00, 4300.00, 1954.54, 19.75, 30.05, 2432.00, 257.55, 175.46,
3972.00, 17.59, 800.00, 4, 6.058171, 0, English, English, 0",
", 17, Fleet Two, 0.00, 3.42, 6.00, 3937.50, 1789.77, 17.99, 33.56, 2953.00, 193.78, 149.98,
4603.00, 20.76, 850.00, 4, 5.967503, 0, English, English, 0",
", 18, Fleet Two, 0.00, 5.14, 8.00, 4375.00, 1988.63, 21.00, 23.03, 2121.00, 276.27, 182.60,
3763.00, 25.58, 817.00, 4, 3.756932, 0, English, English, 0",
", 19, Fleet Three, 0.00, 3.16, 5.00, 3642.86, 1655.84, 15.21, 34.37, 2888.00, 171.95, 130.52,
4817.00, 25.49, 886.00, 4, 3.470847, 0, English, English, 0",
", 20, Fleet Three, 0.00, 2.34, 4.00, 2973.21, 1351.45, 13.11, 40.75, 3222.00, 140.62, 112.49,
4971.00, 27.67, 886.00, 4, 1.67394, 0, English, English, 0",
", 21, Fleet Three, 0.00, 2.76, 5.00, 3107.14, 1412.33, 14.19, 40.51, 2943.00, 155.07, 117.46,
4804.00, 25.34, 971.00, 4, 2.191648, 0, English, English, 0",
", 22, Fleet Three, 0.00, 2.88, 5.00, 3298.08, 1499.12, 15.26, 37.80, 2858.00, 156.80, 122.30,
4740.00, 24.35, 923.00, 4, 2.64431, 0, English, English, 0",
", 23, Fleet Three, 0.00, 2.67, 5.00, 3053.57, 1387.98, 12.81, 40.12, 2696.00, 153.65, 106.08,
4763.00, 26.80, 914.00, 4, 0.827685, 0, English, English, 0"];

```

```

//Global Variables                                     Comment (Values)
unsigned int Message_Name = 0;                          //LG_Data_GP (3001)
unsigned int Message_Length = 0;
    //length of this message in bytes, excluding the first three fields
unsigned int Simulation_Time = 0;
    //the simulation time in seconds that the data in this message represents
unsigned int Request_Type = 0;                          //DR_TS_VEHICLE (14000)
unsigned int Request_Handle = 0;                        //(1)
unsigned int Class_ID_1 = 0;                            //Link (18000)
short unsigned int Action_ID_1 = 0;                    //UPDATE (1)
short unsigned int Attribute_ID_Count_1 = 0;           //(0)
short unsigned int Number_of_Aggregate_Classes_1 = 0; //(1)
unsigned int Class_ID_2 = 0;                            //Vehicle (33000)
short unsigned int Action_ID_2 = 0;                    //SEARCH (2)
short unsigned int Attribute_ID_Count_2 = 0;           //(1)
short unsigned int Attribute_ID = 0;                   //V_InputAndAnimate (33500)
short unsigned int Number_of_Aggregate_Classes_2 = 0; //(0)
short unsigned int Instance_ID_Count_1 = 0;            //(1)
unsigned int Instance_ID = 0;
    //ID of link containing vehicles for which this message is reporting
short unsigned int Instance_ID_Count_2 = 0;
    //number of vehicles on the specified link at the specified simulation time
unsigned int Global_Vehicle_ID = 0;
    //global vehicle ID of first vehicle in this message
short unsigned int Fleet = 0;
    //0 = Auto, 1 = truck, 2 = carpool, 3 = bus
short unsigned int Vehicle_Type = 0;                   //CORSIM vehicle type
short unsigned int Vehicle_Length = 0;                 //vehicle length in feet
short unsigned int Driver_Type = 0;                    //CORSIM driver type
short unsigned int Lane_ID = 0;
    //CORSIM ID of lane in which vehicle is traveling

```

```

int Vehicle_Position = 0;
    //vehicle's distance from up-stream node of link in feet
short unsigned int Previous_USN = 0;
    //up-stream node ID of the previous link the vehicle traveled
short unsigned int Turn_Code = 0;
    //vehicle turn code: 0=left, 1=through, 2=right, 3=left diagonal,
    //4=right diagonal, 5=source emission
short unsigned int Queue_Status = 0;
    //0 = vehicle is currently not in queue, 1 = vehicle is currently in queue
short int Acceleration = 0;
    //vehicle's instantaneous acceleration in feet/second/second
short unsigned int Velocity = 0;
    //vehicle's instantaneous velocity in feet/second
short unsigned int Lane_Change_Status = 0;
    //0 = vehicle does not want to change lanes, 1 = vehicle wants to change lanes
short unsigned int Target_Lane = 0;
    //CORSIM ID of lane vehicle would like to occupy
short unsigned int Destination_Node = 0;
    //node ID of the vehicles destination node
unsigned int Leader_Vehicle_ID = 0;
    //global ID of vehicle's leader vehicle
unsigned int Follower_Vehicle_ID = 0;
    //global ID of vehicle's follower vehicle
short unsigned int Previous_Lane_ID = 0;
    //lane ID of lane the lane that the vehicle was previously in

// FUNCTIONS //////////////////////////////////////////////////////////////////////
void get_filename(char *fullname, const char *fileextension, int i);
void read_and_calculate(const int num_run);
void read_file_header(FILE *fptr);
void read_mesg_header(FILE *fptr);
void read_link_data(FILE *fptr);
void read_veh_data(FILE *fptr);

// MAIN //////////////////////////////////////////////////////////////////////
main ()
{
    int num_run;
    char ch[2];

    //Get Number of Runs
    printf("Input # of Runs (10~500):");
    scanf("%d", &num_run);
    //Data Reading Loop
    read_and_calculate(num_run);
    //Wait in key
    scanf("%s", ch);

    return 0;
}

```

```

}

// FUNCTIONS //////////////////////////////////////////////////////////////////////
//Read and Calculate Fuel Consumption and Emissions -----
void read_and_calculate(const int num_run)
{
    const unsigned int rampID[29] = {
        10002, 510038, 380052,
        1010003, 1020004, 830103,
        60200, 2010007, 2020009, 2032031, 2040081,
        140300, 3010017, 3020020, 680303, 3040072, 3050074,
        220400, 4010026, 4020027, 4034031, 4040062, 4050065,
        4100411, 4110412, 4120028,
        340500, 5040052, 5050053};

    const int p_eb[23] = { 2500, 6200, 22400, 119100,
        264100, 268800, 277300, 324600,
        425200, 483900, 648300, 649300,
        650500, 656500, 668300, 732500,
        881600, 892900, 913400, 927900,
        968800, 996400, 1000000};

    const int p_wb[23] = { 2300, 5700, 20500, 109300,
        242300, 246600, 254400, 297900,
        390100, 444000, 594800, 596100,
        597600, 605000, 619400, 698200,
        881100, 895100, 915100, 929400,
        969500, 996500, 1000000};

    FILE *fptr_i, *fptr_o;
    int runID, j, k, acf[30000], end_flag, link_flag, cmem_cat, p;
    unsigned int i, time_prev;
    float c_eb[24], c_wb[24];
    char filename[20], buff_out[300], num_string[20];
    int dummy_buff;

    for (runID=0; runID<num_run; runID++){

        for (j=0; j<30000; j++){
            acf[j] = 0;
        }
        for (j=0; j<24; j++){
            c_eb[j] = 0.0;
            c_wb[j] = 0.0;
        }
        time_prev = 0.0;
        end_flag = 0;
        //Open files
        get_filename(filename, ".tsd", runID+1);
        fptr_i = fopen(filename, "rb");
    }
}

```



```

get_filename(filename, "def.txt", runID+1);
fptr_o = fopen(filename, "w");

read_file_header(fptr_i);
read_mesg_header(fptr_i);
printf("Run %3d   Simulation Time:      ", runID+1);

do {
    if ((Simulation_Time+1)>time_prev) {
        printf("%b\b\b\b\b%4d", Simulation_Time+1);
        time_prev = Simulation_Time;
    }
    if ((Message_Name==3001)&&(Request_Type==14000)) {
        read_link_data(fptr_i);
        link_flag = 0;
        for (j=0; j<29; j++) {
            if (Instance_ID==rampID[j]) {
                link_flag = 1;
            }
        }
        for (i=0; i<(Message_Length-38)/32; i++) {
            read_veh_data(fptr_i);
            if (Fleet==0) {
                if (link_flag==0) {
                    if (acf[Global_Vehicle_ID]==0) {
                        cmem_cat = 1;
                        p = random(1000000);
                        if (Instance_ID<500000) { //EB
                            while (p_eb[cmem_cat-1]<=p) {cmem_cat++;}
                            c_eb[cmem_cat-1] +=1.0;
                            c_eb[23] += 1.0;
                        }
                        else{ //WB
                            while (p_wb[cmem_cat-1]<=p) {cmem_cat++;}
                            c_wb[cmem_cat-1] +=1.0;
                            c_wb[23] += 1.0;
                        }
                    }
                    buff_out[0] = '¥0';
                    itoa(Global_Vehicle_ID, num_string, 10);
                    strcat(buff_out, num_string);
                    k = 0;
                    while (buff_out[k]!='¥0') {k++;}
                    for (j=0; j<153; j++) {
                        buff_out[j+k] = def_data[cmem_cat-1][j];
                    }
                    strcat(buff_out, "¥n");
                    fputs(buff_out, fptr_o);
                    acf[Global_Vehicle_ID] = 1;
                }
            }
        }
    }
}

```

