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A technique to resolve road accident problems

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A TECHNIQUE TO RESOLVE ROAD ACCIDENT PROBLEMS

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I certify that this work has not been submitted for a degree to any university or such institution except where specifically indicated.

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PREFACE

A Technique to Resolve Road Accident Problems.

"Resolve - to separate the component parts of - "

Accidents occur and result in death, injury, damage, inconvenience and economic loss; some are reported, the reports are collected and collated; various outputs of information are produced. The outputs are used in many ways, some quite non-productive in affecting the occurrence or severity of the accidents. The collection and processing of accident data must be viewed today in relation to the legal requirements for reporting accidents; the definitions (legal or otherwise) related to roads, intersections and physical features; and the regulations that govern the registration of vehicles, the equipment on/in vehicles and the manner of useage of vehicles on roads. The legal obligations on road users imposed by traffic signs, signals and other controls should also be taken into account.

This work examines certain aspects of what data should/could be collected, how it can be classified after collection, how the accidents can be located and assigned an accident-type and then how this transformed data can be used to "size-up" the particular accident problems in a city or country and provide a systematic approach to the reduction of accidents and/or their severity and cost.

To resolve road accident problems requires an appreciation of the road user movements leading up to the accident and the location of the accident.

It is not necessary to collect a large amount of information on a Police report form to have an effective system of identifying predominant accident types occurring within a given system and to determine whether these accidents "cluster" or not. It is, however, desireable to collect more reports/data on the less severe injury and non-injury accidents so that accident reduction programs can be carried out sooner, that is as soon as a clear pattern of accident-types can be discerned. This additional information need not come from Police reports but could come from insurance companies.

Some areas in this work, are touched upon because there seemed to be a need to make mention of them although these areas are perhaps not drawn into the technique as described.

The technique has been applied to examine the similarities and differences between four cities in different countries. That is the accident reports in these four cities have been searched and pertinent data extracted and transformed so that the analyses have been made very comparable. Normally comparisons would be made on data produced on quite different bases in which the definitions and assumptions are often not known.

The predominant accident-types for Victoria are explored and the history of high accident-frequency intersections is documented over time looking at intersite and within site variations. It is important to judge how much of a site's high record in one year is due to chance variation and how much is due to the hazard of the site because a deal of money is spent each year on the installation and maintenance of traffic control devices.

Definitions in use are looked at for a number of sources and comparisons made with a set of data items and definitions which has been proposed for Australia. Australia still has no uniformly applied set of definitions and concepts which would enable sensible interstate and national research to be made. The W.H.O. definitions appear to be a good starting point which would results in international statistics as well as interstate statistics. A possible system for use in Australia using both primary accident classes and detailed accident types is outlined. The primary accident classes would be compatible with a revised set of defined accident-types, which is also presented.

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A TECHNIQUE TO RESOLVE ACCIDENT PROBLEMS

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1. INTRODUCTION

The scene opens at a meeting in New York on the 28th October 1869 where a paper is being read by Joseph Potts, the title of the paper is "The Science of Transportation". He says (Potts 1870) "I hope to indicate reasonable grounds for declaring that transportation should now rank as a science, and that, when imcompetent charlatans undertake to expound its laws, they deserve a much sterner repression than the public have as yet accorded."

"The power to change at pleasure, and to any extent, the localities of ideas, of persons, and of property; with punctuality, with promptness, with safety, and without large expenditure of labor, has always been a desideratum for mankind. According to the degree of perfection reached by any people in this respect, has been their relative rank in civilisation."

In the paragraph above Potts virtually defined what later came to be the definition of "traffic engineering" adopted by the USA Institute of Traffic Engineers as related to the safe, convenient and economic transportation of persons and goods.

Potts may have been the first to declare that transportation was a science but it was not until 1922 that a post of Traffic Engineer was established in any city and 1930 when the Institute of Traffic Engineers was founded. Not that of course traffic problems were new or unique to the twentieth century; records indicate that in 45 B.C. Julius Caesar "forbade vehicles from entering business districts of large cities of the Roman Empire during certain hours of the day because of traffic congestion." It is also known that one way streets were used in Rome and off-street parking provided to get chariots off the travelled way.

Later in 50 A.D. the Emperor Claudius issued an edict that because of narrow winding streets, chariots would be prohibited in the central city area of Rome on Market Days. In 79 A.D. a one way street system was inaugurated in Pompeii.

The early days in the American Colonies found problems in New Amsterdam (now New York) which resulted in 1652 with the Council of New Netherlands ordering that "no wagons, carts or sleighs shall be run, rode or driven at a gallop within this city." Meanwhile back in England, Charles II in 1660 issued the following: "whereas the excessive number of hackney coaches in the City of London are found to be a common nuisance, the streets and highways being thereby made impassable and dangerous: we command that no person or persons permit or suffer such coaches to stand or remain in any of the streets."

Canal transport developed from the end of the fifteenth Century with a flowering during the eighteenth Century with canal building continuing until about 1820 when supplanted by the introduction of the railways. Stevenson ran his railway locomotive in 1814. In 1825 a public railway was commissioned and by 1860/70 railways were widespread. In the period 1880 to 1900 railway systems were still expanding. By the time of Potts' paper, railways were very extensive and while traffic congestion was reported on Broadway, New York in 1850, it was due to horse traffic as the first patent for a petrol engine was not filed in the USA until 1878. The first asphalt paving was used in 1870 and greatly improved the travel comfort for horse and carriage but the motor car was soon to appear to replace the horse. The ignition petrol engine was invented in 1860 and by 1887 Daimler and Benz had started manufacturing cars in Germany and then in 1908 Henry Ford introduced the assembly line technique to the manufacturing of automobiles and the car became available to the average family.

The petrol engine also made powered flight possible for the 'lighter-than-air' machines. Zepplin began construction of a dirigible in 1897 and it flew in 1900. Soon after that the first 'heavier-than-air' machine was flown by the Wright Brothers in 1903. The First World War 1914-18 did much for the development of the aeroplane.

Oil, the 'blood' for much of todays transport was it self first transported in barrels by wagon, boat and railroad. In 1865 the first rail tanker was used for oil and in the same year the first oil pipeline (2 inches in diameter and 5 mile long) went into use.

Potts' paper is very prophetic in many ways, but how has the science of transportation advanced over the last Century?

We have built our cities, studies of the interaction of city growth and traffic generation have been made and more persons are moving from the country into urban areas. Traffic congestion, accidents, deaths and injuries have been the by-products, not that these are unique to the motor vehicle era; congestion, deaths and injuries have resulted with all forms of transport throughout recent history and today perhaps it is the sheer scale of movement coupled with the recording systems which enable us to quote the relevant numbers and sum the cost to our respective communities. Some of the problems have lead to an understanding of the solutions which are effective such as the question of congestion and capacity, however this thesis is to deal with the question of traffic accidents and the question is what has been the progress of transportation science in this area.

As Ashton (1966) points out the subject of road accidents is obviously of great social importance, and it is increasingly a topic for scientific investigation by workers in a variety of fields. Since Greenwood and Yule published their paper in 1920 there have been literally hundreds of papers on various aspects of accident causation. Ashton says that "however, few results of real scientific value have yet emerged"; she says there are two reasons for this, the difficulty of getting non-corrupt data and statistical difficulties. The <u>types of accidents</u> involved are relevant, but the seriousness of the results of the accident may have lttle connection with the causation. To use the outcome of an accident for classification could be valueless if the hypothesis is that the result is due to chance and nothing else. There is some justification to argue that is better to pool all kinds of accident severity. Other problems exist because the total mileage at risk is a highly variable quantity and it is obviously correlated with other factors such as age and experience. Ashton says that "<u>multiple correlation</u> analysis is therefore indicated, although in most investigations known to the author it does not seem to have been used. Usually simple comparisons have been made of the effect of experience on accident rates for the different age groups separately. Where exposure to risk is not included as a variate it must be equalized over the population of drivers considered. This is difficult as it includes not only total mileage driven but also such factors as time of day, hours already spent driving, weather conditions, routes taken and so on."

Wigglesworth (1971) states that there is a paucity of accident research in Australia and suggests two reasons - the lack of professionalisation and the continued community acceptance of accident folk-lore. He says the main consequences of the lack of professionalisation and some components of accident folklore are given in this table.

Table I Reasons for the absence of Research (Wigglesworth, 1971).

Lack of professional workers

1. Limitations of accident data.
2. Lack of precise terminology.
3. Community acceptance of folk-lore.

Accident folk-lore

1. Fatalistic resignation.
2. Concept of culpability.
3. Reliance on commonsense.
4. The unique insoluble problems.

Wigglesworth points out a lack of "safety courses" in Australian tertiary establishments and the pressing need to develop a terminology as common usage has led to a fundamental problem in semantics. He also states there exists a desire to explain causation by an anomalous allocation of culpability and that assigning blame for an accident is a barren and sterile exercise that helps neither in the understanding of the phenomenon nor in the consideration of appropriate countermeasures. The attitudes, coupled with reliance on common sense instead of research, has led naturally to the introduction of remedies based on supposition, intuition and conjecture. Little attempt is made to measure the effect of many of the remedies and they are in due course seen to be ineffective. However, the publicity that accompanies their introduction, especially in the road safety field, supports the belief that all that can be done is being done and as it is not making any impact on the problem, this serves to "confirm" the opinion that the accident problem is not only different but is also unique, for it has no solution. As there is no point in wasting effort on an insoluble problem, the belief that there is obviously no point in carrying out research into accidents is sustained and reinforced.

It appears that the number of accidents has increased in all countries in the world progressively with time. The data in developed countries is more readily available and World Health Organisation (WHO) statistics (Hobbs, 1974) show that over one third of all accidental deaths are attributable to motor vehicle accidents in developed countries. Marked differences occur between the statistics of one country and another and the comparison of statistics is made difficult because common definitions are not used.

Hobbs (1974) says "there are many reasons for the growth in accidents, besides the increase in populations and wealth enabling more people a greater amount of individual travel, and these range from individual to collective apathy to man's physical and emotional limitations to live safely in a mechanised environment."

Toomath (1975) in looking at traffic accidents over twenty years in New Zealand found a 6% annual increase in accidents which was of the same order as increases in vehicle registrations and fuel consumption but much greater than the increase in population. In the period 1953-73, accident casualties almost trebled while the population increased by only one half.

Thomson (1977) in an overview of 30 "Great" cities of the world asks the question "how great a problem is road safety? How seriously do cities rate the fact that hundreds of their people die on the roads each year? Is it as important as road congestion, and does it command as great an effort to alleviate it? Does it influence plans to continue the process of private motorisation or to build urban railways?"

He says there appears to be in many cities a strange subliminal separation of the problem of accidents from the policies that give rise to them. Accidents are blamed on drivers, vehicles or roads; they are not accepted as an inherent drawback of the transport system that gives rise to them. From data on deaths and car ownership for 18 cities Thomson deduces that the highest incidence of deaths occurs in cities with the highest rate of car ownership, however, the death rate rises much less than proportionately with the rate of car ownership, indicating that the use of a car is much safer in cities with high car ownership than in those of low car ownership.

Plowden (1971) includes in his book some data on accidents and registrations for the UK covering the period 1928-1969 which had an increase between the two end years of 107% in casualties while vehicle registrations increased 623%. (The end year did not represent the highest level reached for casualties during the period, but is used to illustrate the change.)

Data for Victoria over a similar period, for that quoted by Plowden for the U.K., is for 1932-70 and shows an increase of 463% in casualties while vehicle registrations increased 687%.

A number of organisations in various countries quote RATES based on a range of parameters such as population, vehicle registrations and vehicle-miles often to "prove" that the situation is improving. Smeed (1949) derived a relationship between deaths per registered vehicle (D/V) and the number of vehicles per head of population (V/P) for 20 developed countries for the year 1938, [$D/V = .0003\ (P/V)^{.667}$], he later confirmed (Smeed 1969) that the same equation was a good fit to data for 1957-1966 from 16 countries. Jacobs and Bardsley (1977) carried out the same analysis on data for the same original countries used by Smeed but for the years 1950, 1960 and 1970 thus giving a view at ten year intervals. They said the relationships derived were very close indeed to those obtained by Smeed and thus the relationship appeared stable in those countries. The results they obtained for 32 developing countries showed that as vehicle ownership increased, the fatality rate decreased, thus the less developed countries (with lower vehicle ownership) were those with the higher fatality rate.

Thomas Hall (1978) in reviewing safety programs in the USA said that the fatal accident rate (not specified, but assumed to be per registered vehicle) had been following a consistent downward trend since 1925, however injury accidents have continued to increase. His graph of the downward trend in the fatal rate has "milestones" marked and it is suspected that one is meant to draw an inference of cause and effect for these milestones and the reducing rate. Patrick Hall (1970) in applying the Smeed formula technique to the accident data for Ireland (1946-68) compared his resultant curve $[D/V = .0129\ (P/V)^{.54}]$ with Smeed's curve and Foldvary's curve $[D/V = .0131\ (P/V)^{.882}]$ and remarked that the death rate per registered vehicle decreases as the number of vehicles per head of population increases and further that the curves suggest that as the degree of motorisation reaches saturation level, the death rate per registered vehicle tends to stabilise. As a particular example of the last point, Hall says the death rate in the USA was decreasing regularly since 1925 and has started to stabilise since 1958. In other words in the USA where the degree of motorisation is one vehicle for every two people, the death rate from 1958 onwards has no longer shown any significant differences in the course of time. It is interesting to compare this statement with the paper of Thomas Hall (1978) who while producing graphs showing downtrends, does not mention anything about significant changes. Smeed (1972) in discussing the uses of his formula $[D/V = .0003\ (P/V)^{.667}]$ showed how both the death rate per vehicle and the death rate per head of population can be expressed in terms of the degree of motorisation, (vehicles per head of population). The rates show that deaths/vehicle increases with increasing motorisation and deaths/population increases with increasing motorisation. For a level of motorisation of 0.5 (one vehicle for two persons) the vehicle fatality rate is about 5 deaths/10000 vehicles and the population fatality rate is about 24 deaths/10000 vehicles.

Could it be that the vehicle death rate decreases as a function of motorisation in a country and is not directly related to any road safety countermeasures excepting if the trend departs significantly from the trend predicted by Smeed's formula following the introduction of a countermeasure?

This excursion into the matter of RATES is to raise questions about their use without qualification and that deaths alone is probably not a particularly good indicator of the road safety condition. A road death is a fairly clear cut criterion and is no doubt the reason for its use but "fatal accidents" might be better and indeed casualty accidents and all accidents would be preferred as a measure as they refer to incidents and not the numbers of persons who became a casualty as a result. There are, of course, problems in making comparsisons with other countries or even interstate in Australia due to differing definitions but within a single country or state as long as the definitions have been consistent over the years, the number of accidents would be the better measure for general trends rather than the number of persons killed. Excepting that, for some specific issues other measures would be more appropriate and then one is often forced to use the closest measure one can get. Also if the ratio of the number of persons involved per accident is reasonably constant over the years (e.g., number of persons killed per fatal accident) then either deaths or fatal accident trends will obviously produce similar results. If the ratio of persons killed to persons injured in accidents is reasonably constant over the years similar trends would also appear, however, if severity modifying or ameliorating measures were introduced then the similarity of trends would be likely to disappear.

McMonagle (1952) looking at the fatality rate (deaths per 100 million vehicles miles) for Michigan 1930-51 commented that the fatality rate had declined steadily during the past 10 years and the trend had been downward for 14 years and that "we should hesitate to assign too much credit for this condition to any particular factor or factors.

Undoubtedly safety education and traffic engineering operations have contributed, BUT probably of greater importance are the lessons of care and conservation which home-front restrictions taught motorists during the war years. And in this connection, one should not forget the progress of medical science, especially in the use of blood transfusion which undoubtedly has benefitted many traffic casualties".

Thus it would appear that the improvement in post-crash treatment of casualties since World War II has resulted in a greater survival rate and hence fewer deaths.

The absolute number of accidents and casualties is rising and this thesis will examine a technique which breaks the accident problem into components known as accident-types. These accident-types, which are classified by the movements of the road users leading up to the accident, are combined with descriptors of the location of each accident. Predominant accident-types can be determined and the accident-types taken against any other useful factor (e.g., location, vehicle type, driver age) to determine "clustering". The type of remedy which affects each of these accidents-types can then be investigated.

2. ACCIDENTS - NATURE AND CAUSATION

Ashton (1966) said in relation to accident research that the types of accidents involved are relevant, but the seriousness or otherwise of an accident may have little connection with the causation.

Wigglesworth (1971) said assigning blame for an accident is a sterile exercise that helps neither in our understanding of the phenomenon nor in our consideration of appropriate countermeasures.

The occurrence of an accident is not usually attributable to a single cause but to the combined effects of a number of deficiencies or failures associated with the user, his vehicle and the road layout. (Hobbs, 1974).

The Metropolitan Town Planning Commission (1929) in commenting on accidents in Melbourne 1922-1928 said "an analysis of the figures may give rise to a variety of views as to causes. It has to be recognised that the human element enters into this matter to such an extent that accidents are bound to occur. The greatest need is to reduce the risk as much as possible, and, apart from mechanical improvements to vehicles, the education of pedestrians and drivers must be constantly aimed at. There are too many accidents due to faulty driving and it is a matter for serious consideration whether stricter control over the issue of licences and greater penalties should not be enforced. The vastly increased number of vehicles using the road each year should not be accepted as a reason for a proportionate increase in the number of accidents".

Thorpe (1959) when speaking of the difficulty of assigning causes to accidents said all accidents must be attributed to one or more of three causes: Human errors, Faulty vehicles, and Road conditions. Various estimates have been made of the extent to which each of these three factors is responsible, for instance in Australia in 1957/58 drivers were judged responsible for 69% of accidents reported, mechanical defects 6.4% and road conditions 5.5%. By comparison UNESCO reported that in Europe drivers were responsible for 20% of accidents, cyclists and pedestrians for 5%, mechanical defects 5% and road deficiencies for 70%. The difference is explainable by different methods of assigning causes. It is extremely difficult to assign one cause to an accident; it is more likely that every accident is the result of a complexity of causes. The accident reports (1959) record insufficient facts and rely too much on opinion, they tend to be subjective rather than objective. Too much reliance on opinions produces records which give answers at variance with common sense. For example for 1957/58 for accidents in which the driver was judged responsible, the principal cause was:

(a) excessive speed in 9.7% of accidents in NSW
and 24% in Victoria.

(b) bad hand signals in 0.3% of accidents in NSW
and 3.45% in Victoria.

The records also showed road conditions caused 1520 accidents in NSW but only 34 in Victoria. Thorpe said "it is beyond reason to believe such differences really exist".

Anderson (1976) highlighted the myth situation which is often propounded in road safety that 80 to 90 percent of all accidents are created by driver error. Many of the official publications (in the USA) list major circumstances contributing to accidents all of which are driver-related. One example is the weekly summary of the Maryland State Highway Patrol for Fatal Accidents in which all accidents are attributed to one of three reasons on the standard form; alcohol, speed or driver error. Anderson says it must be remembered that the patrolman is a fault finder not a fact finder and that almost any accident can be rationalised as having been caused by the human factor. For example if a tyre blows out, the driver should have replaced it sooner. When the brakes fail, they were improperly maintained. The right angle collision at a blind intersection was caused by failure to give way. He says it is incredible that such a myth should persist in light of common sense. Of course human error is a significant cause in many accidents but it is not the only factor. Is a head on collision on a narrow bridge driver error only? Is a pedestrian accident in a residential area without footpaths driver error only? Are 12 right angle collisions at an unsignalised intersection driver error only? Driver error contributes to many accidents and so does the highway environment. In fact, the environment may lead the driver into error or prevent him from making the right decision. The importance of driver error accidents is recognised in national accident warrants for stop signs and signals. These warrants indicated that a number of driver error accidents is a justification for the installation of these devices.

Anderson also quotes Dr Tarrants (National Highway Traffic Safety Administration) as saying "the most common and universal fallacy is one which is so ingrained that it is seldom explicitly recognised. In its most common form, the assumption states that because drivers cause most accidents, most prevention programs correspondingly must be concerned with drivers .... In the real world, there is no basis for making this assumption."

An interesting comment from the area of occupational accidents is by Kletz (1976). He discusses equipment failure rates, noting that information should be collected on accidents not on injuries, and that information on failure rates can be used to predict accidents and action can be taken to prevent them occurring. Kletz then discusses human failure rates and says the following: "We have to accept that men, like equipment, sometimes fail. If the failure rate is unacceptable we must redesign the equipment - it is no use telling the man to be more careful. We might just as well reprimand a light bulb for going out." Studies of railway accidents that he quotes demonstrate that it is more value to accept that even the most experienced driver may have an occasional lapse and to design the equipment so that such lapses are less likely to produce an accident. He says the first problem is to train ourselves to recognise human failing when it occurs. At present it rarely comes to light until there has been an accident and then the tendency is to blame someone. The second problem is to determine the failure rate as distinct from the accident rate, although this poses problems in the practical area of reporting near-misses and mistakes that were nearly made.

Kletz gives three examples of failure rates including a case of operating electronic equipment with labels and push buttons. It demonstrates that a succession of six items each with a probability of success well above 99% will nevertheless give a joint likelihood of 4 errors in 1000 operations.

The work of Platt (1958) on the operational analysis of traffic safety gave an estimate of the relative frequency of traffic situations, injuries and fatals. The decisions, errors and near collisions are estimated as well as the collisions which could lead to an estimte of human failure rate in the traffic environment in accordance with Kletz's concept. Platt's figures give a ratio of 40 decisions for each error and a ratio of 1000 decisions for each near collision. The ratio of near collisions to collisions being 122 to one.

Matson, Smith and Hurd (1955) in discussing the question of legal vs natural causes state the following. "In the search for accident causation there is a tendency to charge road users with violation of some preconceived notion of moral or statutory law and thus to establish the cause of the accident. While the traffic engineer is vitally concerned with the system of traffic regulation and accepted convention of society, it is his responsibility to search for the scientific facts which surround accidents and if possible find the laws of nature which influence or govern accident causation.

"In one case, right angle collisions at a signalised intersection on a high speed road were numerous. In the attempt to reduce accidents, many persons were charged with violation of signals. It was later found that the mere lengthening of the amber of the clearance period practically eliminat ed all right angle collisions and numerous rear end collisions. Here it is clear that violation of the natural laws of inertia, momentum, and human reaction time, rather than intended violation of legal statute governing the meaning of signal legend, was the cause of the accidents."

In the introduction to Research on Road Safety (RRL 1963) the following comments are made about the research point of view. "It is desirable that the records of accidents should supply not opinions but as much factual information about the conditions of the accident as possible .... Such things as the width of a street, its curvature and gradient, the quality of its surface, the flow of traffic and its speed, all influence the probability of an accident in a street .... When individual accidents are studied and "causes" sought it is not in general these factors that will be cited .... Ignoring these "normal" factors gives rise to a tendency to ascribe most accidents to human factors such as error or carelessness, since it is usually possible to believe that there would have been no accident if someone had acted differently. This in turn may lead to believing that accidents can only be reduced by means which act directly on the road user's attitude or skill (e.g., propaganda or training) and to overlook the contribution which can come from changes in the physical environment of road and vehicle."

Pignataro (1973) while acknowledging that most accidents result from a combination of several contributing factors then proceeds to regurgitate the standard published data myth that 90.6 per cent of accidents (USA) were attributed to improper driving. For vehicles he finds a contribution of 2 per cent and for environmental factors he states the extent of influence is yet to be determined. He then goes on to say that "The traffic engineer must strive to change driver and pedestrian behaviour, by reasonable regulations and enforcement, so as to reduce their dangerous acts." It seems that Pignataro is out of step with Matson, Smith and Hurd (1955) in what the role of a traffic engineer is with respect to accidents.

Forbes (1972) in discussing theories of accident causation said "What might be called the "driver culpability theory" was and still is often accepted. In other words there is a tendency to blame the driver for inefficiencies and breakdowns in the system especially for accident occurrence."

Vey (1965) commented that data from conventional accident reports relating to offences or driver and vehicle conditions preceding the accident are essentially opinions (rather than facts) and should be quoted only with extreme caution.

The most recent Australian publication which illustrates the views put forward by Forbes (1972) and Vey (1965) was that published by the R.A.C.S. (1979) It perhaps should not be viewed as a scientific document since for example it refers to "an important study from the United Kingdom" without giving a direct reference for this study. It is interesting to note that from the study quoted that 59% of the drivers of motor cars were primarily at fault and human error was the sole explanation of no fewer than 65% of the accidents. It is interesting because it is less than the 90 per cent quoted by American sources.

Some of the interpretations made by the RACS of the accident data (obtained from ABS publications) require some comments.

(1) Type of licence

> "Whilst 20% of all casualty accidents involve probationary licence holders, only 12% of all licences issued are probationary licences. Thus probationary licence holders are grossly over represented in casualty accidents."

In the preceding paragraph of the publication the sex of the driver is analysed and males are involved in 79% of casualty accidents. The RACS did not comment that males were grossly over represented since they have 60% of all licences. They have ignored the question of exposure. For the case of sex of driver, roadside studies (Andreassend, 1972) have shown that averaged across different times of day and days of the week, male drivers are 84% of the drivers on the road. Thus their exposure and accident experience are comparable and perhaps the same is true for probationary licence holders.

(2) Daily pattern of accidents

> "There is a second peak between 10 p.m. and 1 a.m. which is most obvious on Friday and Saturday nights. This seems to be related to increased road traffic after the evening entertainment period and to hotel closing hours ..... The late evening peak indicates a strong relationship between drinking and driving, tiredness, and irresponsible driver behaviour in producing road crashes at a time when traffic density is low."

Certainly there have been studies of drinking and driving which relate to hotel closing times but the addition of irresponsible driver behaviour and tiredness are not vindicated by any known studies.

(3) Age of vehicle

"One third (36%) of all fatal accidents involved vehicles more than nine years old. There is a definite trend towards older vehicles being involved in crashes."

No attempt is made to compare the age of vehicles on the register with the age of vehicles in crashes, let alone the age of vehicles in use on the roads.

(4) Speed Zones

"In the rest of Victoria, the 100 km/h speed zone accounts for 71.8% of fatalities, whilst injuries are almost as common in country 60 km/h zones as in 100 km/h zones. The high fatality accident rate particularly relates to 100 km/h speed zones, thus proving that speed kills."

The speed zone on a road does not necessarily reflect the speed of the vehicles involved at the time of the accident. Certainly a crash at high speed is potentially more lethal than one at low speed (to the occupants). Again the question of exposure is involved; perhaps travel outside Melbourne is greater (i.e. vehicle-km of travel) in 100 km/h zones than in 60 km/h zones; for long distance travellers on the main highways this is obviously true.

(5) Curved and straight roads

"75% of all fatal and 68% of all injury accidents in Victoria ... were on straight roads."

What constitutes a curve is a matter of opinion and the choice to be reported on the accident form is between straight and curve.

(6) Divided roads

> "14% of all fatal and 17% of all injury accidents in Victoria occurred on divided roads. Divided roads make up only a small percentage of Melbourne district roads. A conclusion is that faster and perhaps more irresponsible driving on divided roads causes the crashes."

There are many points in this one, what a divided road is, is not defined therefore short lengths of central traffic island might be viewed by the reporting officer as constituting a divided road, hence it is a matter of opinion rather than fact. Most accidents occur on arterial roads in Melbourne and that is where one finds the divided roads and the heavy traffic flows. The actual percentage of divided roads is not given. How one can determine that driving is faster and more irresponsible on divided roads from the very basic data of percentage split is amazing.

(7) Light and visibility conditions

"The vast majority of casualty accidents occur in clear conditions and on dry roads. Accidents are not related to bad road or poor weather conditions."

The fact that the weather throughout the year tends to be fine and dry has been overlooked (13% occurred during rain). The researchers who have demonstrated a link between poor weather, wet surfaces and accidents would be surprised by this statement.

The document has a chapter entitled Countermeasures and within this puts countermeasures into five main categories:

(a) Improved medical care including first aid, ambulance and hospital services.

(b) Legislative provisions (which strangely includes traffic management, construction and the elimination of some road hazards in with seat belt wearing, speed limits, and drink-driving).

(c) The car as a safety package.

(d) Community awareness.

(e) Legal sanctions relating to drivers in Victoria (which covers licences, knowledge of regulations, and obedience to the regulations).

It is perhaps not surprising in view of the driver-blaming approach that environmental countermeasures have not been separately mentioned. As Anderson (1976) points out there are literally hundreds of documented studies which clearly indicate the value of environmental improvements in reducing accidents.

As Thorpe (1967) points out, "If in fact, drivers are careless, irresponsible, unqualified, inept and without the ability to operate a motor vehicle, this should show up in a close physical and psychological examination. Such examinations of drivers show that the average driver is a normal person. The logical extension to this line of reasoning would be that the normal person does not have the ability to operate a motor vehicle. If this is so, vehicles and roads should be redesigned so that they can be used safely by normal persons.

"Strangely, therefore, the complete development of the argument that drivers are to blame for most accidents appears to arrive at the conclusion that roads and vehicles should be improved."

3. ACCIDENT STUDIES

3.1 Remedial Measures

In the preceding chapter the question of approach to accident research was discussed as regards blaming the driver compared to taking a multi-factor approach and examining the component parts.

Here if one starts with nothing one would have to deduce what type of remedies would be effective in reducing road accidents and one would need an accident reporting and recording system. The next question would be the cost of the remedy and the expected savings, for these have to be kept in some perspective. Obviously a huge expenditure ($20M) to save two accidents a year would not seem reasonable for current social attitudes. The next step would be a trial of the remedy with the appropriate before and after measures being made. The remedy should then be tried elsewhere to ascertain the repeatability of the effect and thus hopefully establishing "cause and effect".

Of course today we are not starting with nothing but the steps outlined above should still apply. Fortunately there is a good deal of literature demonstrating the value of some remedies and unfortunately a great deal of folklore concerning the value or possible value of some other remedies.

3.2 What is being studied?

This raises the blaming the driver vs. the multi-factor approach in the research and in accident reporting. Therefore for each accident all factors which seem to contribute should be recorded. As Thorpe (1967) suggests this requires a system based on the "Accident Frequency" method as opposed to a system based on the "Individual Inquest" method. In the Accident Frequency method all the identifiable factors are recorded, as far as they can be determined reliably whereas in the Individual Inquest method one cause is assigned to each accident and a system of records built up on that basis.

The Individual Inquest method must always be suspect to some extent, as experience has shown that the cause assigned to any accident will vary somewhat according to whoever assigns the cause. The Accident Frequency method avoids pitfalls such as this and allows predictions to be made of the reduction in accidents which will follow the introduction of a particular contermeasure. For example the accidents at a railway crossing are reduced by two thirds when automatic signals are provided. In the Individual Inquest method most rail crossing accidents would probably be attributed to "Driver failed to keep proper lookout".

As Thorpe puts it "the Accident Frequency method seeks to determine the causes of accidents without determining the "cause" of individual accidents."

The common use of the Individual Inquest type of accident records leads to the oft-repeated statements such as "human error is the cause of 90% of accidents, vehicle defects 7% and road deficiencies 3%."

Thorpe says that the Accident Frequency method produces a fundamentally different picture. If all the factors associated with accidents could be identified, it might show that in 90% of accidents there was some human failure, there was a vehicle defect involved in 30% of accidents, a road deficiency in 45%, ineffective enforcement contributed to 5%, indequate laws to 5%, and inadequate driver training to 10%. The figures quoted are to illustrate how the factors associated with accidents add up to much more than 100% of accident numbers.

So the Accident Frequency method should be used to study accidents and the effect of remedial measures, however it appears equally important to the writer that a further step of Accident-type should be added. So then there would be an Accident-type and Frequency method. It is perhaps encompassed by Thorpe's method but not specifically elaborated except where he refers to "Accident Frequency statistics - classing accidents according to what happened (which is fact, not according to why, which is often only surmise) have provided a means to asses not only the success or failure of many countermeasures, but the extent to which they are successful."

