MONASH University
Accident Research Centre

ESTABLISHING A BENCHMARK OF SAFETY ON MELBOURNE ROADS DURING 2001

by

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Abstract:

This project was conducted as part of Monash University Accident Research Centre's Baseline Research Program due to a perceived lack of data available on Melbourne-based road safety indicators. The study aimed to report on car driver, motorcyclist, and bicyclist safety indicators on Melbourne roads, including: levels of seat belt use by drivers and passengers; levels of child restraint usage; levels of helmet and conspicuous clothing use by bicyclists; levels of helmet and protective clothing use by motorcyclists; vehicle occupancy rates; and speed profiles.

The majority of vehicles observed (68%) had a single occupant. Higher non-wearing seat belt rates were observed for male drivers (2.6%) than for females (1.9%). The highest non-wearing seat belt rates amongst passengers were for those in the middle rear seating position (14.2%). Within this position, females (20.8%) and those aged between 26-39 years (60%) had the highest non-wearing rates. Amongst child passengers those aged 4-7 years had the highest rate of incorrectly worn seat belts (25.3%), whilst children aged 8-13 years had the highest non-wearing rate (10.7%). The seat belt wearing rate for child passengers (70.5%) was considerably less than for adult passengers (89.5%). Whilst all motorcyclists wore a helmet, only 12% wore all the types of recommended protective clothing (i.e. upper and lower body, footwear and gloves). Forty percent of bicyclists wore a helmet, and 56% wore conspicuous clothing.

Across the surveyed Melbourne sites in 60 km/h speed zones, the majority of vehicles were recorded travelling at speeds between 41-60 km/h (52%) or between 61-70 km/h (32%); 40.4% of vehicles were exceeding the speed limit; 8.1% were exceeding the speed limit by at least 10 km/h; 1.0% were exceeding the speed limit by at least 20 km/h, and 0.18% of vehicles were exceeding the speed limit by at least 30 km/h. A high proportion of vehicles was observed exceeding the speed limit during night-time hours: approximately 75% between 1 a.m.-5 a.m. on weekdays, and over 70% between 3 a.m.-6 a.m. on weekends. Drivers in the Northern regions of Melbourne exhibited the highest proportion of vehicle speeds exceeding the speed limit (75%), and also had a higher proportion of excessive speeds above 90 km/h (i.e. 5% c.f. 2.8% for all Melbourne regions).

Target groups and road safety issues that need to be addressed through enforcement, education and advertising campaigns are discussed, as are the proposed recommendations aimed at increasing the safety of road users.

Key Words:
Seat belt usage; child restraint; helmet wearing; protective clothing; motorcyclist; bicyclist; vehicle occupancy; speed survey; speed limit; speed profiles

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Preface

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EXECUTIVE SUMMARY

This research project was conducted as part of Monash University Accident Research Centre's Baseline Research Program due to a perceived lack of data available on road safety indicators for Melbourne and rural regions of Victoria.

ORIGINAL OBJECTIVES

The initial aim of the project was to examine a number of road behaviours, in order to establish a benchmark of safety on Victoria's roads. Knowledge of behavioural indicators of road safety is critical for a thorough and accurate understanding of the levels of safety on Victorian roads. Such data can be collected on an annual or bi-annual basis in order to identify emerging trends and safety issues.

Regular measurements of specific on-road behaviours have the potential to provide information to road safety organizations about the effectiveness of their education and advertising programs, and to illustrate which safety messages need to be restructured to better reach the community. Such measurements complement evaluations based on actual road trauma outcomes, by allowing stronger conclusions to be reached regarding the causal role of each initiative. Emerging safety issues may also be identified, enabling intervention programs to address problem behaviours before they impact on road trauma levels. Therefore, a behavioural survey program can provide important information to road safety organisations, not only on their current programs but how to best target future programs.

Another of the original objectives of the study was to compare and calibrate the findings of observational surveys with those of telephone surveys, in a cost-effective way. This would assist understanding of the extent to which telephone surveys are biased, by investigating the similarity of results to the observational surveys. The inclusion of a telephone survey was based on the notion that this type of data collection is more cost-effective than large-scale observational surveys. However, due to the rising costs and low response rates of telephone surveys, this strategy has been questioned, and hence only observational surveys were carried out. In addition, only behavioural data on Melbourne roads was collected instead of data representing all regions of Victoria.

AIMS OF CURRENT STUDY

The present study aimed to provide benchmark data for car driver, motorcyclist, and bicyclist road safety indicators on Melbourne roads. Behavioural data was collected through an observational survey on selected Melbourne roads in 60 km/h speed zones. Speed survey data, containing vehicle speed measurements from sites in Melbourne occurring in 60 km/h speed zones, was obtained from VicRoads. The following behavioural safety indicators were measured:

- levels of seat belt use by drivers and passengers;
- levels of child restraint usage;
- levels of helmet and conspicuous clothing use by bicyclists;
- levels of helmet and protective clothing use by motorcyclists;
- vehicle occupancy rates;
- age of vehicle; and
- speed profiles.

It was envisaged that the above data, together with other important road safety indicators, would be collected annually to allow for a comprehensive assessment of emerging road safety trends. This report presents the results from a first wave of data collection to meet this end. The findings provide information about current trends; reflecting the extent to which road safety messages have been internalised by Melbourne drivers. Conclusions and recommendations are aimed at road safety organisations in terms of current trends and likely effectiveness of existing educational and advertising programs.

MAIN FINDINGS

Observational Survey Data

Observational data was obtained from five sites in Melbourne during 2001, one in each Victorian Police Region, on all of the above indicators except speed profiles. A total of 4,665 observations were made at the selected Melbourne sites. Of these 4,595 were cars, 45 were motorcycles and 25 were bicycles. More male drivers were observed, however there were slightly more female passengers observed.

The main findings from the observational survey of behavioural safety indicators were:

Vehicle occupancy rates

- The majority of vehicles observed had a single occupant, i.e. driver only (68%), followed by driver plus one passenger vehicles (24%). This indicates that vehicles with high occupancy rates (i.e. 3 or more occupants) are not as common as driver-only vehicles, or driver plus one passenger vehicles.

- Higher vehicle occupancy rates (i.e. driver with at least 2 passengers) were observed on weekends (16.1%) compared to weekdays (5.8%).

- Higher occupancy rates were observed during the weekday evening peak period (7.8%) compared to the early morning peak period on weekdays (4.0%).

Restraint Usage

- For all vehicle occupants the majority wore their seat belts correctly (over 91%), however, males had slightly higher *non-wearing* rates than females (3.7% c.f. 3.0%). In contrast the proportion of *incorrectly* worn seat belts was higher for females than males (4.2% c.f. 3.1%).

- The majority of incorrect seat belt usage by vehicle occupants was due to the straps being loose (30%), twisted (26%) or in contact with the neck (22%).

- For drivers, higher non-wearing rates were observed for male drivers than for females (2.6% c.f. 1.9%) whilst female drivers had the higher 'incorrectly worn' rates (2.6% c.f. 1.8%).

- The proportion of passengers *not* wearing their seat belts was highest for the rear middle seating position at 14.2%. This is contrasted with the proportion of non-wearing rates for drivers at 2.3%. The rear left seating position had the highest proportion of incorrectly restrained observations, at 10.7%.

- The highest non-wearing rates were for passengers in the rear middle seating position (14.2%). Within this position, females (20.8%) and those aged between 26-39 years (60%) had the highest non-wearing rates.

- Amongst adult passengers, young adults aged between 14-17 years and those aged 18-25 years had the highest non-wearing rates (8.1% and 7.9%, respectively).

- The proportion of adult passengers not wearing their seat belt was higher for males than females (7.7% c.f. 3.5%), whilst females had a slightly higher rate of incorrect seat belt wearing (3.9% c.f. 3.7%).

- The most common incorrect use of seat belts by adult passengers was failing to have straps firmly in place (48.9%).

- Child passengers aged between 4-7 years had the highest incorrectly worn seat belt rate (25.3%), whilst children aged 8-13 years had the highest non-wearing rate (10.7%).

- The seat belt wearing rate for child passengers (70.5%) was considerably less than that observed for adult passengers (89.5%).

Motorcyclists

- Whilst all riders and pillion passengers wore a helmet, very few wore the recommended combination of protective clothing or increased their visibility for other road users by wearing conspicuous clothing.

- Overall, the most common protective clothing worn was around the upper body. However, only 12% of motorcyclists wore all types of recommended protective clothing (i.e. upper and lower body, footwear and gloves).

- The majority of motorcyclists were not wearing conspicuous clothing (about 83%).

- Only 50 motorcyclists were observed, 45 riders and 5 pillions, which limits the extent to which the results can be generalised to the overall population of motorcyclists on Melbourne roads.

Bicyclists

- Bicyclists had a 60% helmet non-wearing rate. Over half (56%) of all bicyclists wore conspicuous clothing.

- Similar to the motorcycle safety indicator results, the low observation rate of bicyclists limits the extent to which the results can be generalised to the population of bicyclists riding in Melbourne. The results do indicate a low helmet-wearing rate, which, combined with the relatively poor proportion of bicyclists wearing conspicuous clothing, is discouraging.

Speed Surveys

Profiles of speed for drivers and riders of cars and trucks were obtained from VicRoads, and were analysed for each Region. The findings obtained from the surveys of speed profiles at selected Melbourne sites showed that:

- Across all sites, the majority of vehicles were recorded travelling at speeds between 41-60 km/h (52%) or between 61-70 km/h (32%).

- Across all sites, 40.4% of vehicles were exceeding the speed limit, 8.1% were exceeding the speed limit by at least 10 km/h; 1.0% were exceeding the speed limit by at least 20 km/h, and 0.18% of vehicles observed were exceeding the speed limit by at least 30 km/h.

Regional Differences

- The major Regional difference was the higher percentage of vehicles observed travelling within the speed limit, i.e. between 41- 60 km/h in the Inner South East (49.5%) and in the North East (41.1%), compared to the West (38.2%) and North (24.9%) Regions.

- The North (Region 3) revealed the highest proportion of vehicles exceeding the speed limit (74.4%). In contrast, the Inner South East (Region 1) showed the lowest proportion of vehicles exceeding the speed limit (46.7%).

Time of week

- The majority of vehicles were travelling within the speed limit during daylight hours on both weekdays and weekend days. However, there was a substantially higher number of vehicles exceeding the speed limit during early morning periods. Between 1 a.m.- 5 a.m. on weekdays more than 75% of the vehicles observed were travelling over 60 km/h, whilst between 3 a.m.- 6 a.m. on weekends over 70% of vehicles were exceeding the speed limit.

- The proportion of vehicles exceeding the speed limit by more than 20 km/h or by more than 30 km/h during the early hours of the morning on weekdays was higher in the North Region than in the other regions. Approximately 5% of vehicles were exceeding 90 km/h between 1 a.m.-5 a.m. in the North Region on weekdays (c.f. 2.8% for all Melbourne regions).

Vehicle type

- Across all times of the week and sites, there was a greater proportion of trucks travelling within the speed limit than cars. However, there was a greater proportion of cars observed exceeding the speed limit by up to 10 km/h than trucks, 33% and 20% respectively.

- Similar 'time of day' speed distributions were observed on weekdays and on weekends. For travelling speeds >60 km/h and >70 km/h, a greater proportion of cars were observed exceeding the speed limit than trucks. For travelling speeds > 80 km/h and > 90 km/h, there was a greater proportion of trucks at these travelling speeds across most times of the week. The exception was between the hours of 1 a.m. and 5 a.m. on weekdays.

CONCLUSIONS

Based on the findings of this first wave of data collection, the target groups and road safety issues that need to be addressed through enforcement, education and advertising campaigns are:

- Low seat belt wearing rates by child passengers aged 4-7 years;
- Incorrect seat belt usage by child passengers aged 8-13 years;
- Low seat belt wearing rates by young adult passengers aged 14-25 years;
- Low seat belt wearing rates by rear seat passengers, particularly those in the middle seating position who were female or who were aged 26-39 years;
- Incorrect seat belt usage - the most common types were failing to have straps firmly in place; having twisted straps or having straps in contact with the neck;
- A low proportion (12%) of motorcyclists wearing the recommended combination of protective clothing (i.e. upper and lower body clothing, footwear and gloves);
- A high proportion (about 83%) of motorcyclists not wearing conspicuous clothing;
- The relatively high proportion of bicyclists not wearing a helmet (60%);
- A high proportion of vehicles exceeding the speed limit during night-time hours: more than 75% between 1 a.m. – 5 a.m. on weekdays, and over 70% between 3 a.m. – 6 a.m. on weekends;
- Drivers in the North region of Melbourne who exhibited the highest proportion of vehicle speeds exceeding the speed limit (75%), and who also had a higher proportion of excessive speeds above 90 km/h (5% c.f. 2.8% for all Melbourne regions).

LIMITATIONS OF THE STUDY

1. Whilst some of the above findings relied on the observers' judgements, and were based on relatively few observations, particularly for motorcyclists and bicyclists, they are still suggestive of emerging road safety issues that need to be addressed.

2. In addition to the data collection being limited to a few sites in the Melbourne Statistical Division, a number of important measures had to be excluded because of budgetary constraints. These were:

    - Drink-driving profiles of drivers, motorcycle riders, pedestrians and bicyclists
    - Travel and exposure data for all road users
    - Other pedestrian measures (e.g. use of bicycle-only paths); and
    - Other bicyclist measures (e.g. patterns of bicycle path use).
    - Mobile phone usage by drivers.

3. One of the original aims of the study, to compare and calibrate the findings of the observational survey with those of telephone surveys in a cost-effective way, was not

attempted. This was due to the project's budgetary constraints as well as the rising costs and low response rates of telephone surveys. It is hoped that the collation and calibration of the findings of a variety of surveys (i.e. observational surveys, telephone surveys, surveys undertaken by organizations other than MUARC) will be addressed in a future Baseline Research Program study, scheduled to commence during 2003. The proposed methodological research aims to develop survey techniques that would allow observational surveys of behaviour and exposure to be conducted more frequently by developing a method that used a cost-effective integration of observational and telephone interview/questionnaire surveys fully recognizing likely budgetary constraints. Data collection of the above measures will also be considered in the proposed Baseline Research Program study.

RECOMMENDATIONS

The following recommendations have been proposed for increasing the safety of road users based on the safety indicators that the project has focused on.

1. A reduction in the seat belt non-wearing rates of drivers and passengers could be achieved by targeting certain age groups, seating positions and times of day (e.g. child and young adult passengers, rear-seat passengers).

2. Whilst the high helmet wearing rate for motorcyclists was encouraging, the helmet wearing rate for bicyclists was 60%. An extension of the project may be to undertake further observations of these road users to gain a more representative sample.

3. To increase the sample, observational survey data could be obtained from more sites in the Melbourne Statistical Division, as well as from sites in rural areas of Victoria.

4. Education and publicity campaigns targeting the restraint usage of children could be an effective approach in decreasing the proportion of incorrectly restrained child passengers that was observed in the current survey.

5. Increasing the range of safety indicators by including mobile phone usage by drivers as well as drink-driving profiles.

6. The current study observed cars in the left-hand lane only. The observations of cars in all lanes could decrease the bias in the sample and increase the size of the sample.

7. Whilst speed data was collected at only two sites in the Northern region, an approach to reduce excessive speeding amongst drivers may be to target those who exceed the speed limit according to region and time of week. e.g. drivers in the Northern suburbs of Melbourne and those travelling during the early hours of the morning on both weekdays and weekend days.

8. Speed survey data should be collected that allows for a more comprehensive analysis of driver speeds. It would be beneficial to analyse speed survey data in 5 km/h increments instead of 10 km/h increments. Data that is collected in 5 km/h increments would allow for the assessment of the effectiveness of the TAC's recent "Wipe off 5" campaign targeting speed, as well as the recent speed limit changes that occurred on some residential roads in Victoria. It should also be investigated whether more speed data can be obtained from VicRoads that allows for an examination of differences across a range of rural and metropolitan sites, and in different speed zones (e.g. 50 km/h, 70 km/h, 100 km/h).

1 INTRODUCTION

1.1 BACKGROUND

In 1994, a report prepared by VicRoads presented information on exposure to accident risk in vehicles and motorcycles in Melbourne and rural Victoria during 1994 (Arup Transportation Planning, 1995). This study examined rates of seat belt wearing in addition to factors such as number of passengers in the vehicle, age of the vehicle and years of driving experience. The results demonstrated that 2.6% of *front* seat passengers did not wear seat belts, while 13.9% of *rear* seat passengers were non-users of restraints. It was also found that the vast majority of vehicles contained only the driver (69.8%), that 22% of vehicles had one passenger, and 8.1% of vehicles had two passengers. While the survey was designed to measure exposure to risk of accidents, it also provided basic information about behavioural safety indicators for Victoria's roads.

Similar studies have been conducted more recently in New Zealand. The surveys were designed to monitor changes in road safety indicators over time and, examined behaviours such as speeding and drink-driving. Results from the New Zealand speed surveys indicated that mean speeds had decreased during 1995-2000, as had speeds in the 85th, 90th, and 95th percentiles. Such results were used in New Zealand to establish road safety progress by examining this performance measure in conjunction with measures of Police activity and accident data.

The concepts behind these studies – to examine behavioural measures of road safety in relation to risk of accidents – led to the development of this project. This research project was conducted as part of Monash University Accident Research Centre's Baseline Research Program due to a perceived lack of data available on road safety indicators for Melbourne and rural regions of Victoria. While there has been considerable emphasis on evaluation of Victoria's road safety initiatives in terms of reported crashes, in many cases it has not been clear whether the targeted behaviour has really changed or whether some other factor was responsible.

1.2 INITIAL OBJECTIVES OF STUDY

The initial aim of the project was to examine a number of road behaviours, in order to establish a benchmark of safety on Victoria's roads. Knowledge of behavioural indicators of road safety is critical for a thorough and accurate understanding of the levels of safety on Victorian roads. Such data can be collected on an annual or bi-annual basis in order to identify emerging trends and safety issues. By accurately measuring levels of road law compliance on an annual basis, trends over time may be examined to determine how effectively safety messages are being internalised by the public.

This fundamental data may then be used to provide information to road safety organizations about the effectiveness of their education and advertising programs, and will illustrate which safety messages need to be restructured to better reach the community. Emerging safety issues can be identified by such a survey, which may enable intervention programs to address a behaviour before it becomes a problem for road trauma levels.

Regular measurements of specific on-road behaviours that are related to road trauma risk have the potential to provide early indications of the effectiveness of road safety initiatives. Such measurements complement evaluations based on actual road trauma outcomes, by allowing stronger conclusions to be reached regarding the causal role of each initiative.

Emerging safety issues may also be identified, enabling intervention programs to address problem behaviours before they impact on road trauma levels. Therefore, a behavioural survey program can provide important information to road safety organisations, not only on their current programs but how to best target future programs.

Due to budgetary constraints, the project had to be modified as follows:

- Only behavioural data on Melbourne roads was collected instead of data representing all regions of Victoria.

- One of the original aims of the study was to compare and calibrate the findings of observational surveys with those of telephone surveys, in a cost-effective way. This would assist understanding of the extent to which telephone surveys are biased, by investigating the similarity of results to the observational surveys. The inclusion of a telephone survey was based on the notion that this type of data collection is more cost-effective than large-scale observational surveys. However, due to the rising costs and low response rates of telephone surveys, this strategy has been questioned, and hence only observational surveys were carried out.

1.3 REVISED AIMS OF STUDY

The present study aimed to provide benchmark data for car driver, motorcyclist, and bicyclist road safety indicators on Melbourne roads. The behavioural safety indicators that were measured via an observational survey and a speed survey included:

- levels of seat belt use by drivers and passengers;

- levels of child restraint usage;

- levels of helmet and conspicuous clothing use by bicyclists;

- levels of helmet and protective clothing use by motorcyclists;

- vehicle occupancy rates;

- age of vehicle; and

- speed profiles.

The study also aimed to extend previous research by providing more detailed information on some of the above safety measures. For example, previous research on child restraints had focused only on whether or not restraints were worn correctly; however, there are many different errors that constitute incorrect usage (e.g. child is too large for a restraint, restraint straps twisted). It is useful to obtain information of this nature so that educational programs can be specifically tailored to address the most common and most serious problems.

It was envisaged that such data should be collected annually to allow for a comprehensive assessment of road safety trends.

This report presents the results from a first wave of data collection to meet this end. The findings provide information about current trends; reflecting the extent to which road safety messages have been internalised by Melbourne drivers. Conclusions and

recommendations are aimed at road safety organisations in terms of current trends and likely effectiveness of existing educational and advertising programs.

1.4 LIMITATIONS OF THE STUDY

In addition to the data collection being limited to a few sites in the Melbourne Statistical Division, a number of important measures had to be excluded because of budgetary constraints. These were:

- Drink-driving profiles of drivers, motorcycle riders, pedestrians and bicyclists;
- Travel and exposure data for all road users;
- Other pedestrian measures (e.g. use of bicycle-only paths); and
- Other bicyclist measures (e.g. patterns of bicycle path use);
- Mobile phone usage by drivers.

To address the above deficiencies in this current project, a related Baseline Research Program study to be conducted during 2003, will examine cost-effective ways of conducting observational studies. The proposed methodological research aims to develop survey techniques that would allow observational surveys of behaviour and exposure to be conducted more frequently by developing a method that used a cost-effective integration of observational and telephone interview/questionnaire surveys fully recognizing likely budgetary constraints. Data collection of the above measures will also be considered in the proposed study.

2 METHOD

2.1 OBSERVATIONAL SURVEYS

Behavioural data was collected through an observational survey on selected Melbourne roads. The following behavioural safety indicators were measured:

- levels of seat belt use by drivers and passengers;
- levels of child restraint usage;
- levels of helmet and conspicuous clothing use by bicyclists;
- levels of helmet and protective clothing use by motorcyclists;
- vehicle occupancy rates; and
- age of vehicle.