```

        }
    }
}
else{                                     //if not Vehicle Message
    for (i=0; i<Message_Length-4; i++){
        fread(&dummy_buff, 1, 1, fptr_i);
    }
}
if (feof(fptr_i)==0){
    read_mesg_header(fptr_i);             //read Message Header
}
else{
    end_flag = 1;
}
} while (end_flag!=1);

printf("\n");
for (j=0; j<23; j++){
    printf("    %6.2f    %6.2f\n", 100.0*c_eb[j]/c_eb[23], 100.0*c_wb[j]/c_wb[23]);
}
printf("    %6.0f    %6.0f\n", c_eb[23], c_wb[23]);
printf("\n");

fclose(fptr_o);
fclose(fptr_i);
}
printf("\n");
}

//Generate filename -----
void get_filename(char *fullname, const char *fileextension, int i)
{
    char runID[5], extension[10];

    fullname[0] = '\0';
    itoa(i, runID, 10);
    extension[0] = '_';
    extension[1] = '\0';
    strcat(extension, runID);
    strcat(extension, fileextension);
    strcat(fullname, "network");
    strcat(fullname, extension);
}

//Read and Print 16bytes of File Header -----
void read_file_header(FILE *fptr)
{
    short unsigned int file_header;

```

```

    int i;

    printf("File Header... ");
    for (i=0; i<16; i++){
        fread(&file_header, 1, 1, fptr);
        file_header = (file_header & 0x00FF); //mask upper byte
        printf("%c", file_header);
    }
    printf("\n");
}

//Read the 1st 4 fields of Message Header -----
void read_mesg_header(FILE *fptr)
{
    fread(&Message_Name, 4, 1, fptr);
    fread(&Message_Length, 4, 1, fptr);
    fread(&Simulation_Time, 4, 1, fptr);
    fread(&Request_Type, 4, 1, fptr);
}

//Read Link Specific Data -----
void read_link_data(FILE *fptr)
{
    fread(&Request_Handle, 4, 1, fptr);
    fread(&Class_ID_1, 4, 1, fptr);
    fread(&Action_ID_1, 2, 1, fptr);
    fread(&Attribute_ID_Count_1, 2, 1, fptr);
    fread(&Number_of_Aggregate_Classes_1, 2, 1, fptr);
    fread(&Class_ID_2, 4, 1, fptr);
    fread(&Action_ID_2, 2, 1, fptr);
    fread(&Attribute_ID_Count_2, 2, 1, fptr);
    fread(&Attribute_ID, 2, 1, fptr);
    fread(&Number_of_Aggregate_Classes_2, 2, 1, fptr);
    fread(&Instance_ID_Count_1, 2, 1, fptr);
    fread(&Instance_ID, 4, 1, fptr);
    fread(&Instance_ID_Count_2, 2, 1, fptr);
}

//Read Vehicle Specific Data -----
void read_veh_data(FILE *fptr)
{
    //Read Data
    fread(&Global_Vehicle_ID, 4, 1, fptr);
    fread(&Fleet, 1, 1, fptr);
    fread(&Vehicle_Type, 1, 1, fptr);
    fread(&Vehicle_Length, 1, 1, fptr);
    fread(&Driver_Type, 1, 1, fptr);
    fread(&Lane_ID, 1, 1, fptr);
    fread(&Vehicle_Position, 4, 1, fptr);
}

```

```

fread(&Previous_USN, 2, 1, fptr);
fread(&Turn_Code, 1, 1, fptr);
fread(&Queue_Status, 1, 1, fptr);
fread(&Acceleration, 1, 1, fptr);
fread(&Velocity, 1, 1, fptr);
fread(&Lane_Change_Status, 1, 1, fptr);
fread(&Target_Lane, 1, 1, fptr);
fread(&Destination_Node, 2, 1, fptr);
fread(&Leader_Vehicle_ID, 4, 1, fptr);
fread(&Follower_Vehicle_ID, 4, 1, fptr);
fread(&Previous_Lane_ID, 1, 1, fptr);

//Mask upper byte
Fleet = (Fleet & 0x00FF);
Vehicle_Type = (Vehicle_Type & 0x00FF);
Vehicle_Length = (Vehicle_Length & 0x00FF);
Driver_Type = (Driver_Type & 0x00FF);
Lane_ID = (Lane_ID & 0x00FF);
Turn_Code = (Turn_Code & 0x00FF);
Queue_Status = (Queue_Status & 0x00FF);
Acceleration = (Acceleration & 0x00FF)-256*((Acceleration & 0x0080)==0x0080);
Velocity = (Velocity & 0x00FF);
Lane_Change_Status = (Lane_Change_Status & 0x00FF);
Target_Lane = (Target_Lane & 0x00FF);
Previous_Lane_ID = (Previous_Lane_ID & 0x00FF);
}

```

VISSIM Output to CMEM Input: Vehicle Activity

Input to the program: Step-by-step vehicle data file ("network(run#).txt" file).

Output of the program: Vehicle activity data ("act_(section#)_(run#).txt" file).

Source Code:

```
#include <stdio.h>
#include <math.h>
#include <stdlib.h>
#include <string.h>

enum {max_len_in = 200, sig_digit = 8, data_digit = 8,
      pos_time = 1, pos_vehID = 2, pos_vehtype = 3, pos_spd = 4,
      pos_link = 12, pos_slope = 14};

void read_write_data(const int num_run, const float ac_use);
void get_filename(char *fullname, const char *filename, int i, const char *ext);
void read_num(char *num_string, const char *buff, const int pos_data);
int get_section(int link);

//Main =====
main()
{
    //Variables
    int num_run;
    float ac_use;
    char ch[2];

    //Get Number of Runs
    printf("Input # of Runs (10~500):");
    scanf("%d", &num_run);
    //Get AC usage
    printf("Input %AC use (0~100):");
    scanf("%f", &ac_use);
    //Data Reading Loop
    read_write_data(num_run, ac_use);

    //Wait in key
    scanf("%s", ch);

    return 0;
}

//Functions =====
```

```

//Data Reading Loop -----
void read_write_data(const int num_run, const float ac_use)
{
    int i, j, veh, link, section, acf[30000];
    char filename[16], buff_in[max_len_in], buff_out[max_len_in], num_string[16];
    FILE *fptr_i, *fptr_e1, *fptr_e2, *fptr_e3, *fptr_e4, *fptr_e5,
        *fptr_w1, *fptr_w2, *fptr_w3, *fptr_w4, *fptr_w5;
    float time, time_prev, speed, grade, ac_on, ac_off;

    for (i=0; i<num_run; i++){
        printf("Run: %d   Simulation Time:      ", i+1);
        for (j=0; j<30000; j++){
            acf[j] = 0;
        }
        time_prev = 0.0;
        ac_on = 0.0;
        ac_off = 0.0;
        //Open input file
        get_filename(filename, "network", i, ".txt");
        fptr_i = fopen(filename, "r");
        get_filename(filename, "act_e1_", i, ".txt");
        fptr_e1 = fopen(filename, "w");
        get_filename(filename, "act_e2_", i, ".txt");
        fptr_e2 = fopen(filename, "w");
        get_filename(filename, "act_e3_", i, ".txt");
        fptr_e3 = fopen(filename, "w");
        get_filename(filename, "act_e4_", i, ".txt");
        fptr_e4 = fopen(filename, "w");
        get_filename(filename, "act_e5_", i, ".txt");
        fptr_e5 = fopen(filename, "w");
        get_filename(filename, "act_w1_", i, ".txt");
        fptr_w1 = fopen(filename, "w");
        get_filename(filename, "act_w2_", i, ".txt");
        fptr_w2 = fopen(filename, "w");
        get_filename(filename, "act_w3_", i, ".txt");
        fptr_w3 = fopen(filename, "w");
        get_filename(filename, "act_w4_", i, ".txt");
        fptr_w4 = fopen(filename, "w");
        get_filename(filename, "act_w5_", i, ".txt");
        fptr_w5 = fopen(filename, "w");
        //Get Data for each section
        while (fgets(buff_in, max_len_in, fptr_i)!=NULL){
            if (buff_in[0]!='\n'){
                read_num(num_string, buff_in, pos_time);
                time = atof(num_string)-1499.0;
                if (time>time_prev){
                    printf("%b\b\b\b\b%4.0f", time-1.0);
                    time_prev = time;
                }
            }
        }
    }
}

```

```

buff_out[0] = '¥0' ;
gcv_t(time, 4, num_string);
strcat(buff_out, num_string);
strcat(buff_out, ",");

read_num(num_string, buff_in, pos_link);
link = atoi(num_string);
if ((link!=1)&&(link!=126)&&(link!=1001)&&((link<51)|| (link>74))) {

    read_num(num_string, buff_in, pos_vehtype);
    veh = atoi(num_string);
    if ((veh>105)&&(veh<125)) {

        read_num(num_string, buff_in, pos_vehID);
        veh = atoi(num_string);
        strcat(buff_out, num_string);
        strcat(buff_out, ",");

        read_num(num_string, buff_in, pos_spd);
        speed = atof(num_string)/1.609;
        gcv_t(speed, 4, num_string);
        strcat(buff_out, num_string);
        strcat(buff_out, ",");

        read_num(num_string, buff_in, pos_slope);
        grade = atan(atof(num_string)/100.0);
        gcv_t(grade, 4, num_string);
        strcat(buff_out, num_string);
        strcat(buff_out, ",");

        if (acf[veh]==2) {
            strcat(buff_out, "1");
        }
        else{
            if (acf[veh]==0) {
                if ((1.0*random(1000000))<(ac_use*10000.0)) {
                    acf[veh] = 2;
                    strcat(buff_out, "1");
                    ac_on += 1.0;
                }
                else{
                    acf[veh] = 1;
                    strcat(buff_out, "0");
                    ac_off += 1.0;
                }
            }
            else{
                strcat(buff_out, "0");
            }
        }
    }
}

```