To use Thorpe's earlier example of the rail crossing to add Accident-type to the method would be to ascertain whether the collisions were vehicle-train, vehicle-vehicle, vehicle-roadside object, or non collision (e.g. roll-over) since a range of accident-types can occur at the location of the rail crossing. Then the automatic signalling one assumes would primarily affect the vehicle-train accidents. The examination of accident-types and frequency before and after the signalling allows a more precise prediction of the effect of installation at other railway crossings, given the breakdown of accident types at those types of crossings

3.3 Some examples of specific studies

While by no means trying to present an extensive review of specific accident studies, it is intended to present a few and comment on them in the light of previous discussion.

Thorpe (1962) summarises the measured effects of various treatments in Victoria as follows:

Table 3.3.1 Effect of Counter Measures (Thorpe, 1962)

	Improvement	Effect on Accs.	Significance
(i)	Duplicating a rural highway and providing a wide median.	-30%	$p < .01$
(ii)	Flashing amber signals	-30%	N.S.
(iii)	Stop-go Signals	-50%	$p < .001$
(iv)	Introduction of Amber period in signals	-45%	$p < .001$
(v)	Stop signs	-60%	$p < .001$
(vi)	Flashing red/flashing amber (replacing stop signs or flashing amber)	-30%	$p < .05$
(vii)	Crash helments on motorcyclists	-30% (fatals)	N.S.
(viii)	Very good Street Lighting	-20%	$p < .02$
(ix)	Good Street Lighting	+40%	$p < .001$

Thorpe has summarised the effects in terms of all accidents but for most of the devices he has examined "accident-types" as well and when these are compared:-

Table 3.3.2 Effect on Specific Accident-types

	All Accs.	Significance	Acc. type	Significance
(i)	-30 per cent	.01	Head on -85%	.001
(ii)	-30 "	NS	Right angle -40%	.05
(iii)	-50 "	.001	Right Angle -80%	.001
			Right turn +90%	.05
(iv)	-45 "	.001	Right angle -70%	.001
(v)	-60 "	.001	Right angle comprised 90% of accs.	-
(vi)	-30 "	.05	Right anlge -40%	.02
(vii)	-30 "	NS	No acc. types given	-
(viii)	-20 "	.02	No acc. types, casualty accs. - 34%	.01
(ix)	+40 "	.001	No acc. types, casualty accs. +55%	.01

It can be seen that where acc. types are analysed, the reductions of specific accident types have a higher level of significance. The use of all accidents masks the effect of the component types. In many cases the only reduction has been in one accident type. In one case the overall reduction was balanced between an increase of one type and the decrease of another.

McMonagle (1952) examined the effect of roadside features on accidents. It is an interesting study because it does look at the correlation co-efficients (total and partial) between the various parameters recorded. The results showed that taverns were more closely associated with accidents than any other feature. Unfortunately there is no accident type information and one is left to speculate as to what type of accident occurred at/near taverns.

Lalani and Holden (1978) studied the effects on accidents of a campaign in London to encourage motorcyclists to wear bright garments and to switch headlights on in the daytime. Observation studies indicated increases in conspicuous clothing and in daytime headlight use but at best only about one quarter of the motorcyclists used headlights in the daytime. The accidents were broken down into single motorcycle accidents and motorcycle accidents involving two or more vehicles and subdivided into uncontrolled junctions, and of course day and night. The single motorcycle accident casualities were, according to Lalani and Holden, not affected by the conspicuity factor, deemed to be unaffected by the campaign and therefore excluded from the data (analysis). One of the particular "types" of accident at which the campaign was aimed, was casualties at uncontrolled junctions which had a non-significant reduction. Therefore it is reflected that the authors did not use detailed types of accident and thus it is not known to the reader if the reduction effect is uniform for all motorcycle accident types or if the reduction is limited to a few types (which is the suspected situation).

An earlier paper by Lalani (1975) examined the effect of roundabouts at major/minor priority junctions and illustrates the difficulty with "names" for accident-types and thus the definition of specific types. One of the findings was as follows "Vehicle accidents fell by 39 per cent and since nose- to-tail and single-vehicle accidents have remained more or less the same, the main fall can be contributed to accidents which were formerly crossroad and right-turner type". Reference to the associated table shows that all four of these types are recorded for the before situation ("within 50m") but there are no numbers (even a zero) recorded for the crossroad, and the right-turner types in the after situation. The inference is that these types could not be identified after the roundabout was installed due to limitations in the accident-type classification system rather than the fact that these types, modified by the roundabout presence, did not still occur. The named types accounted for 95% of the vehicle accidents in the before situation but only 30% of the accidents in the after period. Hence 70% of the accidents in the after period were "other" (non-named) types, which leads to the questions, what were they?, has some type increased significantly?

Lalani (1977) examined the effect of pedestrian refuges and found that vehicle accidents were reduced but pedestrian accidents increased. In this study, while the vehicle accidents subdivided into single-vehicle, nose-to-tail, crossroad, and head on parked vehicle; the pedestrian accidents were ony subdivided by distance (within 20 - 50m of the refuge). The lack of pedestrian accident types does not let one see what direction the pedestrian was going at the time. Was he stepping from the kerb or from the refuge? The vehicle accident types now illustrate some points not obvious when reading the previous study. Here we have crossroad accidents taking place at locations which are not junctions, which raises questions about the definition of this accident type and subsequently what was therefore included in the roundabout study if crossroad accidents are not limited to junctions. The nose-to-tail accident is also seen,in the text, to include hitting parked vehicles, as well as the two moving vehicles case. The value of "names" without definitions for accident types can be seen to be of limited value.

Campbell and Reinfurt (1979) attempted to compare 17 studies of seat belt wearing and accidents from Australia, USA and Sweden. Because the studies have used different injury scales Campbell and Reinfurt believe the differences (in the effectiveness of wearing belts) can be reconciled by assuming a continuous underlying injury scale. The apparent differences then being due to injuries being categorised by the use of different scales. A regression analysis was carried out on the data represented by the 17 studies. A problem not discussed is that of making macroscopic comparisons when the microscopic compositions differ. In other words the composition of accident-types that go together to make up the total number of accidents should be considered. The expected benefit of wearing a seat belt would vary according to the accident-type and the speed involved (other factors such as any secondary collision, relative masses of the vehicles, position of person in vehicle etc., are also involved but the first two factors quoted are seen as the primary factors). The apparent benefit of belt wearing in a study of accidents would thus depend on the relative number of each accident-type and in turn the proportion of urban/non urban occurrence (i.e. speed of involvement). Accidents of the urban head-on type might be expected to show the greatest benefit since the belt system is designed around the notion of a frontal impact. Accidents occurring at rural intersections might show little value for seat belts.

So again the component accident types could clearly influence the likely benefits for seat belts as indicated by studies drawn from different areas.

3.4 Understanding the effectiveness of Treatments

Comments were made in the preceding section about the need to identify accident-types or separating the components when studying accidents and an elaboration of the point follows.

Consider a hypothetical case where two accident types A and B occur at an intersection, there are 50 accidents of each type, 100 in all. A treatment is applied which reduces the total number to 60 (i.e. a 40 per cent reduction). If one were content with that analysis one would say that the treatment reduces accidents by 40 per cent at intersections and one would, no doubt, apply this figure to consider the worth of future installation at intersections. If the statement that the treatment reduced all accidents by 40 per cent was literally true then logically one would expect to see the effect as -

$$(50A + 50B) - 40\% \ (50A) - 40\% \ (50B) = (30A + 30B) = 60$$

However if the treatment, in this case, affects only type A accidents and not type B, the reduction in type A accidents would have to be 80 per cent as follows:

$$(50A + 50B) - 80\% \ (50A) - 0 \ (50B) = (10A + 50B) = 60$$

Now when one considers applying the treatment to other intersections one will look for the number of type A accidents since this will tell the expected value of the treatment. Consider three other intersections, all with 100 accidents but all having different proportions of A and B. When the treatment is applied one sees the following -

(i)	(80A + 20B) - 80% (80A) = (16A + 20B)	=	36
(ii)	(20A + 80B) - 80% (20A) = (4A + 80B)	=	84
(iii)	(0A + 100B) - 80% (0A) = (100B)	=	100

In the first case the apparent overall effect of the treatment was 64 per cent reduction in accidents and in the second case only 16 per cent, and in the third case zero, thus an overall study of, say, 20 intersections, without analysing the result by accident-types, might produce a result of say, 30 per cent as the apparent overall effect of the treatment. The extrapolation of this result to a large program of intersection improvements could produce erroneous estimates of the likely benefits and might in some cases lead to the investment of funds in other projects. Clearly the intersections should be ranked in frequency of type A accidents so that the 80 per cent benefit of the treatment can then be applied to all those where the frequency economically justifies the use of the treatment.

The analysis of the example becomes more involved if type B accidents increase after the treatment while type A is reduced and/or a third type C is introduced. It is possible that some further treatment will reduce type B and it may be desirable economically that both treatments be applied at the same time. An analysis of accident-types occurring will make it clear prior to treatment what action should be contemplated.

The lack of application of an adequate analysis by types applies to most studies one finds in the literature; for example the effect of speed limits on accidents, the effect of daylight use of motorcycle headlights, the effect of streetlighting, and the use of crash helmets.

For accident studies in general it is also of great reassurance if one can collect data complementary to the accident data. For example, if studying the effect of a lower speed limit imposed on a length of highway one would compare the accidents before and after the speed limit was imposed (perhaps also use a comparison of accidents over the same total period on a road where no change was made in the speed limit). However, other data such as the traffic flow on the road in the two periods and particularly the measurement of the speeds of the traffic in the two periods provides a further check on the validity of any conclusions of the effects of the speed limit. It would be difficult to claim a reduction in accidents due to the lower speed limit if the speeds had increased significantly in the after period. Similarly a study on the benefits of seat belt wearing is clarified by a study of the number of persons actually wearing their seat belts.

3.5 Traps in analysis and interpretation

While on the subject of accident studies and analysis the Writer thought it worthwhile to add some points which have been gleaned over the years.

3.5.1 Public pronouncements

The area of published information, in the press, is one which must generate much misunderstanding in the public. Often published figures don't mean anything - sometimes they are trivial, sometimes they are obscure or too complex, and sometimes they "prove" something already well established. On the other hand, some figures don't tell the whole truth. Causal factors which are not obvious to the lay reader but should be to the technician are not mentioned. Some examples of the public area information is as follows - deaths go down and credit is taken for a safety program when actually the reduction was due to a decrease in the use of vehicles; accidents of one particular type go down and this fact is widely publicised as a general improvement, with no mention of the increase in another equally important accident type; accidents involving children go down - also pedestrian accidents and daytime accidents go down, no mention is made that more children are pedestrians than drivers and that most child accidents occur during daylight hours.

3.5.2 Analysis

In determining problems to be solved, the matter of relativity is important. The following two cases are used to illustrate portion of the aspect of relativity.

1. Using an average to generalise.

It may be determined that rail crossing accidents are only a small proportion of a State's traffic deaths and a conclusion reached that they are not important. While this is true for the State as a whole it may be wholly untrue for a particular area in the State where rail crossing accidents are a significant proportion of the deaths in that area.

2. Using a particular case to generalise.

It is incorrect to assume that because a particular type of accident or circumstance is prevalent at one location or at one time, that it is prevalent throughout the whole area or for a long period of time. For example a concentration of child accidents in a particular area may mean that a large primary school in that area produces child pedestrian traffic and not that the child accident problem in the whole city is proportionally large.

It is necessary to find the right measure or exposure to assess relativity, and misunderstanding of this aspect leads to the misuse of rates and the mistaken belief that a rate, per se, always means something or 'proves' something.

3.5.3 Failure to recognise chance and probability

Undue importance can be attached to small figures and the analysis of such figures should take into account the elements of chance. For example if the deaths in a city fall from 10 to 9 in one year, this represents a change of 10% but statistically does not indicate much since the figures are so small that chance alone could account for the difference.

A different aspect of this problem arises when one fails to take into account the correct distribution. This is best illustrated by an example. A study was made of the number of accidents by day of the week for a particular month as follows:

Day		No. of accidents
Mon		12
Tues		10
Wed		10
Thurs		12
Fri		13
Sat		25
Sun		18
	Total	100

What is often forgotten is that the number of each of the seven days within the month is not the same. For this month there were 31 days in total with 5 Mondays, Tuesdays and Wednesdays and only 4 of the other four days. So although at first glance it appeared that 12% of the accidents occurred on Monday there were only 10.2%. The correct distribution is determined as follows:

Day	No. Accs.	No. Days	Accs/Day	Adjusted No.
Mon	12	5	2.4	10.2
Tues	10	5	2.0	8.5
Wed	10	5	2.0	8.5
Thu	12	4	3.0	12.8
Fri	13	4	3.3	14.1
Sat	25	4	6.3	26.8
Sun	18	4	4.5	19.1
	100	31	3.2	100.0

$$\sum_{1}^{7} \text{Accs/Day} = 23.5$$

$$\text{Mon} = \frac{2.4}{23.5} = 10.2$$

$$\text{Sat} = \frac{6.3}{23.5} = 26.8$$

3.5.4 Unjustified assumption of cause and effect

This arose in discussing public pronouncements and relates to assuming a cause and effect that may actually be the result of another cause or of pure coincidence. For example if an education campaign is conducted in the theme that a STOP sign means a total stop and subsequently accidents which would involve the failure to stop at stop signs showed a decrease then the campaign may be credited with the decrease. However if reference is made to the records of the police department it is found that enforcement of the law was greatly stepped up during the same period. Was the decrease due to the education campaign or the additional enforcement?

It becomes desirable to measure as many related factors as possible when making studies of this kind or preferably to control the factors so that only a minimum number (one) are varying at the same time.

3.5.5 Spurious accuracy

How often does one see results quoted with the figures carried to four decimal places, obviously refined beyond reasonable limits. Statistical data comes under two categories -

(a) Counts of real and distinct things, such as persons or accidents, each item making the total can be accurately counted and tabulated without fractional values.

(b) Measurements and estimates, such as vehicle-km operated during a given period.

When working with the first group of figures results may be written to a fine degree of accuracy, but this is not true for the second group. The principle of significant figures must be considered. Significant figures are those written to indicate the magnitude of an item and are a measure of the accuracy of the data used in determining that item.

For example the number 2.1 has two significant figures, the number 2.10 has three significant figures and 21,000.6 has six significant figures. The number 0.002 has only one significant figure since the zeros in front of the "2" do not add to its accuracy.

When numbers with mixed accuracy are being added or subtracted the results should be stated with no more accuracy than the least accurate figure. When multiplying or dividing, the result should be given with no more significant figures than the least accurate of the numbers used (e.g., 12 multiplied by 12.2 is 145.4 but as 12 has, in this case, only two significant figures the result should be given as 150.).

3.5.6 Regression Equations

A regression equation does not express an invariable value of y for any given value of x, as an algebraic equation does. Rather it expresses the average value of y for that value of x, and the analysis by which it is derived depends on the process of minimising the squares of the deviations from the regression line and it is only valid in the form derived from that minimization.

If the regression equation is of the form $y = f(x)$ one cannot use ordinary algebraic methods to transform it into the form $x = f(y)$. Transforming the equation by algebraic means would give a false result. If the reverse form is wanted the variates must be changed over and the minimizing done afresh.

3.5.7 Testing the difference between three or more groups

The situation for testing significant differences between two samples sometimes has debate over the appropriate test related to whether the data is "normal" or not but the situation for testing three (or more) groups appears to be not so clear to many researchers. The test should evaluate the null hypothesis that three (or more) samples have been drawn from the same population or from identical populations.

When three (or more) samples or conditions are to be compared it is necessary to use a statistical test which will indicate whether there is an overall difference among the samples before one picks out any pair of samples in order to test the significance of the difference between them.

The incorrect procedure is to first test the samples in pairs since it capitalises on chance. For example, to test five groups in pairs would require ten tests, and one has ten chances rather than one to reject the null hypothesis. If the significance level is $p = .05$, the risk of erroneously rejecting Ho with one test is 5 per cent but with ten tests the probability of a Type 1 error is increased. It can be shown (Siegel, 1956) that the probability of a two sample test finding one or more "significant" differences among five groups is 0.40 (for $p = .05$). In other words the actual significance level becomes $p = .40$.

It is only when an overall test (a k-sample test) allows a rejection of Ho that one is justified in employing a procedure for testing for significant differences between any two of the k samples (Cochran, 1954 and Tukey, 1949).

Cases have been reported (McNemar, 1955) in which an overall test of five samples leads to an insignificant result but two-sample tests of the larger differences among the five samples yield significant findings. Such "a posteriori" selection tends to capitalise on chance and therefore one can have no confidence in a decision involving k samples in which the analysis consisted only of testing two samples at a time.

4. History of Use of Accident Data

4.1 Introduction

The recording of informaton about road accidents started as a means to assist police officers in giving evidence in court about the driver/s involved in an accident. The occurrence of road accidents predates the motorcar and the police had previously to protect property and persons from the dangers of horses, carts, camels, elephants, etc. In many countries the policeman's statement about an accident became converted into a standard document along with all the many other standard forms one associates with police or military "paper-work". The form covered many standard items which were expected to be presented in court as part of the case against the offender. The form oriented itself, apart from reporting facts such as date, time and location, to assess the blame or fault or cause of the accident. Surprisingly a number of countries still rely on an unstructured report by the policeman or drivers involved.

The earliest reference that the Writer could locate on the use of accident records was in the First Edition of the Manual of Traffic Engineering Studies dated 1945 which was superseded by a revised and expanded Second Edition in 1953. Between these two editions a manual entitled "Uses of Traffic Accident Records - a Manual", was published by the ENO Foundation in 1947, but unfortunately this excellent book is no longer in print. This manual tells one that it was not until the early twenties that public officials throughout the USA recognised the importance of standardising and improving report forms and procedures for collecting and analysing information on motor vehicle accidents. The National Conference on Uniform Traffic Accident Statistics was the consequence, it was reorganised in 1941 and a start made on the Manual although progress was limited by the intervention of World War II.

The Conference through one of its other Committees produced an accident report form which had been recognised as a national standard for some years at the time of the Manual's publication (1947). This standard form was published through the National Safety Council as is the current USA standard report form although it has seen some revisions.

The Manual is organised in the following way - basic requirements for accident record uses; administrative and policy uses of accident records, enforcement uses of accident records; engineering uses; educational uses; motor vehicle administrators' uses, and uses by motor carriers.

The "Manual of Traffic Engineering Studies" (1953) deals with much the same material but in an abbreviated form.

"Maintaining Accident Records" (1958) is aimed more at using accident information to define the level of service provided by the street system but it does describe the minimum information required and the way to maintain accident files.

4.2 <u>Format of Data</u>

When an accident takes place it can be viewed as

(i) a fatal, injury or damage accident and/or degree of injury to a person

(ii) happening to a type of road user and/or a specific person

(iii) involving a number and class of vehicles and/or specific vehicle

(iv) occurring at a type of location and/or specific location.

(v) a specific accident-type, determined by the movements of the road users prior to the accident.

Each view can be taken separately to produce information or in combination or, given the appropriate computer system, as interconnected data.

4.3 Accident Records

The classic arrangement of accident records, as described in the Manual of Traffic Engineering Studies (1953), is as follows: the accident report is received and the details are used to produce - general summaries of accidents, spot maps, and an accident location file.

The accident location file (see Fig. 4.1) operates such that the accident reports are filed alphabetically by intersection or street. Accidents at intersections are filed under the name of the intersecting street which is first in alphabetical order, the next street name in alphabetical order becomes the secondary index (sometimes there are up to four street names involved at a four-way intersection). The reports for accidents occurring between-intersections are filed according to the name of the street involved and are placed between the appropriate secondary intersection cards for that street.

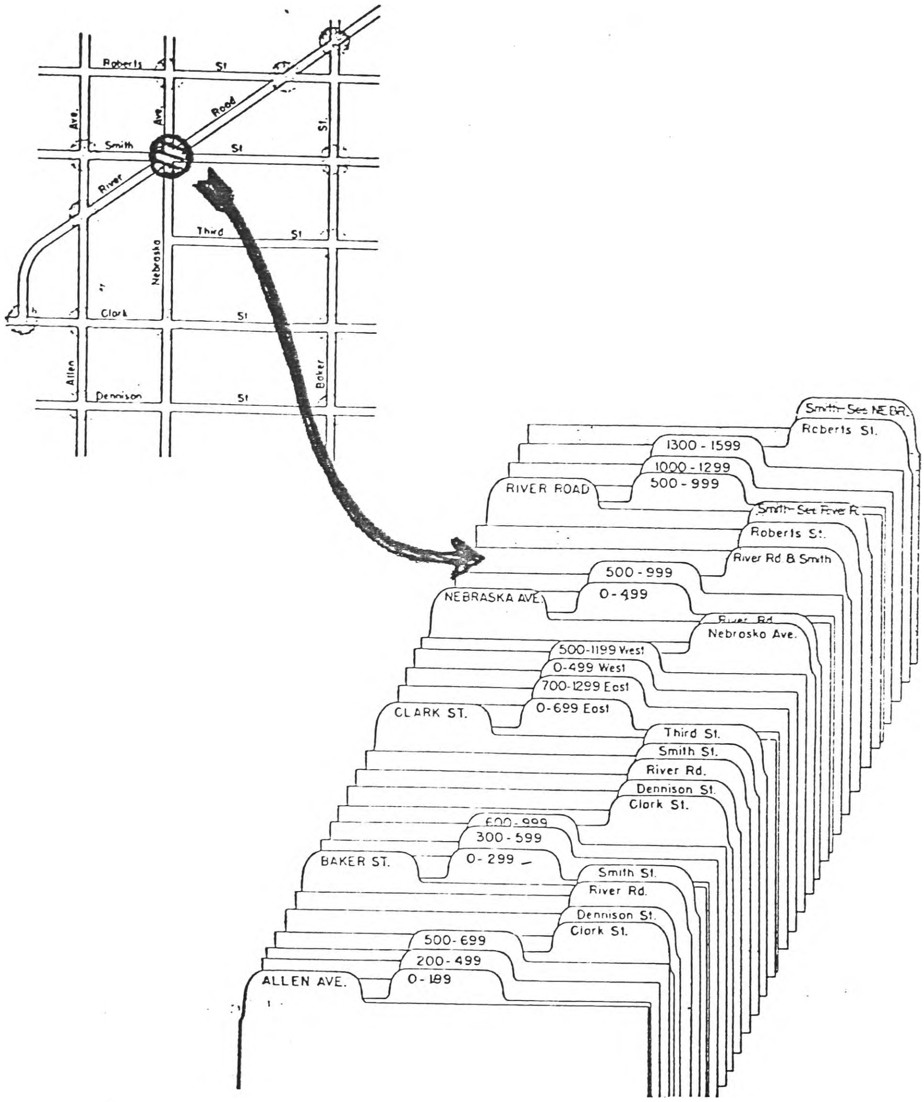


Figure 4·1 Card location system
(after I.T.E., 1965)

Figure 4.1 - Location Card File

4.4 Spot Maps

This is a map of a locality which, through the use of variously shaped or coloured pins, presents a visual record of the location and number of accidents.

The maps are recommended to be of a scale of 5000 to 1 for urban areas and 60,000 to 1 for rural areas. Often two sets of maps are used one for current year and one for the past year. The map is normally photographed at the end of the year and kept for reference.

The overall value of spot maps is limited for research since the amount of detail that can be presented is limited by the shape and colour of pins available, the alternative being to use a large number of maps each showing different aspects or variables but this then presents a comprehension problem for research. A multitude of maps could be used to illustrate the findings of research whereas they won't pinpoint the problem variables since the variables have to be chosen prior to the research being carried out.

4.5 High Accident Frequency Locations

The spot map and the accident location file are used to identify high accident frequency locations. A number of locations with the highest frequencies are selected and for each site - a condition diagram is prepared, a collision diagram is prepared, other studies and diagrams as may be indicated are prepared. One then analyses the assembled data and prescribes a remedy, as detailed later.

The Traffic Engineering Studies Manual (1953) suggests that "as a regular means of measuring the safety benefits of all types of traffic improvements, the preparation of "before" and "after" collision diagrams is a highly effective procedure."

The period covered should be at least a year and preferable 3 or 4 years if the annual accident totals are small.

4.5.1 The Collision Diagram

This shows graphically the nature of all accidents occurring at the location. Each individual accident is indicated by arrows, which show the direction of movement of each vehicle or pedestrian involved. The exact spot of the accident need not be known or indicated. The path of each vehicle is represented by a solid line and each pedestrian by a dotted line. Typical collision diagram symbols as shown in Figure 4.2

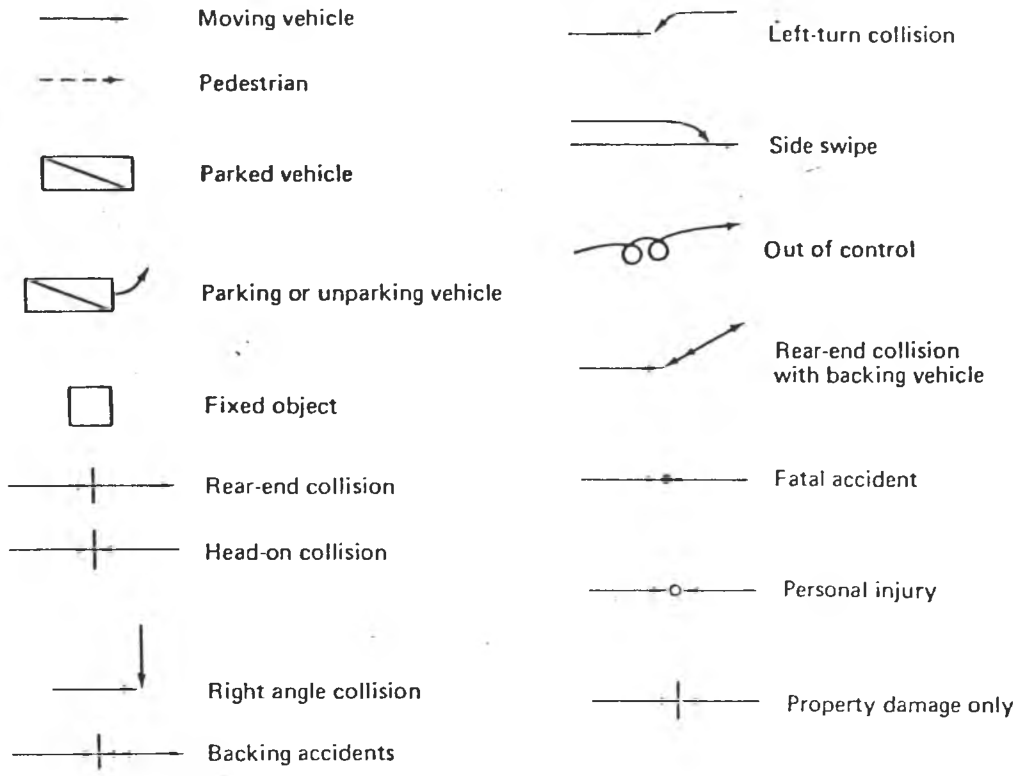


Figure 4.2 Collision diagram symbols (after Pignataro, 1973)

Figure 4.2 Collision Diagram Symbols

An example of a collision diagram is shown in Figure 4.3, and the supplementary details can be shown on each arrow or reference numbers assigned and the data tabled below the diagram.

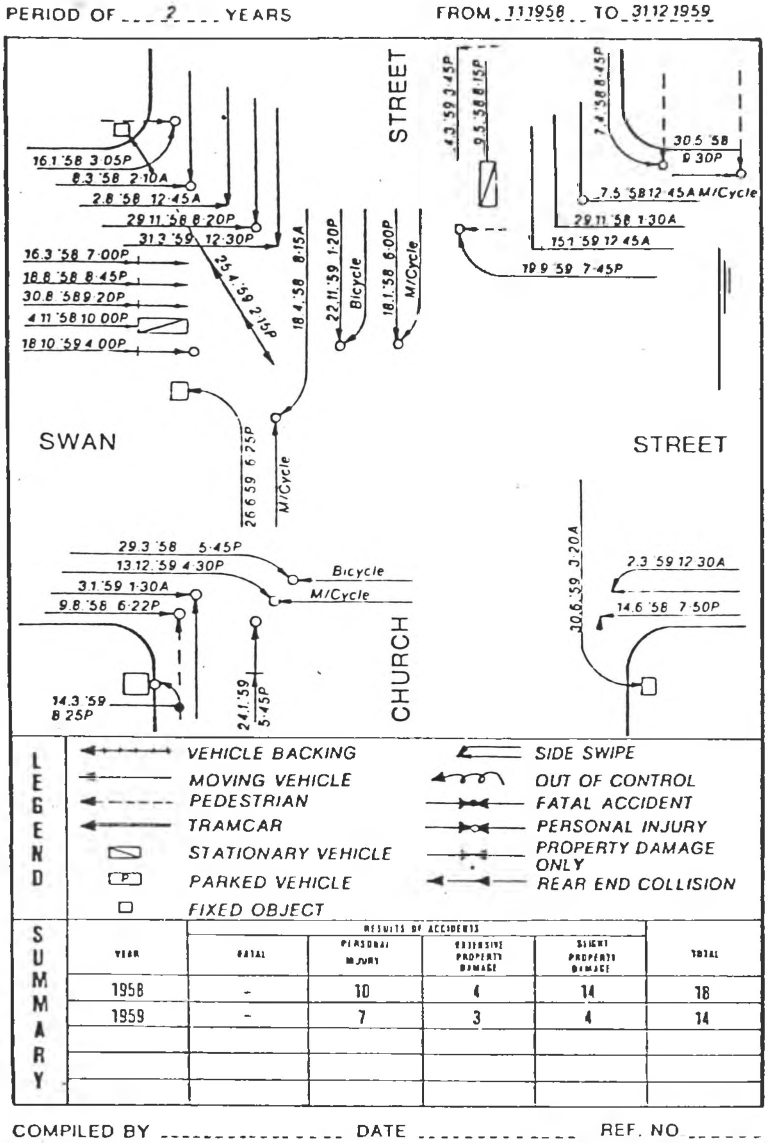


Figure 4.3 Typical Collision Diagram *(from NAASRA, 1976)*

Figure 4.3 Collision Diagram

The diagram reveals the nature of the accident experience and it may also reveal most of the accidents falling into one or more of the following classifications, which are clues to needed remedies:-

(1) 'right-angle' collisions between vehicles entering on intersecting streets
(2) right-turn collisions involving vehicles approaching one another
(3) rear-end collisions
(4) pedestrian versus vehicle

(5) collisions between vehicles travelling in the same direction, involving turning or side-swiping

(7) vehicles running off the roadway at curves or constrictions in the road

(8) collisions with fixed objects at the margin of the road

(9) collisions with parked vehicles.

These and many other combinations give definite indications of the reasons for accident occurrence. The diagram (and data) may also reveal certain months, days and hours when accidents tend to occur as well as the effect of weather conditions.

4.5.2 Analysing the problem

With the collision and condition diagrams, and summary analysis one is ready to examine the problem. (It is, of course, useful to visit the site and observe whilst referring to this data.) When studying the situation the following questions should be considered:-

(1) Are accidents caused by a physical condition of the road or adjacent property, and can the causative condition be eliminated or corrected?

(2) Is a blind corner responsible? Can it be eliminated? If not, have adequate measures been taken to warn motorists?

(3) Are the existing signs, signals and pavement markings doing the job for which they were intended? Are replacements needed? Have conditions changed markedly since original installation? Is it possible they are causing accidents rather than preventing them?

(4) Is traffic properly channeled to minimise the occurrence of accidents?

(5) Would accidents be prevented by the prohibition of any single movement, such as a minor right-turn?

(6) Can some of the traffic be diverted to other streets where the accident potentials are not as great?

(7) Are night accidents far out of proportion to day accidents (based on relative traffic flows) indicating the need for special night time protection such as street lighting, signal control or reflectorised signs.

(8) Do conditions show the need for additional traffic law enforcement?

4.5.3 Accident Patterns and Remedies

The pattern of predominant accident types shown by the collision diagrams will usually give a clue to the remedies needed. For instance the following patterns suggest the corresponding simple engineering remedies. These remedies are taken from the "Manual of Traffic Engineering Studies", (1953) and adapted for driving on the left of the road.

(1) 'Right-Angle' and Rear-End Collisions at Intersections

(a) Removal of view obstructions, such as foliage, bushes, billboards, or parking at kerb.