Much of the planning for the surveys centred on selecting appropriate observation locations and determining representative time periods in which to conduct the observations. This planning was undertaken in liaison with both VicRoads and Victoria Police, with safety issues a priority.

2.1.1 Site selection

The selection of sites for the observational survey was based on those used by Arup (1999). For the Arup surveys metropolitan Melbourne was divided into two study areas (North West and South East) based on VicRoads' Metropolitan Regional Boundaries. Within each of these areas, three sub-areas were identified: Inner, Middle, and Outer metropolitan Melbourne. Sites within each of these sub-areas were selected based on road classification (i.e. main road, local road, highway, freeway), in addition to criteria such as sufficient lighting, manageable light sequences, and reasonable traffic volumes. Signalised intersections of arterial roads were chosen because of their high accident-involvement rates.

Five of the Arup sites were selected for the current survey. Rather than use the two divisions utilised in the Arup surveys (North West and South East), the five Police Regions were selected as an appropriate means of dividing the study area. Several metropolitan sites in each of these five Regions were examined. Many were excluded on the basis that they did not meet the criteria specified for the present study.

The following criteria were identified as essential for site selection in the present study.

The site had to:

a) be comprised of an intersection with traffic lights;

b) be located in a 60km/h speed zone;

c) allow clear visibility for observers, including the absence of tram tracks and slip lanes[1];

[1] Sites with left-hand turn slip lanes were eliminated from the study. This was because vehicles using this type of lane were not stationary for a sufficient period of time to allow for a complete observation. They also obscured the view of stationary vehicles in neighbouring lanes.

d) exclude any other features which might interfere with observations (e.g. as a result of the intersection layout or roadside obstructions, including trees, construction work); and

e) exclude any features that might risk the safety of the observers (e.g. narrow pedestrian paths and/or nature strips that would necessitate the close proximity of observers to passing vehicles).

Preference was given to sites with higher traffic volumes in order to maximise the amount of data that could be collected over short periods of time. The five sites chosen for observation are listed in the following table.

Table 2.1 Observational survey site locations and Police Regions

Police Region / Site Number	Site
Inner South East (Region 1)	Punt Road southbound at Commercial Road, South Yarra
West (Region 2)	Mason Street eastbound at Melbourne Road, Newport
North (Region 3)	Bell Street eastbound at Sydney Road (Hume highway), Coburg
North East (Region 4)	Highbury Road westbound at Middleborough Road, Mount Waverley
South (Region 5)	Sladden Street (Cranbourne-Frankston road) eastbound at High Street (South-Gippsland highway), Cranbourne

2.1.2 Observation time schedule

All observations took place during September and October 2001.[2] Observation periods were limited to daylight hours to allow for more accurate descriptions of drivers, riders and their behaviours. In order to represent each site at different times of the day, observations took place in one-and-a-half hour blocks.

Time periods were selected to capture a representative sample of traffic flow across the working day and weekend days, including peak traffic periods, within the limits of the project budget and timeframe. As not all time periods could be covered (e.g.: night-time observations), time of day differences were deemed more important than day of the week differences (with the exception of the clear differences between weekday and weekend).

A summary of the observation schedule is presented in Table 2.2.

Table 2.2 Observation time schedule

	Site Number				
Day Of Week	1	2	3	4	5
Monday	7:30-9am	10-11:30am	12:30-2pm	2:30-4pm	5-6:30pm
Tuesday	10-11:30am	12:30-2pm	2:30-4pm	5-6:30pm	7:30-9am
Wednesday	12:30-2pm	2:30-4pm	5-6:30pm	7:30-9am	10-11:30am
Thursday	2:30-4pm	5-6:30pm	7:30-9am	10-11:30am	12:30-2pm
Friday	5-6:30pm	7:30-9am	10-11:30am	12:30-2pm	2:30-4pm
Saturday	10:30-12pm	1-2:30pm	10:30-12pm	1-2:30pm	10:30-12pm
Sunday	1-2:30pm	10:30-12pm	1-2:30pm	10:30-12pm	1-2:30pm
Total Hours	**10.5**	**10.5**	**10.5**	**10.5**	**10.5**

[2] This excluded the two-week school holiday period from 24th September to 6th October.

Time periods were randomly distributed across sites so that each site would be observed during each of the five time periods during the week and the two time periods on the weekend. This distribution resulted in a total of 10.5 hours of observation per site: 7.5 hours on weekdays and 3 hours on weekends.

2.1.3 Materials

Observational 'tick-a-box' style checklists were developed to collect data on different indicators. Separate forms were developed for recording details on each of the following measures:

Observation site form:

- site number;
- observation start and finish time;
- observer's initials;
- weather conditions and time of day;
- whether street lights were on or off; and
- special circumstances.

Vehicle[3] and vehicle driver observation form:

- registration plate of vehicle;
- vehicle type;
- vehicle year;
- presence of licence plate;
- vehicle size;
- headlights on/off;
- number of occupants;
- age of driver;
- sex of driver;
- seat belt use; and
- type of incorrect seat belt usage.

Vehicle passenger observation form:

- passenger(s) seating location;
- passenger(s) age;
- passenger(s) sex;
- passenger(s) seat belt use;
- passenger(s) seat belt type; and
- passenger(s) type of incorrect usage.

Motorcyclist observation form:

- motorcycle registration plate;
- presence of licence plate;
- headlamp on/off;
- number of occupants (up to 2);

[3]The type of vehicle surveyed was either a car, four-wheel-drive, mini-bus, utility/panel van, commercial van or a taxi.

- rider/pillion passenger age;
- rider/pillion passenger sex;
- rider/pillion passenger helmet wearing;
- rider/pillion passenger protective clothing; and
- rider/pillion passenger presence of conspicuous clothing.

Bicyclist observation form :

- location of observation;
- age of bicyclist;
- sex of bicyclist;
- conspicuous clothing;
- presence of helmet;
- helmet carried;
- helmet fastened correctly; and
- helmet positioned correctly.

Examples of the observational forms are given in Appendix A. In addition, an Explanatory Statement was prepared according to the guidelines of the 'Monash University Standing Committee on Ethics in Research Involving Humans'. This form was given to drivers, riders or passengers who questioned the observers (Appendix B).

It should be noted that drivers aged 14-17 years were also observed and analysed to take into account the extent of under-age driving, and also to be consistent with the age range groups from the Arup (1995) survey.

2.1.4 Training and pilot testing

Before training commenced, the researchers who developed the checklists piloted them at an intersection in close proximity to the Monash University Accident Research Centre. As it was necessary to estimate some behaviours and some demographics (e.g. age, sex, correct usage of seat belts), all observers underwent an in-depth training session to increase the accuracy and consistency of their observations.

The training session was conducted over a three-hour period to cover the following issues:

- Outline of the study's aims and timetable of observations.

- Detailed description and purpose of the site, vehicle/driver, passenger, motorcyclist, and bicyclist forms used in the observations.

- Examples of different car sizes based on the 'Buyers Guide To Used Car Safety Ratings August 2000' (Cameron & Newstead, 2000).

- An outline of recommendations on:

  - matching various child restraints to approximate age;
  - definition of protective and conspicuous clothing for motorcyclists;
  - correct positioning of bicycle helmets; and
  - suggested protective clothing for motorcyclists.

A practice run was conducted at a nearby site (Mount Waverley, Site 4) for one hour. Observations of the same indicators were taken and compared. After several comparisons, further observations were recorded anonymously in order to gauge inter-rater reliability. Whilst recordings were generally consistent across observations, by the end of this session the indicators that showed the most inconsistency were 'size of car' and 'year of manufacture'. After further referral of the "Buyers Guide to Used Car Safety Ratings" observers were able to overcome these inconsistencies.

2.1.5 Vehicle Selection and Observational procedure

Some vehicle types were excluded from the study on the basis that observations were impractical. These included buses (more than 10 seats), trucks and emergency vehicles.

Priority was given to bicycles and motorcycles due to their relatively low frequency. Cars and vans were selected on the basis of their queue position, beginning with the vehicle closest to the traffic lights and then progressing down the queue. As many vehicles as possible were observed during the red light phase of the traffic signal; on average, five vehicles per pair of observers.

Observations were made when vehicles were stationary at the intersection at a red signal. Only vehicles in the left-hand lane were observed. Not all of the selected intersections had median strips to facilitate observations in other lanes and regardless, median strip observations were considered to appear too intrusive and to present a higher safety risk to the observers.

It was established during piloting that vehicles in lanes other than the left-hand lane were too obscured or too far away to allow for accurate data collection. It was not anticipated that this decision would have a significant impact on the data. However, it should be noted that some drivers might have a consistent lane preference and that, furthermore, this may relate to demographic and/or other characteristics associated with behavioural safety indicators. This possibility should be acknowledged when considering generalisations based on the study outcomes and future survey designs.

Observers worked in pairs for safety reasons as well as to increase inter-rater reliability. They also aimed to be as unobtrusive as possible whilst taking observations. This was achieved by avoiding eye contact with road users and also standing as far from vehicles as was practical for observations to be carried out.

The Explanatory Statement was offered to any person who initiated contact with the observers. This statement emphasised the need to collect benchmark data on road safety indicators so that emerging road safety issues could be identified. Furthermore the anonymity of data from road users was assured and the contact details of the Monash University Standing Committee on Ethics in Research Involving Humans was supplied for complaints and queries. The contact details of a project worker were also given to obtain findings from the data. It was also emphasised verbally that no identifying information was being recorded. If any occupant remained concerned, they were asked if they would like to be withdrawn from the project, and if requested, their data was removed and appropriately destroyed. Approximately five drivers and five front seat passengers requested that their data be withdrawn. Recording of observations had only commenced in half of these cases.

2.2 SPEED SURVEYS

Speed survey data, containing vehicle speed measurements from sites in Melbourne and surrounding areas, was obtained from VicRoads. The data was recorded using the loop classification method, which measures the time taken for a vehicle to move between two fixed locations. Trucks are distinguished from cars on the basis of axle length. Speed data was only processed from sites in 60 km/h speed zones to be consistent with the selection criteria for the observational survey sites. Speed data was obtained from 48 sites, which were then grouped into the five Police Regions. There were no speed surveys conducted in the Southern Police Region (Region 5). A list of the speed survey sites and their categorisation into Police Regions is provided in Appendix C.

2.3 ANALYSES

Chapter 3 presents the findings of the observational survey data whilst Chapter 4 presents the speed survey results.

2.3.1 Observational Survey

The demographic characteristics of the observational data are presented first. The observational data was analysed separately for each of the three road user groups, namely, car occupants, motorcycle occupants, and bicyclists. For cars and car occupants, the findings report on seat belt wearing rates, occupancy rates and vehicle characteristics (i.e. car size, type, year of manufacture). Cross-tabulations between each of these variables and between at least one of the following - age, sex, region, and time of day - were made. Separate analyses were also conducted for adult and for child passengers of vehicles.

The levels of motorcyclist and bicyclist safety indicators were presented as frequencies.

2.3.2 Speed Survey

For the speed surveys, the distribution of speed observations across time of day, day of week and region were presented. Following this, the proportions of speed observations in which the vehicle was exceeding the speed limit by time of day were presented.

3 OBSERVATION SURVEY RESULTS

3.1 OVERVIEW OF GENERAL DEMOGRAPHIC AND SITUATIONAL FACTORS

The following section outlines the number and percentage of observations for each of the five sites, the demographics of each road user group, and the characteristics of their vehicles. A total of 4,665 vehicles were observed. Of these 4,595 were cars, 45 were motorcycles, and 25 were bicycles. Table 3.1 shows the number and percentage of vehicle observations at each of the five sites.

Table 3.1 Number and percentage of vehicle observations by site

SITE NUMBER	SITE LOCATION	CARS	MOTORCYCLES	BICYCLES
Site 4	Mount Waverley	1017	5	3
		22.1%	11.1%	12.0%
Site 5	Cranbourne	989	11	3
		21.9%	24.4%	12.0%
Site 3	Coburg	974	9	0
		21.2%	20.0%	0.0%
Site 1	South Yarra	915	16	15
		19.9%	35.6%	60.0%
Site 2	Newport	700	4	4
		15.2%	8.9%	16.0%
All Sites	**Total**	**4595**	**45**	**25**
		100.0%	**100.0%**	**100.0%**

While there were comparatively fewer observations at the Newport site, the number of observations across the remaining four sites were relatively equal.

3.1.1 Sex and age of road user

In total, 2907 male and 1668 female drivers were observed. The highest number of observations was for drivers aged between 30-39 years (1361, 29.2%). In comparison, fewer drivers aged between 18-21 years were observed (129, 2.8%), and only two drivers aged 75 years or older were observed.

From the total number of drivers observed there were 11 cases whereby the age of the driver was unknown or missing. There were also 20 observations whereby the sex of the driver was missing or unknown. Subsequently, a cross-tabulation using either age or sex could not be computed for those missing or unknown cases.

There was a total of 1921 passengers observed. Unlike the trend for drivers, more female passengers were observed than male passengers. Passenger ages were relatively equal, with passengers aged 26-39 years receiving a slightly higher number of observations. There were 82 observations where either the gender or age of the passenger was unknown. Of these, the sex of 73 passengers aged 0-3 years, seven passengers aged 4-7 years and two passengers aged 8-13 years were not estimated.

Only one female motorcyclist was observed, and 44 males. Consistent with the age of drivers and passengers, the majority of motorcyclists were aged between 30-39 years. Ten observations included unknown details. These were the age of nine males, one female, and

the sex of one road user aged 30-39 years. There were five pillion passengers. Of these, only one was male. Three were aged between 30-39 years, one was aged 18-21 years and the other 26-29 years.

There were 15 male and 10 female bicyclists observed. Overall the age distribution amongst cyclists was fairly even. Interestingly, 70% of female cyclists were aged between 0-17 years.

3.1.2 Vehicle Information

3.1.2.1 Size, type and year of vehicle manufacture

Victorian registration plates comprised 99.4% of the total number of vehicle registrations observed. There were no Tasmanian registrations observed and all other remaining states had relatively equal number of observations. There was one unknown vehicle registration.

Table 3.2 presents the frequency and proportion of cars observed separated according to size; small, medium, and large.

Table 3.2 Number and percentage of observations by vehicle size

VEHICLE SIZE	NUMBER AND PERCENTAGE OF OBSERVATIONS
Small (e.g.: Laser, Excel)	965 (21.1%)
Medium (e.g.: Telstar, Liberty)	898 (19.6%)
Large (e.g.: Commodore, Magna)	2713 (59.3%)
Total	**4576 (100.0%)**

Table 3.2 demonstrates the high proportion of large cars observed. In comparison, the proportion of small and medium cars was approximately 20% each. There were 19 observations where the vehicle size was not recorded.

Table 3.3 shows the frequency and proportion of each car type observed. Standard cars made up the majority of car types. There were relatively few taxis, mini buses and/or commercial vans. The remaining car types were relatively equal amongst those observed. There were 33 unknown or missing car types.

Table 3.3 Number and percentage of observations by vehicle type

VEHICLE TYPE	NUMBER AND PERCENTAGE OF OBSERVATIONS
Car	3680 (80.6%)
4WD	291 (6.4%)
Minibus	109 (2.4%)
Utility/Panel Van	291 (6.4%)
Commercial Van	142 (3.1%)
Taxi	49 (1.1%)
Total	**4562 (100.0%)**

Table 3.4 lists the total number and proportion of vehicle observations by year of vehicle manufacture. Vehicles manufactured before 1979 only accounted for 0.5% of all observations. In fact, the proportion of vehicles observed increases with year of vehicle manufacture. This trend plateaus for vehicles manufactured during 1990-1995 and 1996-2001, with both categories averaging approximately 34% of the observations. There were 7 observations where the year of vehicle manufacture was not recorded.

Table 3.4 Number and percentage of vehicle observations by year of vehicle manufacture

YEAR OF VEHICLE MANUFACTURE	NUMBER AND PERCENTAGE OF OBSERVATIONS
1996-2001	1612 (35.1%)
1990-1995	1553 (33.8%)
1980-1989	1233 (26.9%)
1970-1979	169 (3.7%)
<1970	21 (0.5%)
Total	**4588 (100.0%)**

3.1.2.2 Headlight usage and licence plates

Of the vehicles observed, 95.2% had their headlights off. There were two occasions where the observer was not sure whether the headlight was on or not. This is not surprising as most of the observations were made in daylight hours.

Of the vehicles observed, 23 vehicles displayed learner permits, and 169 displayed probationary licence plates. Ninety-five per cent of drivers did not display an L- or P-plate. It can be assumed, therefore, that the majority of drivers observed held their full licence. There were 87 missing observations for the 'drivers plate displayed' category.

In summary, of the 4595 cars observed, most were large standard cars manufactured after 1990. The majority of vehicles had their headlights off, and drivers were assumed to hold a full licence.

3.2 CAR OCCUPANCY AND RESTRAINT WEARING RATES

3.2.1 Occupancy rates

The vehicle occupancy rates are shown in Table 3.5. The majority of vehicles observed had a single occupant, that is a driver only. In addition, when passengers were present, there were fewer observations with high occupancy rates than low occupancy rates. This indicates that vehicles with high occupancy rates are not as common as driver-only vehicles, or driver plus one-passenger vehicles.

Table 3.5 Frequency and percentage of vehicle occupancies

OCCUPANCY TYPE	NUMBER AND PERCENTAGE OF OBSERVATIONS
Driver Only	3106 (67.6%)
Driver plus one passenger	1092 (23.8%)
Driver plus two passengers	264 (5.7%)
Driver plus three passengers	109 (2.4%)
Driver plus four passengers	20 (0.4%)
Driver plus five passengers	3 (0.1%)
Driver plus six passengers	1 (0.01%)
Total	**4595 (100.0%)**

The vehicle occupancy rates observed at each site are shown in Table 3.6. Whilst vehicles with high-occupancy rates were less common across all sites (Table 3.5), the comparison of occupancy rates between the five sites indicated that the Cranbourne and Coburg sites had the highest number of vehicles with high occupancy rates (Table 3.6).

Table 3.6 Frequency and percentage of occupants by observation site

Site	Driver Only	Driver + 1 pass.	Driver + 2 pass.	Driver + 3 pass.	Driver + 4 pass.	Driver + 5 pass.	Driver + 6 pass.	Total
Newport	440	189	48	19	3	1	0	700
	62.8%	27.0%	6.8%	2.7%	0.42%	0.14%	0.0%	100.0%
Mount Waverley	705	243	57	10	2	0	0	1017
	69.3%	23.9%	5.6%	0.98%	0.19%	0.0%	0.0%	100.0%
Cranbourne	640	248	65	26	9	1	0	989
	64.7%	25.0%	6.5%	2.60%	0.91%	0.10%	0.0%	100.0%
Coburg	680	197	57	34	4	1	1	974
	69.8%	20.2%	5.8%	3.5%	0.41%	0.10%	0.10%	100.0%
South Yarra	641	215	37	20	2	0	0	915
	70.0%	23.5%	4.0%	2.18%	0.21%	0.0%	0.0%	100.0%
Total	**3106**	**1092**	**264**	**109**	**20**	**3**	**1**	**4595**
	100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

The vehicle occupancy rates by time of day and day of week are presented in Table 3.7. Higher occupancy rates were observed on weekends. The observation periods during weekdays showed little variability between peak and off-peak periods. Exploratory analyses using Bivariate Correlations revealed a moderate correlation between occupancy rate and time of day ($r = 0.22$, $p > 0.01$). This indicated that higher occupancy rates were observed during the evening peak and weekend observation times compared to early morning peak periods.

Table 3.7 Frequency and percentage of vehicle occupants by time of day and day of week

Time of day	Driver Only	Driver + 1 pass.	Driver + 2 pass.	Driver + 3 pass.	Driver + 4 pass.	Driver + 5 pass.	Driver + 6 pass.	Total
Morning peak	581	87	23	5	0	0	0	696
	83.48%	12.50%	3.30%	0.72%	0.00%	0.00%	0.00%	100.0%
Mid morning	447	133	22	6	1	0	0	609
	73.40%	21.84%	3.61%	0.99%	0.16%	0.00%	0.00%	100.0%
Lunch	441	135	20	6	1	1	0	604
	73.01%	22.35%	3.31%	0.99%	0.17%	0.17%	0.00%	100.0%
Afternoon	428	134	30	14	1	0	0	607
	70.51%	22.08%	4.94%	2.31%	0.16%	0.00%	0.00%	100.0%
Evening peak	576	170	39	16	7	1	0	809
	71.20%	21.01%	4.82%	1.98%	0.87%	0.12%	0.00%	100.0%
Weekend	633	433	130	62	10	1	1	1270
	49.84%	34.09%	10.24%	4.88%	0.79%	0.08%	0.08%	100.0%
Total	**3106**	**1092**	**264**	**109**	**20**	**3**	**1**	**4595**
	100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

3.2.2 Restraint usage

3.2.2.1 All occupants

Table 3.8 depicts the seat belt wearing rates of all occupants (drivers and passengers) by sex. Whilst the majority of participants wore their seat belts correctly (over 91%), male occupants had slightly higher non-wearing rates. In contrast the proportion of *incorrectly* worn seat belts was higher for females than males. There were 88 observations where the sex of the driver was not determined. Of these, 61 were correctly wearing their seat belts, 19 observations were unknown, 4 were not wearing a seat belt, 2 were wearing a seat belt incorrectly, and for the remaining 2 observations the seat belt was worn but the observer couldn't determine if it was worn correctly.

Table 3.8 Total occupant seat belt wearing rates by sex

Occupant type	Correctly worn	Incorrectly worn	Couldn't tell if worn correctly	Not worn at all	Unknown if worn	Total
Males	3367	114	10	135	30	3656
	92.1%	3.12%	0.27%	3.69%	0.82%	100.0%
Females	2589	118	10	86	23	2826
	91.6%	4.18%	0.35%	3.04%	0.81%	100.0%
All occupants	**6017**	**234**	**22**	**225**	**72**	**6570**
	91.6%	**3.6%**	**0.33%**	**3.42%**	**1.1%**	**100.0%**

Table 3.9 lists the various types of incorrect restraint usage for all occupants and the number of observations for each category. It should be noted that incorrect usage includes those occupants restrained incorrectly as a result of the manufacturer's design of the seat belt (i.e. straps in contact with the occupants neck due to inadequate design, particularly for vehicle occupants of relatively short height), as well as error on the individuals' part (i.e. straps twisted).