```

}
strcat(buff_out, "%n");
section = get_section(link);
if (section==0) {
    fputs(buff_out, fptr_e1);
}
else{
    if (section==1) {
        fputs(buff_out, fptr_e2);
    }
    else{
        if (section==2) {
            fputs(buff_out, fptr_e3);
        }
        else{
            if (section==3) {
                fputs(buff_out, fptr_e4);
            }
            else{
                if (section==4) {
                    fputs(buff_out, fptr_e5);
                }
                else{
                    if (section==5) {
                        fputs(buff_out, fptr_w1);
                    }
                    else{
                        if (section==6) {
                            fputs(buff_out, fptr_w2);
                        }
                        else{
                            if (section==7) {
                                fputs(buff_out, fptr_w3);
                            }
                            else{
                                if (section==8) {
                                    fputs(buff_out, fptr_w4);
                                }
                                else{
                                    if (section==9) {
                                        fputs(buff_out, fptr_w5);
                                    }
                                }
                            }
                        }
                    }
                }
            }
        }
    }
}

```



```

    }
    }
}

    }
}

printf("\n          AC use: %3.1f%%\n\n", 100.0*ac_on/(ac_on+ac_off));

//Close input file
fclose(fp_ptr_i);
fclose(fp_ptr_e1);
fclose(fp_ptr_e2);
fclose(fp_ptr_e3);
fclose(fp_ptr_e4);
fclose(fp_ptr_e5);
fclose(fp_ptr_w1);
fclose(fp_ptr_w2);
fclose(fp_ptr_w3);
fclose(fp_ptr_w4);
fclose(fp_ptr_w5);
}
printf("\n");
}

//Generate input filename -----
void get_filename(char *fullname, const char *filename, int i, const char *ext)
{
    char runID[5], extension[10];

    fullname[0] = '\0';
    itoa(i, runID, 10);
    extension[0] = '\0';
    strcat(extension, runID);
    strcat(extension, ext);
    strcat(fullname, filename);
    strcat(fullname, extension);
}

//Read number as string -----
void read_num(char *num_string, const char *buff, const int pos_data)
{
    int i, j, k;

    i = 0;
    j = 0;

    strnset(num_string, 0, data_digit);

    for (k=0; k<(pos_data-1); k++){

```

```

        while (buff[i]!=';'){i++;}
        i++;
    }
    while (((buff[i]<48)|| (buff[i]>57))&&(buff[i]!='-')){i++;}
    while (((buff[i]>47)&&(buff[i]<58))|| ((buff[i]=='.')||(buff[i]=='-'))){
        num_string[j] = buff[i];
        i++;j++;
    }
    num_string[j] = '\0';
}

//Get SectionID from LinkID -----
int get_section(int link)
{
    int section;
    const int link_info[96] = {
    99, 0, 0, 0, 1, 1, 1, 1, 1, 1,
    1, 2, 2, 2, 2, 2, 2, 2, 2, 3,
    3, 3, 3, 3, 3, 4, 4, 0, 0, 0,
    0, 0, 0, 1, 1, 1, 1, 1, 2, 2,
    2, 2, 2, 2, 3, 3, 3, 3, 4, 4,

    5, 5, 6, 6, 6, 6, 6, 6, 6, 7,
    7, 7, 7, 7, 7, 7, 7, 8, 8, 8,
    8, 8, 8, 9, 9, 99, 5, 5, 5, 6,
    6, 6, 6, 6, 6, 7, 7, 7, 7, 7,
    8, 8, 8, 9, 9, 9};

    const int connector_info[121] = {
    0,0,0,1,1,1,1,1,1,1, 2,2,2,2,2,2,2,2,3,3,
    3,3,3,3,4,4,5,5,6,6, 6,6,6,6,6,7,7,7,7,7,
    7,7,7,8,8,8,8,8,8,9, 9,0,0,0,0,0,0,1,1,1,
    1,1,2,2,2,2,2,2,3,3, 3,3,4,4,5,5,5,6,6,6,
    6,6,6,7,7,7,7,7,8,8, 8,9,9,9,0,0,0,1,1,1,
    2,2,2,3,3,3,3,3,4,5, 5,6,6,6,7,7,8,9,9,7,
    9};

    if (link<200){
        link = link-50*(link>100)-1;
        section = link_info[link];
    }
    else{
        link = link-10000;
        section = connector_info[link];
    }

    return section;
}

```

VISSIM Output to CMEM Input: Vehicle Definition

Input to the program: Second-by-second vehicle data file ("network(run#).txt" file).

Output of the program: Vehicle activity data ("network(run#)def.txt" file).

Source Code:

```
#include <stdio.h>
#include <math.h>
#include <stdlib.h>
#include <string.h>

enum {max_len_in = 200, sig_digit = 8, data_digit = 8,
      pos_time = 1, pos_vehID = 2, pos_vehtype = 3, pos_link = 12};

const char def_data[23][153]={
//"vehicle ID,vehicle category, Fleet, Tsoak, Ed, Nc, Masslb, Masskg, Trlhp, S, Nm, Qm,
Zmax, Np, Mpgc, Idle, ng, sload, updated, in_units_English, out_units_English, CO2_out",
", 1, Fleet One, 0.00, 4.75, 7.00, 3000.00, 1363.63, 13.28, 25.39, 1766.00, 250.35, 119.58,
3259.00, 29.08, 967.00, 4, 3.22672, 0, English, English, 0",
", 2, Fleet One, 0.00, 3.20, 6.00, 3031.25, 1377.84, 12.80, 35.40, 2856.00, 168.00, 119.95,
4560.00, 25.08, 900.00, 4, 3.22672, 0, English, English, 0",
", 3, Fleet One, 0.00, 1.68, 4.00, 2437.50, 1107.95, 11.32, 44.59, 3323.00, 95.21, 77.06,
5261.00, 33.58, 950.00, 4, 3.583865, 0, English, English, 0",
", 4, Fleet One, 0.00, 2.51, 5.00, 3066.18, 1393.71, 11.89, 39.32, 3307.00, 143.30, 110.84,
4908.00, 27.76, 871.00, 4, 4.515261, 0, English, English, 0",
", 5, Fleet One, 0.00, 2.45, 5.00, 3158.33, 1435.60, 12.35, 40.91, 4027.00, 151.27, 140.13,
5520.00, 24.91, 880.00, 4, 3.577786, 0, English, English, 0",
", 6, Fleet One, 0.00, 2.21, 4.00, 3031.25, 1377.84, 12.09, 39.60, 3215.00, 126.11, 100.48,
4754.00, 29.44, 825.00, 4, 3.687098, 0, English, English, 0",
", 7, Fleet One, 0.00, 2.35, 5.00, 2921.88, 1328.12, 12.28, 39.98, 4288.00, 148.38, 141.00,
5650.00, 25.54, 900.00, 5, 3.022606, 0, English, English, 0",
", 8, Fleet One, 0.00, 2.37, 5.00, 3170.45, 1441.11, 11.36, 36.16, 3619.00, 139.00, 119.61,
5127.00, 32.78, 855.00, 4, 4.620147, 0, English, English, 0",
", 9, Fleet One, 0.00, 2.04, 5.00, 2912.50, 1323.86, 11.40, 39.63, 4150.00, 128.30, 130.00,
5650.00, 29.64, 900.00, 5, 4.395798, 0, English, English, 0",
", 10, Fleet One, 0.00, 2.14, 4.00, 2955.36, 1343.34, 11.51, 38.15, 3218.00, 125.42, 108.21,
5011.00, 27.56, 871.00, 4, 3.423368, 0, English, English, 0",
", 11, Fleet One, 0.00, 2.76, 5.00, 3288.46, 1494.75, 12.82, 36.81, 3908.00, 170.08, 153.54,
5404.00, 24.31, 846.00, 4, 4.773903, 0, English, English, 0",
", 12, Fleet Two, 0.00, 6.10, 8.00, 4000.00, 1818.18, 18.30, 16.78, 1286.00, 319.62, 165.63,
2783.00, 28.00, 1000.00, 3, 0.856984, 0, English, English, 0",
", 13, Fleet Two, 0.00, 4.62, 6.00, 3900.00, 1772.72, 17.60, 25.85, 1959.00, 238.18, 143.16,
3607.00, 25.30, 920.00, 3, 0.856984, 0, English, English, 0",
", 14, Fleet Two, 0.00, 2.94, 5.00, 3152.78, 1433.08, 14.64, 40.48, 2689.00, 162.84, 118.47,
4615.00, 22.20, 867.00, 4, 2.775692, 0, English, English, 0",
", 15, Fleet Two, 0.00, 2.77, 5.00, 3351.19, 1523.26, 15.19, 39.02, 3029.00, 157.75, 128.65,
```



```

        while (p_car[cmem_cat-1]<=p) {cmem_cat++;}
        c_car[cmem_cat-1] += 1.0;
        c_car[16] += 1.0;
        cmem_cat = cmem_cat+7*(cmem_cat>11);
    }
    else{
        while (p_ldt[cmem_cat-1]<=p) {cmem_cat++;}
        c_ldt[cmem_cat-1] += 1.0;
        c_ldt[12] += 1.0;
        cmem_cat += 11;
    }
    strcat(buff_out, num_string);
    k = 0;
    while (buff_out[k]!='\0') {k++;}
    for (j=0; j<153; j++) {
        buff_out[j+k] = def_data[cmem_cat-1][j];
    }
    strcat(buff_out, "\n");
//printf("%d %d\n", veh_ID, veh_type);
//printf("%s\n", buff_out);
    fputs(buff_out, fptr_o);
    acf[veh_ID] = 1;
    }
}

}

}
printf("\n");
for (j=0; j<16; j++) {
    printf("  %6.2f  %6.2f\n", 100.0*c_car[j]/c_car[16], 100.0*c_ldt[j]/c_ldt[12]);
}
printf("  %6.0f  %6.0f\n", c_car[16], c_ldt[12]);
printf("\n");

//Close input file
fclose(fptr_i);
fclose(fptr_o);
}

printf("\n");
}

//Generate input filename -----
void get_filename(char *fullname, const char *filename, int i, const char *ext)
{
    char runID[5], extension[10];

    fullname[0] = '\0';
    itoa(i, runID, 10);

```

```

    extension[0] = '¥0';
    strcat(extension, runID);
    strcat(extension, ext);
    strcat(fullname, filename);
    strcat(fullname, extension);
}