(b) Installation of warning signs, if speeds are high and the element of surprise present.

(c) Installation of stop signs, if view is obstructed to such an extent that safe approach speed is 15km/h or less, if one street is a through street, or no other remedy reduces accident frequency.

(d) Installation of traffic signals if minimum warrants are met.

(e) Continuing operation of traffic signals during certain light traffic hours when signals are normally off.

(f) Provision of proper clearance intervals in signal cycle.

(g) Relocation, repair, or other means of providing better visibility of signs or signals.

(h) Better street lighting.

(i) Provision of pedestrian cross-walk markings and/or pedestrian barriers.

(j) Rerouting of through traffic onto specially designated and protected through streets.

(k) Creation of one-way streets.

(l) Provision of traffic signal system timed for progressive movement.

(m) Speed zoning to safe aproach speed.

(2) <u>Right Turn-Head-On-Collisions at Intersections</u>

(a) Provision of turning guide lines.

(b) Prohibition of right turns (provided such movement is of little importance)

(c) Provision of a channelizing island.

(d) Provision of protected turning interval via traffic signal control.

(e) Installation of stop signs (provided no other remedy works).

(f) Elimination of view obstructions.

(g) Creation of one-way street.

(h) Routing of turning traffic via an alternate route (with proper signs) to eliminate right turn.

(3) <u>Pedestrian-Vehicular Collisions at Intersections</u>

(a) Installation of pedestrian cross-walk lines.

(b) Erection of pedestrian barriers.

(c) Installation of traffic signals.

(d) Provision of pedestrian refuge islands.

(e) Prohibition of kerb parking.

(f) Provision of adequate street lighting.

(g) Creation of one-way street.

(h) Rerouting of through traffic to specially designated and protected through streets.

(i) Addition of pedestrian indications and pedestrian actuation features to existing traffic signals.

(4) Side-Swiping Collisions

(a) Installations of painted pavement lane lines.

(b) Installation of channelizing islands if at intersections.

(c) Installation of advance warning signs to warn drivers of proper lane for certain destinations, such as "Left Lane for New York."

(d) Speed zoning.

(e) Provision of acceleration or deceleration lanes at intersections.

(f) Widening of pavement.

(g) Creation of one-way street.

(h) Elimination of marginal obstructions such as caused by parked vehicles or other bottlenecks.

(5) Head-on Collisions

(a) Same remedies as for side-swiping collisions.

(b) Installation of "no overtaking" lines at curves or other points with restricted view.

(c) Installation of centre dividing strip.

(6) Vehicles Running Off Roadway

(a) Installation of pavement centre line.

(b) Installation of warning reflectors, guard rail, or white posts at curve.
(c) Installation of advance warning signs.
(d) Installation of roadside delineators.
(e) Speed zoning.
(f) Street lighting.
(g) Skid-proofing slippery blacktop pavement, improving shoulder maintenance, and prompt ice treatment and snow removal.

(7) <u>Collisions with Fixed Object</u>

(a) Application of paint and reflectors to fixed object.
(b) Use of pavement guide lines to guide traffic around obstruction.
(c) Street lighting
(d) Removal of fixed object.

(8) <u>Collisions with Parked Cars</u>

(a) Parking prohibition.
(b) Change from angle to parallel parking.
(c) Rerouting of through traffic to less congested, specially protected through streets.
(d) Creation of one-way streets.

These suggested remedies are limited to simple engineering measures and do not include such major treatment as construction of underpasses or overpasses, limited access expressways, etc. In addition to these suggested measures, there may be required such additional measures as better enforcement of traffic regulations, assignment of traffic officers or crossing guards to safeguard pedestrian crossings and enforce pedestrian observance of traffic rules, or special educational measures.

It should not be inferred from the foregoing data that the suggested remedies would be completely justified or warranted by the occurrence of the accident patterns indicated. Other warrants involving volumes, speeds, and delay should be investigated also.

4.5.4 Applications

The results of the preceding analysis may be applied in the following ways:-

(1) To determine a logical plan of accident reduction measures, based on treating locations in proper order of severity rating.
(2) To determine definite ways that accident frequency can be reduced through simple engineering measures.
(3) To justify certain recommendations which necessitate large expenditures or marked changes in the physical design of street and highway layout.
(4) To aid in planning a street and highway improvement program.
(5) To reveal and prove the need for additional enforcement or police supervision.
(6) In the assignment of police patrols for selective enforcement.
(7) To reveal certain driver or pedestrian actions causing accidents which might be prevented through public education.
(8) To disprove impractical remedial suggestions made by individuals not acquainted with the facts.
(9) To point out a need for more adequate maintenance of streets, highways, and control devices.
(10) To assist in developing a program of signal, sign, or pavement marking installation.
(11) To aid in developing a speed zoning program.
(12) As a criteria for footpath construction.

(13) To determine priority of need for street lighting.

(14) The collision diagrams and associated data should be kept up-to-date by periodically adding new data, and will provide a handy reference when complaints are received in the future concerning any of the high accident frequency locations.

4.6 Today's Need

Today the collection and processing of accident data must be viewed in relation to the legal requirements for reporting accidents, the definitions (legal or otherwise) related to roads, intersections and other physical features, and the regulations that govern the registration of vehicles, the equipment on/in vehicles and the manner of usage of vehicles on roads. The legal obligations on road users imposed by traffic sign signals and other controls should also be taken into account.

5. COMPARISONS

It is necessary many times in accident analysis to make comparisons and the process is fraught with difficulties. The main essential is to be sure that apples are being compared to apples. This chapter deals with only some aspects of making comparisons.

5.1 The problem with Definitions

The first problem one faces when wanting to make comparisons is whether like is being compared to like. This applies throughout from the severity of the accident, to the road, the accident itself, the type of vehicles involved, the accident-type, an intersection, the class of road, etc.

Typically one is presented with a table of data which compares deaths (and perhaps injuries), populations and vehicles of various countries and derived "rates" (Page, 1975). On investigation one would find that the countries in the table do not all have the same definition of a road death. Most countries use the "death within 30 days of the accident" as a definition but, for example Belgium uses "death at the scene of the accident" [before 1971], Poland uses "death within 48 hours" and the USA uses "death within 12 months". These figures can be given estimates for the 30 day definition (Smeed and Jeffcoate 1970) which are respectively +100 percent, +25 percent, and -5 percent, and these corrections materially affect any derived 'rates'.

The Word Health Organisation (W.H.O.) uses the 30 day definition and it is also recommended by the Economic Commission for Europe (E.C.E.). The

30 day definition is also, supposed to be, the Australian definition of a road death.

The question of degree of injury is rather vexed; any injury that results in death within 30 days becomes a road fatality but for international mortality statistics the cause of death is the cause assigned for primary tabulation. Problems arise when there is more than one cause, that is, a motor vehicle accident injury is reported jointly with a disease condition or other disability and in these cases death is assigned to the cause indicated by the doctor/coroner to be the underlying cause. If the doctor/coroner indicates that death resulted from tetanus which was due to a slight injury received in a road accident, the death is assigned to the disease/infection and not to the accident (Baldwin, 1964).

Whether this appropriate in road accident analysis is debatable and in any case as Campbell and Reinfurt (1979) point out one can view fatality as a continuum from the single injury cause of death to the situation where multiple injuries were received each of which alone would have caused death.

The question of "injury" is of course parallel to Campbell's notion for fatal injury and injury ranges from minor bruising and cuts to prolonged stays in hospital and the paraplegic and quadraplegic cases. The degree of injury sustained may not on ocassions reflect the severity of the initial collision but may be the result of a secondary collision or incident. There is no disagreement that an accident's severity is assigned on the basis of the most severe injury received by anyone of the persons involved. (e.g. Ten persons are involved and one person dies, then the accident is classified as a fatal accident).

A consideration raised by Giusti (1964) is that the post-crash mortality rate may depend on the speed and efficiency of the ambulance service, the hospital care, and a host of different causes that may be of importance in relation to the death of a victim. He suggested that the countries that consider persons who die within 30 days of an accident as having been "killed" should distinguish between cases where death occurs immediately and those where the victims die after the accident. For the post-crash treatment of casualties it is an important aspect one must relate back to the accident form and the reporting process and recognize the inherent difficulties for on-the-spot reporting to have anything but rough accuracy. Much of the reporting is not on-the-spot but is collected later and accuracy would require the filing of returns from hospitals and surgeries where accident victims were taken. While this is feasible it would no doubt slow down the reporting process and impose a large burden in extra clerical activities which would not be reflected in any real benefit. Such studies it is contended would be of value as in-depth studies on a sample of accidents as a guide to the accuracy of the rest of the data collected.

One finds little in common for 'accident-types' except the broad classification of

- collision between vehicles
- collision with a fixed object
- vehicle hits pedestrian.

5.2 Rates

The matter of 'rates' was touched upon in the Introduction (Chapter 1) in relation to Smeed's formula relating degree of motorisation (vehs/popn.) and the number of road deaths per motor vehicle.

Investigations of failures of the transport system from the safety viewpoint frequently use an accident rate of some kind and in view of the importance given to such rates it is worth ensuring that they are used validly.

As Chapman (1974) points out there are a large number of possible rates and problems should be avoided by specifying in any instance which rate is being used. The common ones are numbers of accidents or casualties per unit vehicle-distance, per head of population, per motor vehicle, or per unit time.

The usual are -

a.	Lengths of road	Accidents per million vehicle-kilometres
b.	Intersections	Accidents per 10 million entering vehicles
c.	Fatal accident rate	Accidents per 10,000 registered vehicles
		Accidents per 100,000 population
d.	Fatal accident rate	Accidents per 100 million veh-kilometres

Looking first at lengths of road the rate used is an attempt to allow for differing amounts of traffic and lengths of road and attribute any difference in rates to differences in features such as geometric design, road surface and street lighting. The rate is used to compare different roads or the same road before and after some change is made. The following example is drawn from Chapman (1974). Examine Table 5.1 below.

Table 5.1 Accident and flow data for two roads (Chapman 1974).

	Road A	Road B
Length in miles	5	6
Average daily traffic	20,000	4,000
Number of deaths and injuries in 3 years	60	14
Total accidents in 3 years	72	18
Average number of accidents/ mile/year	4.8	1.0
Rate 1 - Casualties/Million veh-miles	0.55	0.53
Rate 2 - Accidents/Million veh-miles	0.65	0.68

It can be seen that neither rate 1 nor rate 2 distinguishes Road A from Road B in terms of safety; neither indicates which road should be treated first. At first glance Road A, with nearly five times as many accidents per mile per year as Road B offers the greatest potential for accident reduction; however the disposition of accidents along each road and the costs of providing treatments need to be compared.

Accidents at intersections are often compared with a factor to allow for the different amounts of traffic. Chapman (1971) made an analysis of accidents and traffic flows at some 1100 Danish intersections comparing the number of accidents (A) that occurred with three combinations of the crossing traffic $M + N$, MN, $\sqrt{(MN)}$, where M and N are the average daily (or hourly) amounts of traffic entering the intersection from the two roads.

Chapman's analytical consideration of the three measures is reproduced in Table 5.2 to show the effect on two measures if the third remains constant, as the total traffic (M + N) entering the intersection increases.

The three measures behave differently as the flows M,N both increase, so that any conclusions concerning differences in accident experiences may depend upon which rate is used.

Chapman's analysis of the Danish intersections found that $A/\sqrt{(MN)}$ and $A/(M+N)$ tended to be independent of traffic flow, whereas A/MN was significantly negatively correlated with increasing flows.

Table 5.2 Analytical rate behaviour (Chapman, 1971).

	This ratio constant as M+N increases		
	(i)	(ii)	(iii)
Behaviour of this ratio as M+N increases	A/MN	$A/\sqrt{(MN)}$	A/(M+N)
A/MN	-	decreases	decreases
$A/\sqrt{(MN)}$	increases	-	. constant if M=N . increases if M,N diverge . decreases if $\frac{M}{N} \to 1$
A/(M+N)	increases	. constant if M=N . decreases if M,N diverge . increases if $\frac{M}{N} \to 1$	

Tanner's study (1953) found that there were fewer accidents than expected as flows increased, at rural three-way junctions, and the accidents were proportional to the square root of the product of the flows. So the ratio 'number of accidents/square root of product of flows' was suggested to assess the safety of various designs, it being expected that the ratio would allow automatically for the effect of flow. However since that time the suggestion has been applied far and wide and for example was used by Thorpe (1968) to compare the safety of signalised and non-signalised four-way urban intersections. The validity of any conclusions must be doubted because of the difference between Tanner's study environment and that of Thorpe. Thorpe did not set out to prove the relationship for his conditions, he assumed it to apply. A rule should only be used within the bounds of its definition, unless justification for its extension can be offered.

A study reported by Sparks (1977) examined the relationship and effect of traffic flow on intersection accidents, the result showed little correlation between either major or minor street flows with accidents. Relationships such as the simple ratio of major street flow to minor street flow and other suspected relationships were ruled out.

The fatal accident rates per registered vehicle and per head of population should be viewed in relation to Smeed's formula [$D/V = .0003 (P/V)^{.667}$] and related work (1972). The population-based rate tends to increase while the vehicle-based rate tends to decrease within one country while comparing between countries those with a relatively low rate per head of population generally have relatively high rate per vehicle and conversely. These trends are related to the degree of motorisation (vehs/pop'n).

The same comment applies to the fatal accident rate based on vehicle-kilometres in comparisons between countries in which the average annual distance travelled per vehicle are similar, since the veh-km is obtained by multiplying the number of registered vehicles by the average annual distance.

As regards the treatment of accident sites, Ridley (1969) suggests that "when assessing practical measures on the ground, the real criteria must centre around and stem from the totals and types of actual accidents in the area being tackled". The problem with rates can be overcome by recognizing that a rate which is useful for one purpose may not be useful for another. What matters in selecting locations for treatment is not the present rate of accidents per unit of vehicle-distance nor the present rate of accidents per year but the savings in accidents per year that could be achieved by available methods within a given budget. To do this the accident data needs to be structured by accident-type within locations and then one can determine the treatment suitable for the accident types at each location and its expected effectiveness in reducing those accident types.

5.3 Comparisons

In accident work many forms of comparison occur generally of the type - internal/external, before/after, street A/street B, country A/country B.

For all of these a measure of the change of other variables, apart from accidents, is sought to judge the size of the change of the accidents.

Sometimes the changes are tested against the control in 2x2 contingency table and sometimes the number of accidents in the after period is "adjusted" in accordance with the change in the control, for the second case the following applies -

	Before	After
experimental	n1	n2
control	N1	N2

$$\text{Ratio of actual to expected number} = \frac{n2}{n1} / \frac{N2}{N1} = \frac{n2N1}{n1N2} = n2\,\frac{N1}{n1N2}$$

Thus the expected number in the after period if the experimental group had changed the same as the control group, $= n1\,\frac{N2}{N1}$.

The 'control' used is often the total number of accidents in the City, State, or Country and unless there are absolutely no other factors operating its use is debatable.

If used, one has to qualify the statement as "the expected number if the number of accidents at the experimental site changed the same way as those in the control".

Measurement of changes at the site/s in question may be of more value, that is before and after measurement could be made of a number of variables - accidents, traffic flows, speeds, weather, physical changes, composition of traffic. Other broad factors may need to be considered such as changes in Traffic Regulations, tax on cars, cost of petrol, etc. All of these allow a fair test of change at a particular site.

Attempting to compare site A to site B introduces the problems discussed in the section on rates and to say site A is safer than site B on the basis of a "rate" is a very doubtful practice. Likewise to compare the accident rate per registered vehicle in Country A against that for Country B and then deduce that safety is greater in whichever country has the lower rate, is somewhat doubtful.

An interesting comparision of accident study data from various countries is in a paper by Silyanov (1973). He compares in turn the effect on accidents per unit of vehicle-kilometre of, width of carriageway, radius of horizontal curve, shoulder width, grade sight distance, intersection angle, coefficient of cohesion, and speed limit. For each of his graphs he gives a formula describing the relationship derived from using the studies from various sources.

Unforunately there is no information given in the paper as to how well the formula fits <u>all</u> the data (e.g. the correlation coefficient and level of significance). Inspection of the graphs is not an analytical technique and on some of them there are some very divergent data points which given no information on goodness of fit leaves one wondering.

The relationship between "angle of intersection" and accidents per million vehicle-kilometres is a contradiciton in itself as to how intersection accidents can be given a measure involving distance of travel. Surely it should involve at least the conflicting flows and the angle of intersection.

Silyanov's conclusion that "accident data for roads of different countries reveal similar trends so that measures that reduce accident frequency in one country are likely to be of value in another" is not one the Writer would contest as such but would doubt that it is derived from the studies he presents. The studies relate condition A to the number of accidents occuring and are NOT studies of applying a treatment to a condition and examining the results.

The work Silyanov did could have been improved by comparing the actual formula of the relationship derived in each study of a particular characteristic from the various countries, assuming that each study gave a formula, along with the correlation coefficient and the level of significance. Similarities in the relationships might be evident but trying to then draw conclusions on why the relationship in Country A showed a greater increase in the accident rate for a change in the condition than country B would then raise again the problems of definitions, rates,and comparisons.

An example of an internal comparison is the work by Satterthwaite (1976) in which he looked at the monthly accidents for Great Britain for nine years. The purpose of the study was to compare the seasonal variations of accident numbers and traffic flows and to compare trends in seasonal variation of fatalities in Britain and the U.S.A. A correlation coefficient was determined for each month which measured whether there had been a trend, over the years, in the proportion of each year's accidents occurring in that month. The same analysis was applied to the traffic flow data. The presence or absence of significant correlations for the various months for the accidents and flows were then compared and a conclusion drawn that the distribution of accidents and flows has changed with an increase in winter months relative to summer months.

Hutchinson and Mayne (1977) studied the year-to-year variability of accident types over a four year period. Any accident types for which a trend was apparent were not considered and any variation due to trend for the types included was small compared to the random variation. The mean was plotted against the standard deviation for all types to test if the Poisson law was valid (the standard deviation equals the square root of the mean). For up to about 100 accidents per year the variability was about that predicted by the Poisson law and then became much greater indicating the standard deviation was then proportional to the mean. The authors concluded that when testing the statistical significance of the difference between the numbers of accidents occurring in two periods of time one should use the chi-squared test (which is based on Poisson's law) ONLY with great caution.

Some other points relevant to comparisons were made in Section 3.5 concerning regression equations, and the comparison of three or more groups.

6. ACCIDENT DATA

6.1 Introduction

This chapter deals with a wide range of topics from the basics of collection, to the sources of data, to the amounts to be collected (by mass collection and special studies). It also looks at accident data reporting and recording in Asian countries with detailed examinations of the systems in Thailand and Hong-Kong. The chapter concludes with the details of the system used in Victoria as the data analyses in chapters 9 and 10 are based on this system.

6.2 Reporting, Collection

The collection of data in any state or country is firstly related to what the legal requirements are for reporting road accidents. These vary from reporting all accidents, to accidents where the damage will cost more than $X to repair, to accidents where someone was injured or the owner of property damaged was absent. Often many more accidents than those legally required to be reported are in fact reported. However, all of these may not form part of the collected data as there is discretion exercised by the policeman to whom the report is made as to whether the event is entered on some minor incident record or whether it goes on to one of the formal detailed reports. The system appears to be haphazard but in Victoria where the basic reporting requirement is injury there is nevertheless an equal number of other accidents fed into the collection system. This is partly a matter of definition since for collection "injury" covers all degree of injury from "injury <u>not</u> requiring medical treatment" upward, whereas for the "official" records, injury at present means "injury requiring medical treatment" and upward. Because these two levels are not in reality well defined and often rely on secondhand information, it is as well that the bonus number of accidents are reported.

As Ashton (1966) said the "seriousness or otherwise of an accident may have little connection with the causation" it is the desire of the accident data analyst to have as large a number of reports as possible to work with. However, the reporting of the accidents and the subsequent paperwork involves a significant effort so the agency involved in the reporting (usually the Police) makes an effort to reduce the effort by restricting the number of accidents that have to be reported. On the other side unfortunately not all those accidents that are required to be reported do in fact get reported. The records of the Motor Accidents Board (Victoria) for 1974 show that some 15% of the casualties (persons) from whom the Board received claims were not recorded on the police accident report forms.

There is a trade-off somewhere between the numbers of accidents to be reported/collected and the amount of information to be collected about each accident, for a given level of manpower resources. Many accidents with a limited amount of information could be collected for the same effort (superficially) as a limited number of accidents with much information on each accident. In developed countries, as there exists the possibility to draw wanted information from sources other than the accident report (e.g., vehicle details from the vehicle register) it should be possible to reduce the number of data items. Further to this point is should be noted that some of the data collected on the report forms are not hard objective data and are thus of questionable value and limited use.

6.3 Sources of Accident Data

Information related to the occurrence of individual accidents is available from many varied sources, the official accident report form being the usual basic source, however the reporting level for the police report is often limited to serious damage or casualty accidents. Other sources for information are:-

i) Car insurance records

   a) comprehensive

   b) third party property

ii) Motor Accidents Board (Victoria)

   - details of injury type, costs, details of accident
   - has details for some casualty accidents not recorded by Police

iii) The tow truck industry

   - possible source for severe damage (non-injury) accidents (Troy and Butlin, 1971, showed no relationship between damage and injury levels).

iv) Hospitals

   - details of highway accidents which are not subject of claims on the Motor Accidents Board.

6.4 Information requirements for Reliable Accident Reporting

6.4.1 Introduction

NHSB (1969) recommended four classes of routinely collected information for all aspects of a co-ordinated federal, state, and local traffic safety program in the United States. These data are: (a) data pertaining to drivers such as their licensing and violation records, and financial responsibility, (b) vehicle data such as make, model and serial number, (c) highway data on milespot basis on bridges, structures, tangents, curves, intersections, and traffic control devices, and (d) traffic collision or accident data linked to involved drivers, vehicles, and highway locations.

It further provided that these four classes of data should be compatible, meaning they could be stored and would be retrievable at any time, and linked between states. A system of this nature evidently permits faster comparative analysis and evaluation using the most accurate, comprehensive, and up-to-date information. With respect to traffic accident data, the minimum information as provided for by NHSB (1969) includes:

a. indentification of location in time and space;
b. driver identification;
c. vehicle identification;
d. type of accident;
e. description of injury or property damage;
f. description of environmental conditions; and

g. causes and contributing factors, including the absence of or failure to use available safety equipment.

The National Committee on Urban Transportation (1958) postulated only 12 minimum data items to be reported; these were thought to be sufficient for basic accident analysis, evaluation, and policy formulation. A copy of the NCUT's abbreviated report form is shown in Figure 6.4.1. The first seven categories can be used to obtain data on high accident locations, accident rates and trends, and monetary loss. The last five items can be used to determine necessary corrective measures and for the analysis of design, operation, and construction features of the road network.

Two other views of accident data needs are given by Hobbs and Richardson (1967) and Jordan and Wilson (1971) and are shown in Table 6.4.1 and Table 6.4.2 respectively. The emphasis is a little different between the two sets of authors, as one lists the data as that needed for "accident records and research" whilst the other says it is "minimum accident data elements that should be collected, stored and retrievable".

ABBREVIATED
ACCIDENT INFORMATION FORM

1. Location on ______________ 2. No. ______________

At (house number) (intersection with) ______________ 3. Date ______________

or ______ feet ______ of ______________ 4. Time ______________

5. Control Section ______________

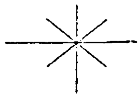
6. Classification of Accident
- Vehicle Fatal ______
- Pedestrian Fatal ______
- Vehicle Injury ______
- Pedestrian Injury ______
- Property Damage ______

7. Severity
- Total Killed ______
- Injured
  - Severe ______
  - Slight ______
- Total Injured ______
- Property Damage ______

8. Vehicle Type*
- Passenger Car ______
- Truck ______
- Bus ______
- Pedestrian ______
- Other ______

9. Surface
- Dry ______
- Wet ______
- Ice/Snow ______
- Fog ______

10. Collision Diagram



Show N

11. Actions*

____
____
____

12. Apparent Cause*

____
____
____

*Show by number on Collision Diagram

Figure 6.4.1 Abbreviated accident form (NCUT 1958)

Table 6.4.1

Elements of information required for accident records and research (Hobbs and Richardson, 1967)

General

Time, date (day, month and year). Locality of event and weather conditions. Holiday period. Highway classification

Road users

- Personal Informationage, sex, marital state, occupation, and any physical disabilities. Travel mode and journey purpose, and previous accident record. If a driver-experience.

- General Information position of fatalities and injured. Type of injuries and property damage. If in vehicle-driver or passenger and number of passengers.
  Impairments-drink, drugs or or illness.
  Interview of witnesses and statements of events.

Vehicles

- Type, make, year of manufacture. External and internal features - ornaments, etc. Condition tyres, brakes, suspension (post accident investigation). Equipment check and functioning-lights and indicators. Damage sustained and position of vehicles. Seating capacity. Vehicle use at time and loading condition. Type of movement. Ancillary equipment-safety belts and crash helmets.

Road Environment

- Traffic Control Signs
  Enirectional, mandatory, warning and information) and other controls (one-way, speed, parking, loading, bus stops, laybys, etc). Pedestrian crossings. Road markings.

- Traffic
  Volume, speeds and traffic composition. Public service vehicles

- Road Design Features
  Grade, alignment, width and cross sectional elements. Intersection layout, bends, crossfall, kerbs and barrier rails. Visibility distances. Street furniture.

- Road Surface
  State and type of surface. Skid resistance values. Defects. Drainage and lighting conditions.

- Adjacent Land Use
  Special buildings - schools, old people's homes, factories, etc., position of accesses.

- Special consideration
  Movement of vehicles and pedestrians Animals involved.

Table 6.4.2

Minimum accident data elements that could be collected, stored and retrievable. (Jordan and Wilson, 1971)

1. Identification

- Accident identification number
- Driver identification
- Vehicle identification
- Road location description
- Time of accident (month, week, day, time)

2. Driver(s)/Pedestrian(s)

- Condition(s)
- Alcohol and drug involvement
- Traffic law violation
- Intention

3. Vehicle(s)

- Defects
- Speed
- Manoeuvre
- Point of impact

Vehicle(s) (Cont'd).

- Damage severity
- Object struck
- Mileage or odometer reading

4. Accident severity

- Property damage
- Injury
- Fatal

5. Victims

- Injury type
- Age
- Sex
- Seating position/ pedestrian
- Use of restraints
- Cause of death
- Blood alcohol concentration
- Ejection
- Date of death
- Extrication time
- Object struck in vehicle

6. Environmental Conditions

- Light
- Weather
- Condition of road surface
- Maximum safe speed
- Road defects
- Physical features

7. Emergency response

- Time police notified
- Time police arrived
- Time EMS notified
- Time EMS arrived

6.4.2 Reliability/Accuracy of Data Items

Indepth studies offer the chance to compare the data items on the standard report as collected by the Police with the items collect by the specialist team but little seems to have been published in Australia from indepth studies. However, a separate study has been published based on an examination of the South Australian (S.A.) accident reporting system (Dept. of Transport Australia, (DOT A), 1979) but unfortunately the actual reporting mechanism differs in S.A. from other States in as far as any accident involving two or more drivers generates a report from each driver for those accidents that the police do not attend (81 per cent of all the reported accidents are NOT attended by the police in S.A.).

In other States the accident report form is compiled and co-ordinated by one police officer, whilst in S.A. the Highways Department undertakes the task of resolving the disagreements between reports for the same accident.

The report (DOTA 1979) says "the greater the need for resolution of discrepancies, the greater the potential for the introduction of errors during the process" and goes on to list various data items that were omitted from one or both reports, the items that were ambiguous, and the items that were contradictory.

The authors of the report also visited accidents attended by police and filled in their own version of a accident report which was later checked against the police report. Some 112 accidents were attended by the survey team and of these, 98 appeared on the computer tape to form the basis of the comparison. Due to differences in the report form and layout compared to Victoria, and the technique of deriving certain data items from the report form the reliability/accuracy will not be directly comparable, however, the data items with less than .05 error rate are listed below:

Item	Error Rate
Date	0
Time of Day	.03
Day of week	0
Unit Type (i.e. vehicle type)	.04
Sex of Driver	.03
Speed Limit	.02
Road Condition - sealed/unsealed	0
Driver Seat Belt (fitted, worn/not worn)	0
Weather (raining/not raining)	.02

It is difficult to say what level of accuracy is acceptable (since some error is inevitable) and the report does not address itself to that point.

One item "road condition - wet/dry" with an error rate .08 could be cross-checked in one direction in practice by a computer edit with "weather, raining/not raining" to allow internal validation such that when 'raining' was recorded then 'wet road' was also recorded. There is no mention of the survey team having made the cross check for the data they collected.

A further aspect is the amount of error introduced by the reporting officer inadvertantly checking the wrong box, even though he knows the "right" answer, i.e., a "slip of the pen". Whereas, it is noted that 'Date' and 'Day of Week' show zero error rates, by comparison the computer edits on Victorian data which check the "Day of Week" against "date" by an internal almanac do find contradictions, which may be a reflection of sample size as the South Australian sample of 98 report forms is NOT a large sample and may not have been an adequate sample.

Figure 6.4.2 from Little (1968) gives the relative reliability of various types of data item summarised from a number of sources in the U.S.A., U.K. and Australia.