Table 3.9 Frequency and proportion of <u>incorrectly</u> restrained seat belts for all occupants

TYPE OF INCORRECT USAGE	NUMBER OF OBSERVATIONS
Straps not firm	66 (29.7%)
Straps twisted	57 (25.7%)
Straps not level/above shoulder	23 (10.4%)
Straps in contact with neck	48 (21.6%)
Strap crosses stomach area not hip	7 (3.2%)
Rug/blanket under harness	1 (0.5%)
Eye level higher than back of the car seat	2 (0.9%)
Straps not firm/twisted	3 (1.4%)
Straps not firm/not level above shoulder/in contact with neck	1 (0.5%)
Straps not firm/ not level or above shoulder	2 (0.9%)
Straps not firm/in contact with neck	3 (1.4%)
In contact with neck/other (child to big for seat)	1 (0.5%)
Other	8 (3.6%)
TOTAL	**222 (100.0%)**

The majority of incorrect seat belt usage was due to the straps being loose, twisted, or in contact with the neck. There were 12 observations for which specifying the way in which the seat belt was incorrectly worn was missing or unknown.

A closer analysis examines the seat belt wearing rates for drivers, adult passengers and child passengers separately in the next sections.

3.2.2.2 Drivers

Table 3.10 presents the seat belt wearing rates of drivers by age. The proportion of drivers correctly restrained was at least 95% for all age groups. A relatively equal proportion of 'incorrectly worn' and 'not worn at all' seat belt usage was revealed across all age groups. The non-wearing rates of drivers aged between 26-59 years was marginally greater than the non-wearing rates of drivers aged 60+ years and 21 years and under. Interestingly the youngest (14-17 year olds) and oldest (75 years and above) drivers had 100% seat belt wearing rates, although there were only eight and seven observations made for these age groups, respectively.

Table 3.10 Drivers' seat belt wearing rates by age group

Age group (years)	Correctly worn	Incorrectly worn	Couldn't tell if worn correctly	Not worn at all	Unknown if worn	Total
14-17	8 100.0%					8 100.0%
18-21	122 95.3%	3 2.3%		3 2.3%		128 100.0%
22-25	376 95.7%	8 2.0%		9 2.3%		393 100.0%
26-29	648 95.5%	16 2.4%		13 1.9%	1 0.1%	678 100.0%
30-39	1286 95.1%	26 1.9%	1 0.07%	34 2.5%	5 0.4%	1352 100.0%
40-49	1072 95.2%	25 2.2%	2 0.2%	20 1.8%	7 0.6%	1126 100.0%
50-59	581 95.1%	7 1.1%		22 3.6%	1 0.2%	611 100.0%
60-74	244 93.8%	9 3.5%		6 2.3%	1 0.4%	260 100.0%
75+	7 100.0%					7 100.0%
All Drivers	**4350** **95.1%**	**94** **2.0%**	**3** **0.06%**	**107** **2.3%**	**18** **0.4%**	**4572** **100.0%**

**The age or seat belt wearing information of 23 drivers was missing or unknown.*

The seat belt wearing rates of male and female drivers are shown in Table 3.11. Slightly higher non-wearing rates were observed for male drivers than for females whilst females had higher 'incorrectly worn' seat belt rates. There were five observations in which the sex of the driver could not be determined. Of these, two drivers were correctly wearing their seat belts and it was not known if the remaining three were wearing their seat belts.

Table 3.11 Drivers' seat belt wearing rates by sex

Occupant type	Correctly worn	Incorrectly worn	Couldn't tell if worn correctly	Not worn at all	Unknown if worn	Total
Males	2751	52	1	76	13	2893
	95.1%	1.8%	0.03%	2.6%	0.44%	100.0%
Females	1584	43	2	31	2	1662
	95.3%	2.6%	0.12%	1.9%	0.12%	100.0%
All Drivers	**4338**	**94**	**3**	**107**	**18**	**4560**
	95.1%	**2.0%**	**0.06%**	**2.3%**	**0.4%**	**100.0%**

**The sex or seat belt wearing information of 35 drivers was missing or unknown.*

3.2.2.3 All Passengers

The seat belt wearing rates of all passengers, regardless of their age and sex, is shown in Table 3.12 according to their seating position. The proportion of passengers *not* wearing their seat belts was highest for the rear middle seating position at 14.2%. This is contrasted with the proportion of non-wearing rates for drivers at 2.3%. The rear left seating position had the highest proportion of incorrectly restrained observations, at 10.7%.

Table 3.12 Seat Belt Wearing Rates For All Passengers By Seating Position

Passenger Seating Position	Correctly worn	Incorrectly worn	Couldn't tell if worn correctly	Not worn at all	Unknown	Total
Front Left	1160	88	7	46	3	1304
% Front left	89.0%	6.75%	0.53%	3.52%	0.23%	100.0%
Rear Left	232	32	5	22	9	300
% Rear left	77.33%	10.67%	1.67%	7.33%	3.0%	100.0%
Rear Middle	79	3	3	17	18	120
% Rear middle	65.83%	2.50%	2.50%	14.16%	15.0%	100.0%
Rear Right	166	14	3	25	12	220
% Rear right	75.45%	6.36%	1.36%	11.36%	5.45%	100.0%
Drivers	**4338**	**94**	**3**	**107**	**18**	**4560**
	95.1%	**2.0%**	**0.06%**	**2.3%**	**0.4%**	**100.0%**

The seat belt wearing rates by seating position are next given by sex of passenger (Table 3.13) and age of the passenger (Table 3.14). For the front left and rear left seating positions, male passengers had higher non-wearing rates than females. For the rear middle and rear right positions, female passengers had higher non-wearing rates.

The highest proportion of non-wearing recorded was for the 26-29 year-old passenger age group in the rear middle seating position at 60% (Table 3.14). Passengers in the rear right and rear middle seating positions aged between 14-17 years also had high non-wearing rates (up to 25%).

Table 3.13 Passenger seat belt wearing rates by seating position and sex

Passenger seating position	Correctly worn	Incorrectly worn	Couldn't tell if worn correctly	Not worn at all	Unknown if worn	Total
Front Left						
Male	399	39	4	28	0	470
	84.90%	8.30%	0.85%	5.95%	0.0%	100.0%
Female	760	48	3	18	2	831
	91.46%	5.77%	0.36%	2.16%	0.24%	100.0%
Rear Left						
Male	99	16	2	14	2	133
	74.43%	12.03%	1.50%	10.52%	1.50%	100.0%
Female	133	16	3	8	7	167
	79.64%	9.60%	1.80%	4.80%	4.19%	100.0%
Rear Middle						
Male	25	2	1	6	9	43
	58.13%	4.65%	2.32%	13.95%	20.93%	100.0%
Female	29	1	1	10	7	48
	60.41%	2.08%	2.083%	20.83%	14.58%	100.0%
Rear Right						
Male	84	6	2	10	3	105
	80.0%	5.71%	1.90%	9.52%	2.85%	100.0%
Female	77	8	0	15	3	103
	74.75%	7.76%	0.0%	14.56%	2.91%	100.0%

Table 3.14 Passenger seat belt wearing rates by seating position and age

Age Group (years)	Correctly worn	Incorrectly worn	Couldn't tell if worn correctly	Not worn at all	Unknown if worn	Total
Front Left						
0-3	50.0%	40.0%	0.0%	10.0%	0.0%	100.0%
4-7	43.05%	47.22%	4.16%	5.55%	0.0%	100.0%
8-13	84.53%	9.27%	2.06%	4.12%	0.0%	100.0%
14-17	94.38%	2.24%	0.0%	3.37%	0.0%	100.0%
18-25	90.16%	4.37%	0.0%	5.46%	0.0%	100.0%
26-39	93.02%	3.84%	0.0%	2.88%	0.24%	100.0%
40-59	93.13%	2.94%	0.32%	3.26%	0.32%	100.0%
60+	93.02%	3.87%	0.77%	2.32%	0.0%	100.0%
Rear Left						
0-3	86.42%	6.17%	0.0%	2.46%	4.93%	100.0%
4-7	61.77%	22.06%	4.41%	10.30%	1.47%	100.0%
8-13	76.47%	7.84%	1.96%	13.72%	0.0%	100.0%
14-17	94.88%	5.13%	0.0%	0.0%	0.0%	100.0%
18-25	70.83%	8.33%	0.0%	12.5%	8.33%	100.0%
26-39	73.0%	2.70%	2.70%	16.21%	5.40%	100.0%
40-59	79.0%	15.79%	0.0%	0.0%	5.26%	100.0%
60+	76.47%	11.76%	0.0%	11.76%	0.0%	100.0%
Rear Middle						
0-3	78.68%	0.0%	4.91%	4.91%	11.47%	100.0%
4-7	54.28%	5.71%	2.85%	14.28%	22.85%	100.0%
8-13	63.63%	0.0%	0.0%	9.10%	27.27%	100.0%
14-17	25.0%	25.0%	0.0%	25.0%	25.0%	100.0%
18-25	16.67%	0.0%	0.0%	50.0%	33.33%	100.0%
26-39	40.0%	0.0%	0.0%	60.0%	0.0%	100.0%
40-59	50.0%	0.0%	0.0%	25.0%	25.0%	100.0%
60+	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Rear Right						
0-3	76.19%	4.76%	2.38%	2.38%	14.28%	100.0%
4-7	68.42%	14.03%	3.50%	10.52%	3.50%	100.0%
8-13	78.12%	9.37%	0.0%	12.5%	0.0%	100.0%
14-17	77.27%	0.0%	0.0%	22.72%	0.0%	100.0%
18-25	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
26-39	86.36%	4.54%	0.0%	0.0%	9.10%	100.0%
40-59	88.23%	0.0%	0.0%	5.88%	5.88%	100.0%
60+	100.0%					100.0%

In summary the highest non-wearing rates were for passengers in the middle rear seating position. Within this position, females and those aged between 26-29 years had the highest non-wearing rates. (Appendix F gives the raw frequency, not percentage, of wearing rates by age).

3.2.2.4 Adult passengers

The following tables present seat belt wearing rates for adult and child passengers regardless of their seating position in the vehicle. In addition to passengers aged 18 years and above, passengers who were estimated to fall into the 14-17 years age group were categorised as adult passengers. In total, 1301 adult passengers were observed. A summary of their seat belt usage by age group is presented in Table 3.15. Young adult passengers aged between 14-17 years and those aged 18-25 years had the highest non-wearing rates. Only one driver aged 60+ years was not wearing a seat belt.

Table 3.15 Adult passengers' seat belt wearing rates by age group

Age group (years)	Correctly worn	Incorrectly worn	Couldn't tell if worn correctly	Not worn at all	Unknown if worn	Total
14-17	141	5		13	2	161
	87.5%	3.1%		8.1%	1.2%	100.0%
18-25	192	12		18	5	227
	84.5%	5.2%		7.9%	2.2%	100.0%
26-39	403	17	1	24	7	452
	89.1%	3.76%	0.22%	5.3%	1.5%	100.0%
40-59	311	11	1	12	3	338
	92.0%	3.25%	0.29%	3.6%	0.9%	100.0%
60+	99	4	1	1		105
	94.3%	3.8%	0.95%	0.95%		100.0%
All Adult Passengers	**1147**	**49**	**3**	**68**	**17**	**1284**
	89.3%	**3.8%**	**0.2%**	**5.3%**	**1.32%**	**100.0%**

**The age or seat belt usage of 17 adult passengers was missing or unknown.*

Table 3.16 shows that the proportion of passengers not wearing their seat belt was higher for males than females, whilst females had a slightly higher rate of incorrect seat belt wearing. Overall, adult female passengers were more likely to be incorrectly restrained. There were three unknown observations of the passenger's sex. One was for a correctly worn seat belt and for the remaining two it was not known if the seat belt was worn.

Table 3.16 Adult passengers' seat belt wearing rates by sex

Occupant type	Correctly worn	Incorrectly worn	Couldn't tell if worn correctly	Not worn at all	Unknown if worn	Total
Males	399	17		35	4	455
	87.6%	3.7%		7.7%	0.8%	100.0%
Females	750	32	3	29	13	827
	90.7%	3.9%	3.5%	3.5%	1.6%	100.0%
All Adult Passengers	**1149**	**49**	**3**	**64**	**19**	**1284**
	89.5%	**3.81%**	**0.2%**	**5.0%**	**1.5%**	**100.0%**

**The sex or seat belt usage of 17 adult passengers was missing or unknown.*

Table 3.17 shows that the most common incorrect use of seat belts by adult passengers was failing to have the straps firmly in place. This accounted for nearly half of the observations of incorrect seat belt wearing. Other common incorrect usage of seat belts was having straps twisted or having straps that were either not level or above the occupant's shoulder. This pattern of findings is similar to the rates of incorrect restraint usage by drivers.

Table 3.17 Adult passengers' Incorrect Seat belt usage

TYPE OF INCORRECT USAGE	NUMBER OF OBSERVATIONS
Straps not firm	23 (48.9%)
Straps twisted	7 (14.9%)
Straps not level/above shoulder	10 (21.3%)
Straps in contact with neck	4 (8.5%)
Strap crosses stomach area not hip	0 (0.0%)
Rug/blanket under harness	0 (0.0%)
Eye level higher than back of the car seat	0 (0.0%)
Straps not firm/not level above shoulder/in contact with neck	1 (2.1%)
Straps not firm/not level above shoulder	1 (2.1%)
Straps in contact with neck/child too small for seat	1 (2.1%)
Other	0 (0.0%)
All Adult Passengers	**41 (100.0%)**

3.2.2.5 Child restraints

The restraint usage of children firstly presents the demographics of the child passengers and their restraint usage patterns. Then the relationships between the demographics of drivers and the accuracy of restraining their child passengers are presented.

A total of 644 child passengers (aged between 0 to 13 years) were observed. Table 3.18 lists the frequency and proportion of child passengers' seat belt wearing rates by age. Children aged between 4-7 years had the highest rate of incorrectly worn seat belts (25.3%), and the highest non-wearing rates (9.7%). The 'Unknown if worn' column indicates that there was some difficulty in observing the restraints of infants. The seat belts of infant capsules located in the centre rear seat were more difficult to observe compared to child or booster seats due to their angle and location in the car. In addition sun reflectors attached to windows of the car for the protection of the infants, often obscured the observers' vision.

Table 3.18 Child passengers' seat belt wearing rates by age

Age group (years)	Correctly worn	Incorrectly worn	Couldn't tell if worn correctly	Not worn at all	Unknown if worn	Total
0-3	157	11	4	7	16	195
	80.5%	5.6%	2.0%	3.6%	8.2%	100.0%
4-7	132	60	9	22	14	237
	55.7%	25.3%	3.7%	9.3%	5.9%	100.0%
8-13	160	16	3	22	4	205
	78.0%	7.80%	1.5%	10.7%	2.0%	100.0%
All child passengers	**449**	**87**	**16**	**51**	**34**	**637**
	70.5%	**13.7%**	**2.5%**	**8.0%**	**5.3%**	**100.0%**

Table 3.19 shows that there was little variability between the seat belt wearing rates of male and female children, with female children displaying higher non-wearing. Whilst the majority of children wore their seat belt correctly (70.5%), a 100% wearing rate for this group was not observed. Furthermore, 'Correctly Worn' seat belt wearing rates for child passengers were considerably less than those for adult passengers.

Table 3.19 Child passengers' restraint wearing rates by sex

Occupant type	Correctly worn	Incorrectly worn	Couldn't tell if worn correctly	Not worn at all	Unknown if worn	Total
Male	198	45	9	22	13	287
	69.0%	15.7%	3.14%	4.5%	4.5%	100.0%
Female	188	39	5	23	7	262
	71.8%	14.9%	1.9%	8.8%	2.7%	100.0%
All Child Passengers	**449**	**87**	**16**	**51**	**34**	**637**
	70.5%	**13.6%**	**2.5%**	**8.0%**	**5.3%**	**100.0%**

Table 3.20 reveals the most common type of incorrect seat belt usage was that the seat belt straps were in contact with the child's neck (44%). This was quite prevalent amongst children aged between 4-7 years. As previously stated in section 3.2.2.1, the incorrectly restrained category includes both those individuals who were incorrectly restrained due to the manufacturer's design of the seat belt, and those due to error on the wearer's part. The seven observations classified as 'Other' were concerned with the child's seat being the incorrect size for their age.

Table 3.20 Child passengers' frequency of incorrect seat belt usage by age

Age group (years)	Straps not firm	Straps twisted	Straps not level/ above shoulder	Straps in contact with neck	Straps not firm/ twisted	Straps not firm / not level or above shoulder	Straps not firm / in contact with neck	Straps not firm / in contact with neck / other	Other	Total
0-3	5	1		3		1			1	11
	45.4%	9.1%		27.2%		9.1%			9.1%	100.0%
4-7	13	1	4	29	1		2	1	7	61
	21.3%	1.6%	6.5%	47.5%	1.6%		3.2%	1.6%	11.4%	100.0%
8-13	6	1	2	6	2					17
	35.2%	5.8%	12.5%	35.2%	11.7%					100.0%
All Child Passengers	**24**	**3**	**6**	**38**	**3**	**1**	**2**	**1**	**8**	**86**
	27.9%	**3.5%**	**7.0 %**	**44.1%**	**3.5%**	**1.2%**	**2.3%**	**1.2%**	**9.3%**	**100.0%**

Exploratory analyses of *drivers* with child passengers who were incorrectly restrained revealed little variability between the sex and age of the driver and the frequency of incorrectly restrained children. This indicates that the incorrect restraining of child passengers occurs across a variety of demographics. Across the five observation sites some variability was revealed with respect to incorrectly restrained children. Of the 105 incorrectly restrained observations of child passengers aged between 0-13 years, 32.4% were observed at the Cranbourne site, 22.9% at Newport, and 20.0% at Mt. Waverley. Coburg and South Yarra made up only 13.3% and 11.4% of the observations, respectively.

3.3 MOTORCYCLISTS

The following section presents the observations found for motorcyclists, by reporting on their helmet wearing, their protective clothing and head light observations.

3.3.1 Helmet wearing

Table 3.21 presents the proportion of motorcycle riders observed to be wearing a helmet. All motorcycle riders wore helmets. Over half of the motorcycle riders observed wore full helmets, which effectively protects the rider's face from rain and other objects whilst

riding. Of the five pillion passengers observed, three were wearing full helmets and two had their helmets open.

Table 3.21 Frequency of helmet wearing in motorcycle riders

HELMET TYPE	NUMBER AND PERCENTAGE OF OBSERVATIONS
Full	28 (63.6%)
Open	16 (36.4%)
None	0 (0.0%)
Total	**45 (100.0%)**

Of the 50 motorcycle riders and pillion passengers observed all were wearing either a full or open helmet. Whilst this is an encouraging trend, caution should be taken when generalising these results to the general population of motorcyclists due to low observation rates.

3.3.2 Protective and conspicuous clothing

The type of observed protective clothing worn by motorcycle riders is shown in Table 3.22. Upper body protective clothing with footwear and/or gloves was worn most frequently. Only 12% of motorcycle riders wore all types of recommended protective clothing (upper and lower body, footwear and gloves). Of the five pillion passengers, two were wearing upper body protective clothing; one was wearing upper, lower, gloves and footwear; one was wearing upper body and footwear; and one was wearing no protective clothing.

Overall, the most common protective clothing worn was around the upper body (e.g. leather jacket). Few motorcycle riders or passengers wore the full combination of recommended protective clothing. Again, this trend may lack reliability due to the low rate of motorcycle rider and pillion passenger observations.

Table 3.22 Frequency of protective clothing in motorcycle riders

PROTECTIVE CLOTHING WORN	NUMBER AND PERCENTAGE OF OBSERVATIONS
Upper Body	3 (7.1%)
Lower Body	0 (0.0%)
Footwear	1 (2.4%)
Gloves	6 (14.3%)
Upper Body, Footwear, Gloves	9 (21.4%)
Upper Body, Gloves	8 (19.0%)
Upper, Lower Body, Footwear, Gloves	5 (11.9%)
Footwear, Gloves	2 (4.8%)
Upper Body, Footwear	5 (11.9%)
None	3 (7.1%)
Total	**42** **100.0%**

Table 3.23 presents the proportion of conspicuous clothing worn by motorcycle riders. The majority of motorcycle riders observed were not wearing conspicuous clothing. Of the five pillion passengers observed, none were wearing conspicuous clothing. The aim of wearing conspicuous clothing is to maximise other road users' detection of motorcyclists by

increasing motorcyclist's visibility. The results demonstrate that of the observed motorcycle riders and pillions very few (less than 18%) wear conspicuous clothing.

Table 3.23 Frequency of conspicuous clothing in motorcycle riders

CONSPICUOUS CLOTHING WORN	NUMBER OF OBSERVATIONS
Yes	8 (18.6%)
No	35 (81.4%)
Total	**43 (100.0%)**

3.3.3 Headlight usage

The majority of headlights on motorcycles were switched off (72.7%). There were four observations where it was not known if the headlight was on or off. The trend found for motorcyclists, to ride with their headlight switched off during daylight hours, was consistent with the observations found for cars.

3.3.4 Summary

The results found for motorcycle safety indicators showed that whilst all riders and passengers wore a helmet, very few wore the recommended combination of protective clothing or increased their visibility for other road users by wearing conspicuous clothing. There was a total of only 50 riders and passengers observed, 45 riders and 5 pillions, which limits the extent to which the results can be generalised to the overall population of motorcyclists on Melbourne roads.