//Read number as string -----
void read_num(char *num_string, const char *buff, const int pos_data)
{
    int i, j, k;

    i = 0;
    j = 0;

    strnset(num_string, 0, data_digit);

    for (k=0; k<(pos_data-1); k++) {
        while (buff[i]!=';') {i++;}
        i++;
    }
    while ((buff[i]<48) || (buff[i]>57)) && (buff[i]!='-')) {i++;}
    while ((buff[i]>47) && (buff[i]<58)) || ((buff[i]=='.' || (buff[i]=='-')))) {
        num_string[j] = buff[i];
        i++;j++;
    }
    num_string[j] = '¥0';
}

```

CORSIM Built-in Model Post Processor

Three programs: Calculator1, Calculator2, and Calculator3.

- Calculator1: calculates VMT by vehicle type by link.

Input: Animation file (“network_(run#).tsd” file).

Output: Comma delimited text file that contains VMT data

(“network_(run#).vmt” file.)

- Calculator2: summarizes fuel consumption and emissions rate by VMT by vehicle type by link.

Input: CORSIM text output file (“network_(run#).out” file).

Output: Comma delimited text file that contains fuel consumption and emissions data (“network_(run#).fe” file.)

- Calculator3: calculates fuel consumption and emissions for entire section and each of the five subsections from output files from Calculator1 and Calculator2. It calculates averages and standard deviations of fuel consumption and emissions of each section for results from multiple CORSIM runs.

Input: Calculator1 output file (“network_(run#).vmt” file) and Calculator2 output file (“network_(run#).fer” file).

Output: Comma delimited text file that contains fuel consumption and emissions data (“network_(run#).fe” file.)

Source Code:Calculator1:

```

#include <stdio.h>
#include <math.h>
#include <stdlib.h>
#include <string.h>

enum {max_veh_no = 2000, max_link_no = 98};

//Global Variables                                     Comment (Values)
unsigned int Message_Name = 0;                          //LG_Data_GP (3001)
unsigned int Message_Length = 0;
    //length of this message in bytes, excluding the first three fields
unsigned int Simulation_Time = 0;
    //the simulation time in seconds that the data in this message represents
unsigned int Request_Type = 0;                          //DR_TS_VEHICLE (14000)
unsigned int Request_Handle = 0;                        //(1)
unsigned int Class_ID_1 = 0;                            //Link (18000)
short unsigned int Action_ID_1 = 0;                    //UPDATE (1)
short unsigned int Attribute_ID_Count_1 = 0;           //(0)
short unsigned int Number_of_Aggregate_Classes_1 = 0;  //(1)
unsigned int Class_ID_2 = 0;                            //Vehicle (33000)
short unsigned int Action_ID_2 = 0;                    //SEARCH (2)
short unsigned int Attribute_ID_Count_2 = 0;           //(1)
short unsigned int Attribute_ID = 0;                   //V_InputAndAnimate (33500)
short unsigned int Number_of_Aggregate_Classes_2 = 0;  //(0)
short unsigned int Instance_ID_Count_1 = 0;            //(1)
unsigned int Instance_ID = 0;
    //ID of link containing vehicles for which this message is reporting
short unsigned int Instance_ID_Count_2 = 0;
    //number of vehicles on the specified link at the specified simulation time
unsigned int Global_Vehicle_ID = 0;
    //global vehicle ID of first vehicle in this message
short unsigned int Fleet = 0;
    //0 = Auto, 1 = truck, 2 = carpool, 3 = bus
short unsigned int Vehicle_Type = 0;
    //CORSIM vehicle type
short unsigned int Vehicle_Length = 0;
    //vehicle length in feet
short unsigned int Driver_Type = 0;
    //CORSIM driver type
short unsigned int Lane_ID = 0;
    //CORSIM ID of lane in which vehicle is traveling
int Vehicle_Position = 0;
    //vehicle's distance from up-stream node of link in feet
short unsigned int Previous_USN = 0;
    //up-stream node ID of the previous link the vehicle traveled

```

```

short unsigned int Turn_Code = 0;
    //vehicle turn code: 0=left, 1=through, 2=right, 3=left diagonal,
    //4=right diagonal, 5=source emission
short unsigned int Queue_Status = 0;
    //0 = vehicle is currently not in queue, 1 = vehicle is currently in queue
short int Acceleration = 0;
    //vehicle's instantaneous acceleration in feet/second/second
short unsigned int Velocity = 0;
    //vehicle's instantaneous velocity in feet/second
short unsigned int Lane_Change_Status = 0;
    //0 = vehicle does not want to change lanes, 1 = vehicle wants to change lanes
short unsigned int Target_Lane = 0;
    //CORSIM ID of lane vehicle would like to occupy
short unsigned int Destination_Node = 0;
    //node ID of the vehicles destination node
unsigned int Leader_Vehicle_ID = 0;
    //global ID of vehicle's leader vehicle
unsigned int Follower_Vehicle_ID = 0;
    //global ID of vehicle's follower vehicle
short unsigned int Previous_Lane_ID = 0;
    //lane ID of lane the lane that the vehicle was previously in

// FUNCTIONS ////////////////////////////////////////
void initialize_link_info(unsigned int link_info[max_link_no*9]);
void get_filename(char *fullname, const char *fileextension, int i);
void read_file_header(FILE *fptr);
void read_and_calculate(unsigned int link_info[max_link_no*9], FILE *fptr);
void initialize_array(unsigned int veh_info[max_veh_no][5]);
void set_initial_condition(FILE *fptr, unsigned int veh_info[max_veh_no][5]);
void read_mesg_header(FILE *fptr);
void read_link_data(FILE *fptr);
void read_veh_data(FILE *fptr);
unsigned int find_veh(const unsigned int veh_ID, unsigned int veh_info[max_veh_no][5]);
void set_veh_info(unsigned int veh_info[max_veh_no][5], unsigned int veh_ID, int flag);
unsigned int find_link(const unsigned int current_link_ID, unsigned int link_info[max_link_no*9]);
void write_result(unsigned int link_info[max_link_no*9], FILE *fptr);

// MAIN ////////////////////////////////////////
main ()
{
    unsigned int link_info[max_link_no*9] = {
        //LinkID, V1-7 VMT(ft), Link Length
        20003, 0, 0, 0, 0, 0, 0, 0, 113,
        30004, 0, 0, 0, 0, 0, 0, 0, 1871,
        40005, 0, 0, 0, 0, 0, 0, 0, 1814,
        50006, 0, 0, 0, 0, 0, 0, 0, 1173,
        60007, 0, 0, 0, 0, 0, 0, 0, 1817,

```

70008, 0, 0, 0, 0, 0, 0, 0, 660,
80009, 0, 0, 0, 0, 0, 0, 0, 1120,
90010, 0, 0, 0, 0, 0, 0, 0, 250,
100011, 0, 0, 0, 0, 0, 0, 0, 774,
110012, 0, 0, 0, 0, 0, 0, 0, 1180,
120013, 0, 0, 0, 0, 0, 0, 0, 1106,
130014, 0, 0, 0, 0, 0, 0, 0, 1206,
140015, 0, 0, 0, 0, 0, 0, 0, 645,
150016, 0, 0, 0, 0, 0, 0, 0, 1079,

160017, 0, 0, 0, 0, 0, 0, 0, 171,
170036, 0, 0, 0, 0, 0, 0, 0, 402,
360018, 0, 0, 0, 0, 0, 0, 0, 113,
180019, 0, 0, 0, 0, 0, 0, 0, 746,
190020, 0, 0, 0, 0, 0, 0, 0, 360,
200021, 0, 0, 0, 0, 0, 0, 0, 2077,
210022, 0, 0, 0, 0, 0, 0, 0, 2717,
220023, 0, 0, 0, 0, 0, 0, 0, 113,
230024, 0, 0, 0, 0, 0, 0, 0, 336,
240025, 0, 0, 0, 0, 0, 0, 0, 1398,
250026, 0, 0, 0, 0, 0, 0, 0, 113,

260027, 0, 0, 0, 0, 0, 0, 0, 1791,
270028, 0, 0, 0, 0, 0, 0, 0, 1122,
280029, 0, 0, 0, 0, 0, 0, 0, 2398,
290030, 0, 0, 0, 0, 0, 0, 0, 2256,
300031, 0, 0, 0, 0, 0, 0, 0, 875,
310032, 0, 0, 0, 0, 0, 0, 0, 401,
4110412, 0, 0, 0, 0, 0, 0, 0, 796,
4120028, 0, 0, 0, 0, 0, 0, 0, 326,

320033, 0, 0, 0, 0, 0, 0, 0, 2208,
330034, 0, 0, 0, 0, 0, 0, 0, 557,
340037, 0, 0, 0, 0, 0, 0, 0, 113,
370035, 0, 0, 0, 0, 0, 0, 0, 1488,

520053, 0, 0, 0, 0, 0, 0, 0, 1367,
530054, 0, 0, 0, 0, 0, 0, 0, 610,
540055, 0, 0, 0, 0, 0, 0, 0, 2510,

550056, 0, 0, 0, 0, 0, 0, 0, 335,
560057, 0, 0, 0, 0, 0, 0, 0, 757,
570058, 0, 0, 0, 0, 0, 0, 0, 2373,
580059, 0, 0, 0, 0, 0, 0, 0, 1364,
590060, 0, 0, 0, 0, 0, 0, 0, 1217,
600061, 0, 0, 0, 0, 0, 0, 0, 686,
610062, 0, 0, 0, 0, 0, 0, 0, 2026,
600403, 0, 0, 0, 0, 0, 0, 0, 241,

620063, 0, 0, 0, 0, 0, 0, 0, 121,
630064, 0, 0, 0, 0, 0, 0, 0, 1427,
640065, 0, 0, 0, 0, 0, 0, 0, 338,
650066, 0, 0, 0, 0, 0, 0, 0, 269,
660067, 0, 0, 0, 0, 0, 0, 0, 2379,
670068, 0, 0, 0, 0, 0, 0, 0, 2109,
680069, 0, 0, 0, 0, 0, 0, 0, 633,
690070, 0, 0, 0, 0, 0, 0, 0, 621,
700071, 0, 0, 0, 0, 0, 0, 0, 675,

710072, 0, 0, 0, 0, 0, 0, 0, 114,
720073, 0, 0, 0, 0, 0, 0, 0, 952,
730074, 0, 0, 0, 0, 0, 0, 0, 884,
740075, 0, 0, 0, 0, 0, 0, 0, 989,
750076, 0, 0, 0, 0, 0, 0, 0, 1084,
760077, 0, 0, 0, 0, 0, 0, 0, 1128,
770078, 0, 0, 0, 0, 0, 0, 0, 717,
780079, 0, 0, 0, 0, 0, 0, 0, 138,
790080, 0, 0, 0, 0, 0, 0, 0, 1449,
800081, 0, 0, 0, 0, 0, 0, 0, 582,
780203, 0, 0, 0, 0, 0, 0, 0, 239,

810082, 0, 0, 0, 0, 0, 0, 0, 3080,
820083, 0, 0, 0, 0, 0, 0, 0, 1805,
830084, 0, 0, 0, 0, 0, 0, 0, 1882,

10002, 0, 0, 0, 0, 0, 0, 0, 1621,
510038, 0, 0, 0, 0, 0, 0, 0, 656,
380052, 0, 0, 0, 0, 0, 0, 0, 984,
1010003, 0, 0, 0, 0, 0, 0, 0, 164,
1020004, 0, 0, 0, 0, 0, 0, 0, 164,
60200, 0, 0, 0, 0, 0, 0, 0, 164,
2010007, 0, 0, 0, 0, 0, 0, 0, 164,
2020009, 0, 0, 0, 0, 0, 0, 0, 164,
140300, 0, 0, 0, 0, 0, 0, 0, 164,
3010017, 0, 0, 0, 0, 0, 0, 0, 164,
3020020, 0, 0, 0, 0, 0, 0, 0, 164,
220400, 0, 0, 0, 0, 0, 0, 0, 164,
4010026, 0, 0, 0, 0, 0, 0, 0, 164,
4020027, 0, 0, 0, 0, 0, 0, 0, 164,
4100411, 0, 0, 0, 0, 0, 0, 0, 164,
340500, 0, 0, 0, 0, 0, 0, 0, 164,
5040052, 0, 0, 0, 0, 0, 0, 0, 164,
5050053, 0, 0, 0, 0, 0, 0, 0, 164,
4034031, 0, 0, 0, 0, 0, 0, 0, 164,
4040062, 0, 0, 0, 0, 0, 0, 0, 164,
4050065, 0, 0, 0, 0, 0, 0, 0, 164,
680303, 0, 0, 0, 0, 0, 0, 0, 164,
3040072, 0, 0, 0, 0, 0, 0, 0, 164,