PERSONS INVOLVED

Source	License Number - Driver	Biographical Data - Driver	Driver History (Legal)	Driver Condition	Psychological Factors	Physiological Factors	Vision	Sociological Factors	Driver Education Background	Biographical Data - Passengers	Biographical Data - Pedestrians
Police Reports	G	G		P						P	
Insurance Reports		A									
ICC Reports[1]	G	G		P		P					
Driver Reports	G	G									
Inspection Reports											
Traffic Tickets	G	A		A							
Coroners' Reports				P		A					
ACIR Medical Reports[2]				A	A	A	A	A			
ACIR Police Reports[2]											
ITTE-UCLA[3]											
Moseley[4]	G	G	G	A	A	A	A	A	A	A	
Baker[4]	G	G	G	A	A	G	G	A	G	G	G
Auto Manufacturers[5]											
RRL England[6] Braking & Related Studies											
Fleet Operators[7] Accident Reports & Files	G	G	A	A	P	A	A		A		
Ryan, McLean[8]		G								G	
Special Studies by States on Selected Topics		P	P						P		
Service Diagnostic Reports[9]											

VEHICLES INVOLVED

Source	License Number - Car	ICC Numbers	Vehicle Owners	Vehicle Make and Year	Vehicle Type	Vehicle History	Vehicle Defects	Tire Type and Details	Seat Belts
Police Reports	G		A	G	G				
Insurance Reports				G	A				
ICC Reports[1]	G	G		G	G			P	
Driver Reports	G		G	G	G				
Inspection Reports	G		G	G	G		A	P	
Traffic Tickets	G			G	G				
Coroners' Reports									
ACIR Medical Reports[2]						A			
ACIR Police Reports[2]				G	G	P			G
ITTE-UCLA[3]				G	G				G
Moseley[4]	G		G	G	G	A	G	A	G
Baker[4]	G		G	G	G	A	G	G	
Auto Manufacturers[5]				G	G				G
RRL England[6] Braking & Related Studies				G	G	G		G	
Fleet Operators[7] Accident Reports & Files	G	G	G	G	G	G	G	G	
Ryan, McLean[8]					A		A	A	
Special Studies by States on Selected Topics								P	A
Service Diagnostic Reports[9]				G	G		G		

ENVIRONMENTAL CONDITIONS

Source	Location	Area Characteristics	Topography	Road Type	Road Dimensions	Road Crown	Pavement Type	Pavement Color	Coefficient of Friction	Road Signs	Traffic Signals	Visual Background	Traffic Density	Weather Conditions	Light Conditions	Road Conditions	Time of Day - Date
Police Reports	G	A	P	A						A	A			A	A	A	G
Insurance Reports	G																G
ICC Reports[1]	G		P	A						P	P			A	A		G
Driver Reports	G			A						A	A			A	A		A
Inspection Reports																	
Traffic Tickets	G	A		A						A	A		P	A	A		G
Coroners' Reports																	
ACIR Medical Reports[2]	G																G
ACIR Police Reports[2]	G																G
ITTE-UCLA[3]	G																G
Moseley[4]	G	G	G	G	G	G	G	G		G	G	G	A	A	A	A	G
Baker[4]	G	G	G	G	G	G	G	G		G	G	G	A	G	G	G	G
Auto Manufacturers[5]	G																G
RRL England[6] Braking & Related Studies	G			G			G		G								
Fleet Operators[7] Accident Reports & Files	G	A	P	A						A	A			A	A	A	G
Ryan, McLean[8]	A	A		A											A		A
Special Studies by States on Selected Topics	A	A							P	A				A			A
Service Diagnostic Reports[9]																	

DESCRIPTION OF ACCIDENT EVENT

Source	Accident Type	Vehicle Movements	Pedestrian Movements	Timing or Sequence	Skidding	Velocities	Forces	Deceleration	Trajectories	Passenger Locations	Impact Sites - Occupant	Ejection	Laws Violated
Police Reports		A	A			P							A
Insurance Reports													
ICC Reports[1]	P	A			A								
Driver Reports	P	P	A			P							
Inspection Reports													
Traffic Tickets	A	P	P		P								A
Coroners' Reports													
ACIR Medical Reports[2]										G			
ACIR Police Reports[2]	G					P				G		G	
ITTE-UCLA[3]	G	G	G	G		G	G	G	G	G	G	G	
Moseley[4]	G	A		A	A	A			A	G	A	G	
Baker[4]	G	G	G	A	G	A				A	A		
Auto Manufacturers[5]	G			G		G	G	G	G	G	G	G	
RRL England[6] Braking & Related Studies		G			G	G		G					
Fleet Operators[7] Accident Reports & Files	A	A				P							
Ryan, McLean[8]	A	A	A		A	A			A	A	A		
Special Studies by States on Selected Topics													P
Service Diagnostic Reports[9]													

ACCIDENT CONSEQUENCES / MISC

Source	Vehicle Condition - After	Deformation	Parts Damaged	Property Loss	Injuries Sustained	Injury Loss	Photos Taken	Witnesses	Diagram of Accident	Test, Experiments	Controlled Collection	Mass Nonspecific
Police Reports	P				P		P	P	A			X
Insurance Reports	P			A	A	A		A	A			X
ICC Reports[1]				A				A				X
Driver Reports			P	P	P				P			X
Inspection Reports												X
Traffic Tickets												X
Coroners' Reports					A							X
ACIR Medical Reports[2]					G						X	
ACIR Police Reports[2]		G			A		G		A		X	
ITTE-UCLA[3]	G	G	G		P		G		G	X		
Moseley[4]	A	A	A		G		G	A	G		X	
Baker[4]	G		G		G		G	G	G		X	
Auto Manufacturers[5]	G	G	G		P		G		G	X		
RRL England[6] Braking & Related Studies							A			X	X	
Fleet Operators[7] Accident Reports & Files	G		A	A	P	A	A	A				X
Ryan, McLean[8]		A			G		A				X	
Special Studies by States on Selected Topics	P											X
Service Diagnostic Reports[9]												X

RELATIVE DATA RELIABILITY

G Good
A Average
P Poor

(1) See notes on next page.

FIGURE 2 SUMMARY CHART OF DATA AND SOURCES

NOTES FOR FIGURE 2

1. ICC (Interstate Commerce Commission) collects reports on accidents involving carriers under its authority.

2. ACIR (Automotive Crash Injury Research Project) at Cornell Aeronautical Laboratory analyzes data on injury accidents collected under their direction by cooperating police and medical agencies.

3. ITTE-UCLA (Institute of Transportation and Traffic Engineering of the University of California at Los Angeles) has performed many instrumented crash tests. The results have been published widely, including reports in the Stapp Conference Papers and the SAE Journal.

4. A.L. Moseley, of the Trauma Research Institute, and J.S. Baker, of Northwestern University, have carried out very detailed investigations of accidents, Moseley on fatal accidents in the Boston area and Baker on accidents in Evanston, Illinois.

5. Automobile manufacturers conduct crash tests for R&D purposes and also for proof testing. Results have been published in different sources, among them the Highway Research Board Bulletin.

6. RRL (Road Research Laboratory) in England has investigated many aspects of traffic safety. Skidding, both at accident sites and on proving grounds, has been explored.

7. Fleet owners and operators keep records on the mechanical history of their vehicles and the histories of their drivers while in their employ.

8. G.A. Ryan and A.J. McLean investigated accidents in Adelaide, Australia, much as Moseley and Baker did in this country. Of particular interest is their work on pedestrian impacts, published in the proceedings of the 9th Stapp Conference.

9. Service Diagnostic Reports--The manufacturers of automobile service and test equipment (notably the Marquette Corp.) have been promoting automobile diagnostic systems. Arrayed as a sort of a conveyor line service, these installations are well equipped and capable of detecting many defects. The equipment manufacturers generally train personnel for two weeks. Most operators maintain a file of all copies of reports and give a copy to the customer.

Figure 6.4.2 Data reliability. Source - A.R. Little (1968)

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6.4.3 Information Requirement for Reliable Reporting

As mentioned in 6.1 there is a trade off somewhere between the number of accidents to be reported/collected and the amount of information to be collected about each one.

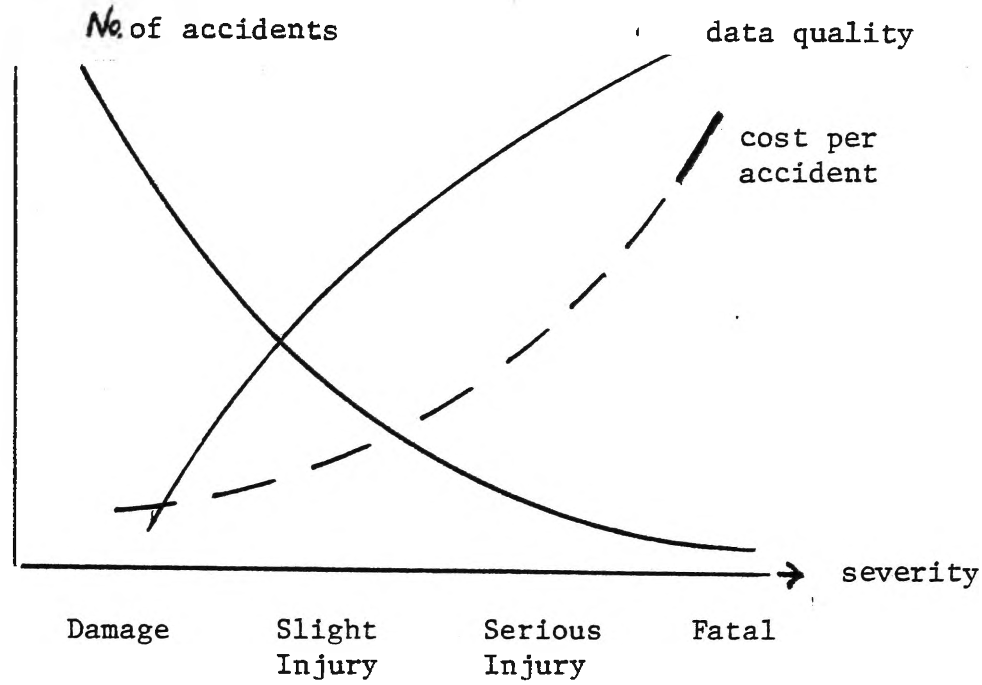

Figure 6.4.3 Accidents and data quality (after Hendy, 1976)

Figure 6.4.3 is used by Hendy (1976) to illustrate schematicaly accident severity related to accident cost, accident frequency, and data quality. The more severe the accident, the greater the cost and the greater the likelihood of it being reported and the more thoroughly it will be investigated. Hendy says there is a clear trade off between data quality and number of accidents.

Several points arise in relation to this statement firstly the more severe the accident the more thorough the investigation. Hendy is referring to the New Zealand system and an extensive examination and report is prepared for each fatal accident entailing trained traffic officers and automotive engineers who visit the scene and inspect the vehicles. For the accident data system however, the details actually entered for a fatal accident may be no more extensive than for the slight injury accident although the answers nay be more precise. It can be argued, that given the precise (or reasonable precise) shape of the frequency and cost curves there is as many economic grounds to report damage accidents as fatal accidents.

Damage: Many accidents x small average cost = \$Z

Fatal: Very few accidents x high average cost = \$Z

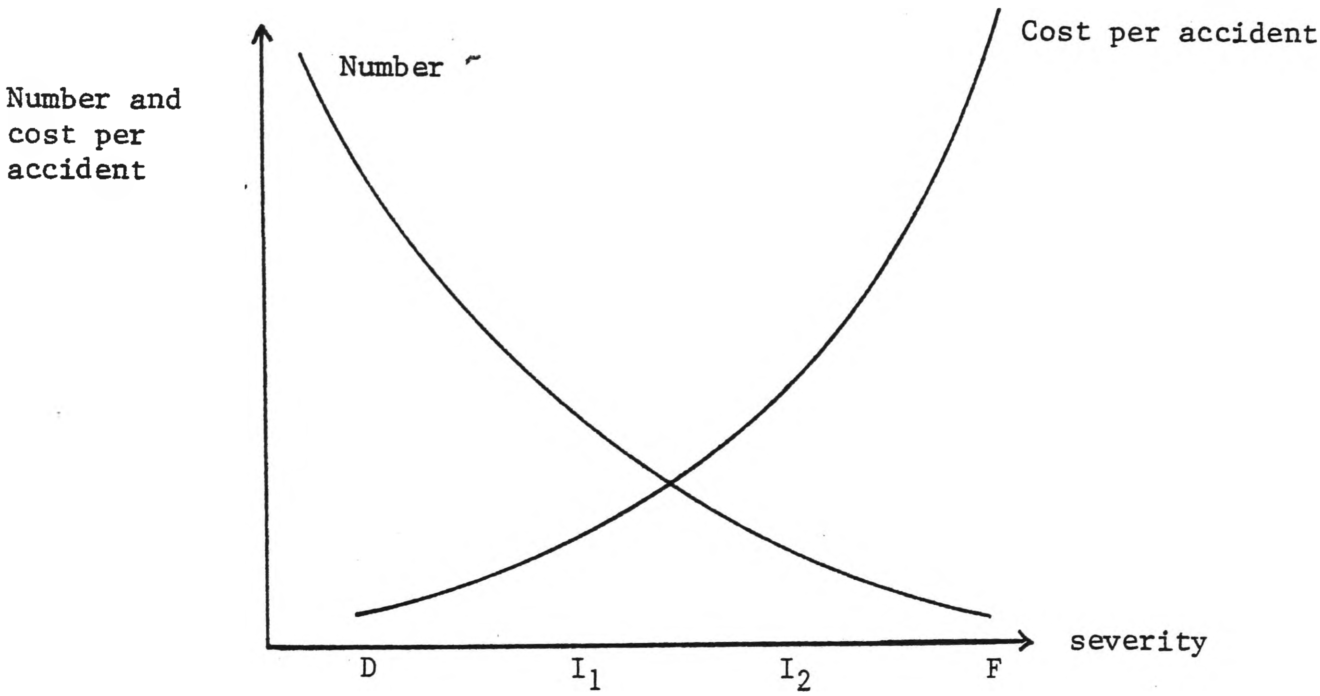

Figure 6.4.4 Numbers and cost/accident vs. severity

What is the shape of the Total Cost curve, given each accident severity frequency and cost?

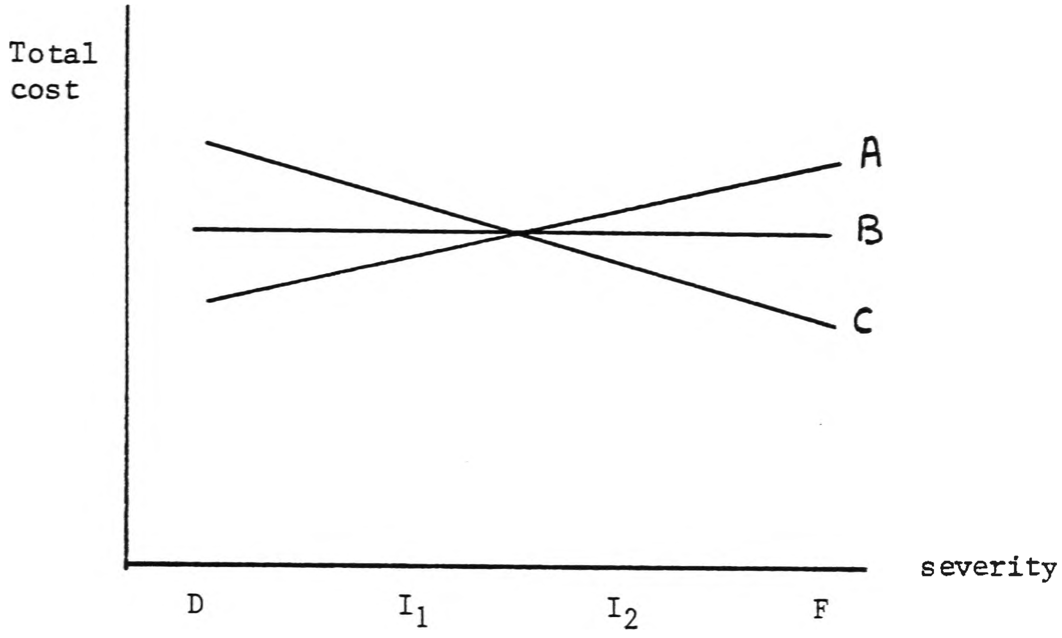

Figure 6.4.5 Total cost vs. Severity

Jarvis (1977) estimated the total cost (for 1976) in Australia of each of the three severity classes as:-

Fatal accidents	\$373.8 M
Injury accidents	\$339.1 M
Damage only accident	\$374.0 M

The damage accident figure is based on the proportion of damage to injury accidents found by Troy and Butlin (1971) for the A.C.T. This is likely to be an under estimate since although all accidents are required to be reported in the A.C.T. there was bound to be a number of minor damage accidents, particularly single vehicle accidents, which were not reported. Also between the time of the Troy and Butlin data and 1976 the proportion of injury to damage could have changed due to, say, seat belts. The difference in environment between the A.C.T. and the rest of Australia could also influence the proportion of injury to damage, in particular rural areas might exhibit a different ratio to that of the predominantly urban A.C.T.

However the information suggests that line B on Figure 6.4.5, or even a line toward line C, would be about right.

It is known that in the USA a vehicle design rule was introduced to specify the strength of bumper bars since there was huge costs each year to repair "cosmetic" damage to motor vehciles. A study after new bumpers were implemented showed a reduction of 60% in crash damage for 1979-80 cars compared with the pre-standard (1972 and earlier) cars, (IIHS, 1980). This confirms the large economic share of what are mostly unreported accidents.

Apart from the shape of the total cost curve one further aspect of collecting non injury accidents is that it allows one to determine from the accident types occurring at particular sites the need for and type of corrective treatment. Thus 'early' detection of "black" spots from the use on non-injury data would allow early treatment and the avoidance of having to wait until a sufficient number of injury accidents have been reported. Searles (1980) has provided some data based on N.R.M.A. insurance claims which the writer has shown illustrates that the "crash types" are "equally" distributed with respect to the three groups of coding (viz "official" statistics, reported but not in statistics, and not reported). Thus the non-reported crash types are in the same rank ordering as the crash types in the official statistics. (The severity, of course, differs between these two groups).

A more appropriate relationship to be examined is that beteen data quantity and the cost of obtaining the data. Figure 6.4.6 shows a possible form of relationship between these parameters. However the cost of collection may not necessarily be limited to one agency if sources other than the police report are used to compile the total data bank.

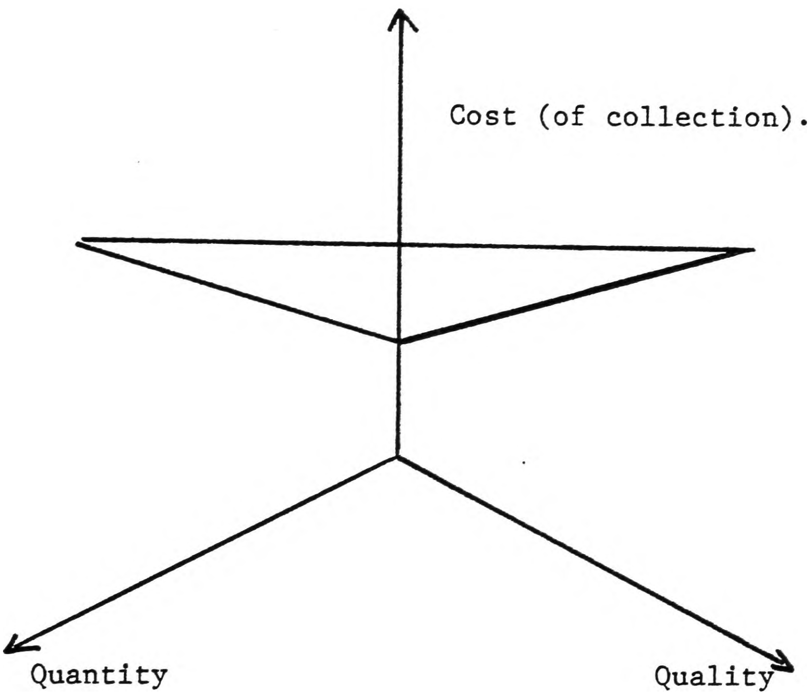

Figure 6.4.6 Cost, Quality and Quantity of Data

6.4.4 A View of what to Collect

How much data should be collected on any given accident is a question that is basic to any accident record system. There are many inherent aspects within the driver-road-vehicle configuration and potential requirements exist for details on the many phases of the accident. There is room for doubt as to whether all these details have to be reported or recorded and whether they are ultimatedly utilised.

The investigation and collection of a large amount of information for each accident places a burden on the police officer and in many cases he has not received any specialised training to perform the task. Another aspect is the requirements of accident data user groups such as the police, courts, highway departments, motor vehicle departments, etc. They need information for different purposes and in varying complexity, from simple statistical summaries and tabulations to more intensive coverage of a single accident or a group of accidents.

The inherent intricacies and difficulties suggest the need for a practical and functional accident data system that can accumulate basic accident information applicable to all concerned user groups and can be collected in a simple manner. There is also a need to ascertain and stratify the capabilities and constraints related to the primary reporting agency (i.e. the police) and the related complementary agencies (e.g. motor vehicle or highways department). This is essential in establishing the priorities in the data collection process for the optimum use of accident data. Collecting accident data is costly and requires a lot of manpower.

Ideally, accident data which fulfils the minimum analytical requirements of the data collector as well as the ultimate end user should be reported with the greatest accuracy possible. Less reporting detail on other aspects of the accident may be required to underscore non-basic, yet useful, information for future investigation research and analysis. This suggests that both on-and-off-scene sources of data have to be incorporated into the total accident data pool.

Information collected at the scene should be limited to useful objective facts, rather than subjective or inferential data.

Four groups of accident data are recommended for reporting as follows:

1. Primary Base Data.
2. Supplementary Base Data.
3. Complementary Data
4. Administrative Data.

Although each is distinct from the others in terms of quality and purpose, the data groups are closely interrelated. They may be collected in part or in whole depending on the applicable limitations of the reporting agency.

Primary Base Data

Primary base data are those accident data that must be collected for basic analytical purposes. These data are adequately sufficient to meet the fundamental requirements for accident comparison and evaluation. They can be used to identify high accident frequency locations, and measure the extent and nature of the accident problem by means of frequencies, rates or trends, by severity of accidents, or by locations, etc. In addition, they permit coding of the accident into one of the road-user defined accident types.

The first group of accident data that should be completed in greatest detail and accuracy as possible, consists of:

a. time of accident (the date, day and hour the accident happened);

b. light condition (daylight, dusk or dawn, darkness). This is a useful addition to incorporate a built-in check mechanism for the time data;

c. exact location of accident, specifically, the precise names of the streets or roads involved;

d.* road classification (arterial, collector, residential, or alternatively, primary, secondary, tertiary);

* can be determined off-scene

e. road condition (dry, wet, snowy or icy; sealed, gravel);

f. the severity of accident (fatal, personal injury, property damage);

g. type of vehicle involved (passenger car, bus, truck, motorcycle, etc.);

h. driver age and sex; and

i. accident collision diagram with brief description to derive the road user movement accident type.

Supplementary Base Data

Supplementary base accident data are the second most important set of data that may be collected either from on-or-off scene sources depending on their availability. When used in conjunction with the primary data, supplementary data could isolate specific driver-vehicle-highway location problems contributory to accident occurrence. They may show special areas of interest where further research or investigation efforts have to be intensified. They may also induce improved and complete comparisons and summaries of the accident problem.

Since an extra item to be collected requires additional time and expenditure, two categories of supplemental base accident data may be considered, as follows:

1. <u>Priority One.</u> Data items which are temporary, transitory or localized conditions which may be useful in determining accident cause. As such they can not be realistically inventoried beforehand and should therefore be collected only at the scene of the accident. These data together with the possible alternative decisions include:

a. status of traffic control device operation (operating, not operating, out of order),
b. object hit, if any (e.g. light poles, traffic sign, guard rails, sign boards, etc.). This applies to both roadside objects and to temporary objects on the road,
c. road defects (pot holes, ruts, loose surface materials, under construction);
d. weather conditions (clear, rainy, cloudy, snowy);
e. status of operation of street lights for night accidents; and
f. age and sex of casualities.

2. <u>Priority Two.</u> Consists of data items that should be collected from existing inventories or permanent agency records, but in their absence could be collected on the report form. These data items consist of:

a. type and location of traffic control devices, particularly, traffic signals and regulatory signs;
b. road surface type (concrete, asphalt, dirt); and
c. speed limits.

Complementary Accident Data

Complementary accident data comprise those data items which require reporting in the least amount of details. They may or may not be collected, depending on requirements or circumstances. If collected, these data may be used to illustrate the overall view of any given accident, particularly in resolving or reconstructing the circumstances of the accident. They may provide a more intensive coverage of any given accident for legal or insurance purposes. However, these data items are exposed to some degree of bias and inaccuracy as they are based on observations, conclusions or statements, expressed by the police, the persons involved, or the witnesses. The following information may be collected as part of the complementary accident data:

a. driver or vehicle movement (overtaking, going straight ahead, turning right, etc.);
b. pedestrian movement (crossing traffic lane, walking against traffic, etc.);
c. driver physical conditions (wearing spectacles, disabled, sick or ill, etc.);
d. pedestrian physical conditions;
e. opinion on driver and pedestrian sobriety, including test results, if applicable;
f. use of safety equipment e.g., safety belts, crash helmets;
g. vehicle make, model type and model year;
h. vehicle defects (headlights out of order, defective brakes, etc.) and
i. estimate of speeds of involved vehicles.

Reporting of Administrative Accident Data

Administrative accident data are data that may be reported as a consequence of the police routine functions towards their enforcement responsibility, especially in the investigation efforts to assist courts of law in resolving criminal or civil responsibility and in aiding the injured persons. These data items may not have any value at all for analytical purposes, but could nonetheless be recorded in the report form for the normal police administrative activities. The following items fall under this category:-

a. the town or city where accident occured;
b. the reporting police station or unit;
c. file or report number of accident;
d. identification details of accident investigator (name, rank, badge number);
e. driver name, address and licence number and type;
f. vehicle owner name and address, if driver is not the owner;
g. vehicle registration or plate number;
h. names and addresses of witnesses;
i. statements of involved drivers, injured persons and witnesses;
j. names and addresses of casualties;
k. emergency medical services performed e.g., injured persons taken to-by;
l. estimates of vehicle and property damage; and
m. record of routine police investigation (time notified and arrived at scene, whether investigation was made on scene, disposition of arrests or charges, if photographs and relevant measurements were taken, etc.).

A summary of the specific data items that comprise the four recommended data groups is presented in Fig. 6.4.7. These data items may all be incorporated in a single report form for one-time collection, or specific data groups may be individually collected for specialized requirements. While the data items are listed, no attempt is made to present an ideal standardized accident report form.

PRIMARY BASE ACCIDENT DATA

Date, Day of Week and Hour of Accident
Light Condition
Exact Location of Accident
Road Classification
Road Condition
Severity of Accident
Type of Vehicle Involved
Driver-age, sex
Accident Diagram

SUPLEMENTARY BASE ACCIDENT DATA

Traffic Control Device Operation
Object Hit
Road Defects
Weather Condition
Street Lights Operation
Age and Sex of Casualties
Type and Location of Traffic Control Devices
Road Surface Type
Speed Limits

COMPLEMENTARY ACCIDENT DATA

Driver or Vehicle Movement
Pedestrian Movement
Driver Physical Condition
Pedestrian Physical Condition
Opinion on Driver and Pedestrian Sobriety
Use of Safety Equipment
Vehicle Make, Model and Year
Vehicle Defects
Estimate of Vehicle Speeds

ADMINISTRATIVE ACCIDENT DATA

Town or City Where Accident Occurred
Reporting Police Station or Unit
File or Report Number
Accident investigator's Identification
Driver Name, Address and Licence Number and Type
Vehicle Owner's Name and Address
Vehicle Plate Number
Names and Addresses of Witnesses
Statements of Involved Parties
Estimate of Vehicle Damage and Other Property Damage
Names and Addresses of Casualties
Emergency Medical Services
Routine Police Activity

Fig. 6.4.7 Summary of Specific Data Items Recommended for the Reporting of Traffic Accidents.

6.5 In-depth Investigations

PCTS (1960) and JOHNSON (1961) state that the collection of information associated with traffic accidents consists of reporting and investigation functions. Accident reporting involves only the collection of readily obtainable facts at the time and scene of the accident. It is a means of getting the minimum amount of data for administrative purposes. On the other hand, accident investigation is a detailed inquiry into all available information pertaining to specific accidents for the purposes of special analyses and research.

According to BLUMENTHAL and WUERDEMANN (1968), reporting of accident data involves the observation and recording of conditions and probably inferences as to how, where, and when the traffic accident event occurred. This will normally consist of:

a. direct observation and recording of conditions at the scene of the accident, after the event;
b. recording of reported recollections of those involved and witnesses or observers;
c. direct observation of off-scene factors which are relevant, e.g., prescription of drug having undesirable side effects;
d. reports from off-scene record sources which are relevant, e.g., driving history, vehicle repairs, etc; and
e. recording of opinions, recollections, and facts from off-scene sources.

Three concepts of reporting and collection of accident data developed in the United States are briefly described below. These are the bi-level concept of MICHALSKI (1967), the multi-level concept proposed by GARRET and THARP (1969), and the five-level concept of BAKER (1969).

a. Bi-Level Concept: (Michalski, 1967). This consists of two parts; the basic level and the supplementary level. The basic level furnishes sufficient data for routine needs of individual reports and users of groups of case reports. It can generate the statistics needed to measure the magnitude of the problem, define major prolem areas, sugest remedial measures, etc. The supplementary level sets details of specific information about drivers, vehicle conditions, and roadway factors. Data on the psychological and physiological characteristics of drivers, defects or failures of specified vehicle components, or data on selected highway and environmental factors are some of the information that may be collected at this supplementary level. However, their collection requires training for investigators to report accurately and completely the desired supplemental data.

b. Multi-Level Concept: (Garret and Tharp, 1969). This is designed to provide accident records that are appropriate in both quantity and quality for the specific task intended. The three levels of investigative efforts are:

i. Level 1 - Basic reporting of all reportable accidents. Data collected include driver and vehicle identification, time and place of occurrence, and a brief description of the accident. These may be used to identify high frequency accident locations, to obtain risks and rate estimates, and to formulate some highway design and operating policies.

ii. Level 2 - Limited investigation of a sample of accidents from pre-selected research objectives on special topics. Information would be collected by technicians or specially trained police and would be used to evaluate topics concerning the driver, the highway, or the vehicle. Sample size would be dependent on study requirements.

iii. Level 3 - Intensive investigation of a limited number of accidents. Detailed information would be collected on a small number of accidents by multi-disciplinary teams. Data will be used to improve investigative techniques, establish research needs, and hypothesize causal relationship which may be examined at level 2.

c. Five-Level Concept: (Baker, 1969). This consists of five levels of activity; the first two performed by the police agencies, and last three by highway and traffic engineers. The five levels, are as follows:

i. Level 1 - This is identical to the basic reporting system. However, no opinions or conclusions are required.

ii. Level 2 - Similar to the supplemental report concept, but limited only to the preliminary and non-technical analyses. Opinions are required in identifying circumstances involved.

iii. Level 3 - Technical Data Preparation. This is made up of technical information, usually objective, that involves road and vehicle examination tests and after-accident situation maps. This includes measurements for grades, sight distances, view obstruction and surface frictions; initial examination of lamps, tyres and other vehicle parts; simple speed estimates from tyre marks, falls, vaults and flips, etc.

iv. Level 4 - Professional Reconstruction. This is entirely subjective information related to how the accident happened; this may involve scientific inferences about speeds, position on the roads, observations and comprehension of traffic control devices, and evasive tactics. Velocity and acceleration diagrams, and time-space diagrams can be prepared at this level.

v. Level 5 - Cause Analysis. This largely involves forming experts' opinions about operational and conditional factors causing the accident.

Summarising the above, the collection of data pertaining to accidents can be viewed as a three-level approach as follows:

a. Level I represents mass data collection.

b. Level II relates to the collection of additional information to that on the standard report form and attached to the form. The collection is usually limited in time, and can also be limited to certain types of accident, geographical area, or vehicle types.

c. Level III collects data through detailed (in-depth) investigation of accidents by a professional multi-disciplinary team. Usually the number of accidents investigated is small but details are produced on the vehicle, the driver and occupants, the environment, and the circumstances leading up to and following the accident. The team usually includes a medico, sociologist or psychologist, an automotive engineer, and a traffic engineer.

The earlier discussion (Section 6.4.3) about the balance between the number of items and the number of accidents to be reported applies to this approach and the data items on the basic report form could be reviewed on the basis of planned and regular use of level II and level III investigations.

In Victoria, a level III (in-depth) study was carried out and this has now terminated but the Writer is unaware of any proposals for such studies in the future. The large mass of data collected has still to be resolved into useful form. It would appear that in-depth studies should be started only after definitive areas to be investigated are defined. An example would be the examination of a sample of vehicles involved in crashes to ascertain usage of seat belts, the nature of impact, the detailed type of injuries sustained and objects within the vehicle struck by the occupants.

6.6 Accident Data Systems in Asia

6.6.1 Introduction

A later part of this work (Chapter 9) relates to the application of an accident location and accident-type system to Asian cities and this section deals with what sort of data is presently collected in a selection of Asian countries and the use made.

Jacobs, Bardsley, and Sayer (1975) of the TRRL describe the analysis of a questionnaire sent to a number of developing countries in October 1972. Responses were received from 34 countries of which 7 were Asian countries, the others being African, Middle Eastern and West Indian, many of which appeared to be former British colonies. The report makes a comparison against the data collected by these countries and the data items on the British "Stats 19" report. Just why the "Stats 19" should be used as a norm is not justified. The report then produces a recommended police accident data booklet for developing countries. In designing a system there was to be a balance between collecting a considerable amount of data as in the UK and a simplified system where only the most basic data are collected. If fewer, but essential questions are asked it was assumed reasonable for the questions to be answered thoroughly and accurately. Alternatively, if many questions were demanded there would be less readiness to complete the document. The authors said "it was decided that a system based on the method used in the UK but considerable simplified would best meet the needs of police forces and those organizations requiring statistical information and analysis" and this appears to be the total and only reasons given for including items which in this writer's view do not meet the previous stated argument of fewer but essential questions to be asked to achieve a thorough and accurate response. Neither do the authors advance any reasons as to why a system collecting only the most basic data would not be suitable for developing countries. It depends on what is defined as basic data and obviously the data collected should be collected for a defined purpose and collection justified in terms of the use to which the data will be put.

The next section will discuss more recent work of accident data collection in Asia and will address the last point raised.

6.6.2 General Overview of the Reporting Systems.

The following sections 6.6.2 to 6.6.4 on accident data systems in Asia are extracted from Vitasa (1978) who carried out a study under the writer's supervision whilst the writer was teaching at the Asian Institute of Technology.