3.4 BICYCLISTS

Despite there being only 25 bicyclist observations, the helmet wearing and conspicuous clothing results for these road users are presented below.

3.4.1 Helmet wearing

Table 3.24 presents the proportion of bicycle riders wearing their helmet and the proportion carrying their helmet.

Table 3.24 Frequency and proportion of helmet wearing and carrying by bicyclists

HELMET WEARING STATUS			
Worn	**Carried**	**Neither worn nor carried**	**TOTAL**
10	9	6	**25**
40%	36%	24%	**100%**

Table 3.24 shows that bicyclists had a 60% non-wearing rate. Of the 10 bicyclists wearing a helmet all had their helmet done up correctly, but only eight out of the ten had their helmet positioned correctly. Therefore there were only 8 bicyclists out of the 25 that observed, who wore their helmet correctly. Of the 15 bicyclists observed not wearing their helmet, nine carried their helmet and the remaining six neither wore nor carried a helmet. More than half of the bicyclists not wearing a helmet, carried one instead.

3.4.2 Conspicuous clothing

Table 3.26 displays the proportion of bicyclists wearing conspicuous clothing. Slightly more than half of all bicyclists wore conspicuous clothing. Similar to the motorcyclist safety indicator results, the low number of bicyclists observed limits the extent to which the results can be generalised to the population of bicyclists riding in Melbourne. These results do indicate, however, a low helmet-wearing rate, which, combined with the relatively poor proportion of bicyclists wearing conspicuous clothing, is discouraging.

Table 3.25 Frequency of conspicuous clothing worn by bicyclists

CONSPICUOUS CLOTHING WORN	NUMBER & PERCENTAGE OF OBSERVATIONS
Yes	14 (56.0%)
No	11 (44.0%)
Total	**25 (100.0%)**

4 SPEED SURVEY RESULTS

4.1 INTRODUCTION TO DATA

The speed survey data was obtained from VicRoads. Approximately three and a half months of survey data were analysed, covering an 18-month period, from the beginning of May 2000 to mid-October 2001. Surveys were usually conducted over a seven-day period. In order to compare the results with the observational surveys (where all sites had a 60 km/h speed limit), only sites in 60 km/h speed zones in metropolitan regions were selected for the speed profile analysis. The following data were recorded:

- Number of vehicle speeds observed in the following speed ranges:
  - 0-40 km/h,
  - 41-60 km/h,
  - 61-70 km/h, 71-80 km/h,
  - 81-90 km/h, and
  - > 90 km/h;
- Length of vehicle – this was used to group vehicles into either:
  - cars, or
  - trucks.
- Time of day (hourly blocks over a 24-hour period);
- Day of week (over a seven day period); and
- Location of the survey (categorised into the 5 Victorian Police Regions).

The 48 speed survey sites were grouped according to Police Boundaries (Appendix C gives the groupings). Victorian Police Boundaries are separated into 5 regions across metropolitan and rural areas of Victoria. For the Melbourne Metropolitan area the following Police regions were included in the surveys[2]:

- Region 1 = Inner South Eastern Metropolitan
- Region 2 = Western Metropolitan
- Region 3 = Northern Metropolitan
- Region 4 = North Eastern Metropolitan.

The following aggregate analysis presents the distribution of speeds across all vehicle types observed; all hours of the day; all days of week; and all Police Regions (Metropolitan components). In the next section, the data was then analysed according to the distribution of speeds across each of the Metropolitan regions. The distributions of speeds were then analysed by vehicle type; by hour of day; and by the day of week. The proportion of

[2] The speed surveys were not conducted in the Southern Police region (Region 5).

vehicles exceeding the speed limit, by region and time of week, and also by vehicle type and time of week were next presented.

4.2 AGGREGATE RESULTS

Figure 4.1 shows the percentage of vehicle speeds observed in each speed range across all regions, all times of the week, and all vehicle types.

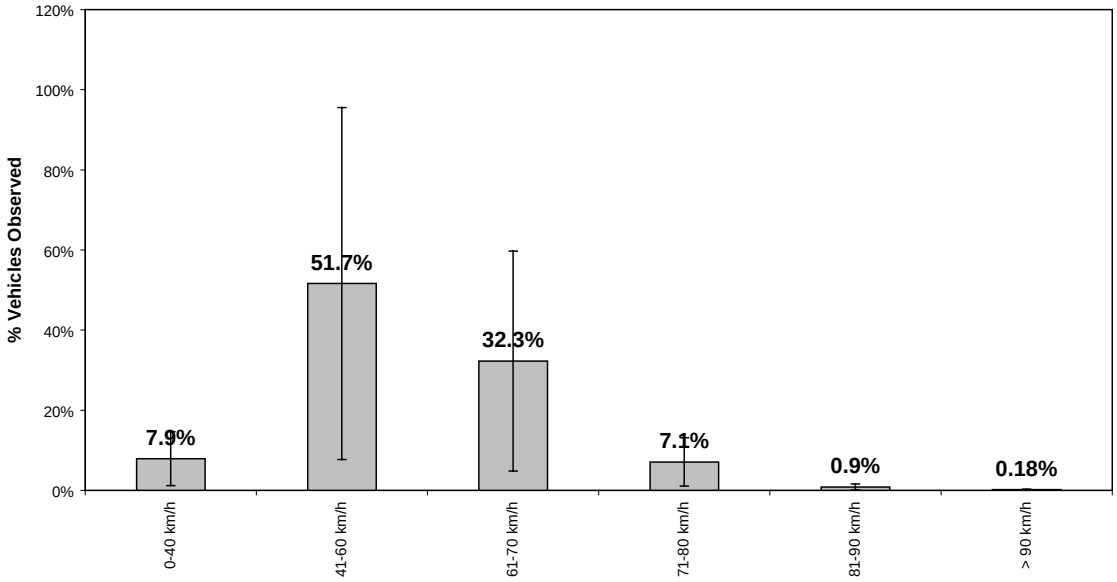

Figure 4.1 Percentage Of Vehicles Observed In Each Speed Range Across All Sites, Times, And Vehicle Types

The majority of vehicles were recorded travelling at speeds between 41-60 km/h and 61-70 km/h. Overall, approximately half of the vehicles observed were travelling at speeds between 41-60 km/h. There were 9,014 (0.18%) vehicles exceeding the 60 km/h speed limit by 30 km/h or more. The cumulative percentage of vehicles *exceeding* 60 km/h, exceeding 70 km/h, exceeding 80 km/h and exceeding 90 km/h is shown in Figure 4.2.

About 40.4% of vehicles were exceeding the 60 km/h speed limit; 8.1% were exceeding the speed limit by at least 10 km/h (i.e. >70 km/h); 1.0% were exceeding the speed limit by at least 20 km/h (i.e. >80 km/h); and 0.18% of vehicles observed were exceeding the speed limit by at least 30 km/h (i.e. >90 km/h).

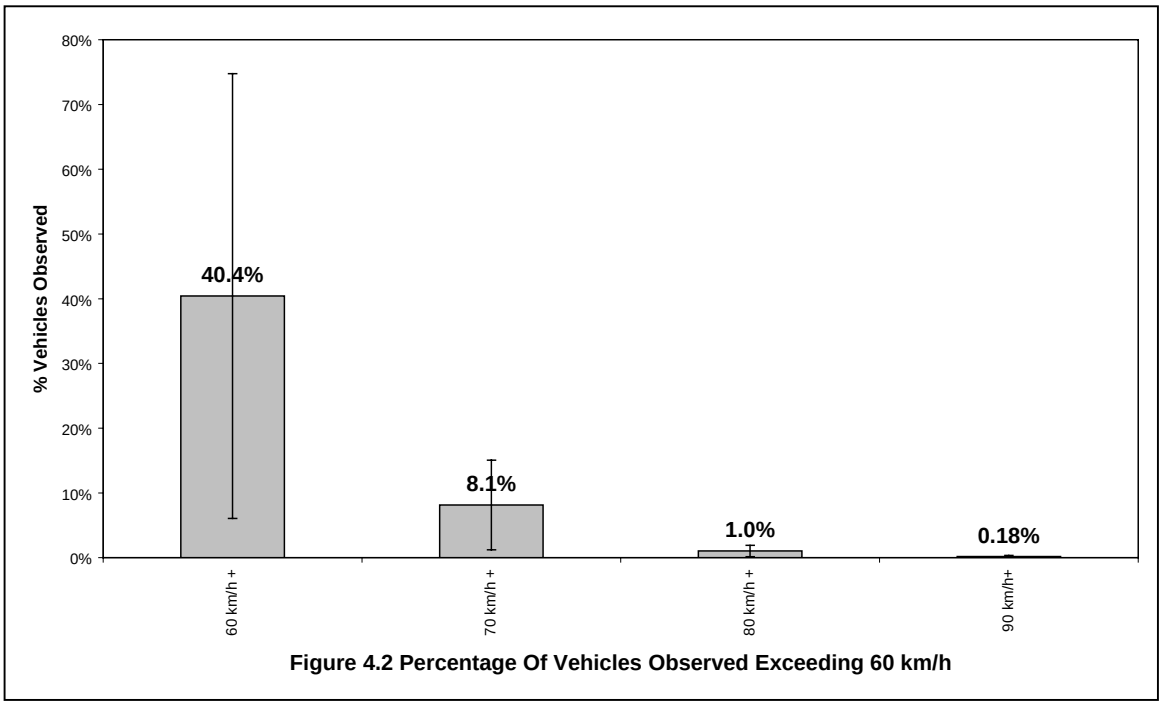

Figure 4.2 Percentage Of Vehicles Observed Exceeding 60 km/h

4.3 COMPARING SPEED DISTRIBUTIONS ACROSS MELBOURNE POLICE REGIONS

Figure 4.3 presents the proportion of vehicle speeds observed in each speed range, for each Melbourne region.

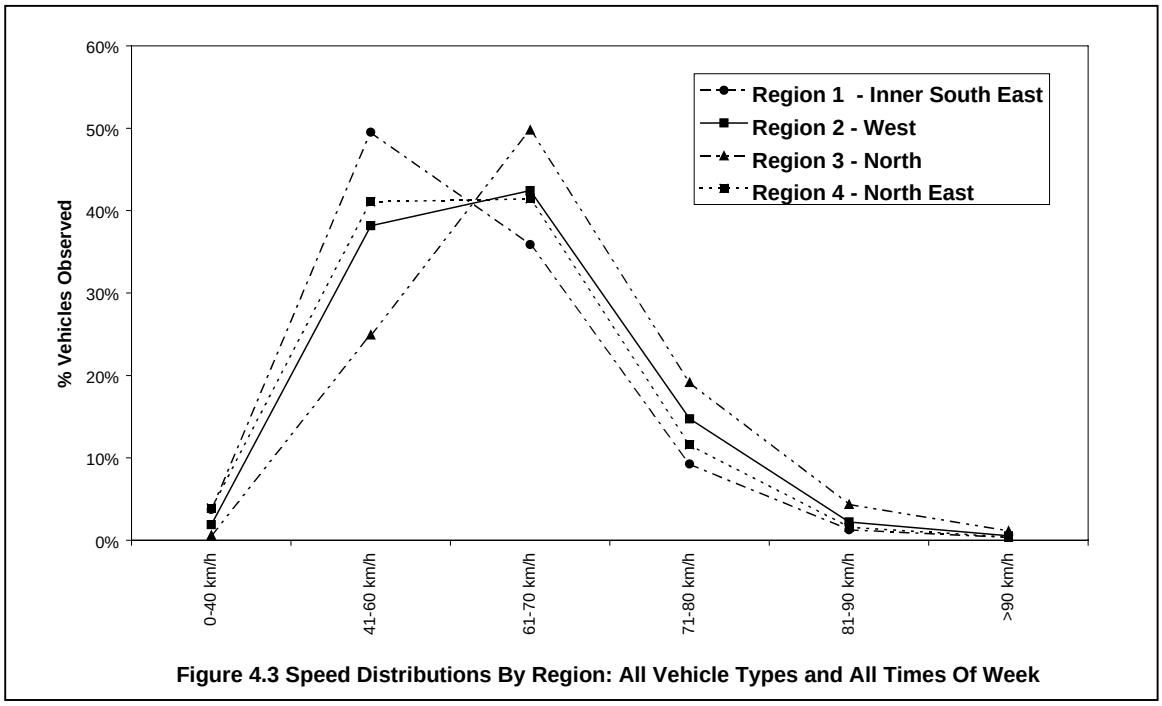

Figure 4.3 Speed Distributions By Region: All Vehicle Types and All Times Of Week

The results indicate that there was only a small difference in the overall proportion of vehicles observed in each speed range across the four regions. The major Regional difference was the higher percentage of vehicles observed travelling between 41- 60 km/h

in the Inner South East (49.5%) and in the North East (41.1%), compared to the West (38.2%) and North (24.9%) Regions. The North (Region 3) revealed the highest proportion of vehicles exceeding the speed limit in each speed range, i.e. 61-70 km/h, 71-80 km/h, 81-90 km/h and >90 km/h. The Inner South East (Region 1) showed the lowest proportion of vehicles exceeding the speed limit in each speed range.

The percentage of vehicles exceeding the 60 km/h speed limit, exceeding 70 km/h, exceeding 80 km/h and exceeding 90 km/h, is shown in Figure 4.4.

The North (Region 3) revealed the highest proportion of vehicles exceeding the speed limit (74.4%). This was also the case for vehicles exceeding the speed limit by at least 10 km/h; at least 20 km/h and at least 30 km/h. In contrast, the Inner South East (Region 1) showed the lowest proportion of vehicles exceeding the speed limit (46.7%).

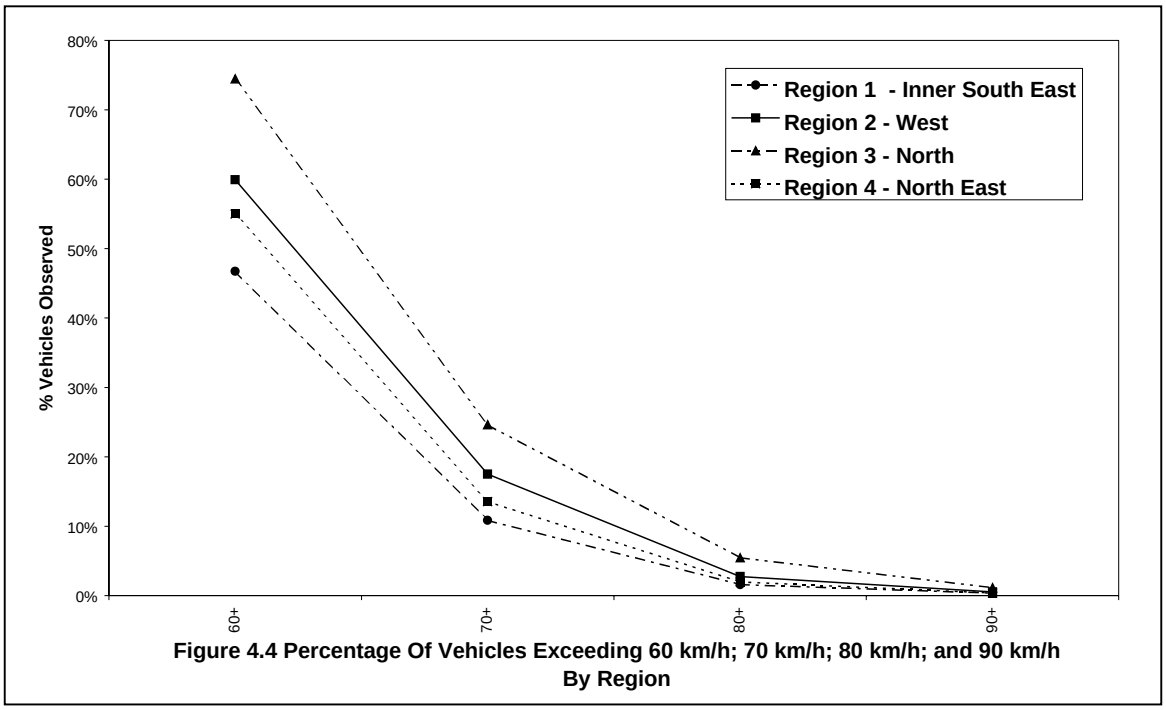

Figure 4.4 Percentage Of Vehicles Exceeding 60 km/h; 70 km/h; 80 km/h; and 90 km/h By Region

4.4 SPEED DISTRIBUTION BY VEHICLE TYPE

The speed distribution of cars compared to trucks is given in Figure 4.5. Again, the overall trend was for the majority of vehicles to be recorded at travelling speeds of 41-60 km/h, regardless of vehicle type. There was a greater proportion of trucks travelling within the speed limit, between 41-60 km/h, than cars. However, a greater proportion of cars were observed travelling between 61-70 km/h than trucks, 33% and 20% respectively.

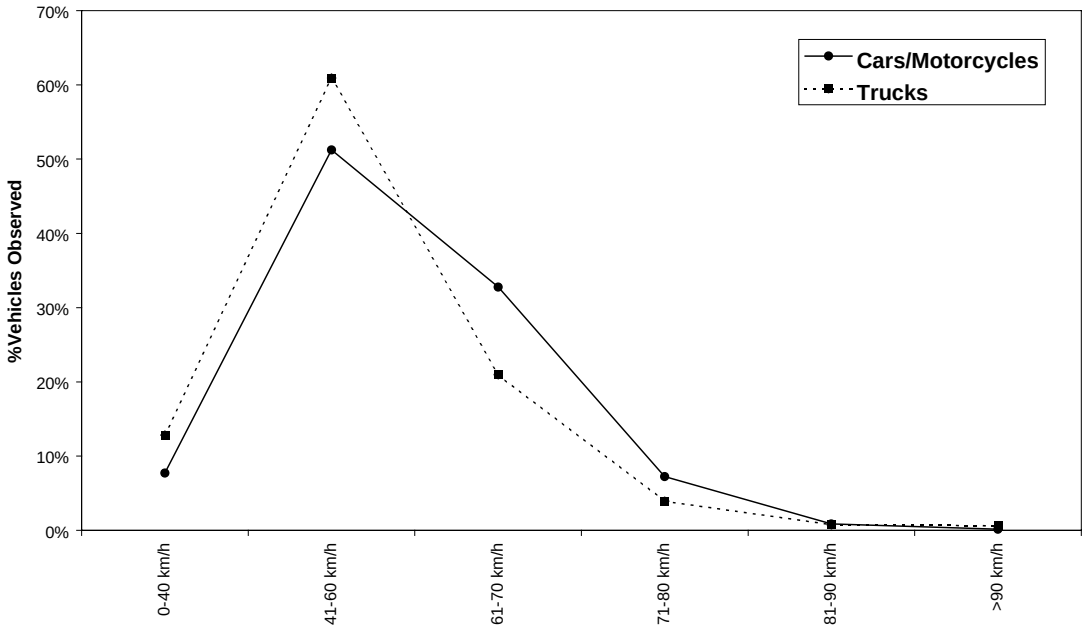

Figure 4.5 Vehicles Observed In Each Speed Distribution By Vehicle Type

4.5 SPEED DISTRIBUTIONS BY DAY OF WEEK

A similar pattern in the speed distribution was observed for vehicles travelling on weekdays and those travelling on weekends (Figure 4.6). Approximately 50% of vehicle speeds were in the 41-60 km/h speed range.

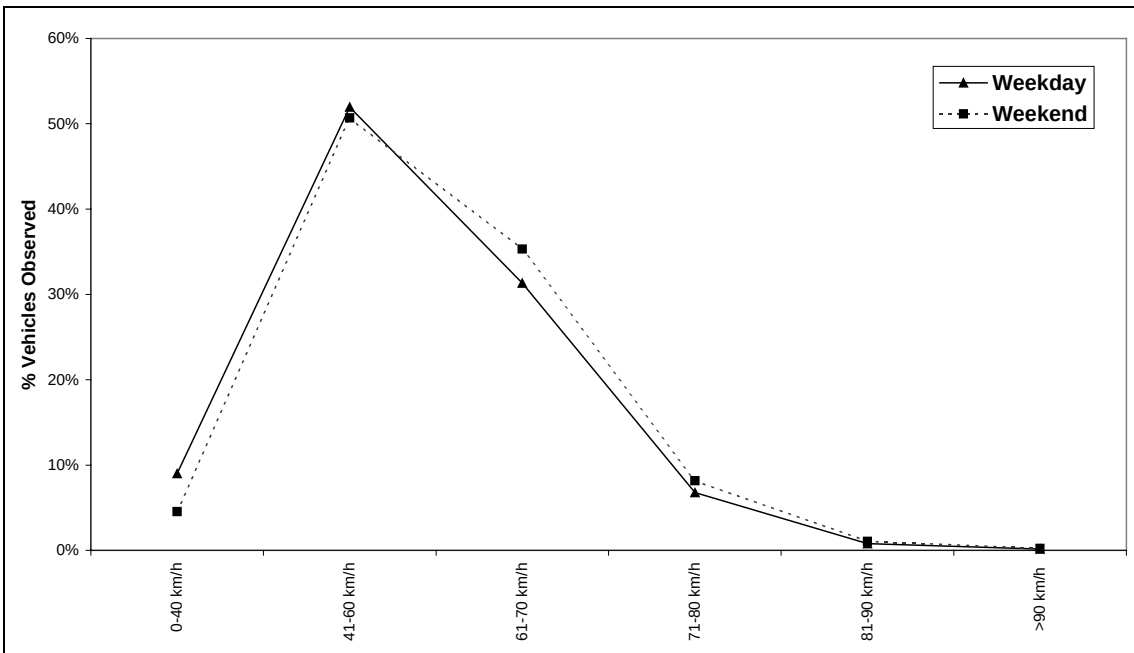

Figure 4.6 Percentage Of Vehicles Observed In Each Speed Distribution By Weekday/Weekend

4.6 SPEED DISTRIBUTIONS BY TIME OF WEEK

The following charts present the distribution of speeds across time of week on weekdays (Figure 4.7) and weekends (Figure 4.8). For weekdays, the data was combined into 12 two-hourly blocks to reduce the total amount of data per hour and to match the speed recording times with the times used for the behavioural survey observations. The data was combined into 8 three-hourly blocks for weekends. The values given in these charts are the percentage of vehicle speeds in each time block.