```

3050074,0,0,0,0,0,0,0,0,164,
2032031,0,0,0,0,0,0,0,0,163,
2040081,0,0,0,0,0,0,0,0,164,
830103,0,0,0,0,0,0,0,0,164};

FILE *fptr;
int runID, num_run;
char filename[20];

//Get Number of Runs
printf("Input # of Runs:");
scanf("%d", &num_run);

for (runID=1; runID<(num_run+1); runID++){
    printf("Run %3d¥n", runID);
    initialize_link_info(link_info);

    get_filename(filename, ".tsd", runID);
    fptr = fopen(filename, "rb");
    read_file_header(fptr);
    read_and_calculate(link_info, fptr);
    fclose(fptr);

    get_filename(filename, ".vmt", runID);
    fptr = fopen(filename, "w");
    write_result(link_info, fptr);
    fclose(fptr);
}

return 0;
}

// FUNCTIONS ////////////////////////////////////////
//Initialize array -----
void initialize_link_info(unsigned int link_info[max_link_no*9])
{
    int i, j;

    for (i=0; i<max_link_no; i++){
        for (j=1; j<8; j++){
            link_info[i*9+j] = 0;
        }
    }
}

//Generate filename -----
void get_filename(char *fullname, const char *fileextension, int i)
{
    char runID[5], extension[10];

```

```

    fullname[0] = '\0';
    itoa(i, runID, 10);
    extension[0] = '_';
    extension[1] = '\0';
    strcat(extension, runID);
    strcat(extension, fileextension);
    strcat(fullname, "network");
    strcat(fullname, extension);
}

//Read and Print 16bytes of File Header -----
void read_file_header(FILE *fptr)
{
    short unsigned int file_header;
    int i;

    printf("File Header... ");
    for (i=0; i<16; i++){
        fread(&file_header, 1, 1, fptr);
        file_header = (file_header & 0x00FF); //mask upper byte
        printf("%c", file_header);
    }
    printf("\n");
}

//Read and Calculate Fuel Consumption and Emissions -----
void read_and_calculate(unsigned int link_info[max_link_no*9], FILE *fptr)
{
    unsigned int i, j; //loop counter
    int dummy_buff; //dummy buffer for reading data
    int flag;
    unsigned int calculator_link_ID; //locally assigned link ID for calculation
    unsigned int calculator_veh_ID;
    unsigned int veh_info[max_veh_no][5];
        //0=vehicle ID, 1=link_ID, 2=position, 3=vehicle type,
        //4=flag (0=not updated, 1=updated)
    unsigned int link_length;

    initialize_array(veh_info);
    flag = 0;

    set_initial_condition(fptr, veh_info);

    printf("Calculating... Simulation Time:");

    do {
        printf("%4d\b\b\b\b", Simulation_Time+1);
        if ((Message_Name==3001)&&(Request_Type==14000)){ //if Vehicle Message

```

```

read_link_data(fp_ptr); //read Link Data
for (i=0; i<(Message_Length-38)/32; i++) {
    read_veh_data(fp_ptr); //read Vehicle Data
    calculator_veh_ID = find_veh(Global_Vehicle_ID, veh_info);
    if (veh_info[calculator_veh_ID][4]==1) {
        if (veh_info[calculator_veh_ID][1]==Instance_ID) {
            calculator_link_ID = find_link(Instance_ID, link_info);
            link_info[calculator_link_ID*9+Vehicle_Type] +=
                (Vehicle_Position-veh_info[calculator_veh_ID][2]);
            set_veh_info(veh_info, calculator_veh_ID, 2);
        }
        else{
            calculator_link_ID =
                find_link(veh_info[calculator_veh_ID][1], link_info);
            link_length = link_info[calculator_link_ID*9+8];
            link_info[calculator_link_ID*9+Vehicle_Type] +=
                (link_length-veh_info[calculator_veh_ID][2]);
            calculator_link_ID = find_link(Instance_ID, link_info);
            link_info[calculator_link_ID*9+Vehicle_Type] += Vehicle_Position;
            set_veh_info(veh_info, calculator_veh_ID, 2);
        }
    }
    else{
        calculator_link_ID = find_link(Instance_ID, link_info);
        link_info[calculator_link_ID*9+Vehicle_Type] += Vehicle_Position;
        set_veh_info(veh_info, calculator_veh_ID, 2);
    }
}
else{ //if not Vehicle Message
    if (Message_Name==3003) {
        for (i=0; i<max_veh_no; i++) {
            if (veh_info[i][4]==1) {
                calculator_link_ID = find_link(veh_info[i][1], link_info);
                link_length = link_info[calculator_link_ID*9+8];
                link_info[calculator_link_ID*9+veh_info[i][3]] +=
                    (link_length-veh_info[i][2]);
                for (j=0; j<5; j++) {
                    veh_info[i][j] = 0;
                }
            }
            else{
                if (veh_info[i][4]==2) {
                    veh_info[i][4] = 1;
                }
            }
        }
    }
    for (i=0; i<Message_Length-4; i++) {

```

```

        fread(&dummy_buff, 1, 1, fptr);
    }
}

if (feof(fptr)==0) {
    read_mesg_header(fptr);                //read Message Header
}
else{
    flag = 1;
}
} while (flag!=1);

printf("¥n");
}

//Initialization of Arrays -----
void initialize_array(unsigned int veh_info[max_veh_no][5])
{
    int i, j;

    printf("Initializing...");
    for (i=0; i<max_veh_no; i++) {
        for (j=0; j<5; j++) {
            veh_info[i][j] = 0;
        }
    }
    printf("¥n");
}

//Set initial vehicle positions on link -----
void set_initial_condition(FILE *fptr, unsigned int veh_info[max_veh_no][5])
{
    unsigned int calculator_veh_ID, dummy_buff, i;

    printf("Setting Initial Conditions...¥n");

    read_mesg_header(fptr);                //read Message Header
    while (Simulation_Time==0) {
        if ((Message_Name==3001)&&(Request_Type==14000)) { //if Vehicle Message
            read_link_data(fptr);            //read Link Data
            for (i=0; i<(Message_Length-38)/32; i++) {
                read_veh_data(fptr);          //read Vehicle Data
                calculator_veh_ID = find_veh(Global_Vehicle_ID, veh_info);
                set_veh_info(veh_info, calculator_veh_ID, 1);
            }
        }
        else{                                //if not Vehicle Message
            for (i=0; i<Message_Length-4; i++) {
                fread(&dummy_buff, 1, 1, fptr);
            }
        }
    }
}

```



```

    }
}
    read_mesg_header(fptr);           //read Message Header
}

//Read the 1st 4 fields of Message Header -----
void read_mesg_header(FILE *fptr)
{
    fread(&Message_Name, 4, 1, fptr);
    fread(&Message_Length, 4, 1, fptr);
    fread(&Simulation_Time, 4, 1, fptr);
    fread(&Request_Type, 4, 1, fptr);
}