The comparative review covers the responses to the questionnaires sent to 12 countries of Asia, viz: Bangladesh, Hong Kong, India, Indonesia, Iran, South Korea, Malaysia, Pakistan, the Philippines, Singapore, Sri Lanka, and Thailand. An average of three questionnaires was sent to each country, mostly to the participants of the "Seminar-Cum-Training Course for Traffic Engineers and Transport Planning Officers - Their Role in City Administration" held in 1976 under the auspices of the Economic and Social Commission for Asia and the Pacific (ESCAP). A total of 17 replies were received.

The questions were directed mainly to the basic details of the existing structure and operation of the accident data system in those countries. A sample copy of the official traffic accident traffic report from was requested and ten countries provided them. The various individual responses describing the present system of traffic accident reporting in the 12 countries studied are summarized in Table 6.6.1.

The traffic accident reporting and investigation function in these countries is primarily entrusted to the local police agencies or departments. This indicates that motor vehicle accident reports usually originate from a single source, i.e., the police officer who witnessed the accident or was called to the scene, and , in most cases, the police officer who "investigated" the accident. A traffic accident report in Thailand, however, may emanate from either field highway personnel or field highway police for accidents occurring on the national and provincial highways outside the Bangkok metropolis. Similarly, in the Philippines a report may also be derived from a highway patrol officer for accidents arising on the national road network. Motor vehicle traffic accident reports are normally made for all types of accidents (fatal, personal injury and property damage) in the 12 countries studied. In Iran and the Philippines, reports involving property damage accidents are only effected when damage is in excess of 50 and 25 U.S. dollars, respectively. Accidents have to be reported to the police immediately after the accident in five of the countries or within 24 hours of the accident in another five countries. In South Korea and Pakistan, there is no prescribed time period set to report the occurrence of a traffic accident. Upon notification of the accident, the police generally conduct on-scene investigation for fatal and serious physical injury accidents. For minor types, the involved parties are advised to report to the nearest police station. In few instances, the parties may settle the case amicably among themselves, without the benefit of an official police report or action. For this latter case the lack of reports may be sufficient to distort the total accident picture in those places where the practice is permitted.

Important differences are evident in the definitions of some basic accident data items requested in the report forms. A striking difference lies in the definitions of a fatality and of serious physical injury. In five countries, fatality is taken to mean death within any period in time; in three, it means a person dies within 3 days, 21 days, or within a year and one day of the accident, respectively. It should be noted that similar contrasting definitions have been observed by SMEED (1968) in different developed countries. Smeed's study showed, in particular, that between 93 and 96 percent of those who died as a result of accident died within 30 days. By comparison, those who died within one hour were between 28 to 46 percent. Thus, it may be gleaned that countries using the on-the-spot definition understate deaths vis-a-vis the 30-day period by as much as 100 percent (the correction factor ranging from 2.1 to 3.4 times the stated deaths).

The definition of a serious physical injury extends from an explicit hospital admission and attendance by a medical doctor, irrespective of the number of days stay in the hospital, to incapacity for labour for more than 30 days with or without hospital admission and medical attendance.

Another difference is the definition of intersection. A majority of the respondents define the legal limits of an intersection, as used in their system, to be the area enclosed by the kerb lines drawn to the opposite approaches of the intersection. In Hong Kong and Pakistan, there is no law prescribing the legal limits although in the former the intersection covers the enclosed area within 100 square metres of the intersection for accident black-spot purposes. In Thailand, the intersection boundaries for highway engineering design are based on the "right-of-way" limitations.

Compilation and statistical analysis of accident data are performed by the police at their own level or area of jurisdiction. All 12 countries officially document national accident summary statistics on annual basis. In addition to the yearly report, some publish national statistics on a quarterly or semi-annual basis. In nine countries, the annual publication of these statistics are available from police agencies. The police are the sole source of accident statistics in six countries; Hong Kong, Iran, South Korea, Malaysia, the Philippines and Singapore. In contrast, the central statistics agency is the only source in Pakistan and Sri Lanka. Publication of more than one set of statistics is potentially available in four countries in view of the highway police, the highway or transport department, or even the central statistics agency consolidating or disseminating similar information. Six countries have electronic data processing equipment at their disposal, while two countries were contemplating utilizing the same.

Table 6.6.1 Present Structure and Operation of the Accident Data Systems in 12 Countries of Asia.

INQUIRY	Bangladesh	Hong Kong	India	Indonesia	Iran	South Korea	Malaysia	Pakistan	Philippines	Singapore	Sri Lanka	Thailand
1. Government agency charged with traffic accident reporting:												
Police Department	X	X	X	X	X	X	X	X	X	X	X	X
Motor Vehicle Licensing Agency												
Highway Department												X
Highway Police Agency									X			X
2. An official report form is used for accident reporting and investigation:	X	X	X	X	X	X	X	X	X	X	X	X
3. Report form is in:												
Local Language				X	X	X	X					X
English								X	X	X		
Both		X									X	
4. Person who completes report:												
Police officer	X	X	X	X	X	X	X	X	X	X	X	X
Driver												
Both police & driver												
Highway dept. personnel												X
5. Police attend to ALL reported accidents:	X	X	X	X	X	X	X	X	X	X	X	X
6. Investigation conducted by police:												
On-Scene	X	X	X	X	X	X	X	X	X	X	X	X
Off-Scene		X		X					X	X		
7. Severity of accidents reported:												
Fatal	X	X	X	X	X	X	X	X	X	X	X	X
Personal Injury	X	X	X	X	X	X	X	X	X	X	X	X
All Property Damage	X		X	X		X	X	X		X	X	X
Property Damage with Costs Limits					X				X			

INQUIRY (cont'd)	Bangladesh	Hong Kong	India	Indonesia	Iran	South Korea	Malaysia	Pakistan	Philippines	Singapore	Sri Lanka	Thailand
8. Prescribed time required to report occurrence of accident:												
Right after accident	X		X	X	X				X			
Within 24 hours		X					X			X	X	X
Within 48 hours												
No limit						X		X				
9. Fatality means death:												
On-the-spot				X					X			X
Within 3 days							X					
Within 21 days			X									
Within one year and one day		X										
No time limit	X						X	X		X	X	
10. Types of personal injuries reported:												
Serious Injuries	X	X	X	X	X	X	X	X	X	X	X	X
Slight Injuries	X	X	X	X	X	X	X	X	X	X	X	X
11. Legal limits of intersection is:												
Building or property line			X									ROW
Kerb (Curb) line	X			X	X	X	X		X	X	X	
No limits		X						X				
12. Are traffic accident statistics officially published:												
Yes		X	X	X	X	X	X	X	X	X	X	X
No												
Not aware	X											
13. Government agency that publishes traffic accident statistics:												
Police Department		X	X	X	X	X	X		X	X		X
Highway Police Agency					X				X			
Highway Department			X									X
Central Statistics Agency								X			X	
Transport Department			X	X								

INQUIRY (cont'd)	Bangladesh	Hong Kong	India	Indonesia	Iran	South Korea	Malaysia	Pakistan	Philippines	Singapore	Sri Lanka	Thailand
14. Frequency of publication of accident statistical reports:												
Quarterly	X		X				X					
Semi-annual			X					X				
Annual	X	X	X	X	X	X	X	X	X	X	X	
15. Accident data analysis uses:												
Computer facilities	X	X		X		X		X	X	X		
Manual system			*		X		X	X			*	

Note: *Presently using a manual system, but there are plans to use computer facilities.

6.6.3 Evaluation of Existing Traffic Accident Report Forms

Traffic accident report forms from ten countries of Asia were examined, both in content and format, to determine the kind and amount of information which is potentially available and reported, and the standard of uniformity. Two forms were evaluated for Thailand, one used by the Department of Highways and the other by the Police Department for the Bangkok Metropolitan Administration and the local roads not under the jurisdiction of the former agency.

The report forms varied physically in many ways. There are three types of documents used for reporting traffic accidents: namely, the booklet form, the file jacket and the simple form. The booklet form, which is the most common, is used in seven countries, i.e., Iran, South Korea, Pakistan, the Philippines, Singapore, Sri Lanka and Thailand. The file jacket or cover type of report form is used in Hong Kong. Both contain write-in items, narrative or descriptive sections, accident diagrams and check-off lists in pre-structured formats. A simple form is used in Indonesia and Malaysia, where information is entered by description under the headings printed in the form. They are apparently ordinary police incident or complaint reports in view of their purely descriptive and non-structured format. Five forms are written in the local language (Indonesia, Iran, South Korea, Malaysia, and Thailand), two in both English and the local language (Hong Kong and Sri Lanka), and three in English (Pakistan, the Philippines and Singapore). The forms come in various sizes, ranging from 190 by 268mm sheet as in South Korea to a 330 by 436mm form in Pakistan. Moreover, the information requested is consolidated in a one-page report as in Iran, or on a two side one-sheet form used in Pakistan, the Philippines, Singapore, Sri Lanka and Thailand. In South Korea and Hong Kong, the data are contained in a four-page report form. Similarly, information being requested are arranged or laid out in various styles from the simplest manner to the most compact and complicated manner. Some forms tend to minimize a great deal of handwriting by reducing the amount of write-in items and descriptive data, while others minimize the amount of information in the check-list formats. Completion in nearly all the forms could be done both by filling in the specified blanks and by ticking or placing entries in appropriate boxes.

Three sets of criteria were established in the comparative evaluation of the accident report forms. These were:

a. Data requested or potentially available in the report forms. An inventory of the accident information in each report form was done. A total of 94 data items grouped under nine major categories was arbitrarily chosen to serve as the basis of comparison. A summary is given in Tables 6.6.2. and 6.6.3.

c. Number of contributing factors available during the investigation of traffic accidents. A detailed inventory of the resultant evaluation is summarized in Table 6.6.4.

The least requested data items included the distance and direction from landmarks, traffic lanes, traffic control devices, driving experience, insurance coverage data, pedestrian condition and emergency services performed. In some report forms, other (interesting) information were also requested like vehicle color, vehicle inspection data, driver race and language spoken, animal action, damages to the property of the Highway Department.

A closer examination of the report forms showed distinct disparities between the number of major categories and the corresponding inquiries, and the number of contributing factors potentially to be recorded during accident investigation. In Table 6.6.3 it can be seen that major items of information contained in the forms varied from five to 26 categories. Over half of the report forms required 13 to 17 major items, covering amongst other things, time and location of accident, driver identification, vehicle identification, accident type, severity, roadway and environmental conditions, accident causes or contributing factors and police action.

Correspondingly the specific queries to be completed and filled in, ranged between 22 and 208 with half of the reports having 50 to 100 inquiries.

Similarly, a large number of alternative contributing circumstances attributable to the driver, pedestrian, vehicle, or the roadway was potentially available to consider accident causation and responsibility, (see Table 6.6.4). The total number of possible factors ranged from 28 to 149 factors. In four report forms, over 100 factors were listed for the reporting officer to consider. Moreover, within specific data groupings, the number of items used for the same data classification varied greatly in different forms. Most reports used numerous options pertaining to driving violatons, driver action and vehicle condition. Since all these factors could and often do, apply in an accident, there is danger that not all of them will be reported when all are grouped under a single classification, e.g., as in the Thai Highway Department accident form. On the other hand, separate classification has the advantage not only of showing whether a particular factor was relevant, but also of simplifying the data-processing analysis. In extreme cases, the data groups may present some difficulties. For instance some reports had over 10 categories to describe driver action, while others over 20. Pedestrian action varied from 10 to 26 items, and road character varied from 5 to 12. This obviously may make comparisons between countries perplexing and unreliable. Despite this apparent problem, the various forms studied showed uniformity in certain data classifications, e.g., driver physical condition, pedestrian condition, road surface type and conditions, view obstructions, weather and light conditions. Details of the abovementioned analyses on the individual report forms are found in Tables 6.6.2 and 6.6.3.

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Table 6.6.2 Inventory of Traffic Accident Data Requested or Potentially available from accident Report Forms Used in 10 Countries of Asia.

DATA ITEM	Hong Kong	Indonesia	Iran	Sth. Korea	Malaysia	Pakistan	Philippines	Singapore	Sri Lanka	Thailand(H'Ways)	Thailand(Police)
I. TIME AND ENVIRONMENTAL DATA											
Date (Month/Day/Year)	X	X	X	X	X	X	X	X	X	X	X
Day of Week	X	X	X	X	X	X	X	X	X	X	X
Hour of day	X	X	X	X	X	X	X	X	X	X	X
Light condition	X	.	X	X	.	X	X	.	.	.	X
Weather condition	X	X	X	X		X	X			X	X
II. LOCATION DATA											
Political jurisdiction	X	X	X	X	X	X	X	X	X	X	X
Name of street, road or highway	X	X	X	X	X	X	X	X	X	X	X
Highway section or control number								X	X	X	
Name of interesecting street, road or highway	X	X	X	X	X	X	X	X	X		
Distance and direction from nearest landmark				X	.	X	X	X	X		
Urban or Rural									X		
Kind of locality or area				X	.	X					
III. ROADWAY DATA											
Road type	X	.	X							X	
Road surface type		E	X	X		X	X			X	X
Road surface condition	X	E	X	X		X	X		X		X
Road character	X		X	X		X	X		X	X	X
Obstruction to view				X		X	X		E		
Street lighting	X			X		X	X		X		X
Pedestrian crossing	X			X		E		X			X
Speed limits				X		X					X
Traffic conditions	X	X		X				X			X
Traffic lanes				X		X	X	X		X	
Traffic control devices	X			X		X		X			X

DATA ITEM (cont'd)	Hong Kong	Indonesia	Iran	Sth. Korea	Malaysia	Pakistan	Philippines	Singapore	Sri Lanka	Thailand (Highways)	Thailand (Police)
IV. INVOLVED VEHICLES(S) DATA											
Year of manufacture (age)	X			X		X	X		X		
Make	X			X		X	X	X	X	X	X
Type	X	X	X	X		X	X	X	X	X	X
Color	X							X			
Plate number	X		X	X		X	X	X	X	X	X
Registry class				X			X	E			
Place of registration				X		X	X				
Recent inspection data			X								
Owner's name and address				X		X	X	X			
Vehicle defects	X			X		X	X		X	E	
Parts damaged	X	X	X	X		X	E	X		X	
Insurance coverage	X		X				X	X			
Estimate of damaged parts	X	X	E	X		X	X	E		X	X
V. INVOLVED DRIVER(S) DATA											
Name	X	X	X	X	X	X	X	X	X	X	X
Age (or Birthdate)	X	X	X	X	X	X	X	X	X	X	X
Address	X	X		X	X	X	X	X			
Sex	X		X	X	X	X	X	X	X	X	X
Occupation		X		X	X	X	X	X			X
Nationality/Religion/Race		X			X		X				X
Language spoken					X			X			
Driving experience				X		X	X				
Personal account of accident	X			X							
Licence number	X		X	X		X	X	X			
Type of licence	X		X	X		X	X	X			
Date and place of issue			X			X	X				
VI. POST-ACCIDENT DATA											
Severity (fatal, injury, damage)	X	X	X	X	E	E	X	E	X	E	
Type of accident	E	E	X	E	E	X	X	E	E	E	
Type of collision	E	E	X	E		E	X	X	X		
Property damage other than vehicle	X	X		X		X				X	X
Non-vehicular property damage estimates	X	X	X	X		X				X	E
Driver action	E		E	X		X	X	E	X	E	E
Driver physical condition		X		X		X	X		X	E	X
Driver violation or offence			E	X	X	X	X	X			X
Driver under influence of drug or alcohol				X	X		X		E		
Pedestrian action	E			X		X	X	E	X		E

DATA ITEM (Cont'd)	Hong Kong	Indonesia	Iran	Sth. Korea	Malaysia	Pakistan	Philippines	Singapore	Sri Lanka	Thailand (Highways)	Thailand (Police)
VI. (Cont'd)											
Pedestrian condition		X		X		X	X				
Animal action			X				X		E		
Accident diagram			X	X		X	X	X	X	X	X
Accident description	X	X	X	X	X	X	X	X	X	X	X
Personal details of witnesses (name & address)	X	X		X	X	X	X				
Hit-and-run cases	E			X		X	X	X			
VII. CASUALTY DATA											
Number of fatalities	E	E	X	X		X	E	E	E	X	X
Number of injuries	X	E	X	X		X	E	E	E	X	X
Road-user category	X	E	X	E		X	X	E	X		X
Severity classification	X	E	X	X		X	X	E	X		X
Name	X	X		X		X	X				
Age	X	X		X		X	X		X		X
Sex	X			X		X	X		X		
Address	X	X		X		X	X				
Occupation		X		X							X
Personal account of accident	X			X							
VIII. EMERGENCY SERVICES DATA											
Vehicle towed by ___ to ___	X					X					
First aid											
Injured taken by ___ to ___	X					X					
Name of hospital	X			X	E	X	X				
Next of kin informed	X										
IX. POLICE ADMINISTRATIVE AND INVESTIGATION DATA											
Date and time notified	X	X					X				
Police notified by ___	X	X		X	X			X			
Time of arrival at scene	X		X			X					
Investigation conducted at scene	X		E	X	E	X					
Identification of evidence	X	X		X	X						
Photographs	X			X	E	X					
Investigator's recommendation	X	X		X	X		X				X
Disposition of case	X			X	X	X	X				X
Enclosures	X			X			X				
Investigator's identification	X	X	X	X	X	X	X	X	X	X	X
Date report is made	X	X	X	X	X	X	X	X	X	X	X
Report to be approved by ___	X			X			X		X		X
Date of approval	X						X				
Reporting police agency or unit	X	X	X	X	X	X	X	X	X		X
File/Report Number	X	X	X	X	X	X	X	X	X		X

NOTE: E - Data item does not specifically appear in the form but can be potentially extracted in some related data items.

Table 6.6.3 Number of Accident Data Items Covered in Accident Report Forms

COUNTRY	NUMBER OF MAJOR CATEGORIES OF ACCIDENT DATA	NUMBER OF INQUIRIES TO BE COMPLETED
HONG KONG	13	208
INDONESIA	13	31
IRAN	15	60
SOUTH KOREA	17	177
MALAYSIA	5	22
PAKISTAN	24	182
PHILIPPINES	26	95
SINGAPORE	15	70
SRI LANKA	23	50
THAILAND (Highway Dept.)	13	48
THAILAND (Police Dept.)	15	81

Table 6.6.4 Number of Contributing Factors Listed on Report Forms, 10 Asian Countries.

CONTRIBUTING FACTOR		Hong Kong	Iran	Sth. Korea	Pakistan	Philippines	Singapore	Sri Lanka	Thai Highways	Thai Police
I. DRIVER FAILURE										
Action or movement		22	13	11	13	16		21		
Violation or offence		19		14	14	14	2		10	*
Physical condition				8	6	6		6		
	S.T.	41	13	33	33	36	2	27	10	
II. PEDESTRIAN FAILURE										
Action or movement		26			15		10	19	1	
Physical condition					8		6			*
	S.T.	26		23	16	25	1			
III. VEHICLE FAILURE (defects)		20		5	5	14	3	12		
IV. ROADWAY AND ENVIRONMENTAL FAILURE										
Road character		10	12	5	8	7	11	12	7	*
Road surface type			3	5	5	6			4	*
Road surface conditions		6	5	4	8	5		5		
Obstructions to view		20		9	9	9		9		
Traffic conditions		3		1			4			*
Traffic control devices		9		7	9		7			
Weather conditions		6	3	5	4	7			7	*
Light condition		8	2	7	6	6		4		*
	S.T.	62	25	43	49	40	22	30	18	
TOTAL NUMBER OF FACTORS		149	38	104	103	115	28	69	48	

NOTE: * Data items requested in the report form but with no choice for possible decisions. This has to be provided by the investigating police officer

To recapitulate, the comparative evaluation of the various report forms showed that there is a large area of agreement on the nature of accident data being reported, but with little uniformity in extent. All forms could basically provide answers to the elemental aspects of any given accident, particularly, the location and time of the accident, details of the involved drivers and vehicles, the accident severity, roadway conditions, and why and how the accident happened. In general, the reported data fell into two major categories:- personal details or identification data, and statistical data.

The report forms, as they had been structured, may well indicate the kind and extent of the items that have to be reported and consequently collected to document the traffic accident information in each of the countries studied. On the other hand, the reporting of accident data may, by and large, be beyond the normal comprehension and capability of the police officer investigating the accident. The reports obviously are prone to bias and are not objectively factual information to a considerable degree. It is therefore necessary to realize certain limitations and restrictions of accident reporting. The report is only as good as the person reporting it. Accident reporting is normally one of the many police tasks, care of the injured and restoration of traffic flow take precedence over securing accident data; the police report often consists of a description provided by drivers and witnesses; the police are more apt to be trained in accident reporting, per se, than in scientific accident investigation, if trained at all. If a report form is used, reported information is limited to those items listed but which may not be useful. If a report is not used, the investigating officer often reports only apparent and possibly superficial information. In the broadest perspective, other restrictions may include the reporting agencies' goals, needs and objectives and availability of manpower, fiscal and physical resources.

Thus accident reports may not be entirely complete, or if complete at all, recorded information may still be futile and unreliable in some cases. Within the reporting agencies' known capabilities and constraints, it would then be essential that trade-offs and guidelines have to be set as to the type and kind of information to be reported and collected, as well as the degree or level of reporting. This is necessary in order that a minimum amount of accident data may yield optimum and effective results in describing the actual accident picture in the least ambiguous way. In the long run, the same amount of minimum data may serve to measure the overall accident trends in a particular location and suggest the corresponding remedial measures. Finally, it would also be important that the police and any other organizations involved receive adequate training in the investigation and collection of these minimum set of accident data, particularly, in familiarizing them with the type of data required and how to report them.

6.6.4 Description of Accident Data System in Hong Kong and Thailand

The systems in two particular countries are given to illustrate some of the aspects that are common to all those countries studied.

6.6.4.1 Hong Kong

The Royal Hong Kong Police Force has statutory duty for the control of traffic on public roads in the crown colony, and the investigation of accidents occurring therefrom. The latter duty is embodied in Section 27(1) of the Road Traffic Ordinance Cap. 220 Laws of Hong Kong. This section states that should a driver be involved in a minor accident which involves nothing more than damage to a vehicle he is required to stop and give his name and address together with the name and address of the vehicle owner and the vehicle registration number to any person (e.g., the other involved driver, any police officer) who has reasonable grounds of requiring him to do so. If the said particulars are not exchanged with another driver or interested party, and in any event that injury is caused to any person, the driver is required by law to report the traffic accident to the nearest police station or to any police officer within 24 hours of its occurence. Accidents involving damage to vehicles but no injuries to persons are not normally recorded as it is not obligatory to report them to the police. However, should the involved driver wish to make a complaint about the driving behaviour of the other, he may make a report to the police who then investigate the case.

Three classes are therefore compulsory reported; fatal;, serious and slight injury accidents. A fatal accident is one in which at least one person is killed within a year and a day of the date of the accident. A serious injury accident is when one or more persons is injured and admitted to hospital for more than 12 hours, while a slight injury is when at least one person is injured but not to the extent of requiring hospital admission. Details of each class of accident is completed on a four-page distinctly coloured file jacket by the investigating officer.

The sequence of events whereby an individual accident occurence becomes part of the Hong Kong police accident data systems are:

a. a traffic accident occurs in which someone is injured, damage is caused or one party alleges a traffic violation against the other;
b. the police are informed and, depending on the severity of the accident, they either attend the accident scene or not;
c. if police attend the scene, photographs and relevant measurements are made by traffic branch personnel;
d. the investigating officer reports the basic facts to the accident inquiry section of the traffic branch;
e. statements are taken from those involved and an official report is completed on the proper form (Pol. Form No. 281-284);
f. the vehicle(s) is examined for mechanical defects by professional motor vehicle examiner; and
g. prosecution proceedings are instituted, if evidence warrants it.

The individual reports are submitted, compiled and analysed at the traffic police headquarters. In this regard, reported data are coded using a separate traffic accident statistics incident report. The traffic accident statistics report consists of three parts that relate to the overall picture of any given accident. Forty major items or phases of the accident are coded and each accident may have a total of 532 alpha-numeric coded data. The data which are coded mainly relate to the details of the accident location and its environmental conditions, the time of the accident, the general particulars of the driver and the vehicle (violations, manoeuvres, driver condition, vehicle defects, etc.), and the personal particulars of the casualties (age, sex, severity and location of injury, physical condition, pedestrian actions). The information is then fed into the computer on two instalments every month each covering a compilation of the accidents on a two-week period. The statistical outputs are however officially published on a quarterly and annual basis. The quarterly or annual traffic accident report which is documented and disseminated by the Traffic Headquarters of the Hong Kong Police Force comprises the following set of accident statistics:-

a. number of traffic accidents (fatal, serious, slight) by political districts;
b. monthly variations in the number of traffic accidents;
c. number of casualties by age groups and severity;
d. number of casualties by road-user types and severity;
e. number of traffic accidents by locations (junctions and pedestrian crossings). A specific location is classified as a traffic accident blackspot if 6 or more injuries occur within an area of 100 square metres during each three-month period;
f. number of traffic accidents by vehicular involvement, by severity and by districts;
g. number of traffic accidents by hour of the day (24 hour system) and by district;
h. number of traffic accidents by day of the week and by district;
i. number of traffic accidents by accident causes; and
k. number of traffic accidents by subdivisions, by district and severity. This illustrates the accident picture in each of the 42

political subdivisions of the four districts (Kowloon, Hong Kong Island, New Territories and Marine) in Hong Kong.

The official reports are distributed by the traffic police headquarters to 33 units within the police force in the Crown Colony. Some of the external agencies where the reports are disseminated are the Ministries of Home Affairs and Environment, Public Works Directorate, Transport Advisory Committee, Census and Statistics Commission, Transport Commission, Standing Committees on Road Use and Road Safety, Highway and Traffic Engineering Offices, Road Safety Association and Hong Kong Automobile Association.

6.6.4.2 Thailand

The function of reporting traffic accidents occurring on public roads in Thailand is performed by three separate agencies of the government; the Department of Highways under the Ministry of Communications, the Highway Police, and the local Police Departments. The first two agencies have jurisdiction over accidents occuring on the 40,337 kilometre national and provincial road network. Functionally, however, these two agencies are fused as a single entity; the highway police being under the operational budget and technical supervision of the Highway Department. In fact the highway police central office is housed in the premises of the Highway Department to ensure close coordination between the two agencies. The Local Police departments have the power over traffic accidents taking place on local or town roads, not otherwise under the responsibility of the Highway Department. In the Bangkok-Thonburi

Metropolitan Area, however, the sole reporting agency is the police department. Thus there are three accident reporting systems in Thailand, one for each reporting agency. These three reporting schemes appear to be anomalous, accident data are collected on different accident report forms and there could be duplication of accident reports for traffic accidents occurring on the highway. These irregularities give doubts as to whether all reported accidents from these three agencies are taken collectively to illustrate the actual picture of the traffic accident situation in Thailand, or on whose data to rely for purposes of traffic accident research and analysis. The system employed by the Department of Highways appears to be the most active and functional system, and therefore, only the Highways Department traffic accident reporting system is discussed in detail.

In Thailand all three classes of accidents require reporting within 24 hours; fatal, physical injury and property damage accidents. A fatal accident is one where at least one person is killed on-the-spot. An injury accident is normally one which entails hospitalization or medical treatment of the injured for more than 14 days; this is classified as a serious physical injury accident. Slight physical injuries are not usually recorded. Property damage accidents, include those involving damage to vehicles and other property, and also damage to the property of the Highways department, e.g., guard rails, bridges, lamp posts, etc. On rare occassions, minor types of accidents can be settled amicably among the involved drivers or parties without the benefit of an official traffic accident report.

Traffic accident reports originate from field highway district personnel (who may be an engineer, inspector or technician) and/or a highway police officer. For fatal accidents, telegram reports are sent to the office of the Director-General for information in addition to the usual highway accident report. The standard highway accident report, as it is designed, deals more with accident data like location and time of accident, roadway and environmental conditions, type of vehicles, severity, nature and estimates of property damage, and the accident diagram and description. It may be noted that the information requested on the form relates mainly to highway engineering usage of accident data. Conversely, the highway police accident report form contains mostly detailed information concerning the action or investigation made by the police in deciding who is at fault, such as - observations at the scene, opinion on the cause of accident time police arrived, driver and vehicle details, statements of drivers and other involved persons, charge or offence, etc. Other than these requirements, the latter form has information relating to the location and time of the accident, general conditions of the area, type of accident, and an accident diagram and description. It was observed that two reports on a single accident occurrence are possible, each coming from both highway personnel and a highway police officer attending the scene of the accident. Highway accident standard reports are completed in four copies and are distributed as follows; Planning Division, Maintenance and Construction Division, Highway Division File copy and Highway district file copy.

Copies of the accident reports are compiled at the district levels on a monthly basis and are forwarded to the Planning Division for statistical analysis and evaluation. These functions are done by the Statistics Section, in conjunction with the Traffic Engineering Research Section of the Research and Materials Division. An official set of statistics on traffic accidents is published on an annual basis by the Planning Division of the Department of Highways. The details of the annual traffic accident report are the following:

a. number of traffic accidents, fatalities and injuries, and property damage cost estimates on national and provincial highways;
b. number of traffic accidents, fatalities and injuries on national and provincial highways by:
   - field division
   - month (October-September)
   - day of the week
   - hour of the day (24 hour system, by three-hour intervals)
   - type of vehicle involved
   - contributing circumstances
   - type of road
   - highway classification;
c. amount of property damage to highway department property and others by month;
d. number of fatal accidents and fatalities by field division;
e. fatality rate and fatal accident rate per 100 million vehicle-km of travel;
f. number of fatal accidents and fatalities by:
   - month
   - day of week

- hours of day
- contributing circumstances
- type of vehicle
- type of road;

g. number of accidents, fatalities and injuries, and property damage estimates attributable to the vehicle and equipment of the highway department; and

h. number of accident involvement of the highway department equipment by type.

A compilation of the above statistical summaries was obtainable for the period covering 1967-1976. These summaries are illustrated by bar charts and line charts to depict the trends and comparisons. Accident spot maps for the national divided highways, national and provincial highways are likewise prepared. The Department of Highways disseminates accident information to the various highway field division offices; research agencies like the National Research Council of Thailand; the police department; the land transport department; and the central statistics agency. Moreover, the Highway Department was currently engaged in localized accident studies on seven major and heavy volume routes, and in the study of the etiology and prevention of traffic accidents in Thailand, with other agencies of government. The Highway Department has also adopted a coding by road user movement of 85 types of accident based on the Victorian RUM code (Australia) [see 8.2] for use in these studies, and has proposed a single standard accident report form for the whole of Thailand.

6.7 Accident Reporting System in Victoria

The law requires the reporting to the nearest police station as soon as possible, of road accidents in which a person was injured or when the owner of property damaged was not present. All other accidents require drivers to exchange names and addresses. See Table 6.7.1 for the present requirements for reporting to the Police and to the insurer.

Table 6.7.1 Reporting of Accidents in Victoria.

(a) To Police

Motor Car Act 1958 S.S. 80(1)

Where owing to the presence of a motor car on any highway an accident occurs -

- whereby any person is injured, or
- whereby any property, including any vehicle, motorcycle, bicycle, horse, cattle or sheep is damaged or destroyed -

the person driving the motor car -

(a) shall immediately stop, and
(b) " " render assistance and
(c) shall at the scene of the accident give his name and address (and vehicle owner's) and number of motor car -

(i) to any person injured, or the owner of any property which has been damaged or
(ii) give details to a representative of above and

(d) shall at the scene give said names etc., to police present and
(e) (i) if person injured and police not present, report to the nearest police station or

(ii) if property damaged and if no owner, no representative or no police present, report to nearest police station.

(b) To Insurer (Third Party)

Motor Car Act 1958 S.S. 56.

(1) On the happening of any accident affecting a motor car and resulting in death or bodily injury to any person it shall be the duty of the owner as soon as practicable after such accident (......) to notify in writing the authorised insurer of the fact of such accident...

- - - - - - - - - - - -

In the above context "Motor Car" is a mechanically propelled vehicle (excluding train, tram). The Act does not require the reporting of accidents which do not involve a "motor car", as defined, and thus an injury accident involving a bicyclist and a pedestrian is not required to be reported. The modifier between the requirements to REPORT and the action of RECORDING is Police Standing Orders.