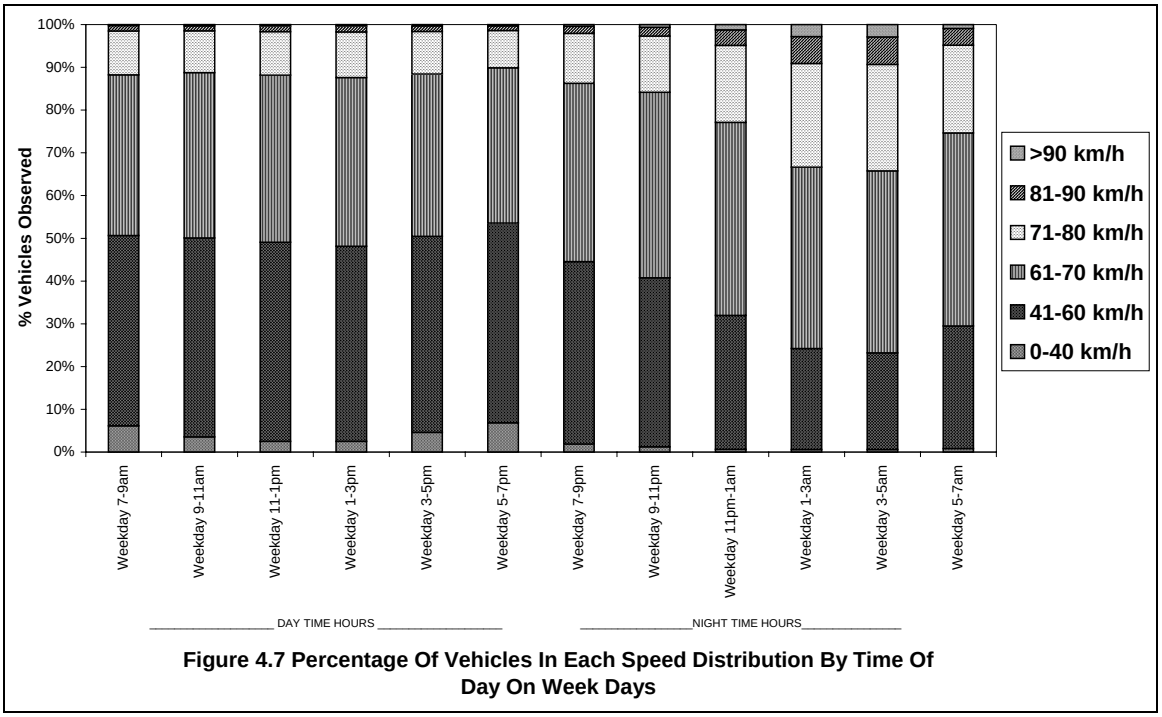

Figure 4.7 Percentage Of Vehicles In Each Speed Distribution By Time Of Day On Week Days

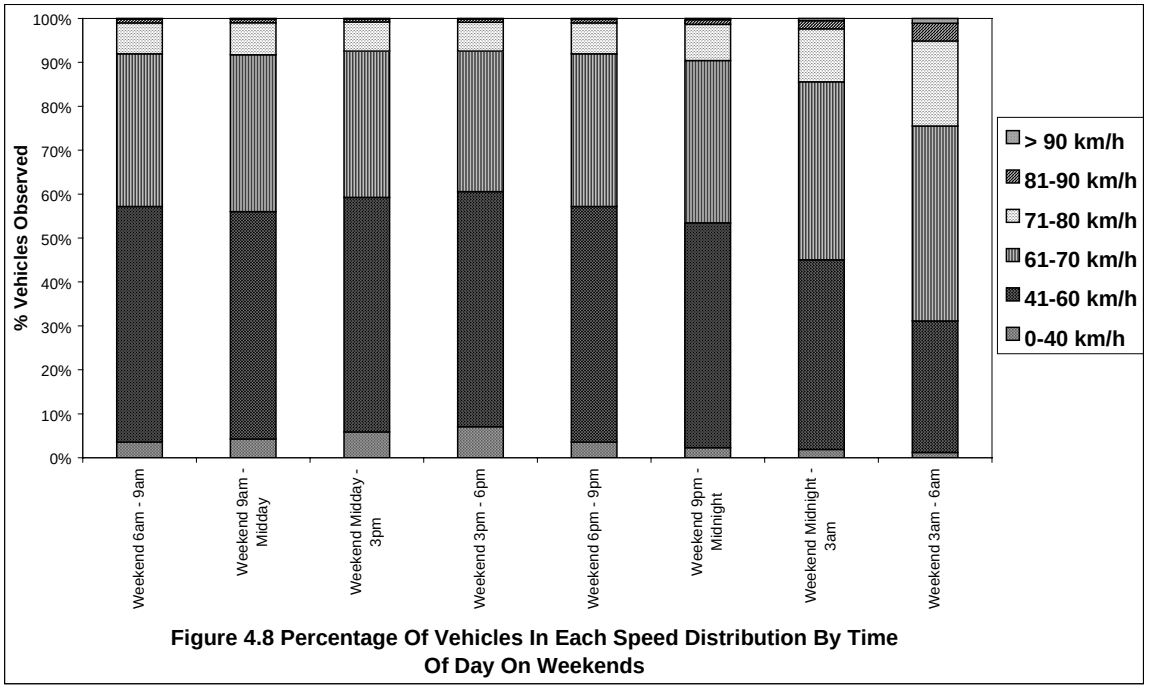

Figure 4.8 Percentage Of Vehicles In Each Speed Distribution By Time Of Day On Weekends

On weekdays the majority of vehicles were travelling within the speed limit during daylight hours (Figure 4.7). However, there was a substantially higher number of vehicles exceeding the speed limit during weekday night-time hours; especially between 1 a.m.- 3

a.m. and between 3 a.m. – 5 a.m. More than 75% of the vehicles observed were travelling over 60 km/h during these time periods.

The majority of vehicles travelling during day light hours on weekends were within the speed limit (Figure 4.8) – i.e., a similar distribution to the distribution of vehicle speeds observed on weekdays. During early morning periods on weekend days, more vehicles were exceeding the speed limit than during day light hours; especially during 3 a.m.-6 a.m. when over 70% of vehicles were exceeding the speed limit.

4.7 SPEED DISTRIBUTIONS FOR VEHICLES EXCEEDING THE SPEED LIMIT BY REGION AND TIME OF WEEK

The following sections summarise the differences in speed distributions between Regions across times of day for weekdays and weekends. The speed distribution differences between vehicle types for vehicles exceeding the 60 km/h speed limit by time of day were also given. All trends are graphically presented in Appendices D and E.

4.7.1 Weekdays

The percentage of vehicles recorded travelling above 60 km/h (Figure D1); above 70 km/h (Figure D2); above 80 km/h (Figure D3), and above 90 km/h (Figure D4), by Region and by time of day on weekdays, are shown graphically in Appendix D.

On weekdays, across the four Police regions, the North region revealed the highest proportion of vehicles exceeding the speed limit across all times of day. In contrast, the Inner South East region generally revealed the lowest proportion of vehicles exceeding the speed limit across all times of day.

For each region, the proportion of vehicles exceeding 60km/h; exceeding 70 km/h; exceeding 80 km/h and exceeding 90 km/h was greatest between 1a.m. - 5 a.m. In the North region almost 5% of vehicles were exceeding the speed limit by at least 30 km/h in the early hours of the morning on weekdays.

4.7.2 Weekends

Appendix D gives the percentage of vehicles travelling over 60 km/h (Figure D5), over 70 km/h (Figure D6), over 80 km/h (Figure D7) and over 90 km/h (Figure D8), by Region and time of day on weekends. Again, the North region revealed the highest proportion of vehicles exceeding the speed limit across all times of the day on weekends, and the Inner South East region revealed the lowest proportion of vehicles exceeding the speed limit.

The proportion of vehicle speeds exceeding the speed limit; exceeding the speed limit by at least 10km/h; exceeding the speed limit by at least 20 km/h and exceeding the speed limit by at least 30 km/h, generally increased after 9pm on weekends peaking in the early morning hours between 3 a.m.-6 a.m. Just over 2% of vehicles were exceeding 90 km/h in the North region between 3 am-6am on weekends (c.f. about 5% on weekdays).

4.8 SPEED DISTRIBUTIONS FOR VEHICLES EXCEEDING THE SPEED LIMIT BY VEHICLE TYPE AND TIME OF WEEK

4.8.1 Weekday

Appendix E depicts the percentage of vehicles travelling over 60 km/h (Figure E1), over 70 km/h (Figure E2), over 80 km/h (Figure E3) and over 90 km/h (Figure E4), on weekdays by vehicle type and time of day.

Across all times of the day on weekdays, a higher proportion of cars exceeded the speed limit or exceeded the speed limit by at least 10 km/h compared to trucks. However, a greater proportion of trucks were observed exceeding 80 km/h or 90 km/h – except between the hours of 1 a.m. and 5 a.m. when a greater proportion of cars were observed exceeding the speed limit by at least 20 km/h and at least 30 km/h.

4.8.2 Weekend

Figures E5, E6, E7 and E8 present the proportion of vehicles observed travelling over 60 km/h, over 70 km/h, over 80 km/h, and over 90 km/h respectively, by vehicle type and time of day on weekends. For travelling speeds exceeding 60 km/h, a greater proportion of cars were exceeding the speed limit than trucks. For travelling speeds exceeding 70 km/h, exceeding 80 km/h and exceeding 90 km/h, there was a higher proportion of observations of trucks than cars across most times of day on weekends.

4.9 SPEED SURVEY SUMMARY

The speed survey has demonstrated that the majority of vehicles observed at the 48 sites were recorded travelling at speeds between 41-60 km/h and 61-70 km/h. About 40.4% of vehicles were exceeding the 60 km/h speed limit; 8.1% were exceeding the speed limit by at least 10 km/h; 1.0% were exceeding the speed limit by at least 20 km/h, and 0.18% of vehicles observed were exceeding the speed limit by at least 30 km/h.

The North (Region 3) revealed the highest proportion of vehicles exceeding 60km/h, exceeding 70 km/h, exceeding 80 km/h and exceeding 90 km/h. Region 1 (Inner South East) had the lowest proportion exceeding the speed limit. Examining those vehicles exceeding the speed limit by vehicle type showed that a greater proportion of trucks, compared to cars were observed exceeding the speed limit by at least 20 km/h.

On weekdays the majority of vehicles were travelling within the speed limit during daylight hours. However, there was a substantially higher number of vehicles exceeding the speed limit during weekday night-time hours; especially between 1 a.m.- 3 a.m. and between 3 a.m. – 5 a.m. More than 75% of the vehicles observed were travelling over 60 km/h during these time periods.

The majority of vehicles travelling during day light hours on weekends were also within the speed limit – i.e., a similar distribution to the distribution of vehicle speeds observed on weekdays. During early morning periods on weekend days, a greater proportion of vehicles were exceeding the speed limit than during day light hours; especially during 3 a.m.-6 a.m. when over 70% of vehicles were exceeding 60 km/h.

5 SUMMARY

5.1 OBSERVATIONAL SURVEY FINDINGS

Several findings were highlighted from the observational survey of behavioural safety indicators. A total of 4,665 observations were made at the selected Melbourne sites. More male drivers were observed, however there were slightly more female passengers observed. Despite only 708 observations at the Newport site (Region 2), the observations across sites were relatively equal. The majority of cars observed displayed a Victorian registration plate; were large; and were manufactured after 1989.

The main findings of the behavioural safety indicators that were measured are highlighted below:

Vehicle occupancy rates

- The majority of vehicles observed had a single occupant, i.e. driver only (68%), followed by driver plus one passenger vehicles (24%). This indicates that vehicles with high occupancy rates (i.e. 3 or more occupants) are not as common as driver-only vehicles, or driver plus one passenger vehicles.

- Higher vehicle occupancy rates (i.e. driver with at least 2 passengers) were observed on weekends (16.1%) compared to weekdays (5.8%).

- Higher occupancy rates were observed during the weekday evening peak period (7.8%) and during weekends (16.1%) compared to the early morning peak period on weekdays (4.0%).

Restraint Usage

- Whilst the majority of vehicle occupants wore their seat belts correctly (over 91%), males had slightly higher *non-wearing* rates than females (3.7% c.f. 3.0%). In contrast the proportion of *incorrectly* worn seat belts was higher for females than males (4.2% c.f. 3.1%).

- The majority of incorrect seat belt usage by vehicle occupants was due to the straps being loose (30%), twisted (26%) or in contact with the neck (22%).

- The non-wearing rates of drivers aged between 26-59 years (2.4%) was marginally greater than the non-wearing rates of drivers aged 60+ years (2.3%) and those aged 21 years and under (2.3%). Interestingly the youngest (14-17 year olds) and oldest (75 years and above) drivers had 100% seat belt wearing rates although there were only eight and seven observations made for these age-groups, respectively.

- Higher non-wearing rates were observed for male drivers than for females (2.6% c.f. 1.9%) whilst female drivers had the higher 'incorrectly worn' seat belt rates (2.6% c.f. 1.8%).

- The proportion of passengers *not* wearing their seat belts was highest for the rear middle seating position at 14.2%. This is contrasted with the proportion of non-wearing rates for drivers at 2.3%. The rear left seating position had the highest proportion of incorrectly restrained observations, at 10.7%.

- The highest non-wearing rates were for passengers in the rear middle seating position (14.2%). Within this position, females (20.8%) and those aged between 26-39 years (60%) had the highest non-wearing rates.

- Amongst adult passengers, young adults aged between 14-17 years and those aged 18-25 years had the highest non-wearing rates (8.1% and 7.9%, respectively).

- The proportion of adult passengers not wearing their seat belt was higher for males than females (7.7% c.f. 3.5%), whilst females had a slightly higher rate of incorrect seat belt wearing (3.9% c.f. 3.7%).

- The most common incorrect use of seat belts by adult passengers was failing to have straps firmly in place (48.9%).

- Child passengers aged between 4-7 years had the highest rate of incorrectly worn seat belts (25.3%), whilst children aged 8-13 years had the highest non-wearing rate (10.7%).

- Whilst the majority of children wore their seat belt correctly, a 100% wearing rate for this group was not observed. The seat belt wearing rate for child passengers (70.5%) was considerably less than that observed for adult passengers (89.5%).

Motorcyclists

- Of the 50 motorcyclists and pillion passengers observed, all were wearing either a full or open helmet. Whilst this is an encouraging trend, caution should be taken when generalising these results to the general population of motorcyclists due to low observation rates.

- Only 12% of motorcyclists wore all types of recommended protective clothing (i.e. upper and lower body, footwear and gloves).

- Overall, the most common protective clothing worn was around the upper body. Few motorcyclists or pillion passengers wore the full combination of recommended protective clothing. Again, this trend may lack reliability due to the low rate of motorcyclist and pillion passenger observations.

- The majority of motorcyclists observed were not wearing conspicuous clothing. The results demonstrate that of the observed motorcyclists and pillions very few (less than 18%) wear conspicuous clothing.

- The results found for motorcycle safety indicators showed that whilst all riders and passengers wore a helmet, very few wore the recommended combination of protective clothing or increased their visibility for other road users by wearing conspicuous clothing. There was a total of only 50 riders and pillion passengers observed, which limits the extent to which the results can be generalised to the overall population of motorcyclists on Melbourne roads.

Bicyclists

- Bicyclists had a 60% helmet non-wearing rate. Over half (56%) of all bicyclists wore conspicuous clothing.

- Similar to the motorcycle safety indicator results, the low observation rate of bicyclists limits the extent to which the results can be generalised to the population of bicyclists riding in Melbourne. The results do indicate a low helmet-wearing rate (40%), which, combined with the relatively poor proportion of bicyclists wearing conspicuous clothing (56%), is discouraging.

5.2 SPEED SURVEYS

The findings obtained from the surveys of speed profiles at selected Melbourne sites in 60 km/h speed zones are highlighted below:

- Across all sites, the majority of vehicles were recorded travelling at speeds between 41-60 km/h (52%) or 61-70 km/h (32%).

- Across all sites, 40.4% of vehicles were exceeding the 60 km/h speed limit, 8.1% were exceeding the speed limit by at least 10 km/h; 1.0% were exceeding the speed limit by at least 20 km/h, and 0.18% of vehicles observed were exceeding the speed limit by at least 30 km/h.

Regional Differences

- The major Regional difference was the higher percentage of vehicles observed travelling within the speed limit, i.e. between 41- 60 km/h in the Inner South East (49.5%) and in the North East (41.1%), compared to the West (38.2%) and North (24.9%) Regions.

- The North (Region 3) revealed the highest proportion of vehicles exceeding the speed limit (74.4%). In contrast, the Inner South East (Region 1) showed the lowest proportion of vehicles exceeding the speed limit (46.7%).

Time of week

- The majority of vehicles were travelling within the speed limit during daylight hours on *weekdays.* However, there was a substantially higher number of vehicles exceeding the speed limit during night-time hours; between 1 a.m.- 3 a.m. and between 3 a.m. – 5 a.m.; more than 75% of the vehicles observed were travelling over 60 km/h.

- The majority of vehicles travelling on the *weekend* during daylight hours were within the speed limit, which is similar to the distribution of vehicle speeds observed on weekdays. During early morning periods a greater proportion of vehicles were exceeding the speed limit than during day light hours; between 3 a.m. -6 a.m. on weekends, over 70% of vehicles were exceeding the speed limit.

- The proportion of vehicles exceeding the speed limit by more than 20 km/h or by more than 30 km/h during the early hours of the morning on weekdays was higher in the North Region than in the other regions. Approximately 5% of vehicles were

exceeding 90 km/h between 1 a.m.-5 a.m. in the North Region on weekdays (c.f. 2.8% for all Melbourne regions).

Vehicle type

- Across all times of the week and sites, there was a greater proportion of trucks travelling within the speed limit, between 41-60 km/h, than cars. However, there was a greater proportion of cars observed exceeding the speed limit by up to 10 km/h than trucks, 33% and 20% respectively.

- On weekdays, there was a higher proportion of cars exceeding the 60 km/h speed limit, and exceeding 70 km/h, across all times of the day than trucks. At travelling speeds greater than 80 km/h and greater that 90 km/h, a greater proportion of trucks were observed exceeding the speed limit than cars – except between the hours of 1 a.m. and 5 a.m.

- A similar pattern for vehicle types was observed during the weekend as on weekdays. For travelling speeds >60 km/h and >70 km/h, a greater proportion of cars were observed exceeding the speed limit than trucks. For travelling speeds > 80 km/h and > 90 km/h, the proportion of trucks exceeding these speeds was higher than cars, across most times of the week.

6 CONCLUSIONS

Behavioural data was collected through an observational survey on selected Melbourne roads in 60 km/h speed zones. The following behavioural safety indicators were measured:

- levels of seat belt use by drivers and passengers;
- levels of child restraint usage;
- levels of helmet and conspicuous clothing use by bicyclists;
- levels of helmet and protective clothing use by motorcyclists;
- vehicle occupancy rates; and
- age of vehicle.

VicRoads' speed survey data, containing vehicle speed measurements from sites in Melbourne occurring in 60 km/h speed zones was analysed by time of day, day of week, vehicle type and region.

It is envisaged that the above data, together with other important road safety indicators, should be collected annually to allow for a comprehensive assessment of road safety trends.

Based on the findings of this first wave of data collection, the target groups and road safety issues that need to be addressed through enforcement, education and advertising campaigns are:

- Low seat belt wearing rates by child passengers aged 4-7 years.

- Incorrect seat belt usage by child passengers aged 8-13 years.

- Low seat belt wearing rates by young adult passengers aged 14-25 years.

- Low seat belt wearing rates by rear seat passengers, particularly those in the middle seating position who were female or who were aged 26-39 years.

- Incorrect seat belt usage - the most common types were failing to have straps firmly in place; having twisted straps or having straps in contact with the neck.

- A low proportion (12%) of motorcyclists wearing the recommended combination of protective clothing (i.e. upper and lower body clothing, footwear and gloves).

- A high proportion (about 83%) of motorcyclists not wearing conspicuous clothing.

- The relatively high proportion of bicyclists not wearing a helmet (60%). This is low in comparison to the 1994 Arup survey (Arrup Transportation Planning, 1995).

- A high proportion of vehicles exceeding the speed limit during night-time hours: more than 75% between 1 a.m. – 5 a.m. on weekdays, and over 70% between 3 a.m. – 6 a.m. on weekends.

- Drivers in the North region of Melbourne exhibited the highest proportion of vehicle speeds exceeding the speed limit (75%), and also had a higher proportion of excessive speeds above 90 km/h (5% c.f. 2.8% for all Melbourne regions).

Whilst some of the above findings relied on the observers' judgements, and were based on relatively few observations, particularly for motorcyclists and bicyclists, they are still suggestive of emerging road safety issues that need to be addressed.

One of the original aims of the study, to compare and calibrate the findings of the observational survey with those of telephone surveys in a cost-effective was not attempted. This was due to the project's budgetary constraints as well as the rising costs and low response rates of telephone surveys. It is hoped that the collation and calibration of the findings of a variety of surveys (i.e. observational surveys, telephone surveys, surveys undertaken by organizations other than MUARC) will be addressed in a future Baseline Research Program study, scheduled to commence during 2003.

7 RECOMMENDATIONS

The following recommendations have been suggested for increasing the safety of road users based on the safety indicators that the project has focused on.

1. A reduction in the non-wearing seat belt rates of drivers and passengers could be achieved by targeting certain age groups, seating positions and times of day (e.g. child and young adult passengers, rear-seat passengers).