//Read Link Specific Data -----
void read_link_data(FILE *fptr)
{
    fread(&Request_Handle, 4, 1, fptr);
    fread(&Class_ID_1, 4, 1, fptr);
    fread(&Action_ID_1, 2, 1, fptr);
    fread(&Attribute_ID_Count_1, 2, 1, fptr);
    fread(&Number_of_Aggregate_Classes_1, 2, 1, fptr);
    fread(&Class_ID_2, 4, 1, fptr);
    fread(&Action_ID_2, 2, 1, fptr);
    fread(&Attribute_ID_Count_2, 2, 1, fptr);
    fread(&Attribute_ID, 2, 1, fptr);
    fread(&Number_of_Aggregate_Classes_2, 2, 1, fptr);
    fread(&Instance_ID_Count_1, 2, 1, fptr);
    fread(&Instance_ID, 4, 1, fptr);
    fread(&Instance_ID_Count_2, 2, 1, fptr);
}

//Read Vehicle Specific Data -----
void read_veh_data(FILE *fptr)
{
    //Read Data
    fread(&Global_Vehicle_ID, 4, 1, fptr);
    fread(&Fleet, 1, 1, fptr);
    fread(&Vehicle_Type, 1, 1, fptr);
    fread(&Vehicle_Length, 1, 1, fptr);
    fread(&Driver_Type, 1, 1, fptr);
    fread(&Lane_ID, 1, 1, fptr);
    fread(&Vehicle_Position, 4, 1, fptr);
    fread(&Previous_USN, 2, 1, fptr);
    fread(&Turn_Code, 1, 1, fptr);
    fread(&Queue_Status, 1, 1, fptr);
    fread(&Acceleration, 1, 1, fptr);
    fread(&Velocity, 1, 1, fptr);
}

```

```

fread(&Lane_Change_Status, 1, 1, fptr);
fread(&Target_Lane, 1, 1, fptr);
fread(&Destination_Node, 2, 1, fptr);
fread(&Leader_Vehicle_ID, 4, 1, fptr);
fread(&Follower_Vehicle_ID, 4, 1, fptr);
fread(&Previous_Lane_ID, 1, 1, fptr);

//Mask upper byte
Fleet = (Fleet & 0x00FF);
Vehicle_Type = (Vehicle_Type & 0x00FF);
Vehicle_Length = (Vehicle_Length & 0x00FF);
Driver_Type = (Driver_Type & 0x00FF);
Lane_ID = (Lane_ID & 0x00FF);
Turn_Code = (Turn_Code & 0x00FF);
Queue_Status = (Queue_Status & 0x00FF);
Acceleration = (Acceleration & 0x00FF)-256*((Acceleration & 0x0080)==0x0080);
Velocity = (Velocity & 0x00FF);
Lane_Change_Status = (Lane_Change_Status & 0x00FF);
Target_Lane = (Target_Lane & 0x00FF);
Previous_Lane_ID = (Previous_Lane_ID & 0x00FF);
}

//Convert Global Vehicle ID to calculator's local vehicle ID -----
unsigned int find_veh(const unsigned int veh_ID, unsigned int veh_info[max_veh_no][5])
{
    unsigned int i, value, min_zero;

    value = 9999;
    min_zero = 9999;

    //look for current veh ID in the array
    for (i=0; i<max_veh_no; i++){
        if (veh_info[i][0]==veh_ID){
            value = i;
            i = max_veh_no;
        }
        else{
            if ((veh_info[i][4]==0)&&(min_zero==9999)){
                min_zero = i;
            }
        }
    }
}

//for the 1st time, register the vehicle ID to array
if (value==9999){
    veh_info[min_zero][0] = veh_ID;
    value = min_zero;
}

```

```

    return value;
}

//Set veh_info -----
void set_veh_info(unsigned int veh_info[max_veh_no][5], unsigned int veh_ID, int flag)
{
    veh_info[veh_ID][1] = Instance_ID;
    veh_info[veh_ID][2] = Vehicle_Position;
    veh_info[veh_ID][3] = Vehicle_Type;
    veh_info[veh_ID][4] = flag;
}

//Convert CORSIM link ID to calculator's local link ID -----
unsigned int find_link(const unsigned int current_link_ID, unsigned int
link_info[max_link_no*9])
{
    unsigned int i;

    //look for current link ID in the array
    i=0;
    while (link_info[i*9]!=current_link_ID){
        i++;
    }

    return i;
}

//Write results to file -----
void write_result(unsigned int link_info[max_link_no*9], FILE *fptr)
{
    int i, j;
    int up_stream_node_ID, down_stream_node_ID;
    char buff[80], value[16];

    printf("Writing...\n");

    buff[0]='\0';
    strcat(buff, "VMT\n");
    fputs(buff, fptr);
    buff[0]='\0';
    strcat(buff, "USN, DSN, 1, 2, 3, 4, 5, 6, 7\n");
    fputs(buff, fptr);

    for (i=0; i<max_link_no; i++){
        buff[0]='\0';

        down_stream_node_ID = link_info[i*9]%10000;
        up_stream_node_ID = (link_info[i*9]-down_stream_node_ID)/10000;
        gcvt(up_stream_node_ID, 5, value);
    }
}

```

```

    strcat(buff, value);
    strcat(buff, ",");
    gcvt(down_stream_node_ID, 5, value);
    strcat(buff, value);

    for (j=1; j<8; j++){
        gcvt(link_info[i*9+j], 10, value);
        strcat(buff, ",");
        strcat(buff, value);
    }
    strcat(buff, "\n");
    fputs(buff, fptr);
}
buff[0]='\0';
buff[1]='\0';
fputs(buff, fptr);

printf("\n");
}

```



```

810082, 0, 0, 0, 0, 0, 0, 0,    0, 0, 0, 0, 0, 0, 0,    0, 0, 0, 0, 0, 0,    0, 0, 0, 0, 0, 0,
820083, 0, 0, 0, 0, 0, 0, 0,    0, 0, 0, 0, 0, 0, 0,    0, 0, 0, 0, 0, 0,    0, 0, 0, 0, 0, 0,
830084, 0, 0, 0, 0, 0, 0, 0,    0, 0, 0, 0, 0, 0, 0,    0, 0, 0, 0, 0, 0,    0, 0, 0, 0, 0, 0];

FILE *fptr;
int runID, num_run;
char filename[20];

//Get Number of Runs
printf("Input # of Runs (10~500):");
scanf("%d", &num_run);

for (runID=1; runID<(num_run+1); runID++){

    printf("Run %3d¥n", runID);

    get_filename(filename, ".out", runID);
    fptr = fopen(filename, "r");
    read_and_calculate(link_info, fptr);
    fclose(fptr);

    get_filename(filename, ".fer", runID);
    fptr = fopen(filename, "w");
    write_result(link_info, fptr);
    fclose(fptr);
}

return 0;
}

// FUNCTIONS ////////////////////////////////////////
//Generate filename -----
void get_filename(char *fullname, const char *fileextension, int i)
{
    char runID[5], extension[10];

    fullname[0] = '¥0';
    itoa(i, runID, 10);
    extension[0] = '_';
    extension[1] = '¥0';
    strcat(extension, runID);
    strcat(extension, fileextension);
    strcat(fullname, "network");
    strcat(fullname, extension);
}

//Read and Calculate Fuel Consumption and Emissions -----
void read_and_calculate(int link_info[max_link_no*29], FILE *fptr)
```

```

{
    char buff[150], data_strg[data_digit];
    int ups_ID, dns_ID;                                //Upstream ID and Downstream ID
    int cal_link_ID, veh_type;
    int i, j;

    if (find_data_location(fp_ptr)!=1) {
        printf("Data Read Error!\n");
    }

    while (fgets(buff, 150, fp_ptr)!=NULL) {
        i = 0;
        while (buff[i]!=' '){
            i++;
        }
        if (buff[i]=='('){
            i = read_num(data_strg, buff, i+1);
            ups_ID = atoi(data_strg);
            i = read_num(data_strg, buff, i+1);
            dns_ID = atoi(data_strg);
            cal_link_ID = find_link(ups_ID*10000+dns_ID, link_info);
            if (cal_link_ID!=99){
                while ((buff[i]<'0')||(buff[i]>'9')){
                    i++;
                }
                j = link_info[cal_link_ID*29+28];
                link_info[cal_link_ID*29+28]++;
                for (veh_type=j*7+1; veh_type<(j*7+8); veh_type++){
                    i = read_num(data_strg, buff, i);
                    link_info[cal_link_ID*29+veh_type] = atof(data_strg)*100.0+0.5;
                }
            }
        }
    }
}

// Find Data Location -----
int find_data_location(FILE *fp_ptr)
{
    int i, j, flag;
    char buff[150];
    char key_phrase[45]="FRESIM CUMULATIVE VALUES OF FUEL CONSUMPTION";

    flag = 0;
    do {
        i = 0;
        if (fgets(buff, 150, fp_ptr)==NULL) {
            flag = 2;
        }
    }
}

```



```

    while (buff[i]==' '){
        i++;
    }
    for (j=i; j<i+44; j++){
        if (buff[j]==key_phrase[j-i]){
            flag = 1;
        }
        else{
            flag = 0;
            j = i+44;
        }
    }
} while (flag==0);

return flag;
}

//Read number as string -----
int read_num(char *num_string, const char *buff, int pos_data)
{
    int j;

    j = 0;

    strnset(num_string, 0, data_digit);

    while (buff[pos_data]==' '){pos_data++;}
    while (((buff[pos_data]>47)&&(buff[pos_data]<58)) || (buff[pos_data]==46)) {
        num_string[j] = buff[pos_data];
        pos_data++;j++;
    }
    num_string[j] = '\0';
    return pos_data;
}