All accidents of all severities are initially recorded by the officer to whom the accident is reported on what is known as "Form 512, the accident report card" and also recorded in the station accident book. The form 512 is sent to the Traffic Branch in Dawson Street, Brunswick, where a reference number is assigned to the particular accident and the stub of the form returned to the officer (see Figure 6.7.1, for a sample of the form).

When the reference number (known as the "File Number") is received by the reporting officer it is used to identify the subsequent report form that he prepares.

The following guide (extracted from Police Standing Orders) should be used by the reporting officer -

(i) Form 512A - used to report any non-injury motor vehicle accident where no police action is contemplated. The officer should ascertain (a) was anybody injured? (b) was name and address given to other party? and (c) is driver alleging any breach of the regulations against the other driver? If the answer to (a) and (c) are NO and the answer to (b) is YES, the 512A is the correct form.

(ii) Form 513/513A - used to report all accidents, other than non-injury accidents where no police action is contemplated; occurring on "highways" involving "vehicles", the definitions of which are contained in the Road Traffic Regulations 1973.
The 513 shall also be used to report all accidents involving trains occurring on "railway crossings" or "footways" as defined in the Road Traffic Regulations 1973. The 513A form shall also be completed for all such accidents, and the 513A should be sent direct to the Road Safety and Traffic Authority on the same day that the File Number is received from the Traffic Branch.

(iii) Form 513B shall be used to report all other accidents (including boating accidents) for which 512A or 513 is not to be used.

Note. In this context "vehicle" means any conveyance designed to be propelled or drawn by any means, and includes an articulated vehicle, a bicycle and a tram-car and where the context permits, includes an animal driven or ridden but does not include a train.

A difference exists between this Traffic Regulations definition and the Motor Car Act definition. The Act does not require the reporting of, for example, bicycle accidents whereas it is the intention of this part of Police Standing Orders that injury accidents involving bicycles be reported. There are problems in practice and this is discussed again later.

Samples of form 512A, 513B and Form 513A are shown in Figures 6.7.2, 6.7.3. and 6.7.4. Form 513A was/is designed by and for the use of the Traffic Commission/RoSTA and has seen several versions and editions since 1958. These various versions, as many as could be found and copied, are in the Appendix. A brief summary of the changes to the questions and format of successive versions of the 513A forms has been prepared and this is to be found in Table 6.7.2 which follows.

Reprinted 1.10.73 Form No. 512

VICTORIA POLICE

ACCIDENT CARD

FOR TRAFFIC OFFICE USE ONLY — No.

Date Received

Stn. A.B. No.

Speed Limit

DATE OF ACCIDENT / / 19 TIME A.M. P.M.

EXACT LOCALITY OF ACCIDENT

MUNICIPALITY:

NATURE OF ACCIDENT

Names and Addresses of Drivers and Injured Persons Only—Not Witnesses (Block Letters)

NAME / ADDRESS	*DRIVER *KILLED *INJURED	*CAR *CYCLE	No.
NAME / ADDRESS	*DRIVER *KILLED *INJURED	*CAR *CYCLE	No.
NAME / ADDRESS	*DRIVER *KILLED *INJURED	*CAR *CYCLE	No.
NAME / ADDRESS	*DRIVER *KILLED *INJURED	*CAR *CYCLE	No.
NAME / ADDRESS	*DRIVER *KILLED *INJURED	*CAR *CYCLE	No.

DAMAGE TO VEHICLES OR PROPERTY *SLIGHT *EXTENSIVE | *Cross out whichever is NOT applicable

SIGNATURE RANK No.

( )

STATION DATE / /

NOTE.—Particulars re "TOWING SERVICE", MUST be completed on back

FOR TRAFFIC OFFICE USE ONLY

Fold Here—DO NOT DETACH

TRAFFIC DEPARTMENT

FILE No.

A

Note: To remain on Form 513 at all times.

TRAFFIC DEPARTMENT

FILE No.

B

Note: To be attached to Form 513A prior to despatch to R.S.T.A.

—/—/—

Ref.: Station Accident Book *No.

Officer in Charge,

______________Station

The File No. shown above has been allotted to the Form 512 in this matter, and should be quoted relevant to any future enquiry or on Form 512A, if subsequently submitted.

Please cross-reference to the Station Accident Book, and affix conjoined Part "A" to Report Form 513 and Part "B" to Statistics Sheet, Form 513A.

Officer In Charge

TRAFFIC DEPARTMENT

* To be inserted prior to despatch of Form 512 to Traffic Department.

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FOR TRAFFIC OFFICE USE ONLY

DATE	TO	

PARTICULARS OF TOWING SERVICE USED

Was towing service used? YES/NO

Vehicle Nos.	Towed by	Towed to (location)
(1)		
(2)		
(3)		

OWNER'S REQUEST (1)

or (2)

POLICE ALLOCATION (3)

Figure 6.7.1 512 Form

Figure 6.7.2 512A Form

a 6.60

FOR TRAFFIC OFFICE USE ONLY	Revised 30.8.77 **Form No. 512A** VICTORIA POLICE **ACCIDENT CARD** (NON-INJURY)	No.
	DATE RECEIVED	R.U.M. No.

DATE OF ACCIDENT / / TIME OF ACCIDENT HOURS

EXACT LOCALITY

MUNICIPALITY

NATURE OF ACCIDENT

TO BE SUBMITTED FOR NON-INJURY ACCIDENTS WHERE NO POLICE ACTION IS CONTEMPLATED

NAMES AND ADDRESSES OF DRIVERS ONLY—BLOCK LETTERS

NAME

ADDRESS

TYPE OF VEHICLE REG. No. EXPIRY DATE / /

LICENCE No. CURRENT TILL / /

NAME

ADDRESS

TYPE OF VEHICLE REG. No. EXPIRY DATE / /

LICENCE No. CURRENT TILL / /

NAME

ADDRESS

TYPE OF VEHICLE REG. No. EXPIRY DATE / /

LICENCE No. CURRENT TILL / /

I AM SATISFIED AS A RESULT OF MY ENQUIRIES THAT NO PERSON WAS INJURED NOR PROSECUTABLE OFFENCE COMMITTED

SIGNATURE RANK No.

STATION DATE / /

8735/77—Z.4 **PLEASE COMPLETE BACK OF THIS CARD**

STATION ACCIDENT BOOK No.....................

FORM 512 TO "T" DISTRICT ON........./........./.........

OFFICER IN CHARGE

No. ....DIVISION

....

FORM 512A HEREWITH

FOR INFORMATION AND TRANSMISSION TO "T" DISTRICT PLEASE

O/C STATION

RANK.....................No.....................

DATE........./........./ ....

OFFICER IN CHARGE

"T" DISTRICT

FORM 512A HEREWITH

FOR FILING, PLEASE.

INSPECTOR

No. ....DIVISION

DATE......... /........./..........

NOTE.—If more than three vehicles are involved please attach additional 512A.

Revised 1.3.70

Form No. 513B

FOR TRAFFIC OFFICE USE ONLY
File No.
Date Received

VICTORIA POLICE

ACCIDENT REPORT FORM

(FOR OTHER THAN VEHICULAR ACCIDENTS ON HIGHWAYS)

Date of Accident 22/2/79 Time 5.35 p.m. Day of Week Thursday

Nature of Accident Horse threw rider onto roadway.

Place of Accident In Lower Plenty Road, Lower Plenty, 50 metres east of Eugene Street.

PARTICULARS OF PERSONS INJURED or KILLED

Name	Address	Age	Sex	Nature of Injuries
Renata CROMARTY	263 Lower Plenty Road, Rosanna	16	F	Minor bruising

What became of injured persons? Conveyed to Austin Hospital by ambulance, not admitted.

If removed to hospital were they admitted and friends informed? Not admitted . Relatives informed

Personal Effects : If unconscious, how disposed of? Conscious at time.

PARTICULARS OF OTHER PERSONS DIRECTLY INVOLVED

Name	Address	Age	Sex	How Involved
Nil				

WITNESSES TO ACCIDENT

Name	Address	Viewed Accident From	Was written statement made?
NIL			

Weather conditions Road dry and weather fine. Traffic heavy.

Was accident witnessed by police No, We came upon accident, when returning from conveying a Missing Person home to ELTHAM

(If not, state source of information)

P.148—751/7C

(Over)

Figure 6.7.3 513B Form

Police action taken or proposed

DO NOT WRITE IN HERE

OPINION OF POLICE—Accidental or negligence

Accidental

Opinion must be expressed if possible

State if any of the Persons concerned Suffer any Physical Defects NIL

SOBRIETY OF PERSONS INVOLVED (Sober, smelt of liquor, under the influence of liquor or drugs) Sober

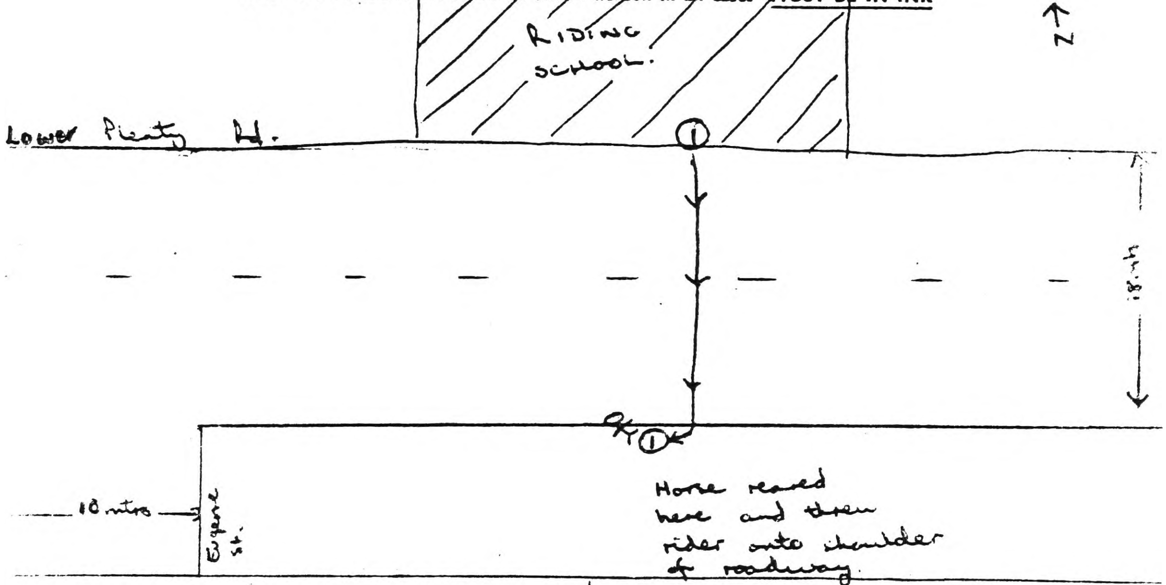
GENERAL DESCRIPTION OF ACCIDENT (EXCLUDING ANY VERBAL STATEMENT OR ADMISSION MADE BY PERSONS CONNECTED)

(These particulars must be furnished in all cases. Brief to be attached when any breach of law committed)

CROMARTY had addended the Lower Plenty Riding Club, wher she had one of the horses shoes repaired. The girl then rode her horse to Lower Plenty Road, where she stopped on the road shoulder. CROMARTY then apparently checked left and right, however there was nothing coming, so she rode the horse across the road. Just after she had crossed the road, a truck apparently drove past, and scared the horse, which reared and threw CROMARTY onto the road shoulder.

CROMARTY only received minor bruising in the fall.

SKETCH OF LOCALITY—To be shown hereon in all cases—MUST BE IN INK



Additional Particulars marked* entered by :—

Signature

Rank No.

Date

Form 512 to Traffic Control Branch :—

Member of Force Reporting Accident :—

Signature P.J. DINAN

Rank Constable No. 19930

Station Preston Uniform Date 22 . 2

STATEMENT
1 WRITTEN STATEMENT MADE
2 " " NOT MADE

VEHICLE (VEH)
INSERT A,B,C,ETC., OR P (FOR PEDESTRIAN)

POSITION (POS)

LF	CF	D
LR	CR	RR
OR		

BLANK – PEDESTRIAN
PL – PILLION PASSENGER
OR – OTHER REAR PASSENGER – INCLUDES: LUGGAGE AREA OF STATION WAGON, REAR OF GOODS CARRYING VEHICLE, BUS, TRAM, ETC
NK – NOT KNOWN

* INSERT APPLICABLE CODE

SEATBELT
1 NOT FITTED
2 CHILD RESTRAINT FITTED
3 ADULT " "
8 NOT APPLICABLE FOR VEHICLE TYPE (e.g. MOTORCYCLE, TRAM, ETC.)
9 NOT KNOWN IF RESTRAINT FITTED (LEAVE BLANK FOR PEDESTRIANS)

INJURY
1 KILLED OR DIED WITHIN 30 DAYS
2 INJURED ADMITTED TO HOSPITAL
3 OTHER INJURED REQUIRING MEDICAL TREATMENT
4 OTHER INJURED NOT REQUIRING MEDICAL TREATMENT
5 NOT INJURED

TYPE OF ACCIDENT – (INITIAL EVENT)
1 VEHICLE TO VEHICLE COLLISION
SINGLE VEHICLE ACCIDENT –
a. ON CARRIAGEWAY:
2 STRUCK PEDESTRIAN
3 " ANIMAL (NOT RIDDEN)* *
4 " OBJECT* *
5 OVERTURNED
6 FALL FROM MOVING VEHICLE
b. RAN OFF CARRIAGEWAY AND:
7 STRUCK PEDESTRIAN (ON FOOTPATH, ETC.)
8 " VEHICLE
9 " ANIMAL (NOT RIDDEN)* *
10 " FIXED OBJECT* *
11 NO OBJECT STRUCK
12 OTHER ACCIDENT

* *GIVE DETAILS OF OBJECT OR ANIMAL STRUCK:

INJURED TAKEN TO: (SHOW DESTINATION(S). WHEN THIS IS A HOSPITAL, SPECIFY IF ADMITTED)

WERE FRIENDS/RELATIVES INFORMED?

PERSONAL EFFECTS: (HOW WERE THESE DISPOSED OF WHEN PERSONS WERE UNCONCIOUS?)

TRAFFIC CONTROL (SELECT ONE OR MORE)
1 INTERSECTION SIGNALS OPERATING STOP-GO
2 " " " FLASHING
3 " " MALFUNCTIONING
4 PUSH-BUTTON PED SIG'S NOT CONTROLLING INTERSECTION
5 PEDESTRIAN CROSSING
6 RAIL X-ING – GATES OR BOOMS
7 " " – FL. LIGHTS/BELLS ONLY
8 " " – NO AUTOMATIC SIGNALS
9 POLICE
10 STOP SIGN
11 GIVE-WAY SIGN
12 GIVE WAY TO RIGHT SIGN
13 SCHOOL CROSSING WITH FLAGS
14 " " WITHOUT FLAGS
15 NO CONTROL
ALSO CROSS IF CONTROL WAS OUT OF ORDER OR DAMAGED PRIOR TO ACCIDENT

ROAD CHARACTER
1 CROSS INTERSECTION
2 'T' " "
3 'Y' " "
4 MULTIPLE INTERSECTION
5 NOT AT INTERSECTION

(SELECT ONE OR MORE)
1 STRAIGHT
2 CURVE
3 DIVIDED ROAD
4 MEDIAN OPENING (NOT AT INTERSECTION)
5 BRIDGE, CULVERT OR CAUSEWAY
6 ROUNDABOUT
7 ROAD CLOSURE
8 ROADWORKS
9 RAILWAY LEVEL CROSSING

ROAD SURFACE CONDITION
1 DRY
2 WET
3 MUDDY
4 SNOWY OR ICY

1 PAVED
2 UNPAVED OR GRAVEL

ATMOSPHERIC CONDITION
(SELECT ONE OR MORE)
1 CLEAR
2 RAINING OR SNOWING
3 FOG
4 SMOKE OR DUST IN THE AIR
5 STRONG WIND

LIGHT CONDITION
1 DAYLIGHT
2 DUSK OR DAWN
3 DARK – STREET LIGHTS ON
4 " – STREET LIGHTS OFF
5 " – NO STREET LIGHTS
6 " – STREET LIGHT DETAILS NOT KNOWN

VEHICLE TYPE (VEH A, VEH B, VEH C)
1 CAR OR STATION WAGON
2 TAXI OR HIRE CAR
3 UTILITY OR PANEL VAN
4 ARTICULATED VEHICLE (SEMI)
5 TRUCK (EXCLUDING SEMI)
6 BUS
7 MOTOR CYCLE OR MOTOR SCOOTER
8 BICYCLE
9 HORSE-DRAWN/RIDDEN HORSE
10 TRAM
11 RAILWAY TRAIN, TROLLEY, ETC.
12 EMERGENCY VEHICLE* *
13 OTHER VEHICLE* *
99 NOT KNOWN
* *SPECIFY TYPE:

VEHICLE MOVEMENTS (VEH A, VEH B)
1 OVERTAKING
2 GOING STRAIGHT AHEAD
3 TURNING RIGHT AT INTERSECTION OR INTO DRIVEWAY
4 TURNING LEFT AT INTERSECTION OR INTO DRIVEWAY
5 'U' TURNING
6 LEAVING PRIVATE DRIVEWAY
7 PARKING OR UNPARKING
8 REVERSING ON CARRIAGEWAY
9 PARKED – STANDING ALLOWED
10 PARKED – STANDING PROHIBITED
11 STATIONARY AFTER BEING IN AN ACCIDENT OR BROKEN DOWN
12 OTHER STATIONARY ON CARRIAGEWAY
99 NOT KNOWN

(IF APPLICABLE) (VEH A, VEH B)
1 SKIDDING ON CARRIAGEWAY
2 SKIDDING ON GRAVEL SHOULDER
3 SWERVING TO AVOID PEDESTRIAN, ANIMAL, ETC.
4 DRIVERLESS MOVING VEHICLE

CONTINUE REPORT ON 513A-2

10546/77-2,8

Figure 6·7·4 513 A Form (1977)

RoSTA USE ONLY

SEVERITY | L.G.A.

LOCATION CODE

RUM | OBJECT HIT

VICTORIA POLICE — FORM 513A-1

TRAFFIC ACCIDENT REPORT

DUPLICATE (4.10.77)

THIS FORM MUST ACCOMPANY FORM 513A-2

FORWARD TO: ROAD SAFETY AND TRAFFIC AUTHORITY 801 GLENFERRIE RD., HAWTHORN, 3122

VEHICLES "A" AND "B" MUST BE THE VEHICLES INVOLVED IN THE FIRST IMPACT

TRAFFIC DEPT. FILE NO.

STATION A/B NO

COPY TO RoSTA ON / /19

TOTAL NO. OF VEHICLES INVOLVED | TOTAL NO. OF PERSONS INVOLVED

LOCATION

MUNICIPALITY | DATE OF ACCIDENT / /19 | TIME OF ACCIDENT (24HR) | DAY OF WEEK | ZONE SPEED LIMIT (KM/H)

OCCURRED ON: NAME OF STREET, ROAD OR HIGHWAY | DISTANCE FROM INTERSECTION N/S/E/W OF | NAME OF NEAREST INTERSECTING STREET, ROAD OR HIGHWAY

ALSO FOR COUNTRY: DISTANCE FROM NEAREST LANDMARK N/S/E/W OF | IN/BETWEEN TOWN(S) OF

VEHICLE A

DRIVERS NAME | ADDRESS

DATE OF BIRTH / / | LICENCE NO. | STATE | DATE OF EXPIRY / /19 | LICENCE TYPE: 1 LEARNER 2 PROBATIONARY 3 CONDITIONAL 4 PROB.&COND. 5 STANDARD 6 DISQUALIFIED 7 UNLICENCED 9 NOT KNOWN | SEATBELT * | SEX | INJURY *

MAKE OF VEHICLE | YEAR | REGISTRATION NO. | STATE | DATE OF EXPIRY / /19 | VEHICLE CAUGHT FIRE: 1 YES 2 NO 9 NOT KNOWN | TOWED AWAY: 1 YES 2 NO 9 NOT KNOWN

OWNERS NAME (IF SAME AS DRIVER WRITE 'AS ABOVE') | ADDRESS (IF SAME AS DRIVER WRITE 'AS ABOVE') | DAMAGE

VEHICLE B

DRIVERS NAME | ADDRESS

DATE OF BIRTH / / | LICENCE NO. | STATE | DATE OF EXPIRY / /19 | LICENCE TYPE: 1 LEARNER 2 PROBATIONARY 3 CONDITIONAL 4 PROB.&COND. 5 STANDARD 6 DISQUALIFIED 7 UNLICENCED 9 NOT KNOWN | SEATBELT * | SEX | INJURY *

MAKE OF VEHICLE | YEAR | REGISTRATION NO. | STATE | DATE OF EXPIRY / /19 | VEHICLE CAUGHT FIRE: 1 YES 2 NO 9 NOT KNOWN | TOWED AWAY: 1 YES 2 NO 9 NOT KNOWN

OWNERS NAME (IF SAME AS DRIVER WRITE 'AS ABOVE') | ADDRESS (IF SAME AS DRIVER WRITE 'AS ABOVE') | DAMAGE

VEHICLE C

DRIVERS NAME | ADDRESS

DATE OF BIRTH / / | LICENCE NO. | STATE | DATE OF EXPIRY / /19 | LICENCE TYPE: 1 LEARNER 2 PROBATIONARY 3 CONDITIONAL 4 PROB.&COND. 5 STANDARD 6 DISQUALIFIED 7 UNLICENCED 9 NOT KNOWN | SEATBELT * | SEX | INJURY *

MAKE OF VEHICLE | YEAR | REGISTRATION NO. | STATE | DATE OF EXPIRY / /19 | VEHICLE CAUGHT FIRE: 1 YES 2 NO 9 NOT KNOWN | TOWED AWAY: 1 YES 2 NO 9 NOT KNOWN

OWNERS NAME (IF SAME AS DRIVER WRITE 'AS ABOVE') | ADDRESS (IF SAME AS DRIVER WRITE 'AS ABOVE') | DAMAGE

OTHER PERSONS INVOLVED (DO NOT INCLUDE DRIVERS/RIDERS)

NAME	ADDRESS	STATE-MENT *	VEH *	POS *	SEAT-BELT *	AGE (YRS)	SEX (M F)	INJURY *

TRAFFIC DEPT. FILE NO.

WERE PRESCRIBED LAMPS ALIGHT?
1 NOT APPLICABLE
2 NO
3 YES
9 NOT KNOWN
VEH A VEH B

VICTORIA POLICE
DUPLICATE

TRAFFIC ACCIDENT REPORT

THIS FORM MUST ACCOMPANY FORM 513A – 1

FORM 513A–2 (4.10.77)

STATION A.B No.

MUNICIPALITY

DATE OF ACCIDENT / /19

TIME OF ACCIDENT (24HR)

WAS VEHICLE ENGAGED IN TOWING? (DO NOT INCLUDE SEMI)
1 NOT TOWING
2 TOWING – CARAVAN
3 " – TRAILER
4 " – OTHER, SPECIFY:
9 NOT KNOWN IF TOWING
VEH A VEH B

POLICE ESTIMATE OF SPEED
VEH A KM/H
VEH B KM/H

PEDESTRIAN SECTION– THIS SECTION RELATES TO THE FIRST PEDESTRIAN HIT

I PEDESTRIAN MOVEMENTS
1 CROSSING CARRIAGEWAY
2 WORKING, PLAYING, LYING OR STANDING ON CARRIAGEWAY
3 WALKING ON CARRIAGEWAY – WITH TRAFFIC
4 WALKING ON CARRIAGEWAY – AGAINST TRAFFIC
5 PUSHING OR WORKING ON VEHICLE
6 WALKING TO, FROM OR BOARDING TRAM
7 WALKING TO, FROM OR BOARDING OTHER VEHICLE – SPECIFY
8 NOT ON CARRIAGEWAY (EG. ON FOOTPATH)
9 NOT KNOWN

II DID PED. COMPLY WITH CONTROL? (IF APPLICABLE)
1 NO
2 YES
9 NOT KNOWN

III TYPE OF CROSSING SUPERVISOR (IF APPLICABLE)
1 SUPERVISOR (WHITE UNIFORM)
2 BY-LAWS OFFICER
3 POLICE
4 OTHER –SPECIFY:

IV DID PED. EMERGE FROM BEHIND A STATIONARY VEHICLE?
1 NO
2 YES
9 NOT KNOWN

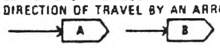
V OPINION OF SOBRIETY
1 HAD NOT BEEN DRINKING
HAD BEEN DRINKING
2 OBVIOUSLY AFFECTED
3 NOT OBVIOUSLY AFFECTED
9 NOT KNOWN WHETHER DRINKING

SKETCH OF LOCALITY

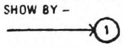
SHOW NORTH WITH AN ARROW:

INSTRUCTIONS

1 LETTER EACH VEHICLE AND SHOW DIRECTION OF TRAVEL BY AN ARROW –

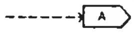


2 NUMBER EACH PEDESTRIAN AND SHOW BY –



3 USE SOLID LINE TO SHOW PATH OF VEHICLE BEFORE ACCIDENT –

AND DOTTED LINE AFTER ACCIDENT –



4 SHOW RAILWAY BY –

NOTE: – SHOW DISTANCE AND DIRECTION TO ANY LANDMARKS, IDENTIFYING THEM BY NAME
– INDICATE WIDTH OF ROAD AND ANY SKIDMARKS ON THE DIAGRAM
– SHOW ALL TRAFFIC CONTROL DEVICES

DESCRIPTION (DESCRIBE ACCIDENT BRIEFLY)

(REFER TO VEHICLES AND PEDESTRAINS BY THE SAME LETTERS AND NUMBERS AS ON THE SKETCH)
EXCLUDE ANY VERBAL STATEMENT OR ADMISSION

SECTION 80 MCA COMPLIED WITH 1 YES 2 NO
VEH A VEH B VEH C

REPORTED BY: SIGNATURE | NAME (BLOCK LETTERS) | DATE

DISTRICT | STATION | RANK | NUMBER

1 ACCIDENT WAS WITNESSED BY POLICE
2 POLICE ATTENDED SCENE OF ACCIDENT
3 POLICE DID NOT ATTEND SCENE

1110/77–Z.0

Table 6.7.2 Victorian Accident Reporting - Changes in 513A Forms (see the Appendix for copies of these forms)

1958	No record of form used. It is believed that all forms were destroyed.
1959	Samples exist, not a "self-coding" form, layout is different to later forms. Rather basic, depersonalised. Minute sketch space on back.
1960	The ancestor of the 1960-76 forms, the first self-coding form. Bears the "Confidential and Privileged Document" label, although there are no identifiers asked. Many differences in questions to 1959 form. Sketch space enlarged and in front.
1961	Sketch space moves to rear . Characteristic of locality; changed to "built-up or open", from "Manufacturing, Shopping, Residential, etc." . 'Road grade', added . 'Road mark etc.,' dropped . 'Road surface', dropped . 'Dividing plantation', added . 'Object struck', added . 'Vehicle towed away', added . 'Colour of vehs.,' changed . 'Was trailer or caravan attached', dropped . 'Did driver/ped. speak reasonable English', dropped.
1963	. 'Seat belt fitting and wearing', added . 'Colour', dropped . 'Veh. condition (defects)', dropped

Table 6.7.2 (Continued)

1965	.	Order of questions changed
	.	'Obstructions to visibility at site', added
	.	Single veh. accident types extended
	.	'Object struck' , dropped
	.	'Was veh. towed away' , dropped
	.	'Error apparently committed by driver', reduced
	.	'Road condition', number of questions less
	.	'Dividing plantation?' , dropped
	.	'DRIVER LICENCE NUMBER', added
	.	'were proper veh. lamps alight', added
	.	'driver ejected?', added to seat belt question and fitting not asked
	.	Physical condition of pedestrian', dropped
	.	'Was casualty wearing crash helmet?', dropped
1967	.	'Driver age' becomes actual age, not grouped ages
	.	'Driver ejected?', dropped
1969	.	Check boxes moved to left side
	.	Location details expanded to ensure nearest intersection given for country accidents
	.	24 hour time, added
	.	Order of questions changed
	.	'Obstructions to visibility?', reduced
	.	'Characteristics of locality', (derived from LGA and location detail, instead) , dropped
	.	'Total No. of vehs?', , added
	.	Driver licence details expanded to probationary
	.	'Condition of windscreen', , dropped
	.	'Was any veh towed away' , dropped
	.	'Details of veh. occupancy' , added
	.	'ADMITTED to HOSPITAL', degree of injury, added
	.	'Pedestrian sex, age' , added
	.	Narrative space increased
	.	'Driver Errors' , dropped
	.	'Cause of accident/party responsible' , dropped

Table 6.7.2 (Continued)

1974
- 'Location code' space, added
- 'RUM code' space, added
- 'Object Hit code', space added
- 'Obstructions to visibility at site', dropped
- 'Hit/Run?', added
- Seat belt details expanded for all seats, and child restraints recorded
- 'Driving experience' changed to 'time since obtaining first licence'
- 'Physical condition of driver', dropped
- Layout of pedestrian details changed
- Casualty/occupancy table rearranged and Age in actual years, not grouped ages.

1977
- Introduction of self-carboning A4 size form
- 513 and 513A identical except for breath/blood tests
- 'Names and address of drivers and others' , added
- 'Name/address of veh. owner' , added
- Licence detail expanded
- Date of birth replaces Age for drivers
- Type of accident altered
  Vehicle to vehicle accident types reduced from five types to one
- 'Traffic control', modified
- 'Road character', expanded
- 'Road condition paved/unpaved' , added
- 'Child restraint make/model' , dropped
- 'Seat belt wearing' , dropped
- 'Veh. towed away' , added
- 'Vehicle caught fire ' , added
- 'Damage' , added
- 'Vehicle defects' , dropped
- 'Police attendance' , added

- - - - - - - - - - -

The Form 512A was introduced into the reporting system on 14 July 1970 primarily to reduce the time spent by police officers in submitting accident reports. It was done without discussion with the Traffic Commission, which was a pity since with a few changes it could have been useful. The sample of accidents that the Traffic Commission was receiving per the 513A form was cut by about 7,000 (per annum). In view of the subsequent introduction of the seat belt wearing law in December 1970, the loss of this much data did not help in researching the effects of the law.

A comparison of Police Standing Orders, the various report forms and the practice of the police officers was made by R.A. Daltrey (Accident Investigations Officer, RoSTA) in 1979. A modified version of the result is reproduced in Table 6.7.3 to demonstrate how there are gaps and confusion in the present system which result in a number of accidents not getting into the Accident Record System (run by RoSTA) and subsequently not getting into the state and national statistics (released by ABS) the problem is apparently related to non-motor vehicles on highways and vehicle accidents on off-highway areas.

The problem with non-motor vehicle casualty accidents on highways not being reported on 513 forms is that accidents involving ridden horses or bicyclists either alone or with pedestrians or other non-motor vehicles are not entering the data system. (This lack of reporting is despite the requirement of Police Standing Orders.) Thus accidents between bicyclists and pedestrians crossing the roadway or on footpaths are being ommitted, fairly vital information if one is considering allowing cyclists to ride on footpaths (or the effects of), or considering the inclusion of cyclist hit pedestrian in the no fault accident compensation scheme administered by the Motor Accident Board, or one just wants to know the accident experience of bicyclists.

Definitions are discussed elsewhere but it is important to reiterate the difference between the definition of "injury" for reporting accidents and the definition used to classify accidents within the record system. The present classifications of severity on the report form are:

(1) death, within 30 days of the accident
(2) injured, admitted to hospital
(3) injured, requiring medical treatment
(4) injured, not requiring medical treatment
(5) non-injury.