2. Whilst the high helmet wearing rates for motorcyclists were encouraging, the helmet wearing rates for bicyclists was only slightly above 50%. An extension of the project may be to undertake further observations of these road users to gain a more representative sample.

3. To increase the sample, observational survey data could be obtained from more sites around Melbourne and from sites in rural areas of Victoria.

4. Education and publicity campaigns targeting the restraint usage of children could be an effective approach in decreasing the proportion of incorrectly restrained child passengers observed in the current survey.

5. Increasing the range of safety indicators by including mobile phone usage by drivers and drink-driving profiles is proposed in the forthcoming Baseline Research Project that examines Behavioural, Travel and Exposure Surveys.

6. The current study observed cars in the left-hand lane only. The observations of cars in all lanes could decrease the bias in the sample and increase the size of the sample.

7. Whilst speed data was collected at only two sites in the Northern region, an approach to reduce excessive speeding amongst drivers may be to target those who exceed the speed limit according to region and time of week. e.g. drivers in the Northern suburbs of Melbourne and those travelling during the early hours of the morning on both weekdays and weekend days.

8. Speed survey data should be collected that allows for a more comprehensive analysis of driver speeds. It would be beneficial to analyse speed survey data in 5 km/h increments instead of 10 km/h increments. Data that is collected in 5 km/h increments would allow for the assessment of the effectiveness of the TAC's recent "Wipe off 5" campaign targeting speed, as well as the recent speed limit changes that occurred on some residential roads in Victoria. It should also be investigated whether more speed data can be obtained from VicRoads that allows for an examination of differences across a range of rural and metropolitan sites, and in different speed zones (e.g. 50 km/h, 70 km/h, 100 km/h).

8 REFERENCES

Arup Transportation Planning (1999). *Design and Specification for A Vehicle Restraint Usage Study*. Prepared for VicRoads Information Services Department.

Arup Transportation Planning. (1995). *The 1994 Crash Exposure Survey*. Prepared for VicRoads, Melbourne.

VicRoads (2002). *The Right Stuff: Motorcycle Protective Clothing*. Road Safety Brochures, www.vicroads.vic.gov.au/road_safe/index.htm, VicRoads, Melbourne.

APPENDIX A

OBSERVATIONAL SURVEY FORMS FOR DRIVERS, PASSENGERS, MOTORCYCLISTS AND BICYCLISTS

SITE DETAILS:

SITE NO: □□□ First Observation Number_____
DATE: □□/□□/ 2001 Last Observation Number _____

Time – commence □□:□□ am / pm
Time – complete □□:□□ am / pm

SURVEY OBSERVERS _____

_____

CONDITIONS:

	HOUR 1	HOUR 2			HOUR 1	HOUR 2
Sunny	1	1		Dawn	1	1
Cloudy	2	2		Day	2	2
Rain	3	3		Dusk	3	3
Other	4	4		Night	4	4

Weather Comments: _____

_____

Street Lights : On / Off / None Speed zone: _____ Kph

Special Circumstances:_____

_____

_____

_____

_____

Observation no:_____

VEHICLE OBSERVATION FORM

CAR CHARACTERISTICS

Plate State

1 VIC
2 NSW
3 QLD
4 TAS
5 SA
6 NT
WA
7 Unknown
8

Type of vehicle

1 Car
2 4WD
3 Minibus
4 Utility/ Panel Van
5 Commercial van
6 Taxi
7 Unknown

Year of Vehicle

1 1996-2001
2 1990-1995
3 1980-1989
4 1970-1979
5 <1970

Headlights

1 On
2 Off
3 Unknown

Plate displayed

1 None
2 L
3 P

Size of car

1 Small
2 Medium
3 Large

Total no. of occupants

1 2 3 4 5 6 7 8 9

DRIVER CHARACTARISITCS

Age

1 14-17
2 18-21
3 22-25
4 26-29
5 30-39
6 40-49
7 50-59
8 60-74
9 75+
10 Unknown

Sex

1 Male
2 Female
3 Unknown

Seat belt use

1 YES Correctly worn
2 YES Incorrectly worn
3 YES Can't tell if correct
4 NO Not worn at all
5 UNKNOWN if worn

If incorrectly worn

1 Straps not firm
2 Straps twisted
3 Straps not level/above shoulder
4 Straps in contact with neck
5 Strap crosses stomach
6 Other (specify below):

Passenger Observation Form

	Age	***Sex***	**Seat belt type**	*If incorrect*
	1 0-3	1 Male	1 Lap/sash seat belt	1 Straps not firm
	2 4-7	2 Female	2 Lap seat belt	2 Straps twisted
	3 8-13	3 Unknown	3 Harness alone	3 Straps not level/above shoulder
Notes:	4 14-17	***Seat belt used***	4 Booster seat with lap/sash belt	4 Straps in contact with neck
	5 18-25	1 YES correctly worn	5 Booster seat with harness	5 Strap crosses stomach area not hip
	6 26-39	2 YES incorrectly worn	6 Child seat	6 Rug/blanket under harness
	7 40-59	3 YES can't tell	7 Infant restraint	7 Eye level higher than back of the car seat
	8 60+	4 NO	8 Unsure	8 Other (specify in notes)
	9 Unknown	5 UNKNOWN	*Please tick if rearward facing ϕ	

	Age	***Sex***	**Seat belt type**	*If incorrect*
	1 0-3	1 Male	1 Lap/sash seat belt	1 Straps not firm
	2 4-7	2 Female	2 Lap seat belt	2 Straps twisted
	3 8-13	3 Unknown	3 Harness alone	3 Straps not level/above shoulder
Notes:	4 14-17	***Seat belt used***	4 Booster seat with lap/sash belt	4 Straps in contact with neck
	5 18-25	1 YES correctly worn	5 Booster seat with harness	5 Strap crosses stomach area not hip
	6 26-39	2 YES incorrectly worn	6 Child seat	6 Rug/blanket under harness
	7 40-59	3 YES can't tell	7 Infant restraint	7 Eye level higher than back of the car seat
	8 60+	4 NO	8 Unsure	8 Other (specify in notes)
	9 Unknown	5 UNKNOWN	*Please tick if rearward facing ϕ	

Observation no:_____

MOTOR-CYCLE OBSERVATION FORM

Date: □□/□□/2001 Site No: □□
Time: □□:□□ Observer's Initials: □□

MOTOR-CYCLE CHARACTERISTICS

Plate State:
1 VIC
2 NSW
3 QLD
4 TAS
5 SA
6 NT
7 WA
8 Unknown

Plate Displayed:
1 None
2 L
3 P

Headlamp:
1 On
2 Off
3 Unknown

No of Occupants
1
2

RIDER

Age:
1 14-17
2 18-21
3 22-25
4 26-29
5 30-39
6 40-49
7 50-59
8 60-74
9 75+
10 Unknown

Helmet:
1 YES Full
2 YES Open
3 NO

Protective Clothing
1 Upper body
2 Lower body
3 Footwear
4 Gloves
5 Unknown

Sex
1 Male
2 Female
Unknown

Conspicuous
1 Yes
2 No
3 Unknown

PILLION

Age:
1 14-17
2 18-21
3 22-25
4 26-29
5 30-39
6 40-49
7 50-59
8 60-74
9 75+
10 Unknown

Helmet:
1 YES Full
2 YES Open
3 NO

Protective Clothing
1 Upper body
2 Lower body
3 Footwear
4 Gloves
5 Unknown

Sex
1 Male
2 Female
3 Unknown

Conspicuous
1 Yes
2 No
3 Unknown

Observation no:_____

BICYCLE OBSERVATION FORM

Date: □□/□□/2001 Site No: □□
Time: □□:□□ Observer's Initials: □□

		OPTIONS AVAILABLE	OPTION USED
Road	bicycle lane	1	1
	main road car lane	2	2
	service road car lane	3	3
Shared pedestrian/ cyclist pathway		4	4
Pathway for cyclist only		5	5
Footpath for pedestrians only		6	6

RIDER

Age:
1 0-3
2 4-7
3 8-13
4 14-17
5 18-25
6 26-39
7 40-59
8 60+
9 U

Conspicuous Clothing:
1 Yes
2 No
3 Unsure

Helmet done up correctly:
1 Yes
2 No
3 Unsure

Helmet Worn:
1 Yes
2 No

Helmet positioned correctly:
1 Yes
2 No
3 Unsure

Sex:
1 Male
2 Female
3 U

Helmet Carried:
1 Yes
2 No

PASSENGER

Age:
1 0-3
2 4-7
3 8-13
4 14-17
5 18-25
6 26-39
7 40-59
8 60+
9 U

Conspicuous Clothing:
1 Yes
2 No
3 Unsure

Helmet done up correctly:
1 Yes
2 No
3 Unsure

Helmet Worn:
1 Yes
2 No

Helmet positioned correctly:
1 Yes
2 No
3 Unsure

Sex:
1 Male
2 Female
3 U

Helmet Carried:
1 Yes
2 No

APPENDIX B

‘MONASH UNIVERSITY STANDING COMMITTEE ON ETHICS IN RESEARCH INVOLVING HUMANS EXPLANATORY STATEMENT’ FOR ROAD USERS IN THE OBSERVATIONAL SURVEYS

Establishing a benchmark of safety on Victoria's roads

Road accidents are a major problem worldwide. In Victoria, there are various rules and regulations that are designed to reduce the risk of injury in an accident. These include regulations regarding the use of seat belts and child restraints, and the use of helmets and protective or conspicuous clothing by motorcycle and push-bike riders. It is important to know how many people follow these rules so that safety issues can be identified. The purpose of this study is to collect relevant information by observing drivers and passengers while their vehicle is stationary at a set of traffic lights. **However, it is important to realize that no information that could identify any individual is collected, and there are no legal implications arising from this study.**

It is hoped that the findings of this project will help us to understand the effectiveness of road safety messages and to refine advertising and educational campaigns. It is anticipated that similar data will be collected every year, allowing for an analysis of emerging road safety issues. This research is being conducted by the Monash University Accident Research Centre under the supervision of Professor Max Cameron. (The project is sponsored by VicRoads, the RACV, the TAC and the Department of Justice.)

Ten intersections on arterial roads around metropolitan Melbourne have been selected for this study. The drivers and passengers of vehicles (cars, motorcycles, bicycles) who stop for the red light phase during the observation period will be observed and the data recorded on standard survey sheets. The people selected for inclusion in the study do not have to do anything and there are no consequences of study participation. If, however, you do not wish for your data to be included in the study, please inform the researcher who will give you the data sheets on which your data was recorded. If you have any queries or would like to be informed of the aggregate research findings, please contact Catriona Ross at the Monash University Accident Research Centre on 9905 1840 (telephone) or 9905 4363 (fax).

You can complain about the study if you don't like something about it. To complain about the study, you need to phone 9905 2052. You can then ask to speak to the secretary of the Human Ethics Committee and tell him or her that the number of the project is 2001/369. You could also write to the secretary. That person's address is:

The Secretary
The Standing Committee on Ethics in Research Involving Humans
PO Box No 3A
Monash University
Victoria 3800
Telephone (03) 9905 2052 Fax (03) 9905 1420
Email: SCERH@adm.monash.edu.au

Thank you.

Catriona Ross
Ph: 9905 1840

APPENDIX C

LOCATION OF SPEED SURVEY DATA GROUPED BY METROPOLITAN POLICE REGION

Speed survey locations by Police Region are presented below. A Melway reference and whether the road is divided (D) or undivided (U) is also provided.

Region[4]	SURVEY	LOC	DESCRIPTION	MELWAY	DIVIDED
1	1166	126	BEACH RD NB BTW MCINDOE PDE & RENNISON ST	087 D11	U
1	1168	130	BEACH RD NB BTW NEW ST & ORLANDO ST	076 E05	U
1	1166	127	BEACH RD SB BTW MCINDOE PDE & RENNISON ST	087 D11	U
1	1168	131	BEACH RD SB BTW NEW ST & ORLANDO ST	076 E05	U
1	1120	34	BEACONSFIELD PDE NB BTW KERFERD RD & MILLS ST	002JK11	D
1	1120	35	BEACONSFIELD PDE SB BTW KERFERD RD & MILLS ST	002JK11	D
1	1100	1	DRYBURGH ST NB BTW VICTORIA ST & QUEENSBERRY ST	002AF10	D
1	1100	2	DRYBURGH ST SB BTW VICTORIA ST & QUEENSBERRY ST	002AF10	D
1	1101	629	FLEMINGTON RD NB BTW HARKER ST & ABBOTSFORD ST	002AH05	D
1	1101	630	FLEMINGTON RD SB BTW HARKER ST & ABBOTSFORD ST	002AH05	D
1	1169	132	MARINE PDE NB BTW WORDSWORTH ST & MARINE AV	058 A12	D
1	1169	133	MARINE PDE SB BTW WORDSWORTH ST & MARINE AV	058 A12	D
1	1181	160	NEW STREET NB BTW MUNROE ST & SAYERS LN	067 D12	U
1	1181	161	NEW STREET SB BTW MUNROE ST & SAYERS LN	067 D12	U
1	1146	85	PUNT RD NB BTW FAWKNER ST & NICHOLSON ST	002LE07	U
1	1159	112	PUNT RD NB BTW SHERWOOD ST & THE CROFTS	002GG06	U
1	1146	86	PUNT RD SB BTW FAWKNER ST & NICHOLSON ST	002LE07	U
1	1159	113	PUNT RD SB BTW SHERWOOD ST & THE CROFTS	002GG06	U
2	1133	57	ASHLEY ST NB BTW HAMPDEN ST & BERNARD ST	041 E01	U
2	1133	58	ASHLEY ST SB BTW HAMPDEN ST & BERNARD ST	041 E01	U
2	1125	44	BALLARAT RD EB BTW RICHELIEU ST & IRVING CT	027 G12	U
2	1125	45	BALLARAT RD WB BTW RICHELIEU ST & IRVING CT	027 G12	U
2	10053	918	DYNON RD EB BTW MORELAND ST & MARIBYRNONG ST	042 E04	D
2	10053	919	DYNON RD WB BTW MORELAND ST & MARIBYRNONG ST	042 E04	D
2	10943	2588	FOOTSCRAY RD E BD BTW MORELAND ST & SIMS ST	042 E06	D
2	10943	2589	FOOTSCRAY RD W BD BTW MORELAND ST & SIMS ST	042 E06	D
3	1144	81	PASCOE VALE RD NB BTW MURPHY ST & STRACHAN ST	016 H05	U
3	1144	82	PASCOE VALE RD SB BTW MURPHY ST & STRACHAN ST	016 H05	U
3	1112	96	SUNBURY RD EB BTW COGHILL ST & GLENARA DR	177 C08	U
3	1112	20	SUNBURY RD WB BTW COGHILL ST & GLENARA DR	177 C08	U
4	1313	639	BELL-BANKSIA LINK EB BTW UPPER HEIDELBERG RD & LINDEN AV	031 H04	D
4	1313	640	BELL-BANKSIA LINK WB BTW UPPER HEIDELBERG RD & LINDEN AV	031 H04	D
4	1132	55	BURKE RD NB BTW MCARTHUR RD & THE BOULEVARD	031 K10	D
4	1132	56	BURKE RD SB BTW MCARTHUR RD & THE BOULEVARD	031 K10	D
4	1163	150	CHANDLER HWY NB BTW YARRA BVD & REX AV	045 B01	U
4	1163	121	CHANDLER HWY SB BTW YARRA BVD & REX AV	045 B01	U
4	1114	1139	DORSET RD NB BTW SUTTON AV & CURRAWA DR	064 K12	U
4	1114	22	DORSET RD SB BTW SUTTON AV & CURRAWA DR	064 K12	U
4	1139	69	GRIMSHAW ST EB BTW ADELINE ST & MCDOWELL ST	020 H02	U
4	1139	70	GRIMSHAW ST WB BTW ADELINE ST & MCDOWELL ST	020 H02	U
4	1182	162	LWR DANDENONG RD EB BTW SIBTHORPE ST & BOUNDARY RD	087 K07	U
4	1182	163	LWR DANDENONG RD WB BTW SIBTHORPE ST & BOUNDARY RD	087 K07	U
4	1149	91	STEPHENSONS RD NB BTW ST ALBANS ST & HOLSKAMP ST	061 E12	U
4	1149	92	STEPHENSONS RD SB BTW ST ALBANS ST & HOLSKAMP ST	061 E12	U
4	1157	108	WAVERLEY RD EB BTW THE RIALTO & RAMONA AV	069 C02	U
4	1157	109	WAVERLEY RD WB BTW THE RIALTO & RAMONA AV	069 C02	U
4	1188	174	YARRA JUNC.-NOOJEE RD NB BTW RIVERSDALE & SUMMERHILL	288 G10	U
4	1188	175	YARRA JUNC.-NOOJEE RD SB BTW RIVERSDALE & SUMMERHILL	288 G10	U

[4] Region 1 denotes Inner South East, Region 2 West, Region 3 North, Region 4 North East. There was no speed survey data collected for the South region (Region 5)

APPENDIX D

PERCENTAGE OF VEHICLE SPEEDS TRAVELLING OVER 60 KM/H, 70 KM/H, 80 KM/H, AND 90 KM/H ON WEEKDAYS AND WEEKENDS BY REGION

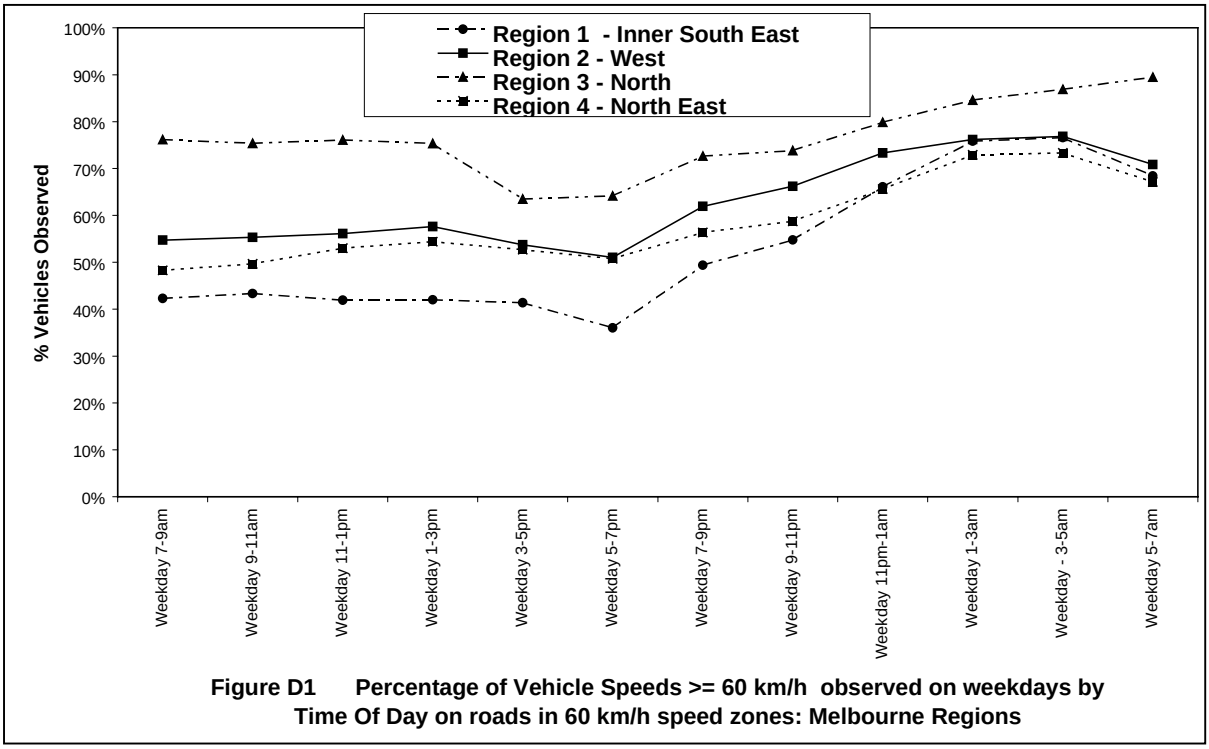

Figure D1 Percentage of Vehicle Speeds >= 60 km/h observed on weekdays by Time Of Day on roads in 60 km/h speed zones: Melbourne Regions

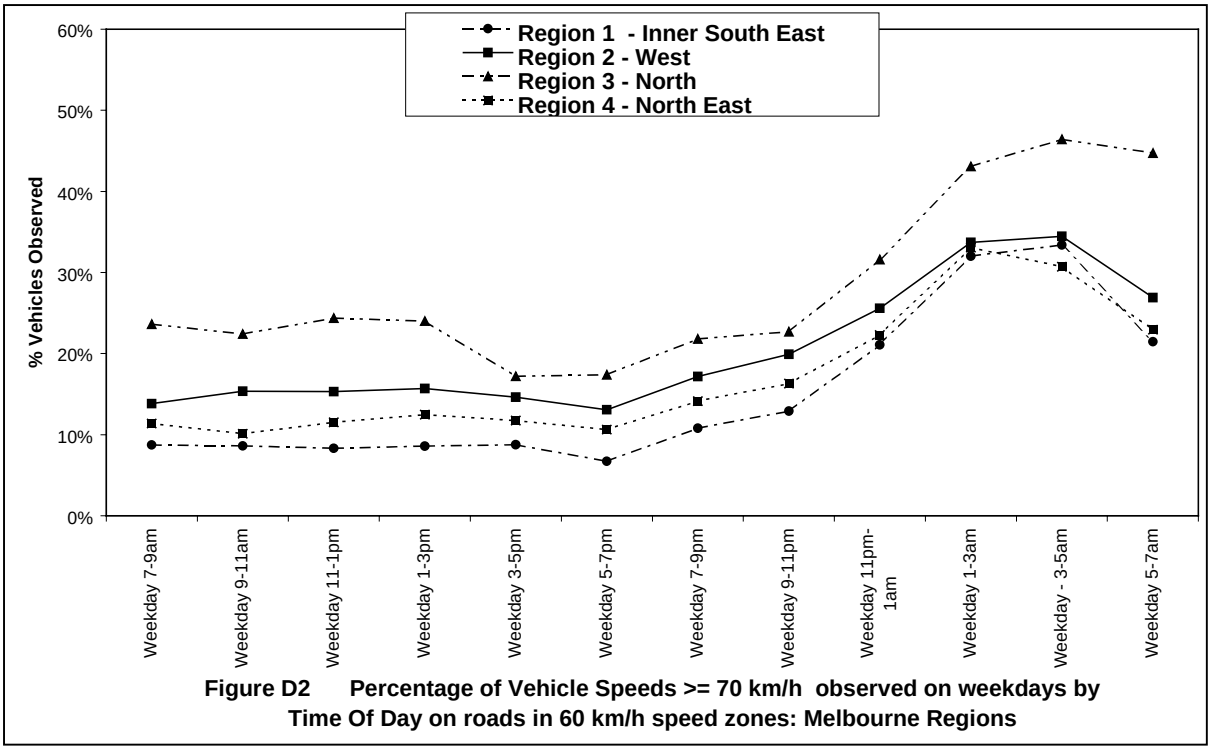

Figure D2 Percentage of Vehicle Speeds >= 70 km/h observed on weekdays by Time Of Day on roads in 60 km/h speed zones: Melbourne Regions