//Convert link ID to local link ID -----
int find_link(const int global_ID, int link_info[max_link_no*29])
{
    int i, link_ID;

    for (i=0; i<max_link_no; i++){
        if (link_info[i*29]==global_ID){
            link_ID = i;
            i = 99;
        }
    }

    if (i!=100){
        link_ID = 99;
    }
}

```

```

    }

    return link_ID;
}

//Write results to file -----
void write_result(int link_info[max_link_no*29], FILE *fptr)
{
    int i, j;
    int up_stream_node_ID, down_stream_node_ID;
    char buff[200], value[12];

    printf("Writing...¥n");

    buff[0]='¥0';
    strcat(buff, "Link ID,,Fuel Consumption,,,,,,,,HC Emission,,,,,,,,CO Emission,,,,,,,,NOx
Emission¥n");
    fputs(buff, fptr);
    buff[0]='¥0';
    strcat(buff, "USN,DSN,1,2,3,4,5,6,7,1,2,3,4,5,6,7,1,2,3,4,5,6,7,1,2,3,4,5,6,7¥n");
    fputs(buff, fptr);

    for (i=0; i<max_link_no; i++){
        buff[0]='¥0';

        down_stream_node_ID = link_info[i*29]%10000;
        up_stream_node_ID = (link_info[i*29]-down_stream_node_ID)/10000;
        gcvt(up_stream_node_ID, 6, value);
        strcat(buff, value);
        strcat(buff, ",");
        gcvt(down_stream_node_ID, 6, value);
        strcat(buff, value);

        for (j=1; j<29; j++){
            gcvt(link_info[i*29+j], 10, value);
            strcat(buff, ",");
            strcat(buff, value);
        }
        strcat(buff, "¥n");
        fputs(buff, fptr);
    }
    buff[0]='¥n';
    buff[1]='¥0';
    fputs(buff, fptr);

    printf("¥n");
}

```

Calculator3:

```

#include <stdio.h>
#include <math.h>
#include <stdlib.h>
#include <string.h>

enum {max_link_no = 71, data_digit = 16,
      no_direction = 2, //0=Eastbound, 1=Westbound , 2=Total
      no_section = 7, //0-4:Section, 5:Directional Total, 6: Total section
      fe_cat = 4, //0=fuel, 1=HC, 2=CO, 3=NOx
      veh_cat = 4, //0=car, 1=truck, 2=bus, 3=total
      no_run = 200, //maximum number of run
};

// FUNCTIONS ////////////////////////////////////////
void get_filename(char *fullname, const char *fileextension, int i);
void read_data(float link_info[max_link_no*28], FILE *fptr_vmt, FILE *fptr_fer);
int read_num(char *num_string, const char *buff, int pos_data);
void cal_section_data(float ene_emi[no_direction][no_section][fe_cat][veh_cat][no_run],
float link_info[max_link_no*28], const int runID);
void initialize_array(float ene_emi[no_direction][no_section][fe_cat][veh_cat][no_run],
const int runID);
void cal_average(float ene_emi[no_direction][no_section][fe_cat][veh_cat][no_run],
const int num_run);
void cal_stdev(float ene_emi[no_direction][no_section][fe_cat][veh_cat][no_run], const
int num_run);
void write_result(float ene_emi[no_direction][no_section][fe_cat][veh_cat][no_run],
const int num_run, FILE *fptr);

// MAIN ////////////////////////////////////////
main ()
{
    float link_info[max_link_no*28];
    float ene_emi[no_direction][no_section][fe_cat][veh_cat][no_run];
    FILE *fptr_i1, *fptr_i2, *fptr_o;
    int runID, num_run;
    char filename[20];

    //Get Number of Runs
    printf("Input # of Runs (10~500):");
    scanf("%d", &num_run);

    for (runID=1; runID<(num_run+1); runID++){

        printf("Run %3d¥n", runID);
        printf("    Reading...¥n");

        get_filename(filename, ".vmt", runID);

```

```

    fptr_i1 = fopen(filename, "r");
    get_filename(filename, ".fer", runID);
    fptr_i2 = fopen(filename, "r");
    read_data(link_info, fptr_i1, fptr_i2);
    fclose(fptr_i1);
    fclose(fptr_i2);

    printf("    Calculating...%n");
    cal_section_data(ene_emi, link_info, runID);
}

cal_average(ene_emi, num_run);
cal_stdev(ene_emi, num_run);

printf("    Writing...%n%n");
fptr_o = fopen("network.fe", "w");
write_result(ene_emi, num_run, fptr_o);
fclose(fptr_o);

return 0;
}

// FUNCTIONS ////////////////////////////////////////
//Generate filename -----
void get_filename(char *fullname, const char *fileextension, int i)
{
    char runID[5], extension[10];

    fullname[0] = '\0';
    itoa(i, runID, 10);
    extension[0] = '_';
    extension[1] = '\0';
    strcat(extension, runID);
    strcat(extension, fileextension);
    strcat(fullname, "network");
    strcat(fullname, extension);
}

//Read and Calculate Fuel Consumption and Emissions -----
void read_data(float link_info[max_link_no*28], FILE *fptr_vmt, FILE *fptr_fer)
{
    char buff_v[150], buff_fe[150], data_strg[data_digit];
    float vmt, fe_rate;
    int i, j, k, l, m, i_rewind;
    int usn1, dsn1, usn2, dsn2;

    for (l=0; l<2; l++){
        fgets(buff_v, 150, fptr_vmt);
        fgets(buff_fe, 150, fptr_fer);
    }

```

```

}

for (l=0; l<max_link_no; l++){
    fgets(buff_v, 150, fptr_vmt);
    fgets(buff_fe, 150, fptr_fer);
    i = 0;
    j = 0;
    i = read_num(data_strg, buff_v, i);
    usn1 = atoi(data_strg);
    i_rewind = read_num(data_strg, buff_v, i);
    dsn1 = atoi(data_strg);
    j = read_num(data_strg, buff_fe, j);
    usn2 = atoi(data_strg);
    j = read_num(data_strg, buff_fe, j);
    dsn2 = atoi(data_strg);
    if ((usn1==usn2)&&(dsn1==dsn2)){
        for (m=0; m<4; m++){
            i = i_rewind;
            for (k=0; k<7; k++){
                if (m==0){
                    vmt = 1.0;
                }
                else{
                    i = read_num(data_strg, buff_v, i);
                    vmt = atof(data_strg)/5280.0;
                    //conversion to mile
                }
                j = read_num(data_strg, buff_fe, j);
                fe_rate = atof(data_strg)/100.0;
                //conversion to gallon (fuel) and g/mi (emissions)
                link_info[l*28+m*7+k] = vmt*fe_rate*(3.785*(m==0)+0.001*(m!=0));
                //conversion to liter and kg
            }
        }
    }
    else{
        printf("Data Reading Error!");
    }
}

}

//Read number as string -----
int read_num(char *num_string, const char *buff, int pos_data)
{
    int j;
    j = 0;

    strnset(num_string, 0, data_digit);

```

```

    if (buff[pos_data]=='.') {
        pos_data++;
    }
    while (((buff[pos_data]>47)&&(buff[pos_data]<58)) || (buff[pos_data]==46)) {
        num_string[j] = buff[pos_data];
        pos_data++;j++;
    }
    num_string[j] = '¥0';
    return pos_data;
}

//Calculate Section Data -----
void cal_section_data(float ene_emi[no_direction][no_section][fe_cat][veh_cat][no_run],
float link_info[max_link_no*28], const int runID)
{
    int i, j, k, l, m, cum_link_no;
    float car, truck, bus;
    const int section_parts[no_direction][no_section-2]={ 5, 9, 11, 8, 4,      3, 8, 9, 11, 3};

    initialize_array(ene_emi, runID);

    for (k=0; k<fe_cat; k++) {
        cum_link_no = 0;
        for (i=0; i<no_direction; i++) {
            for (j=0; j<(no_section-2); j++) {
                for (l=cum_link_no; l<(cum_link_no+section_parts[i][j]); l++) {
                    car = link_info[l*28+k*7+0]+link_info[l*28+k*7+1];
                    truck = link_info[l*28+k*7+2]+link_info[l*28+k*7+3]
                        + link_info[l*28+k*7+4]+link_info[l*28+k*7+5];
                    bus = link_info[l*28+k*7+6];
                    ene_emi[i][j][k][0][runID-1] += car;
                    ene_emi[i][j][k][1][runID-1] += truck;
                    ene_emi[i][j][k][2][runID-1] += bus;
                    ene_emi[i][j][k][3][runID-1] += (car+truck+bus);
                }
                for (m=0; m<veh_cat; m++) {
                    ene_emi[i][no_section-2][k][m][runID-1] += ene_emi[i][j][k][m][runID-1];
                    ene_emi[1][no_section-1][k][m][runID-1] += ene_emi[i][j][k][m][runID-1];
                }
                cum_link_no += section_parts[i][j];
            }
        }
    }
}

//Initialize array -----
void initialize_array(float ene_emi[no_direction][no_section][fe_cat][veh_cat][no_run],
const int runID)
{

```

```

int i, j, k, l;

for (i=0; i<no_direction; i++){
    for (j=0; j<no_section; j++){
        for (k=0; k<fe_cat; k++){
            for (l=0; l<veh_cat; l++){
                ene_emi[i][j][k][l][runID-1] = 0.0;
            }
        }
    }
}

//Calculate Average -----
void cal_average(float ene_emi[no_direction][no_section][fe_cat][veh_cat][no_run],
const int num_run)
{
    int i, j, k, l, m;

    for (j=0; j<no_direction; j++){
        for (k=0; k<no_section; k++){
            for (l=0; l<fe_cat; l++){
                for (m=0; m<veh_cat; m++){
                    ene_emi[j][k][l][m][num_run] = 0.0;
                    for (i=0; i<num_run; i++){
                        ene_emi[j][k][l][m][num_run] += ene_emi[j][k][l][m][i];
                    }
                    ene_emi[j][k][l][m][num_run] /=(1.0*num_run);
                }
            }
        }
    }
}