TABLE 6.7.3 Subsequent Forms to be Used

Severity		Location and Vehicle Involvement	Subsequent Form Required by Standing Orders	Comments
Casualty		Hwy, motor-vehicles	513	
	*	Hwy, non-motor vehicles	513	Officers sometimes refuse to submit 513 - confused sometimes submit 513B
		Hwy, no vehicles	513B	
		non Hwy, vehicles	513B	Often 513 submitted
		non Hwy, no vehicles	513B	non vehicle acc. (includes boating), accidents
Non Injury		Hwy, motor vehicle	512A	
	*	Hwy, non-motor vehicle	None (but see heading on 513B	512A is specified in Standing Orders to cover motor vehicles
		Hwy, no vehicles	513B	
		non Hwy, vehicles	513B	
		non Hwy, no vehicles	513B	non vehicle acc. (includes boating accidents)

NOTE : "Highway" and "Vehicle" as defined by Road Traffic Regulations, 1973.

These forms are required (subsequent to form 512) for every accident coming to the knowledge of Police, including those on private property, buildings being erected, etc.

For reporting, level 1 to 4 are classed as injury but for the present system of records level 1 to 3 are classed as injury accidents to correspond with those used/desired by the ABS (Australian Bureau of Statistics). Level 1 is in common usage throughout Australia as the definition of a road death with no further qualification. It should be noted that in recent years a practice of derating fatal accidents to injury or even non-injury accident has crept in for instances where the coroner indicates death due to heart attack or other "natural causes". The Writer doubts that the post-mortem can reveal that the heart attack took place immediately prior to the acident and thus precipitated it or occurred during or immediately after the impact as part of the associated trauma. The adult Australian population was until recently stated as being vulnerable to heart attacks. It should also be pointed out that post-mortems are comparatively recent for road deaths and this derating of fatals provides a discontinuity with earlier records. The so-called "natural causes" group need further examination, the only example the Writer was given on inquiry was as follows - an elderly pedestrian was struck by a car and taken to hospital with serious but recoverable injuries, whilst in hospital the pedestrian contracted pneumonia and died due in part, no doubt, to a weakened condition after being injured. The simple relationship as seen by the writer is that the pedestrian would not have been in hospital without having been hit by the car and died as a result of insufficient treatment in the hospital.

A sample of the breakdown of traffic fatals is given for 1978 in Table 6.7.4 below, showing that about 4% of the deaths were subtracted.

Table 6.7.4 Victorian Fatals 1978.

Total reported		911
deaths classified as - heart attacks	10	
- natural causes	20	
- unknown	4	
- offroad and railway	8	
Hence "Official" figures		869

- - - - - - - - - - -

The post-crash situation should be included in any evaluation of the total accident system. The components of the system are typically described by the Table below.

Factors \ Phases	Precrash	Crash	Postcrash
Human	X	X	X
Vehicle	X	X	X
Environment	X	X	X

Of course there is a valid argument that the injury received by the pedestrian was not a death producing injury and that that point is more important. On the other hand there is the pedestrian death where the pedestrian is hit by a car and given a non-fatal injury but is run over by a second car while lying on the road after the first impact. The post-mortem says a death producing injury received and the record system does not distinguish the second impact as the cause of death, because of limitations in the recording system and because of the principle of using the "initial impact" as the classifier of accident type. A different example is the case where two vehicles collide, the damage and injury are slight but because of the angle of impact the course of one vehicle is deflected and it leaves the road and goes over a cliff. All occupants of that vehicle are killed in the fall from the cliff top. The accident is recorded as a fatal accident despite the fact that the initial impact itself was not sufficient to cause death-producing injuries.

Thus two different principles are being used, one to "lose" some deaths where there are no death producing injuries, the other to add deaths where the initial impact (used for classifying) was not the death-injury producing event. Both principles would appear to waste usable information and the solution might be to expand the descriptors used in the record system and "flag" or subclassify deaths according to whether they were due to injuries received, heart attacks, or natural causes and to record the event which resulted in the greatest damage and/or injury to the vehicle and roadusers. The latter exercise would be more difficult to carry out (except where there are no subsequent impacts) with any precision for mass data recording. In-depth studies of such multiple impact accidents with specially trained professionals should produce more useful data. It may well be sufficient for mass data purposes to indicate that subsequent impacts or events happened and the nature of any subsequent objects (including vehicles) struck.

As suggested by Guisti (1964) [see 5.1], deaths should be divided into those who die immediately and those who die later on, since the post crash mortality rate may depend on the speed and efficiency of the ambulance service, the hospital care, location of the accident in relation to a hospital, etc. No assessment can be taken of the post crash phase until such basic data as "cause" of death (as above) and the number of days after the accident that the death occurred (even beyond 30 days) are available to be incorporated into the accident data system. A study of 321 fatal accidents in Victoria in 1979 (representing five months) showed that 98.75% of the persons died within 30 days. [90.6% died on the day of the accident, a further 5.7% died with another six days after the day of the accident]. The effort to record the extra data would be small. The definitions for classifying the accident can be used as "filters" for any data supplied for "statistical" purposes but more complete information would at least be available to the researcher with which to make more intelligent use.

The present arrangement of accident data collection in Victoria owes much to the Traffic Commission, which was established in July 1956. As Thorpe (1959) explains, the Commission, when drawing up a new set of traffic regulations for Victoria, was hampered by a lack of factual knowledge of the effect certain regulations would have on the accident rate. The information required was not obtainable from existing Australian traffic accident records. The records collected insufficient facts and relied too much on opinion, they tended to be subjective rather than objective.

Thorpe went on to say "it is difficult to draw valid conclusions from good accident records - it is impossible with inaccurate records".

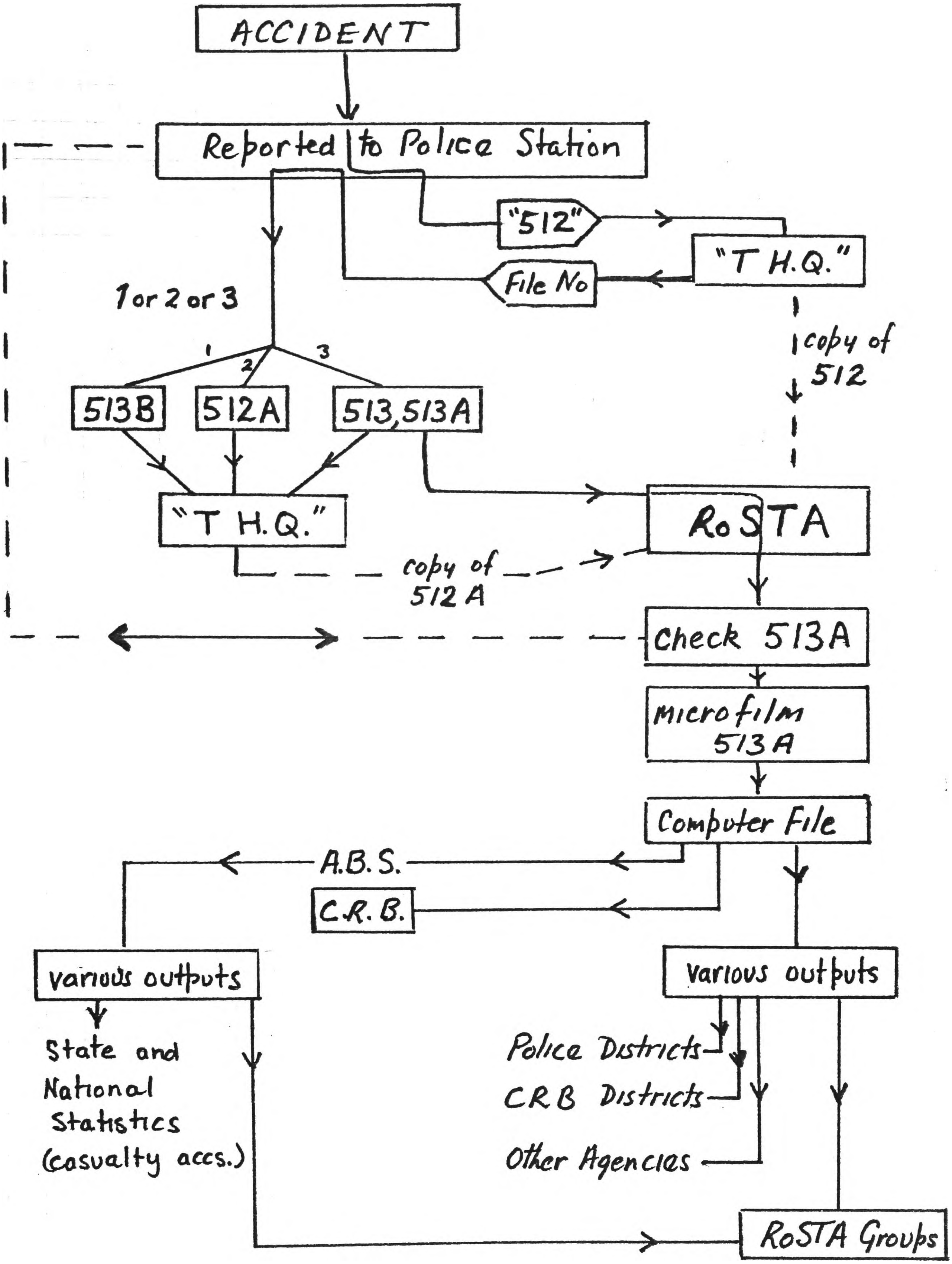
Because of the deficiencies in the then existing traffic records the Commission recommended to the Victorian Government that "the system of reporting and recording be altered to record adequate standard information about each accident in a form which would be suitable for recording and analysis on punch cards". The recommendation was approved by the Government and the new system was in the process of being put into operation in September 1959.

Early in 1959 the Australian Road Traffic Code Committee had discussed the matter of accident data collection throughout Australia, and had come to the conclusion that the overall system was inadequate and recommended that all States should adopt a system similar to that developed in Victoria.

It is not known to the Writer if the recommendation was adopted and acted upon by all other States but it appears retrospectively because of the amount of discussion in later years that it was not acted upon. (See Chapter 11.)

Thorpe also stressed the point in relation to the interpretation of accident information "that analysis of accident records requires the attention of experienced trained men and before valid conclusions can be drawn supplemental studies will often be necessary". Thorpe concludes his paper saying that to make progress in accident reduction it is necessary to have good accident records and a competent <u>team</u> to assess the information obtained from these records. This team must also carry out studies to obtain the true meaning of facts obtained from accident records, it must measure the results of accident prevention methods and make recommendations to have its findings implemented.

Other aspects of the accident record system in Victoria, apart from the mechanism of reporting are discussed in Chapter 8, the intention of this section has been to present the requirements for reporting, the process of recording, the changes in the data items over the years, and some of the apparent flaws. A summary of the recording process is shown in Figure 6.7.5.



ABS = Aust. Bureau of Stats
CRB = Country Roads Board

Figure 6.7.5 Recording process of accidents reported to the Police

6.8 Summary

This chapter has dealt with the requirements for reporting accidents to the police and the other sources of data. It discussed the questions of quality of data, quantity of data and the cost of collection, the accuracy of responses to certain data items and the need to look at accidents of all severity classes on the basis that the costs to the community of the three severity classes (fatal, injury, and non-injury) are approximately equal. A list of data items to be collected is proposed based on the use to which the information will be put. A priority of collection is suggested within the data items.

The results are given of a survey of the accident reporting systems and the report forms of selected Asian countries. And for two of these countries details are given of these specific systems.

To conclude the chapter the details of accident reporting and recording in Victoria are discussed, together with the evolution and changes in the 513A report form since its inception in 1958. The incomplete reporting of all casualty accidents involving all classes of road user is highlighted together with the need to record more detail on the post-crash treatment of injured road users.

7. DATA SYSTEMS

7.1 Introduction

In Chapter 6 (see 6.4.4) the basic data requirements were discussed and mention made of supplementary and complementary data sources that can be used with the accident data beyond the reporting stage so as to avoid the need to collect certain data items, some of which may not be too precisely collected anyway.

This chapter will discuss such sources and systems and their possible uses in administration and in safety.

7.2 Blueprints and Systems

The value of integrating and utilising several data sources no doubt became apparent some time ago but day-to-day usage in the transport area had to await the arrival of the lower priced computer in many cases, so without assigning credit to anyone the references will be dealt with in chronological order.

1. The National Highway Safety Bureau (US DOT, 1969) as part of the Highway Safety Program Manual issued "vol. 10, Traffic Records" in January 1969 with the stated purpose of assuring "that appropriate data on traffic accidents, drivers, motor vehicles, and roadways are available for planning and implementing at state and local levels safety improvements in the motor vehicle transportation system....". Four classes of data were seen as being amenable to routine collection at state or local levels, these were:-

(a) data pertaining to drivers, their licensing, violation records, and financial responsibility,

(b) vehicle data such as make, model and serial number,

(c) highway data on a milepost basis on bridges, structures, tangents, curves, intersections, and traffic control devices,

d) collision data linked to the involved drivers, vehicles, and highway locations.

A traffic records system was also seen as aiding the reduction of on-scene data collection through the increased use of off-scene data sources such as driver licencing and motor vehicle registration files. The report lists data items which are potentially available on-scene and off-scene, sub-divided into pre-crash, crash, and post-crash phases.

The contributors and users of a traffic records system include many different groups and the following is a partial list of areas of interest to groups who provide and use traffic records data:-

1. Law enforcement
2. Driver and vehicle licencing
3. Highway engineering
4. Traffic engineering
5. Vehicle engineering and manufacturing
6. Driver education
7. Motor vehicle inspection
8. Public health
9. Commercial fleet operations
10. Legislation
11. Insurance
12. Legal/judicial/court

The traffic records system (US DOT 1969) could be best described as a broad blueprint.

2. Norman and Bydler (1969) described information for the transportation planner that was available from the nation-wide information systems that were being assembled by the government administration in Sweden. The data banks considered to be of interest were:- 1) The Person Data Bank (population census), 2) The Real Estate Data Bank (all buildings have position co-ordinates), 3) The Car Data Bank (type, age, owner etc., of all cars), 4) The Company Data Bank (includes a register of employees), 5) The Road Data Bank (a description of roads and traffic, all intersections have position co-ordinates and separate files exist for road geometry, accidents, traffic flow etc.). Such a data system allowed an automatic examination of things such as "journey to work" trips based on the Real Estate, Company, and Person data banks linking the home and place of work for individuals in a region. Computer plotted maps and diagrams are also possible since there is a base of co-ordinates for all the nodes.

3. Rowe (1970) in the light of the U.S. "Traffic Records" standard, introduced in 1969, described the accident record system in Los Angeles and the implementation of an integrated EDP system. The system was to link accident data with files on traffic flows, highway characteristics, and traffic control devices and markings. The further integration with driver and vehicle files was not mentioned but perhaps has taken place since. In the process of converting from the basic EDP system to the integrated EDP, X-Y co-ordinates were introduced for all intersections to allow easier "route searches". An X-Y digitiser was used to produce

the actual co-ordinates. The position of the stylus on scale maps was converted to co-ordinates and recorded on magnetic tape.

4. Jordan and Wilson (1971) from the National Highway Traffic Safety Administration elaborated in their paper the data elements that should be collected to form the basis of the "Traffic Records" (US DOT 1969). There were four basic sources - driver data, vehicle data, highway data, and accident data. Their tables are reproduced below:-

Table 7.1 Data Elements for Traffic Records (source Jordan & Wilson, 1971).

I: Minimum driver data elements

1. Identification

Name - last, first and middle
Address - house number, street, city, state, post code
Identification number
Data and place of birth
Sex
Height

2. History

Driver education
- program type
- performance
- year of completion

Licencing
- date of examination
- results
- restrictions

Medical
- physical deficiencies
- mental or nervous impediments

Driving performance
- accident involvement
- traffic violation

- department actions
- driving exposure

II. Minimum motor vehicle data elements

1. Identification of vehicle

model year
Type (car, truck, motorcycle, etc.)
Model
- make
- car line
- series
- body type or style

Vehicle Identification Number (VIN)
Measurements
- empty weight (cars)
- engine cc's
- length, axles, empty weight (commercial vehicles)
- gross laden weight (commercial vehicles)

2. Ownership of vehicle

Owner identification (compatible with driver I.D.)
Address - house number, street, city, state zip code
Current registration plate number
Previous ownership

3. History of vehicle

Accident
- date of event
- severity

Inspection
- date
- defects by category
- mileage or odometer reading

Stolen or abandoned
- date of event
- disposition

Safety defect recall
- nature of defect
- date of repair

III: Minimum Highway data elements

1. Identification of Highway

System name
Road/Street name
Location descriptor

2. Physical features inventory

Traffic control devices
Design characteristics
Traffic characteristics

3. History of location

Traffic violation convictions
Accidents
Road defects
Maintenance and repairs

IV: Minimum accident data elements

1. Identification

Accident Identification number
Driver identification
Vehicle identification
Road location descriptor
Time of accident (month, week, day, time)

2. Driver(s) /Pedestrian(s)

Condition(s)
Alcohol and drug involvement
Traffic law violation
Intention

3. Vehicle(s)

Defects
Speed
Manoeuvre
Point of impact
Damage severity
Object struck
Mileage or odometer reading

4. Accident severity

Property damage
Injury
Fatal

5. Victims

Injury type
Age
Sex
Seating position/pedestrian
Use of restraints
Cause of death
Blood alcohol concentration
Ejection
Date of death
Extrication time
Object struck in vehicle

6. Environmental conditions

Light
Weather
Condition of road surface
Maximum safe speed
Road defects
Physical features

7. Emergency response

Time police notified
Time police arrived
Time EMS notified
Time EMS arrived

The authors said that in successful business corporations, extreme care is maintained in establishing accounting systems to meet the needs of those responsible for allocating funds and committing programs. Effective book-keeping systems are mandatory. Traffic records are the "books" in traffic safety.

5. Johnson (1972) in his article concerning the need and advisability of trying to achieve co-ordination of automation systems gave a diagram (see Figure 7.1) of a central core data system as related to analytical systems in a multi-agency traffic safety program. It shows one basic group of data that can be used to serve many purposes. The

data are structured in such a way as to be readily available for several sub-system anayses, largely automated. The sub-systems are designed to provide the needed management decision input. Because the sub-system analyses require more data than is included in accident reports, non-report data are also made part of the central core record and are conveniently arranged such that all sub-systems can have immediate access to them in the required format. How the data are arranged in the central file is not particularly important so long as they can be supplied immediately on demand.

6. An issue of the "Federal Register", dated 3 August, 1972 contains details of draft legislation which it was proposed would apply to all American states. One part of this draft describes the requirements for traffic record systems as follows:

> "Each State, in co-operation with its political subdivisions, shall establish and maintain a traffic records sytem that is responsive to the information needs of highway safety program managers, can provide statistical data to show magnitude, changes, and trends, of the traffic crash problem and has the capability of identifying areas of needed evaluation, research, and study. The system shall be developed in conformance with the following criteria:

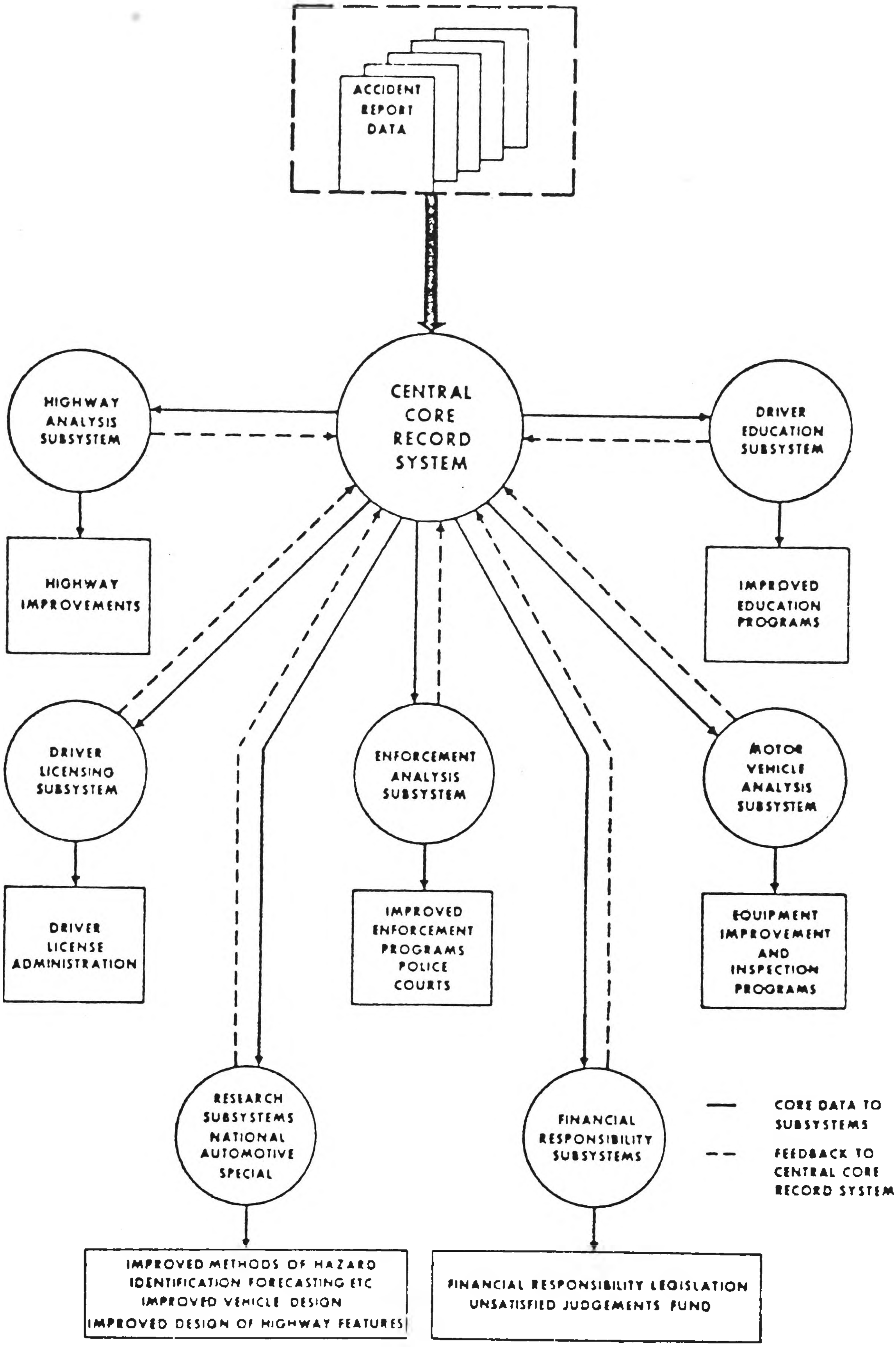


Figure 7.1 Automated accident data systems

Source = R.D. Johnson (1972)

(a) Each State shall identify the agency having primary responsibility for the functions, effective management, and co-ordination of the traffic records system, and shall be responsible for insuring that:

- Procedures are established to insure co-ordination, co-operation, and exchange of information among State and local agencies that are information users or that have management information responsibilities.

- Full-time traffic records personnel are employed.

- Statewide uniform procedures for the definition, classification, analysis, interpretation, and use of traffic records data are established and followed.

- Tra ining requirements and procedures for State and local agency personnel engaged in traffic records activities are implemented.

- Policies are developed and implemented to insure timely transmission and entry into the State records system of:

  - Driver license and vehicle registration data.
  - Police crash investigations.
  - Driver or owner vehicle crash reports.
  - Conviction data.
  - Rules governing security, protection and public availability of traffic records are followed.

(b) The statewide traffic records system, which may consist of compatible subsystems, shall include statewide procedures for the collection and entry of data into the system, including:

- Use of uniform source documents

- Use of standard data elements, definitions, classifications, and codes

- Use of standard identification and common descriptive elements to insure the integration of all subsystems and files.

(c) The records system shall be used to provide individual case records required by State operational highway safety programs and shall also constitute the basis from which analytical studies, both clinical and statistical, may be made. Specific provisions shall be made for the research use of the data under prescribed conditions of access and confidentiality. The system shall be capable of identifying significant problems in the highway transportation system, such as:

- Identification of problem drivers with special emphasis on those with an alcohol or other drug problem.

- Identification of hazardous and potentially hazardous roadway crash locations.

- Identification of common hazardous motor vehicle defects.

(d) Data sampling procedures shall be used to measure the populations of drivers, vehicles, roadway features and crashes, detect their hazardous attributes, and evaluate the effectiveness of applied countermeasures.

(e) The system shall be capable of receiving and processing inquiries 24 hours a day and providing rapid responses to requests by enforcement and judicial and adjudication officials for driver and vehicle status information.

(f) Provisions shall be made for the interchange of information and data with other States as needed and with the Federal Government for the purposes of policy and program development and evaluation. The traffic records system shall be designed and implemented so as to provide information regarding the scope and magnitude of deaths, injuries, and property damage, and include:

- Summary data on drivers, vehicles, roadways and crashes.
- Non-identifying case data on ech fatal crash including blood-alcohol concentrations on each fatality."

The requirements for a motor vehicle registration system are described:

"(a) The registration records system shall be capable of rapid identification of each registered vehicle and its owner, including:

- Collection of descriptive data for identification of registered vehicles, including:
  - make
  - model year
  - line
  - vehicle identification number
  - type of body
  - gross vehicle weight rating

- Collection of descriptive data for identification of owners of registered vehicles, including:
  - name of current owner
  - address of current owner
  - current title number
  - registration plate number
  - name of previous owner
  - previous title number

- Development of a data processing system that is capable of:
  - rapid and accurate entry of new registration data
  - rapid and accurate updating of registration data including recording of renewals and changes in registration
  - rapid and accurate retrieval of data on the vehicle and owner for identification and control
  - receiving and processing inquiries 24 hours a day
  - providing data for statistical compilation and accident research and analysis
- Maintenance of a current vehicle data system that includes the safety history of registered vehicles in relation to accident experience and inspection.

(b) The vehicle registration system shall be used to control the operation of vehicles by problem drivers by suspending the vehicle registration."

The requirements for a driver information data system are also described:

"Each State shall develop a driver information data system consisting of an orderly set of data collection procedures for establishing and maintaining records describing the State's licensed and identified unlicensed drivers, and extracting useful and timely information to use in driver improvement, retraining and referral of problem drinker drivers for appropriate care and treatment. The data system shall meet the following minimum requirements:

(a) A driver record shall be maintained for each driver including at least the following data:
- Convictions of traffic law violations.
- Incidents involving driving without a license.
- Involvement as a driver in motor vehicle crashes.
- Records of all actions taken by the licensing agency against the driver's license, such as warning letters, driver improvement actions, and suspensions.
- All driving and nondriving convictions involving alcohol.
- All social agency reports indicating alcohol involvement.
- Records of all actions taken by any State against the driving privileges of the driver.
- Medical reports of hospitals, institutions, or physicians when the examining medical personnel have reason to believe that physical, or mental conditions, including the excessive use of alcohol or other drugs, exist to a degree sufficient to impair the individual's ability to safely operate a motor vehicle.

(b) The information data system shall, as a minimum, be capable of:
- Identifying problem drivers through review of crash and conviction experience.
- Identifying drivers with mental or physical problems that impair their driving ability, including problems resulting from the use of alcohol or other drugs.
- Retrieving driver history records for use in judicial or adjudicatory proceedings.
- Retrieving driver history for pre-licensing or license renewal purposes.

(c) The State shall establish driver information control procedures that will protect confidential records by specifying to whom and under what circumstances record information may be released, in addition to providing for release of all record information, in understandable, non-coded form, to the driver at his request."

7. The New York State Department of Transportation described in its TOPICS Work Plan (1972) a comprehensive data bank system which was named MAGTOP (derived from management of traffic operations). The interrelationships of the basic components and a general description of the data input and report capabilities of each component are shown in Figure 7.2. The system has the capability to store huge amounts of data amassed in various surveys and routine collection. The data groups into the following categories:

- Accident data
- Travel time date
- Traffic flow data, and
- Physical inventory data

Table 7.2 below lists in more detail the form of information that can be stored in the data bank.

The Federal Highway Administration were impressed with the MAGTOP system and produced a detailed User's Manual in 1975 with the programs using ANSI-FORTRAN.

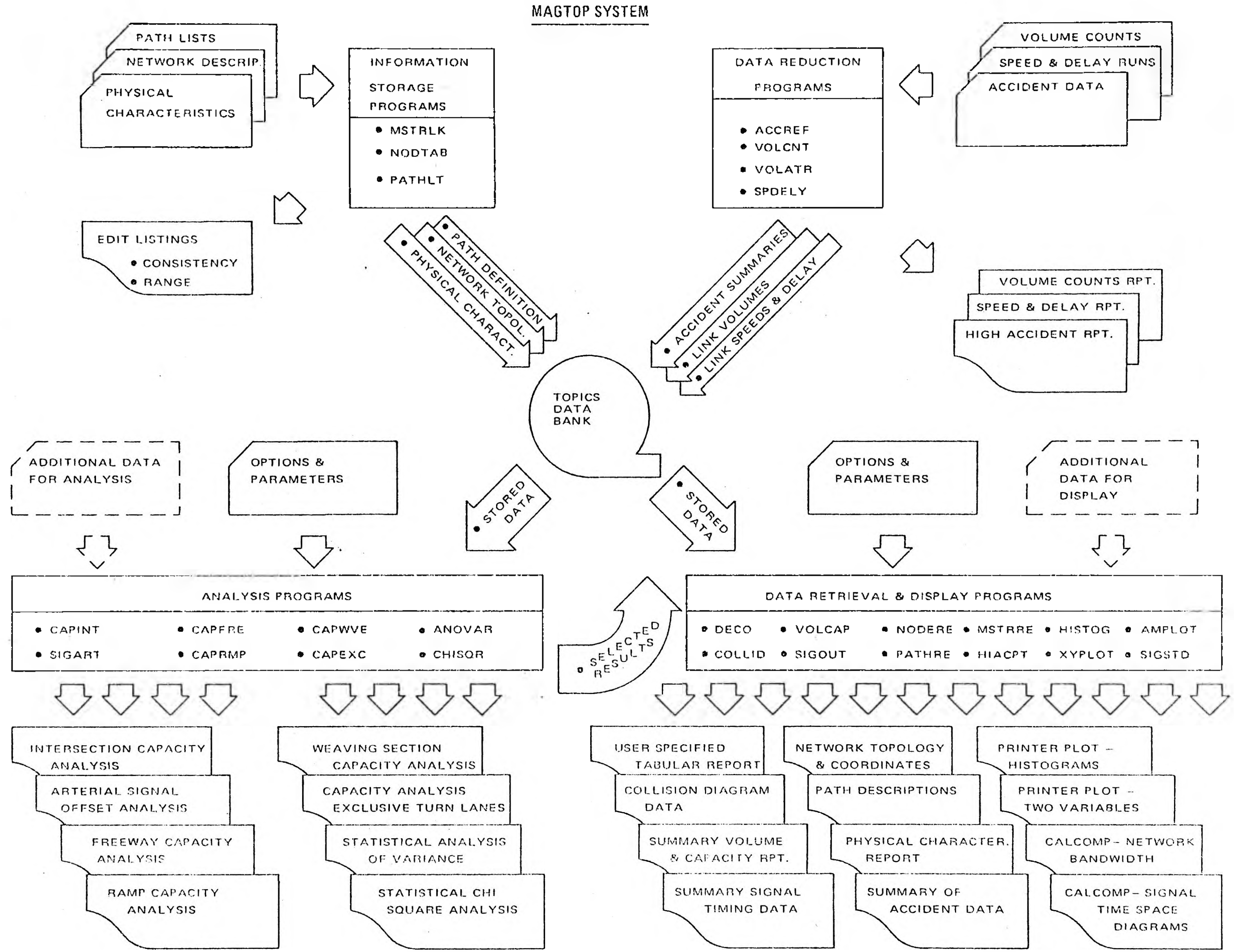


Figure 7.2 MAGTOP system

Table 7.2 - INFORMATION STORAGE - TOPICS DATA BANK

Intersection (node) Identification

- assigned node number
- names of intersecting streets
- geographic co-ordinates
- node numbers of all other intersections connected to the node by street segments (links)

Street Segment (link) Identification

- assigned node numbers of two nodes which uniquely define each link directionally
- jurisdictional and functional classification
- name of street
- name of intersecting street at downstream node

PATH List Definition

- PATH identification number
- name of PATH
- the numbers of the links included in each PATH

Link Physical and Operational Data

- link length
- area type (for capacity analysis)
- lighting classification
- number and width of turning lanes
- approach width and turning prohibitions at downstream intersections*
- parking restrictions*
- one or two-way operation*
- presence and location of bus stop*
- number of mid-block lanes*
- type and timing of control device at downstream intersection*

Link Travel Time and Delay Data

- average total travel time*
- average total delay time*
- average travel speed*
- the delay time recorded and category of delay for each of the 3 most important causes of delay*

Link Approach Volumes and Capacity

- observed or computed peak hour approach volume*
- observed or computed approach capacity*
- desired or computed load factor*
- observed peak hour factor*
- % right and left turns at the downstream intersection*
- % trucks and buses*
- estimated average annual daily traffic volume

Definition of Analysis Time Periods

- the beginning and ending time of up to 6 analysis time periods can be defined for each link (e.g., A.M. peak, Sunday, etc.)
- up to 6 values for each of the items followed by an asterisk can be accommodated in storage.