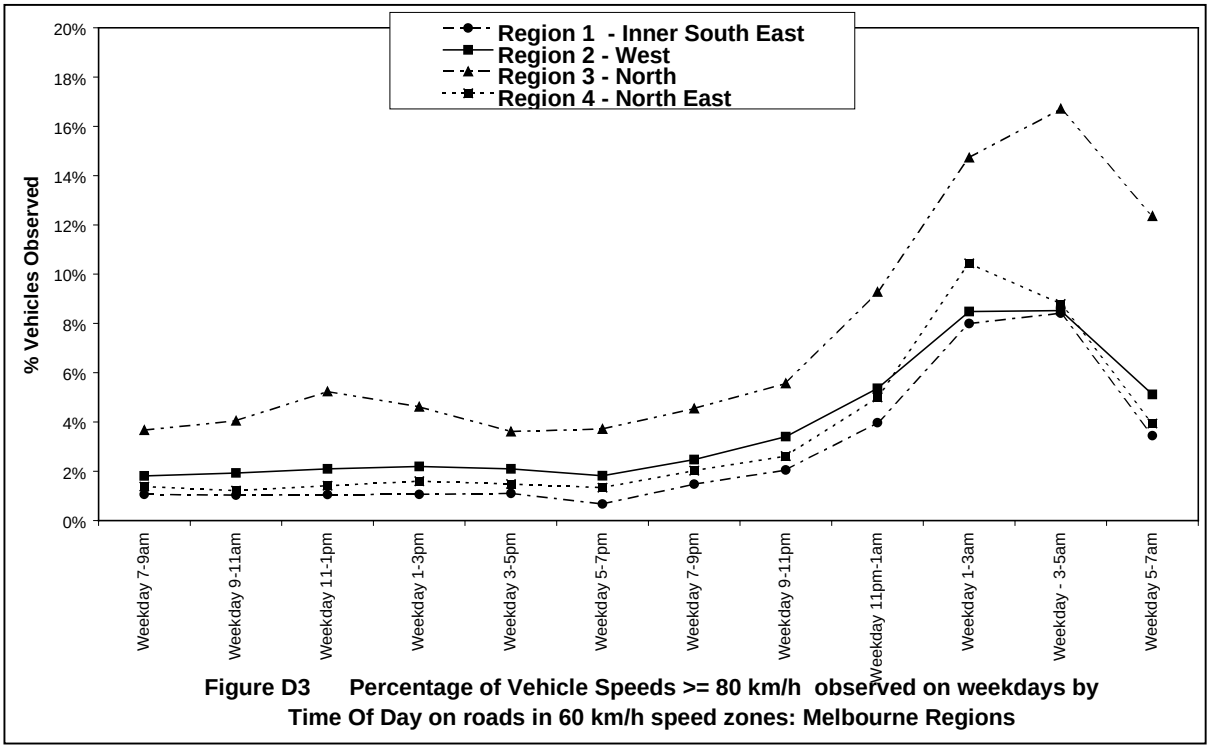

Figure D3 Percentage of Vehicle Speeds >= 80 km/h observed on weekdays by Time Of Day on roads in 60 km/h speed zones: Melbourne Regions

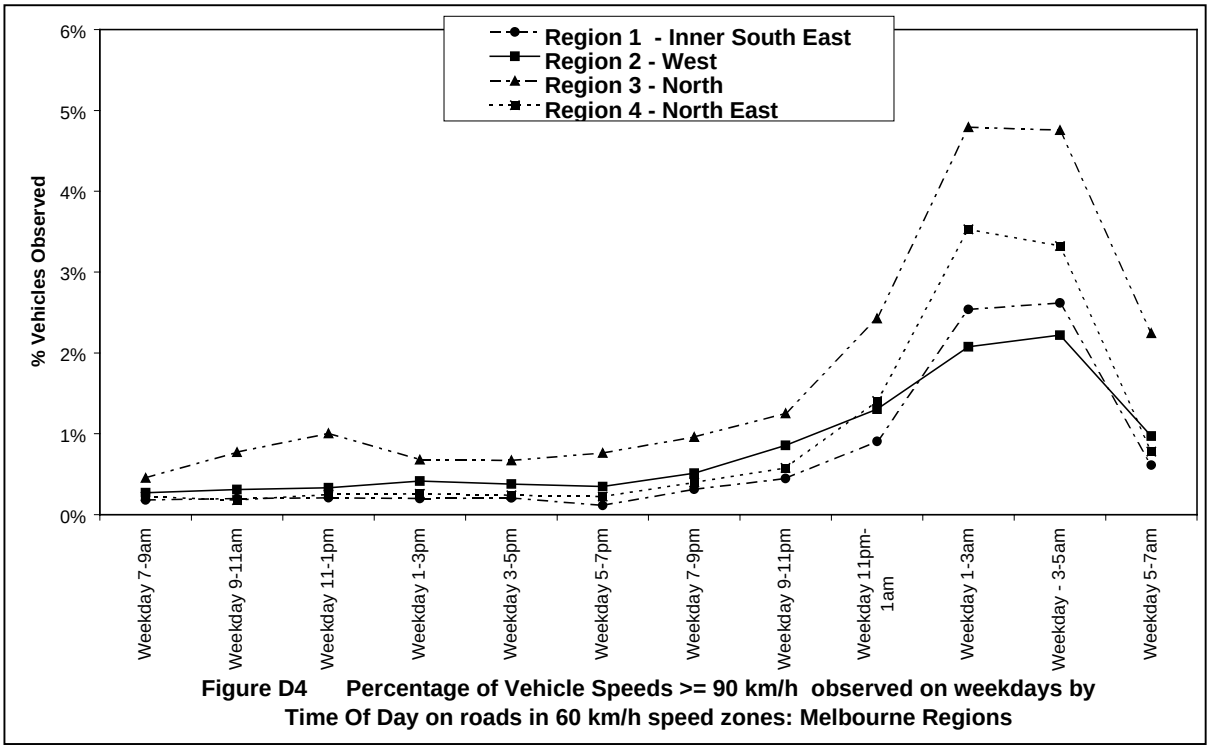

Figure D4 Percentage of Vehicle Speeds >= 90 km/h observed on weekdays by Time Of Day on roads in 60 km/h speed zones: Melbourne Regions

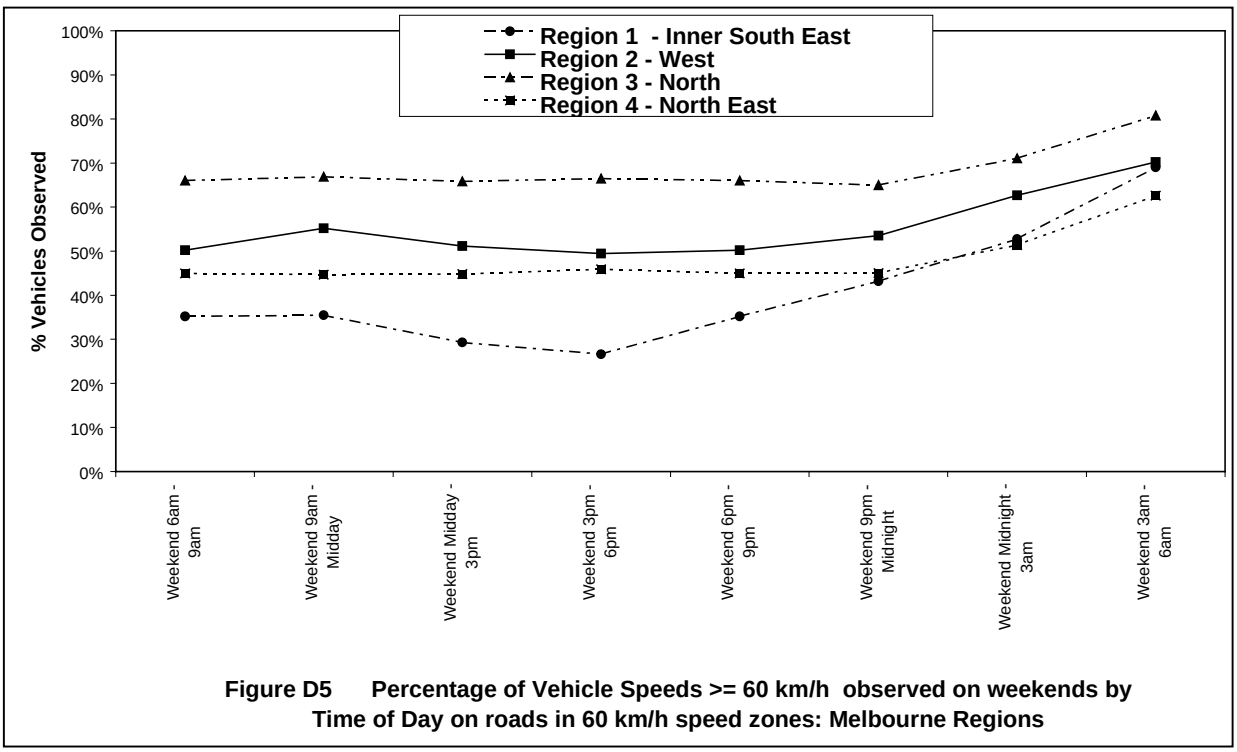

Figure D5 Percentage of Vehicle Speeds >= 60 km/h observed on weekends by Time of Day on roads in 60 km/h speed zones: Melbourne Regions

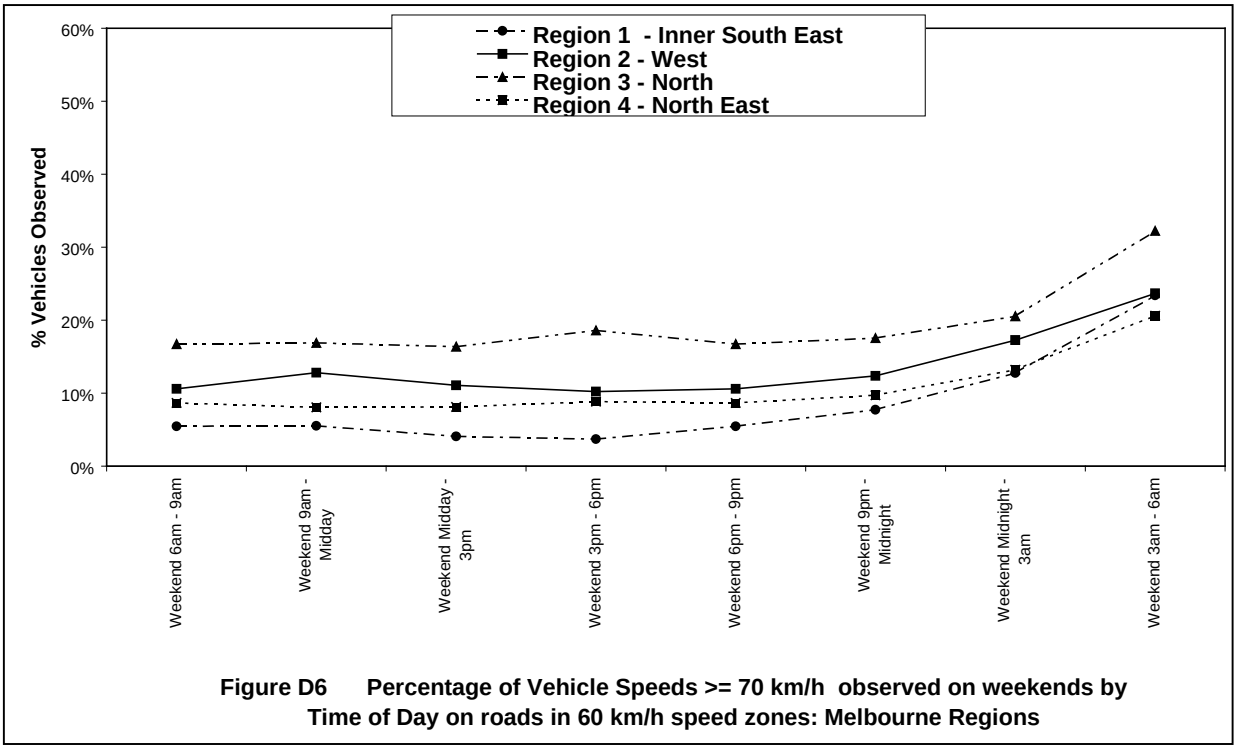

Figure D6 Percentage of Vehicle Speeds >= 70 km/h observed on weekends by Time of Day on roads in 60 km/h speed zones: Melbourne Regions

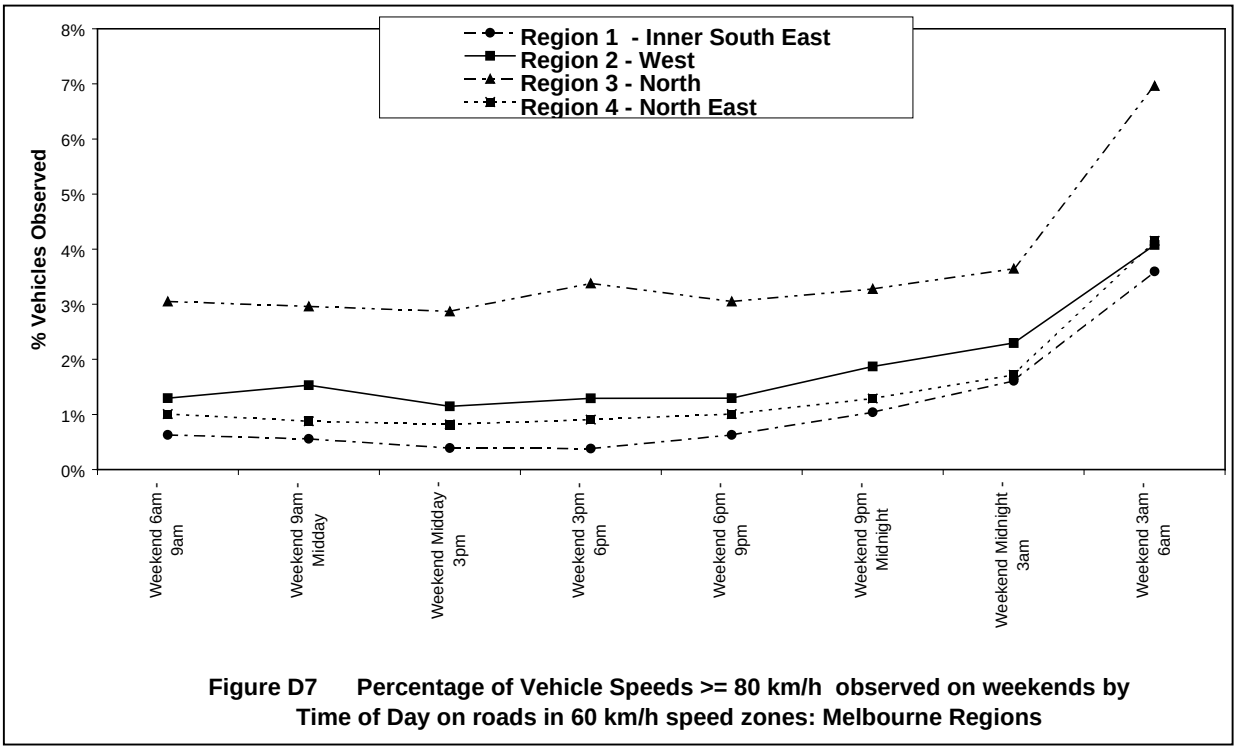

Figure D7 Percentage of Vehicle Speeds >= 80 km/h observed on weekends by Time of Day on roads in 60 km/h speed zones: Melbourne Regions

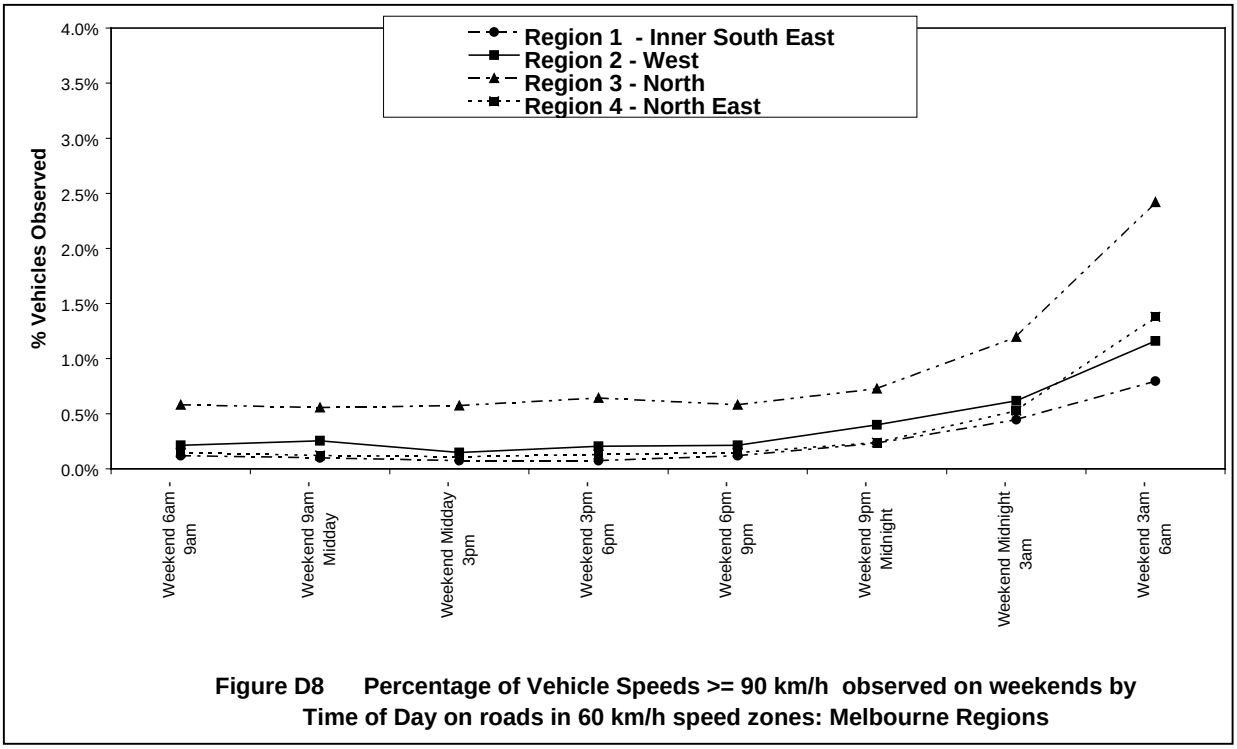

Figure D8 Percentage of Vehicle Speeds >= 90 km/h observed on weekends by Time of Day on roads in 60 km/h speed zones: Melbourne Regions

APPENDIX E

PERCENTAGE OF VEHICLE SPEEDS TRAVELLING OVER 60 KM/H, 70 KM/H, 80 KM/H, AND 90 KM/H ON WEEKDAYS AND WEEKENDS BY VEHICLE TYPE

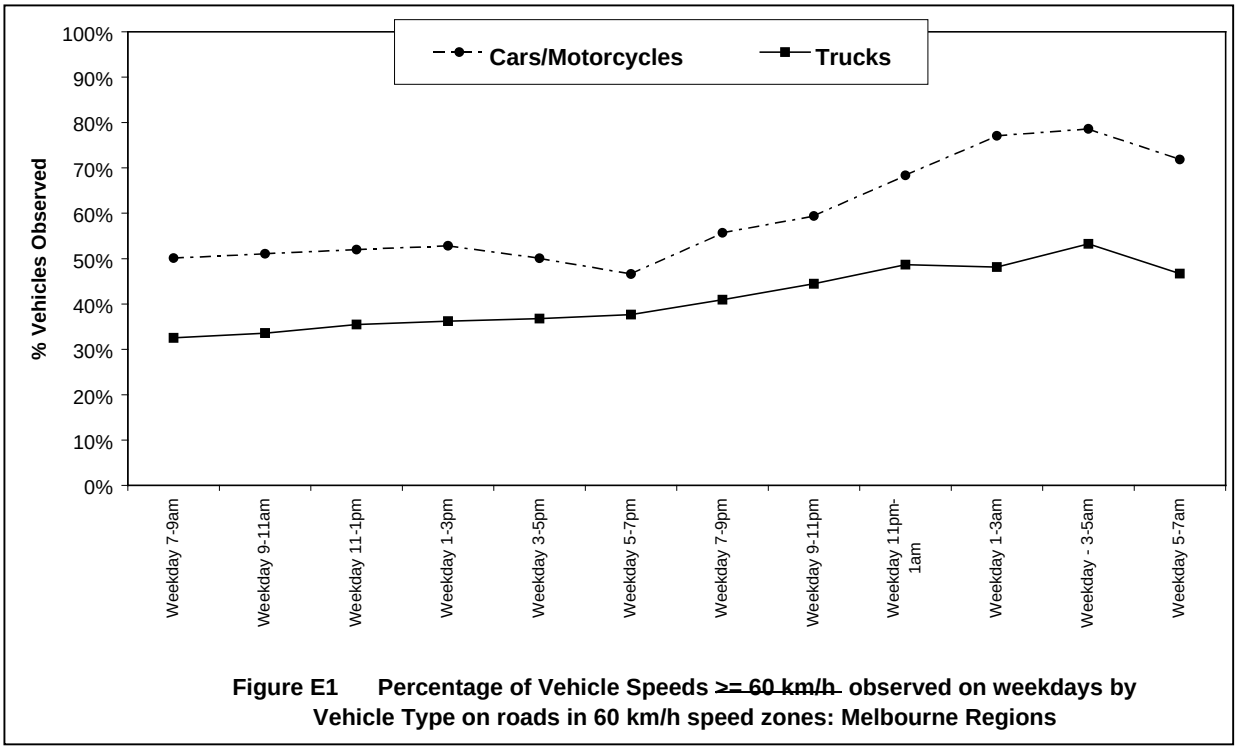

Figure E1 Percentage of Vehicle Speeds ~~>= 60 km/h~~ observed on weekdays by Vehicle Type on roads in 60 km/h speed zones: Melbourne Regions