//Calculate Standard Deviation -----
void cal_stddev(float ene_emi[no_direction][no_section][fe_cat][veh_cat][no_run], const
int num_run)
{
    int i, j, k, l, m;

    for (j=0; j<no_direction; j++){
        for (k=0; k<no_section; k++){
            for (l=0; l<fe_cat; l++){
                for (m=0; m<veh_cat; m++){
                    ene_emi[j][k][l][m][num_run+1] = 0.0;
                    for (i=0; i<num_run; i++){
                        ene_emi[j][k][l][m][num_run+1] +=
                            pow((ene_emi[j][k][l][m][i]-ene_emi[j][k][l][m][num_run]), 2.0);
                    }
                }
            }
        }
    }
}

```

```

        if (num_run>1) {
            ene_emi[j][k][l][m][num_run+1] =
                sqrt(ene_emi[j][k][l][m][num_run+1]/(1.0*num_run-1.0));
        }
        else{
            ene_emi[j][k][l][m][num_run+1] = 99999;
        }
    }
}
}

//Write results to file -----
void write_result(float ene_emi[no_direction][no_section][fe_cat][veh_cat][no_run],
const int num_run, FILE *fptr)
{
    int i, j, k, l, m;
    char buff[500], value[16];

    buff[0]='¥0';
    strcat(buff, "Section, EB,,,,,,,,,WB,,,,,,,,,Two Way¥n");
    fputs(buff, fptr);
    buff[0]='¥0';
    strcat(buff, ", Carp-Palladium,,Palladium-Terry Fox,,Terry Fox-Eagleson,,Eagleson-CNR
OP,,CNR OP-Moodie,,EB Total,,Moodie-CNR OP,,CNR OP-Eagleson,,Eagleson-Terry Fox,,Terry
Fox-Palladium,,Palladium-Carp,,WB Total,,Total¥n");
    fputs(buff, fptr);

    //      for (i=0; i<fe_cat; i++){
    //      for (j=0; j<veh_cat; j++){
    //          for (k=0; k<no_direction; k++){
    //              for (l=0; l<(no_section); l++){
    //                  for (m=num_run; m<(num_run+2); m++){
    //                      printf("before %d %d %d %d %d¥n", i, j, k, l, m);
    //                      printf("%f ", ene_emi[k][l][i][j][m]);
    //                      gcvt(ene_emi[k][l][i][j][m], 8, value);
    //                      printf("%s¥n", value);
    //                      printf("after %d %d %d %d %d¥n¥n", i, j, k, l, m);
    //                  }
    //              }
    //          }
    //      }

    for (i=0; i<fe_cat; i++){
        for (j=0; j<veh_cat; j++){
            buff[0] = 48+i;
            buff[1] = 48+j;

```



```

buff[2] = '¥0';
for (k=0; k<no_direction; k++){
    for (l=0; l<(no_section-1); l++){
        for (m=num_run; m<(num_run+2); m++){
            gcvt(ene_emi[k][l][i][j][m], 6, value);
            strcat(buff, ",");
            strcat(buff, value);
        }
    }
}
for (m=num_run; m<num_run+2; m++){
    gcvt(ene_emi[1][no_section-1][i][j][m], 6, value);
    strcat(buff, ",");
    strcat(buff, value);
}
strcat(buff, "¥n");
fputs(buff, fptr);
}
}
}

```

MOBILE6/MOBILE6C Postprocessor

Input: MOBILE6/MOBILE6C database output file (".tbl" file). Time period of a day can be specified during program execution. Start and end of the period is assigned by MOBILE6 time ID (i.e. 1 for 6 A.M., 2 for 7 A.M. and so on).

Output: Comma delimited text file that contains fuel consumption and emissions rate for 28 MOBILE6 vehicle categories for specified time period.

Source Code:

```
#include <stdio.h>
#include <math.h>
#include <stdlib.h>
#include <string.h>

enum {max_len_in = 210, max_len_out = 500, data_digit = 10,
      pos_pol = 4, pos_vtype = 5, pos_etype = 6, pos_ftype = 7, pos_hour = 9,
      pos_mile = 14, pos_facvmt = 17, pos_regdist = 18, pos_gm = 10, pos_mpg = 15};

int input_time(const char *mesg);
void read_data(float data[28][3][9], const int start_time, const int end_time, const int
section);
void get_ef(FILE *fptr_i, const int k, float data[28][3][9], const int start_time, const
int end_time);
float get_data(FILE *fptr, const int k, const int pol, const int etype, const int ftype,
const int start_time, const int end_time);
float get_tsum(FILE *fptr, const int k, const int pol, const int etype, const int ftype,
const int start_time, const int end_time);
void read_num(char *num_string, const char *buff, const int pos_data);
void output_file(float data[28][3][9], const int section);
void get_filename(char *fullname, const char *filename, int i, const char *ext);

//Main =====
main()
{
    //Variables
    int i, start_time, end_time;
    float data[28][3][9];
    char ch;

    // Input Start & End Time
    start_time = input_time("Start Time ID:");
```



```
//Calculate Sum of Travel Fraction
float get_tsum(FILE *fptr, const int k, const int pol, const int etype, const int ftype,
const int start_time, const int end_time)
{
    char buff[max_len_in], num_string[data_digit];
    float value, mile, regdist;
    long fptr_prev;
    int i, hour;

    i = 0;
    value = 0.0;
    fptr_prev = ftell(fptr);

    while (fgets(buff, max_len_in, fptr)!=NULL) {
```

```

    read_num(num_string, buff, pos_pol);
    if (atoi(num_string)==pol) {
        read_num(num_string, buff, pos_vtype);
        if (atoi(num_string)==k) {
            read_num(num_string, buff, pos_etype);
            if (((etype == 0)&&(atoi(num_string)==1)) || (atoi(num_string)==etype)) {
                read_num(num_string, buff, pos_ftype);
                if (atoi(num_string)==ftype) {
                    read_num(num_string, buff, pos_hour);
                    hour = atoi(num_string);
                    if ((hour>=start_time)&&(hour<=end_time)) {
                        read_num(num_string, buff, pos_mile);
                        mile = atof(num_string);
                        read_num(num_string, buff, pos_regdist);
                        regdist = atof(num_string);
                        value += mile*regdist;
                        i++;
                    }
                }
            }
        }
    }
}

printf("|%3d ", i);
fseek(fp_ptr, fp_ptr_prev, SEEK_SET);
return (value);
}

//Read number as string -----
void read_num(char *num_string, const char *buff, const int pos_data)
{
    int i, j, k;

    i = 0;
    j = 0;
    strnset(num_string, 0, data_digit);

    for (k=1; k<pos_data; k++) {
        do {i++;} while (buff[i]!='9');
    }
    do {i++;} while ((buff[i]<48) || (buff[i]>57));
    while (((buff[i]==46) || ((buff[i]>=48)&&(buff[i]<=57)))&&(j<(data_digit-1))) {
        num_string[j] = buff[i];
        i++;j++;
    }
    num_string[j] = '\0';
}

//Data Reading Loop -----

```

```

void read_data(float data[28][3][9], const int start_time, const int end_time, const int
section)
{
    int k, i, j;
    char filename[20];
    FILE *fptr_i;

    //Open input file
    get_filename(filename, "HWY417", section, ".TB1");
    fptr_i = fopen(filename, "r");
    //Array Initialization
    for (k=0; k<28; k++){ for (i=0; i<3; i++){ for (j=0; j<9; j++){
        data[k][i][j] = 0.0;
    }}}
    //Get Emission Factor
    for (k=1; k<29; k++){
        if (k < 10)
            printf("%nVeh %d", k);
        else
            printf("%nVeh%d", k);
            get_ef(fptr_i, k, data, start_time, end_time);
            printf("%n");
        }
    //Close input file
    fclose(fptr_i);
}

//Output Result -----
void output_file(float data[28][3][9], const int section)
{
    char buff[max_len_out], value[20], filename[20];
    FILE *fptr_o;
    int k, pol, etype;

    //Open output file
    get_filename(filename, "HWY417", section, ".EF");
    fptr_o = fopen(filename, "w");
    //Make buffer & write to file
    for (k=1; k<29; k++){
        buff[0]='V'; buff[1]='e'; buff[2]='h';
        buff[3]=(k-k%10)/10+48;
        buff[4]=k%10+48;
        buff[5]='\0';
        for (pol=1; pol<4; pol++){
            if (pol == 1){
                for (etype=0; etype<9; etype++){
                    strcat(buff, ", ");
                    gcvt(data[k-1][pol-1][etype], data_digit, value);
                    strcat(buff, value);
                }
            }
        }
    }
    fclose(fptr_o);
}

```

```

    }
}
else{
    for (etype=0; etype<3; etype++){
        strcat(buff, ", ");
        gcvt(data[k-1][pol-1][etype], data_digit, value);
        strcat(buff, value);
    }
}
}
strcat(buff, "\n");
fputs(buff, fptr_o);
}
//Close file
fclose(fptr_o);
}

//Get VMT Consumption -----
void get_ef(FILE *fptr_i, const int k, float data[28][3][9], const int start_time, const
int end_time)
{
    int i, pol, etype, ftype;

    i = 0;

    for (pol=1; pol<4; pol++){
        if (pol == 1){
            for (etype=0; etype<9; etype++){
                if ((etype == 0)|| (etype == 1)|| (etype == 6)){
                    for (ftype=1; ftype<5; ftype++){
                        if ((i%7)==0) printf("\n"); i++;
                        data[k-1][pol-1][etype] +=
                            get_data(fptr_i, k, pol, etype, ftype, start_time, end_time);
                    }
                }
            }
        }
        else{
            if ((i%7)==0) printf("\n"); i++;
            data[k-1][pol-1][etype] =
                get_data(fptr_i, k, pol, etype, 5, start_time, end_time);
        }
    }
}
}
else{
    for (etype=0; etype<3; etype++){
        if ((etype == 0)|| (etype == 1)){
            for (ftype=1; ftype<5; ftype++){
                if ((i%7)==0) printf("\n"); i++;
                data[k-1][pol-1][etype] +=
                    get_data(fptr_i, k, pol, etype, ftype, start_time, end_time);
            }
        }
    }
}
}

```