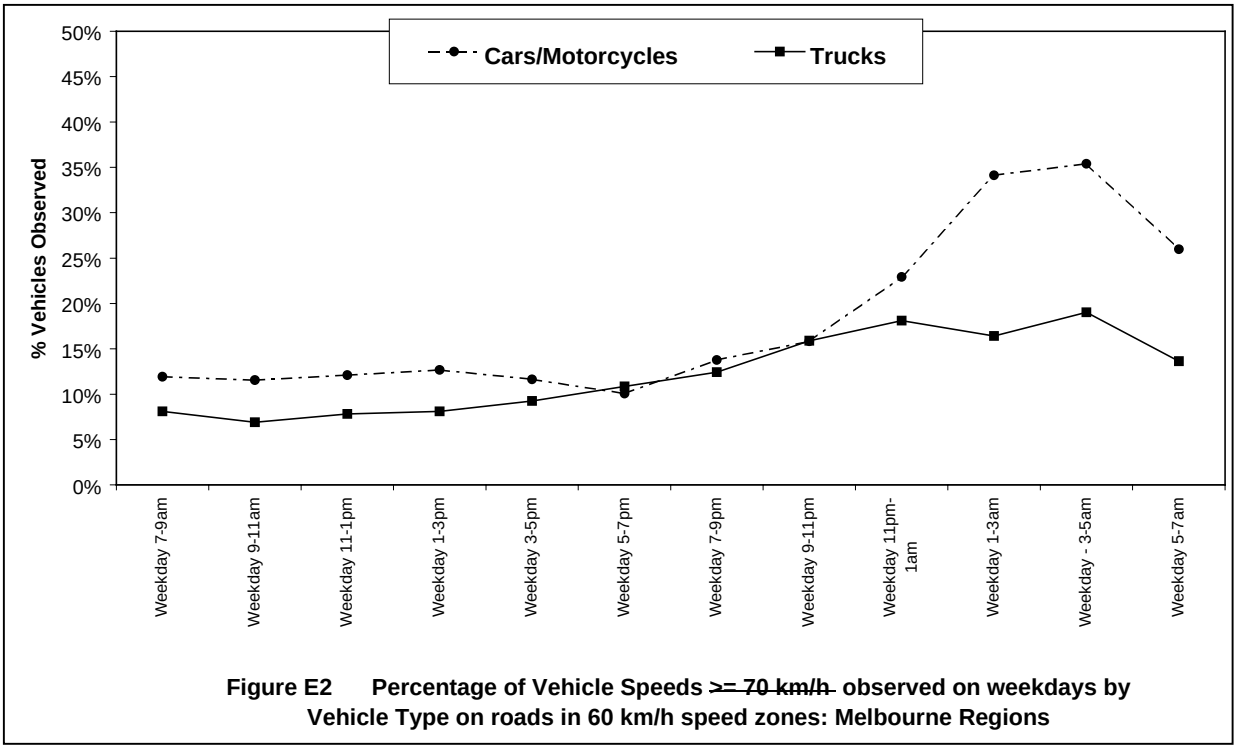

Figure E2 Percentage of Vehicle Speeds ~~>= 70 km/h~~ observed on weekdays by Vehicle Type on roads in 60 km/h speed zones: Melbourne Regions

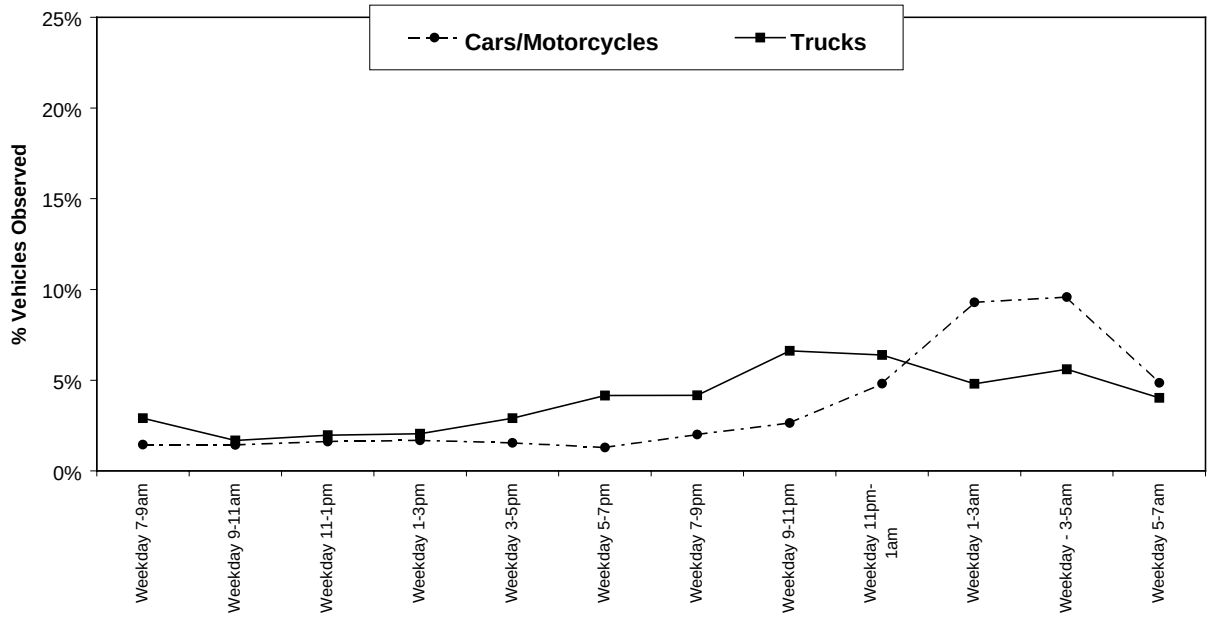

Figure E3 Percentage of Vehicle Speeds ~~>= 80 km/h~~ observed on weekdays by Vehicle Type on roads in 60 km/h speed zones: Melbourne Regions

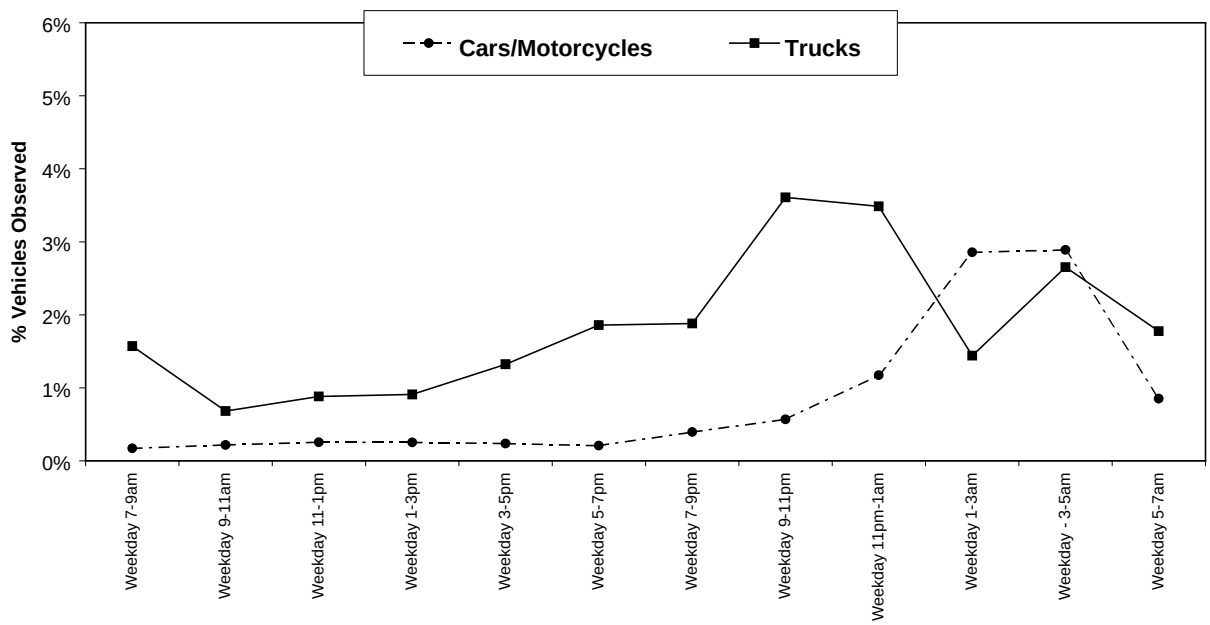

Figure E4 Percentage of Vehicle Speeds >= 90 km/h observed on weekdays by Vehicle Type on roads in 60 km/h speed zones: Melbourne Regions

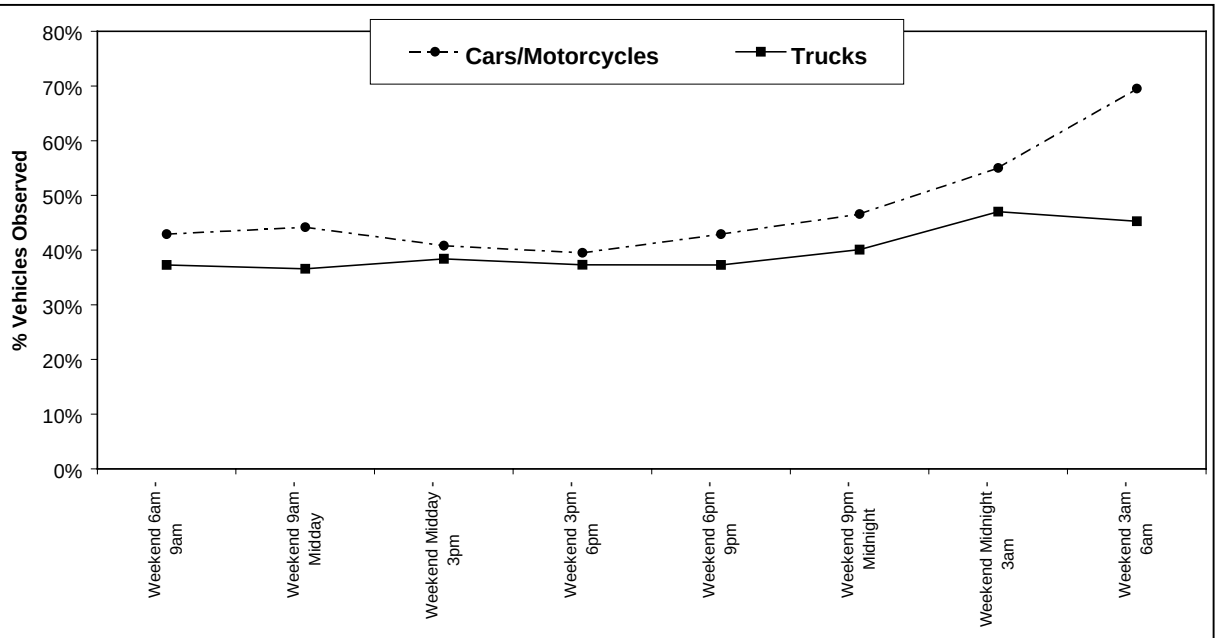

Figure E5 Percentage of Vehicle Speeds >= 60 km/h observed on weekends by Vehicle Type on roads in 60 km/h speed zones: Melbourne Regions

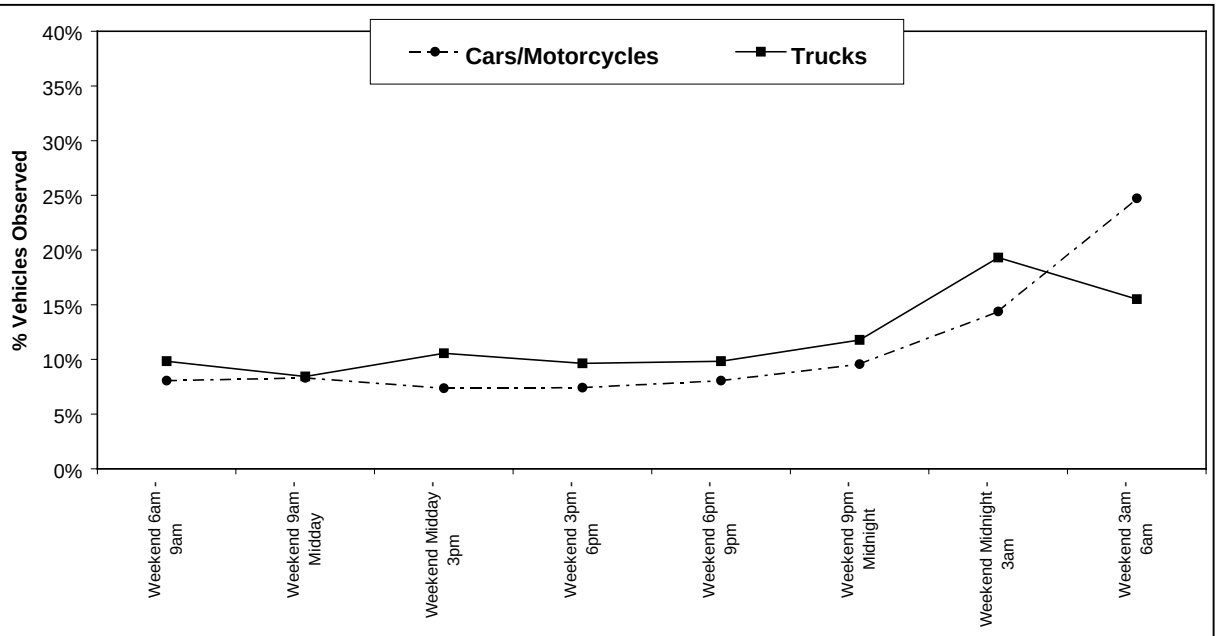

Figure E6 Percentage of Vehicle Speeds ~~>= 70 km/h~~ observed on weekends by Vehicle Type on roads in 60 km/h speed zones: Melbourne Regions

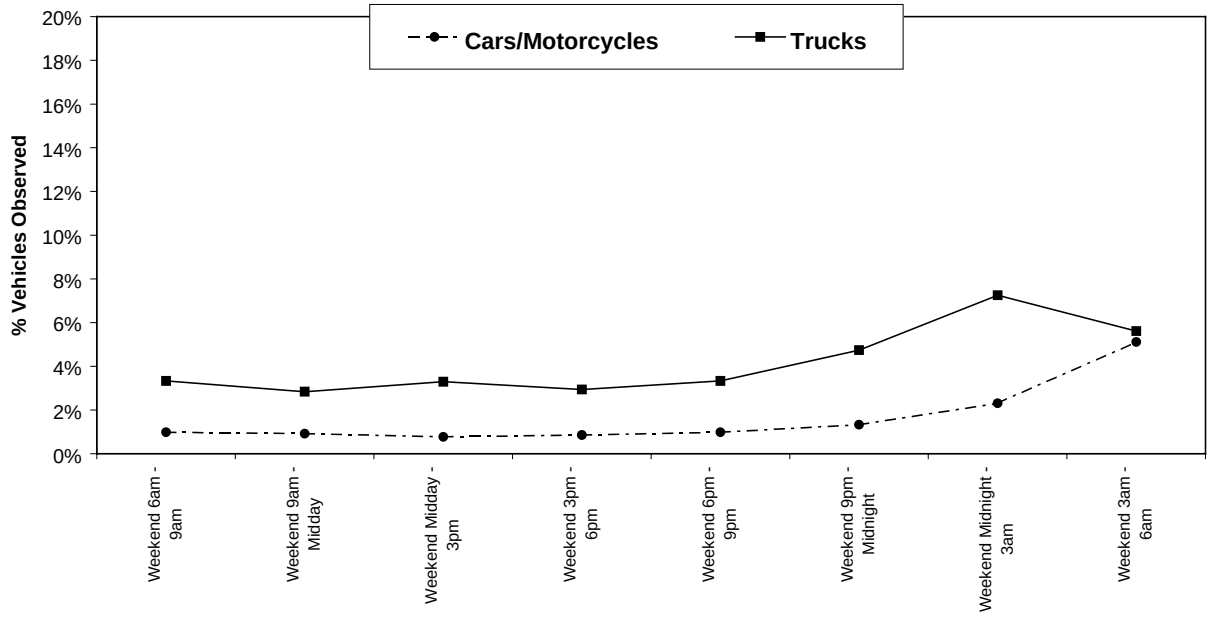

Figure E7 Percentage of Vehicle Speeds >= 80 km/h observed on weekends by Vehicle Type on roads in 60 km/h speed zones: Melbourne Regions

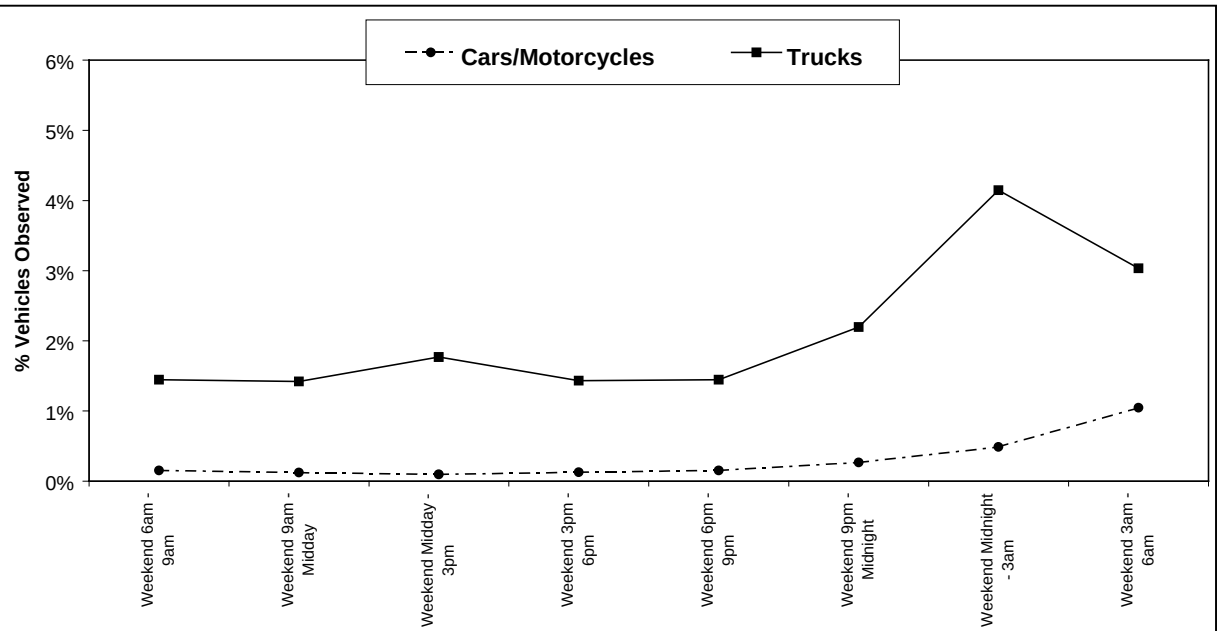

Figure E8 Percentage of Vehicle Speeds >= 90 km/h observed on weekends by Vehicle Type on roads in 60 km/h speed zones: Melbourne Regions

APPENDIX F

RAW FREQUENCY OF SEAT BELT WEARING RATES BY AGE

Age Group (years)	Correctly worn	Incorrectly worn	Couldn't tell if worn correctly	Not worn at all	Unknown if worn	Total
Front Left						
0-3	5	4	0	1	0	10
4-7	31	34	3	4	0	72
8-13	82	9	2	4	0	97
14-17	84	2	0	3	0	89
18-25	165	8	0	10	0	183
26-39	387	16	0	12	1	416
40-59	285	9	1	10	1	306
60+	120	5	1	3	0	129
Rear Left						
0-3	70	5	0	2	4	81
4-7	42	15	3	7	1	68
8-13	39	4	1	7	0	51
14-17	37	2	0	0	0	39
18-25	17	2	0	3	2	24
26-39	27	1	1	6	2	37
40-59	15	3	0	0	1	19
60+	13	2	0	2	0	17
Rear Middle						
0-3	48	0	3	3	7	61
4-7	19	2	1	5	8	35
8-13	7	0	0	1	3	11
14-17	1	1	0	1	1	4
18-25	1	0	0	3	2	6
26-39	2	0	0	3	0	5
40-59	2	0	0	1	1	4
60+	2	0	0	0	0	2
Rear Right						
0-3	32	2	1	1	6	42
4-7	39	8	2	6	2	57
8-13	25	3	0	4	0	32
14-17	17	0	0	5	0	22
18-25	12	0	0	0	0	12
26-39	19	1	0	0	2	22
40-59	15	0	0	1	1	17
60+	6	0	0	0	0	6