Link Accident Data Summary

- number of recorded mid-block accidents stratified by:
  - day
  - severity
  - type
- exposure (in annual vehicle-miles of travel)

Detailed Accident Data

- date of accident
- location of accident (link or node)
- type of accident
- severity
- day or night
- direction of movement of vehicles

* Up to 6 values, one for each previously defined time period, can be accommodated in storage for each of these items.

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8. The Joint Select Committee on Road Safety (Victoria) in its 12th progress report (1973) discussed the matter of statistical data for road safety purposes and included in its summary the following:

" (a) There are at least six Government departments and instrumentalities involved in the compilation and processing of road safety statistics. The Committee has been surprised to learn that each of them is preparing to change to computer based systems with little or no attempt at co-ordination of these activities.

(b) The Committee believes the entire system of road safety statistics should be co-ordinated as a fully integrated system under unified control. Alternatively, if this is not possible, it should at least be organised in fully compatible units based on uniform definitions.

(c) The Committee is continuing its inquiries; but presents this progress report AS A MATTER OF URGENCY, in the belief that failure to co-ordinate statistical requirements will be detrimental to road safety investigation in Victoria."

The Committee included in its recommendations that an inter-departmental committee be set up to co-ordinate all requirements and that a supervisory committee be established, responsible for the overall supervision and control of planning and installing a comprehensive road safety statistical system.

The recommendations were acted upon as far as the formation of an inter-departmental committee in 1974 which met several times and ascertained that further basic work was needed to advance toward co-operative use of the data available from the various departments, but no staff were available to do this work so a request for funds was made to hire a consultant to do the work. It appears that that is where the matter rests to this day.

9. Arrunda et at. (1975) described the system put into operation in the State of Rhode Island in which the accident report information can be matched with highway inventory information, driver information, and vehicle information via common elements such as driver licence number, vehicle identification number and vehicle registration number, and accident location.

10. Bydler et al. (1975) described the concept and development of the Nordic road data banks in the countries of Denmark, Finland, Iceland, Norway, and Sweden. The bank, initially, was mainly structured to serve road authorities and its contents determined by the needs of highway planning, design, construction and maintenance. Later on it was intended that the information needs of other forms of community planning would receive attention.

The contents of the road data bank are as follows:

(a) Administrative data such as road category, road number, country in which the road is located etc.
(b) Descriptive data, such as road geometry and road construction data.
(c) Traffic - regulating data such as speed limits and permissible loads.
(d) Road structure data i.e., data about bridges, tunnels, ferries etc.
(e) Traffic data such as average daily flows.

(f) Traffic accident data, and

(g) Economic data such as road maintenance costs.

11. Cooper (1976) described briefly the establishment of a computer based communication and data retrieval system providing inter-departmental communication and automated access to records for the departments of Police, Justice and Transport in New Zealand.

The Ministry of Transport will have the following applications:

(a) Register of driver licences - control and issue

(b) Register of motor vehicles

(c) Traffic Offence Enforcement - control of all types of traffic offence notices (including parking) and the follow-up through prosecution to final disposition.

(d) Traffic Conviction Histories - to provide details of previous convictions to the courts and maintain the demerit points and disqualified driver records.

(e) Traffic Officer activity records - for management information on the utilisation and disposition of enforcement staff.

Information in the computer is grouped into three classes:

Class A - information contributed by another user but part of a public record (e.g., driver licence and motor vehicle information).

Class B - information necessary for the effective operation of the user in their enforcement activity (e.g., stolen vehicles, persons wanted in warrants).

Class C - information contributed by that user and not part of a public record (e.g., stolen property, Police Dept.; Traffic notices, MOT; court scheduling, Justice Dept.).

All users will be able to access information of Class A. Class B information will be available to those users who need it in their operational enforcement role and Class C information will only be available to the users who put it into the computer.

When the data is no longer required in the Data Base it will be transferred into historical files for research purposes and personal details will be deleted. It was envisaged that little accident information would be available in the System in its initial stages.

12. Slatter (1976) described the TARA system developed in Oxfordshire County to provide a suite of traffic analysis programs and a cross-referencing system to interface the traffic files with accident and other highways data files. The following sources of data have been catered for:

(a) Traffic - cumulative counts from automatic recording counters.
(b) Traffic - totalising counts from non-recording counters
(c) Traffic - classified counts
(d) Traffic - classified turning counts
(e) Traffic - turning counts
(f) Vehicle speed - radar spot speed
(g) Vehicle speed - moving observer method

The accident information recorded in the system is: road and section number, grid references of accident location, time and date, accident reference number, day, weather, light, road surface, pedestrian - crossing, junction control, accident class and number of vehicles. At the time of the author's paper only part of the system was operational.

13. Sparks (1977) talked about the highway safety program of the Oklahoma Department of Highways. He said that an effective program would require pre-requisite action concerning the development of:

1. An adequate data bank.
2. Procedures for identifying and investigating high accident locations and high-accident spots.
3. Procedures for accident trend analysis.
4. Methods for determining remedial improvements.
5. Procedures for evaluating results of remedial improvements.

14. The National Highway Safety Advisory Committee (1979) reported to the Secretary of Transportation (USA) that a Task Force had been formed to study highway safety data needs and what was being done to satisfy these requirements. The Task Force concluded that 'how much data is needed? 'and' what is duplicative?' were still unanswered questions and the Committee recommended that a further group of people (a committee!) knowledgeable in accident data systems be assembled to make recommendations on the need and funding of State and Federal data systems. On reading the Task Force report it now appears that the matter of "Traffic Records" in the U.S.A. has moved backwards as Standard No. 10 (see para. -

1 above) which required each State to institute a uniform traffic record system no longer applies because of changes in the Act in 1976. The States are no longer required to comply and as a result the State systems are not currently compatible. This is despite millions of dollars of Federal Funds being used to support the Standard.

7.3 Some Examples of Driver/Vehicle Systems in the U.S.A.

A number of systems that are already operating exist in the U.S.A. and other countries, and use computer equipment supplied by several different manufacturers. The following three examples are all systems operated by American states, using IBM computer equipment.

(a) New York (Dept. of Motor Vehicles)

This computer system maintains records of about 9million vehicles and about 11 million drivers. It uses two identical computers, one for realtime teleprocessing and the other for central office batch processing. If the realtime computer temporarily fails, the batch computer replaces it, thus giving high continuity of service, 24 hours per day. Through about 300 remote terminals, the system gives almost immediate answers to about 250,000 inquiries per day from administrative, judicial and law enforcement personnel. Details of all reported accidents are recorded, and statistical analyses printed.

(b) Oregon

This system maintains records of about 1.4 million drivers and 1.6 million vehicles (numbers very similar to those in Victoria). It uses a single computer, and about 60 remote terminals. About 15,000 transactions daily are input on an on-line basis, and processed on a batch basis that night. A further 8,000 requests for information each day are replied to almost immediately. Law enforcement inquiries are currently handled over a statewide teletypewriter system, but future plans include providing all law enforcement agencies with 24 hour and a day on-line access to the licence and registration files.

(b) Honolulu

This system records data on about 350,000 vehicles and about 400,000 drivers. The system carries out normal registration and licensing functions, but in addition provides police with data on wanted persons, wanted vehicles, recent crimes and police activity. It is interesting that a state considerably smaller than Victoria has been able to justify such a comprehensive system.

7.4 Possibilities for Research

It is obvious that a totally integrated Data System with data-base programs such as the CDC "System 2000" or the newer IBM "Query by Example" will make front-line research a lot simpler and interactive. Of course the items in all of the separate files will require clear definitions and particularly the effect of the "unnoticed" or "unreported" features could be researched. For example the width of road, the radius of curves, the presence of footpaths, extracted from inventory records could be investigated against, say, accident-type and traffic flow. The possibilities for investigation are almost limitless and indeed are limited only by the meaning or value of some of the possible outcomes.

At the least, statements on the extent of a particular safety issue could be made with a lot more knowledge on who, how, and where. For example, accidents to pedestrians could be looked at in relation to age, accident-type, class of road, traffic flow, time of day, presence of traffic controls, class of vehicle, age of driver, (details of drivers such as previous accidents or traffic offences), blood alcohol concentration of driver and pedestrian, condition of vehicle (age, equipment, roadworthiness), weather, width of road, road friction, roadside development, etc. This type of research is needed particularly for accident-types that do not exhibit any site-clustering.

8. ACCIDENT LOCATION AND ACCIDENT-TYPES

8.1 Accident Location Systems

8.1.1 Introduction

It was in the past, accepted that the method of obtaining knowledge as to the locations where accidents were occurring was to generate a "spot map". This was a scale map of a State, town, region etc., where the spots where individual accidents occurred were indicated by a pin or spot. A spot map was not only labour intensive but was also inadequate since it was limited in the number of characteristics that could be displayed (e.g. night accidents or pedestrian accidents) and a large city required so many maps that it was virtually impossible to gain any overall clear mental picture.

Two particular weaknesses of spot maps given by Hotchkiss (1969) are "(a) The information is readily available only to persons with access to the map room and photos of the maps are either too small in scale or require projectors to blow them up to size.
(b) The maps give little detail of the actual events at each location. As a minimum the system should enable collision diagrams to be drawn without referring back to the reports".

As a method to examine a particular site the collision diagram is good but when contemplating a Metropolitan area one could hardly start by gazing at an array of collision diagrams and the Writer suggests that the system does not literally have to provide for "collision diagrams to be drawn without referring back to the report". Given a breakdown into accident-types, the computer can perform its manipulations and produce a listing of sites according to any particular characteristic or combination of characteristics. The computer can take over the task of scanning all the sites in a metropolitan area to find those with the greatest number of accidents or more importantly it can give the sites with the greatest number of accidents of a particular type or types. The scanning can also be modified by other characteristics such as light condition, age of pedestrian, age of driver, type of vehicle etc. The equivalent in collision diagrams would be a massive pile.

However to do any of these things a location system has to be devised around which the computer can do its manipulations. The various systems described in the next section, by and large, classify locations into - "at intersection" and "not at intersection". The actual location is determined with varying degrees of accuracy. The accident-type is usually related to the type of location, e.g., curve-type accidents happen on curves, intersection-type accidents (crossing-streams) occur at intersections, but some accident types can occur anywhere, e.g., strike rear of the car in front.

It is considered that all accidents should be filed according to where they occurred but when a study is being made of a particular site a scan should be made of adjoining links to ascertain if there has been any"overflow" of the problem.

Something not clearly evident in the papers reviewed is what the authors have defined in terms of area as the intersection or node. Distances are measured from referenced intersections or co-ordinates are calculated from referenced intersections but the boundaries of the intersection are not mentioned. Should one assume that it is the intersection as defined by the respective traffic law applying in the author's State or County? Can one be sure that that is the boundary that the reporting officer has used in filling in the form? How has the measurement been made from that boundary, 'questimate' or actual measurement? Has the reporting officer determined the location as that where the vehicles hit or where the vehicles finished up?

It is the Writer's view that a solution is the solution adopted in the Victorian location system (described in detail in 8.1.3) where the "legal" intersection plus 10m defines the area within which all accidents that occurred are deemed to be "located" at the intersection. The 10m is a tolerance to allow for differences in the knowledge/interpretation of the reporting officers as to what point he is measuring from (or estimating) when he gives a distance from an intersection and it is a slight concession to the notions of Plummer (1972) by allowing the intersectional oriented accidents that occur near the intersection be counted as being at the intersection. The same tolerance distance of 10m is applied to all nodes and all accidents occurring outside the "node zone" are classified as link accidents.

It seems futile to go to great precision with the co-ordinates for an accident location when the distance given by the reporting officer is an estimate. If kilometre signs are used along a highway (i.e., spaced at one kilometre) the average precision would be 0.5km for link accidents and perhaps that is good enough to identify physical features that might be related to the accidents. The Victorian system does not use the distance from the nearest intersection as the basis for "locating" a link accident. The two closest nodes on the road are used to define the link within which the accident happened. The distance from the nearest intersection is collected and is recorded in the computer but is used primarily to identify the correct link as often the distance given conflicts with the sketch on the form which may shown another intersection which is within the distance from the referenced intersection. Either the distance is in error or the referenced intersection has to be changed to be the intersection closest to the accident. The supplementary information of the form is used to make this decision. An example of this problem occurs when accidents happen on a divided arterial road with service roads, and minor roads intersect only the service road, or sometimes intersect the service road and half the main roadway (i.e. the central median is not broken).

8.1.2 Examples of Location Systems

Marconi (1964) described the location coding system that had been in use in San Francisco since 1955 to highlight high accident locations. The details recorded were kept to a minimum and were as follow - full names of the streets, time, day and date, vehicle types, vehicle movement and severity. Monthly and yearly tabulations were produced with accidents at individual intersections grouped and thus sites with large accident histories were readily seen since they took up many lines of type on the printout.

Corgill (1966) described the location system in Florida which originally was intended to be a "milepost marker" system. That is, a series of milepost signs were to be erected on highways showing County code, the State road number or U.S. route number, and the mileage from a start point. In practice, as strip maps were to be used in analysis, it was discovered that the milepost signs were not necessary since landmarks were more readily identified and each was a "milepost". That is, the distances of all landmarks were measured and plotted on the strip maps. Accidents were then located with reference to landmarks instead of signs.

Crowther (1967) described the location system in Hampshire which used road number and map references in Eastings and Northings of the section of road. Specific locations within the section are possible. The sample of computer record given in the paper is somewhat confusing - three accidents occurred at the one loaction (the Barrack Road/The Grove junction) but three different map references are given; two accidents have the same map reference (141938) but are at different locations; and again two other accidents have the same map reference (141937) but occur at different locations. Crowther gives no details on who assigns the map references to the accidents or the accuracy (amount of road) that a reference point would cover (or the distance between two adjacent points).

Lipps (1969) said that two systems had been considered for locating accidents - the nodal system and the co-ordinate system. In the nodal system a unique number is assigned to each intersection and to certain road features. An accident can be located by a single number if it occurred at a node, or if it occurred between nodes it would be identified by the nodes either side and the distance to either. The co-ordinate system assigns a two-part number, X and Y co-ordinates to each accidents loaction. Lipps said the number can be determined by a policeman at the scene through the use of detailed maps containing the co-ordinate grids.

Hotchkiss (1969) described the New South Wales system in which the location name is spelt out in alphabetical characters. The point within the street where the accident occurred is also recorded in terms of distance and direction from an identification point. Hotchkiss also said that the location "could have been given by using a grid system and map co-ordinates, but this would not produce a pattern suitable for the examination of the history of road section, which are often winding." The computer output accumulated accidents occurring at the same location.

Garrett and Tharp (1969) in reviewing accident location systems in the USA said there were three basic types in use or under development at that time -

(1) Route number accumulated mileage system

(2) The node-link system

(3) The co-ordinate system

The route number accumulated mileage system had been used by various states most frequently. Its advantages were comparative simplicity of use, direct coding of location in the field, a short training period for proper use, and comparability with existing road inventory records. Its disadvantages were that it is not adaptable to complex highway configurations (interchanges and channelised intersection, etc.), difficult to use in urban areas, requires a change in logic of concept or a change in reference markers when modifications are made to the highway network, and may require an addition or subtraction procedure by the investigator which increases the possibility of an error.

The node-link system has the advantages of being simple to use in the field, can be used in rural and urban areas, can be adapted to complex highway configurations, can be expanded to all streets and highways, the simplicity of use suggests a potential for fewer field errors, and changes in the highway system can be handled by the placement of another node.

The co-ordinate system (in testing stages, at the time of the paper) has advantages of - no need for field reference markers; permits direct coding in the field, can be expanded to cover all streets and highways. Some disadvantages are: if coded in the field the policeman must be supplied with maps of the entire area he covers; the map scale is normally small and requires fine reading for close location of accidents; the user must have some experience in reading maps; and the map reading process permits additional errors to enter the data.

Garrett and Tharp said a location system should be -

(a) simple to use

(b) economical in the cost of use

(c) provide location data within the required precision

(d) provide comparability of accident data and highway inventory data.

They did not recommend one method but considered it apparent that the node-link system is regarded as most flexible in a changing system.

Another general point raised by them is just how does one determine what part (or parts) of the accident event gives the location. For example, a 'ran-off-roadway' accident may initiate on a curve with the vehicle running off the paved surface on the subsequent tangent and striking a pole still further along the roadway. The question is which location or locations to place in the records system.

Rowe (1970) in talking about the Los Angeles traffic record system said that X-Y co-ordinates were being introduced which would provide the basis for determining the map sequence relationship of intersections along a route. Route searches can then be made by specifying the route and the desired start and end points. An X-Y digitiser converts map position of its stylus to co-ordinates and records them on computer tape, the resolution is equivalent to four feet of actual distance (0.01 inches in a map of one inch to four hundred feet). Intersections are identified by entry of a code from a manual keyboard.

Steel (1970) described the location system in Hertfordshire which used a Cartesian co-ordinate system based on the National Grid reference system. Four figures for Eastings and four figures for Northings are used each to an accuracy of the nearest 0.1km which gives a location accuracy of ±70m. Steel said "further precision to 0.01km would have been better, but this accuracy is not easily attainable in either Police reporting or coding". Extra codes are inserted to identify roads and administrative areas, intersections are identified by two road codes and intersection type is classified by a further code.

Graves (1972) said that three distinct highway accident location concepts were in use in the USA -

- route number and accumulated mileage,
- nodal system, and
- co-ordinate system

In the route number/mileage system, accidents are located on Interstate routes by mileage from south or west state borders, on the State system by mileage from south or west of each County border, on City streets by the street name and the nearest house number.

The nodal system is adapted from network principles, the network is simulated by the identification of nodes similar to the node-link system in urban transportation planning.

In the co-ordinate system each accident is located by its own unique set of plane co-ordinates.

Moellering (1973) described a computer based location system developed by the Highway Safety Research Institute to study accidents in Washtenaw County, Michigan. Four variables described the location of each crash - the two street codes of the nearest intersection, the distance, and the direction from the referenced intersection. Each named road was assigned a unique four-digit numerical code. Stored in the computer was a co-ordinate pair for every intersection (5,500) in the County and provision made for the two street codes to be fed in in any order and the file thus has 11,000 references. The computer assigned the co-ordinates to each accident site based on the co-ordinates for the referenced intersection (derived from the two street name codes) and the distance and direction to the site from that intersection. Distances were reckoned in feet or tenths of a mile and the direction was based on eight-point compass. For accident histories of specific sites a point subset was created and for lengths of a road a linear subset.

Arruda et al. (1975) described the Rhode Island State accident record system as depending on two basic items, two alphabetical description files, one the accident locations and the other of a street and highway system. The location description is framed for an intersection accident, and a non-intersection accident referenced to a nearby intersection by distance and direction. The street and highway system was in the form of a geographic base file. It was composed of segment records, a segment being a length of street or other feature between two nodes. Nodes identified geographic features by point and indicated where the features began, end, intersect or change direction. Each segment was described by a variety of codes such as street name, node numbers at each end of the segment, X-Y co-ordinates for each node, geographic area codes, etc. A matching of these two basic files gave an output containing accident data, address, geographic description in terms of city or town, census tract, census block, road segment and X-Y co-ordinate. The location of an accident as stated in the report form was transcribed directly onto computer tape, the system was designed to match on misspellings and other near matches and was able to process about 35,000 reports per year.

Slatter (1976) described the location system used in the Oxfordshire County traffic data system (known at TARA). The road network was defined by a link-node system, each road being allocated a unique number and each section a number which was unique within that particular road. Major nodes were located at key intersections and where traffic flows alter significantly across the node, and minor nodes are used between major nodes at such points as start of a speed limit, minor intersection, changes in road characteristics, etc. Eastings and Northings were used to define the co-ordinates of each node.

8.1.3 The Victorian Location System

8.1.3.1 Development

The system had its beginnings in 1968 out of the mutual needs of the Traffic Commission and the Country Roads Board (CRB). The Commission needing quicker and more specific access to its accident records and the Board requiring location specific data to be used in the Australian Road Needs studies.

The expressed purpose of the system was "to identify high accident frequency locations, intersections and mid-block lengths, and to provide a detailed classification of "Road User Movements" at each location".

Locations were classified as being at an intersection or between two intersections. Initially in the non-metropolitan area the stated distance from the intersection was going to be used to locate the link acidents but experience found that the link lengths were such that where they were longest, by and large, accidents were few and vice versa and the purpose of identifying high accident frequency locations would not be improved at the expense of the extra effort of adding distance from an intersection to the location of link accidents.

An intersection accident was defined as one occurring within 30ft (later 10m) of the intersection. When intersections were spaced less than 60ft apart they were coded as one intersection. Accidents outside the intersection zone were classified as mid-block (link) accidents. When intersections have more than two street names, the two lowest alphabetical intersecting street names are used. Similarly if the accident site is on the boundary between municipalities the site is assigned to the lowest alphabetical municipality.

The intersection class was expanded by adding "complex intersections" which included interchanges and large channelised intersections where there were "intersections" within the intersection but there were not separately named streets involved.

Each intersection in the system was given a unique number based on - the map number, Easting grid number, Northing grid number, and serial number within the grid. (See Grid G-5 in Figure 8.1.1). The serial numbers within the grid were assigned when the intersection or adjacent link had an accident. Intersections thus had a single four-part number to identify them and links had two four-part numbers. The full alphabetical name of the streets and the four-part number were then entered on computer tape and progressively over the years this has built up an address file of some 70,000 intersections for Victoria.

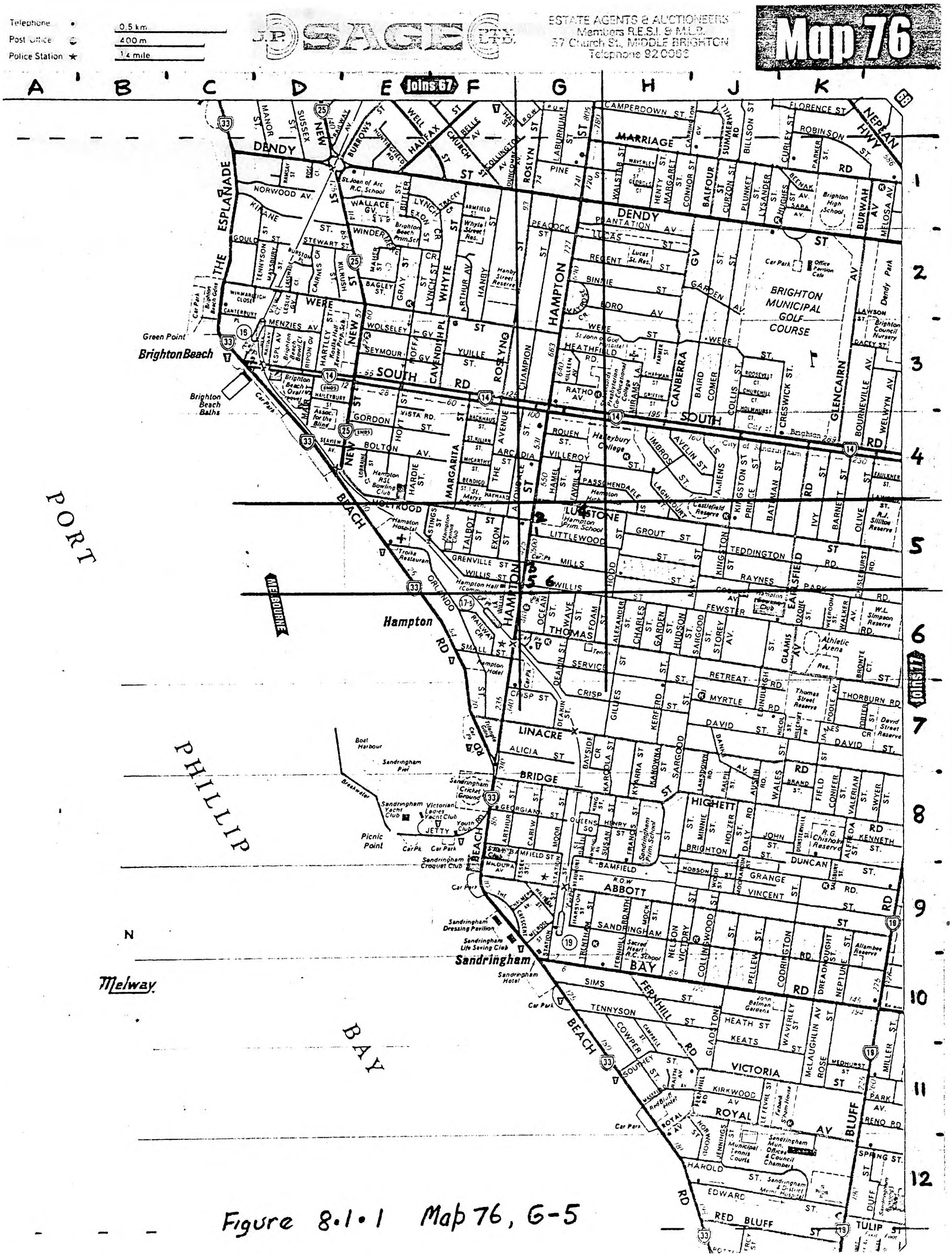


Figure 8.1.1 Map 76, G-5

For this location system a set of maps of the whole state was required that were accurate, scaled and up to date. For the metropolitan area of Melbourne the "Melway" street directory proved to be very suitable, particularly because each page has continued to cover the same area of land in subsequent editions including a conversion to metric distances. For the rest of the state maps were obtained from municipalities and most presented problems such as - showing roads that did not exist, unnamed roads, roads that existed were not shown, road geometry was incorrect, two names for one road, intersections shown that did not exist and vice versa. The Commission then produced its own maps based on the municipal maps (2 miles to 1 inch), with enlarged scale maps for towns ($>$ 400 persons) within the Shire map, and through the co-operation of the municipalities in 1968 and 1969 were able to eliminate a number of these problems and get maps that represented the road networks as they exist. However even when a road is named on the map it is found that few if any road name signs exist in the field and the reporting officer reports what he sees, viz., an unnamed road because it is an unsigned road.

The full address for an intersection is (1) the code for the Local Government Area (LGA), (2) the map number, (3) the grid square on the map, and (4) the serial number within the square. For the National and State Highways each intersection had in addition the cumulative mileage from the highway start point as supplied by the CRB. Thus for the highways it is possible to produce a mileage sequenced printout of intersection and link accidents.

The system was originally designed to run on an I.B.M. 1620 computer which limited the amount of information that could be processed for each accident and the way in which the system as a whole could be manipulated. At the beginning of 1975, following the transfer of the system to a large C.D.C. computer, the whole of the information on the accident form was recorded on computer tape. The file is index sequential and each accident record is attached to the file by the location code. So intersection accidents are attached to one location and link accidents are also attached to one intersection (the lowest co-ordinate) but with a pointer to the second intersection.

8.1.3.2 Refinements

Presently locating staff must refer to a list to determine the co-ordinates of the intersection and then transcribe these onto the space provided on the report form. Intersections not appearing on the list are presumed to be new sites and new co-ordinates are assigned by senior staff. The process is time consuming and has the potenial for error in the transcription of the location code.

Also over time a number of other sites which are strictly not intersections have been given point co-ordinates which in turn means they are viewed by the computer as an intersection and appear in printouts as such. The solution to this is to recognise a full node/link system and classify all point co-ordinates as nodes of which intersections will be a subclass.

It is essential that definitions used in locating and classifying accidents should correspond with the definitions used in the traffic law where such exist, to enable a proper study of accidents in relation to drivers, vehicles and the environment in the context of the rules and regulations that govern all of these aspects. A number of reported accidents do not occur on a "Highway" as defined by the Road Traffic Regulations (RTR) but do occur on a "Highway" as defined by the Motor Car Regulations and other accidents again occur in areas which meet neither definition but which still may be of interest/value to be incorporated in the published State Traffic Accident Record. Some wider definitions such as "road" can encompass - cycle tracks, equestrian trails, pedestrian paths, etc. All such information should be added to the Record with appropriate codes to indicate the differences. For example Police Standing Orders require that the traffic accident report form No. 513 be also used "to report all accidents involving trains occurring on railway crossings or 'footways' as defined in the Road Traffic Regulations". The Australian Bureau of Statistics (ABS) specifically ignores train/pedestrian accidents on footways as it does other accidents in non-highway (RTR) areas.

'Intersections' are formed by two or more 'Highways' (RTR definition) joining or crossing. Intersections are NOT formed by a driveway meeting a 'highway'. Driveways provide access to shopping complexes, large manufacturing plants, off-street parking areas, sports grounds and camping grounds and some of these may be provided with traffic signal control, particularly the suburban shopping complexes. These important nodes should be assigned point co-ordinates and coded to distinguish them from 'real' intersections.

The shopping complex forms a non-'highway' area (as private property) and raises a particular problem about the applicability of many of the traffic regulations, thus the accidents are of interest and the whole area is given a point co-ordinate. To overcome the problem of a lack of names the expression "Z to ...." is used for the driveways and "Z ...." for the area itself. Examples are "North Z to DONC. SHOPTOWN", "Z DONC. SHOPTOWN" and the node controlled by signals is "Williamson Road/North Z to DONC. SHOPTOWN".

In the case of off-road (non-'highway') areas only certain classes are of interest (at this time) and only accidents occurring in these areas should be added to the record. Accidents occurring in domestic properties are not recorded, nor farm or industrial plant areas, nor parking garages or parking areas associated with take-away food establishments. Basically only those large areas with pseudo or defacto roadways such as shopping complexes and camping grounds should be recorded. These are the areas which could generate confusion of road laws and areas (in Victoria) where traffic control devices have been erected which often have no legal standing since the areas are NOT 'highways', obviously not a totally satisfactory situation.

The areas which have been identified form a list of 'described' off-road areas and reference to the list is required to confirm a code of 'H' otherwise an off-road accident is classified 'uncodeable'. Each of the listed off-road areas will generally also have a related accessway (see "Z...." and "Z to ...." in a paragraph above).

Because each link requires two nodes to define it, a node co-ordinate is needed for the point where a road terminates (cul de sac), it is also needed where a road crosses a State boundary.

Railway crossings should be introduced into the system as nodes since they are relatively fixed and would aid in providing printout of accidents at specific railway crossings. In rural areas it would distinguish between two or more rail crossings within the one present link.

The precision of a location is first determined by knowing it took place in Victoria, then knowing the municipality (LGA), knowing whether it was at a node or link, knowing where the streets are (identified on a map) and knowing the names of the streets involved.

A suggested procedure is shown in Figure 8.1.2 in the form of a flow-diagram. The varying degrees of uncertainty are classified and co-ordinates should be assigned ONLY when all roads are named or all roads are known and can be specifically identified on a map. Accidents which occur at locations which do not meet these requirements must not be assigned real co-ordinates but are given the codes, as per Figure 8.1.2, which indicate the missing information relating to location.

The computer printout should then be subdivided into locations which are known and "locateable" and those that are not could be further sub-divided depending on their number. The subdivision would allow a renewed effort to have "unnamed" roads named and signed as well as measuring the general performance/quality of the system.

Some examples of the codes assigned to situations described in Figure 8.1.2 are as follows:

- If all location information is given then the accident is given a code of H, I, L, D etc., ONLY

- If an accident occurs an unspecified distance from a known intersection along a known road then it gets code L,4.
- If an accident occurs on a known road but the location is not specific, except for the L.G.A., then it gets code L,5.
- If an accident occurs at the intersection of a known highway with an unnamed (but known) side road, then it gets code I,1.

LOCATION CODES
(two column)

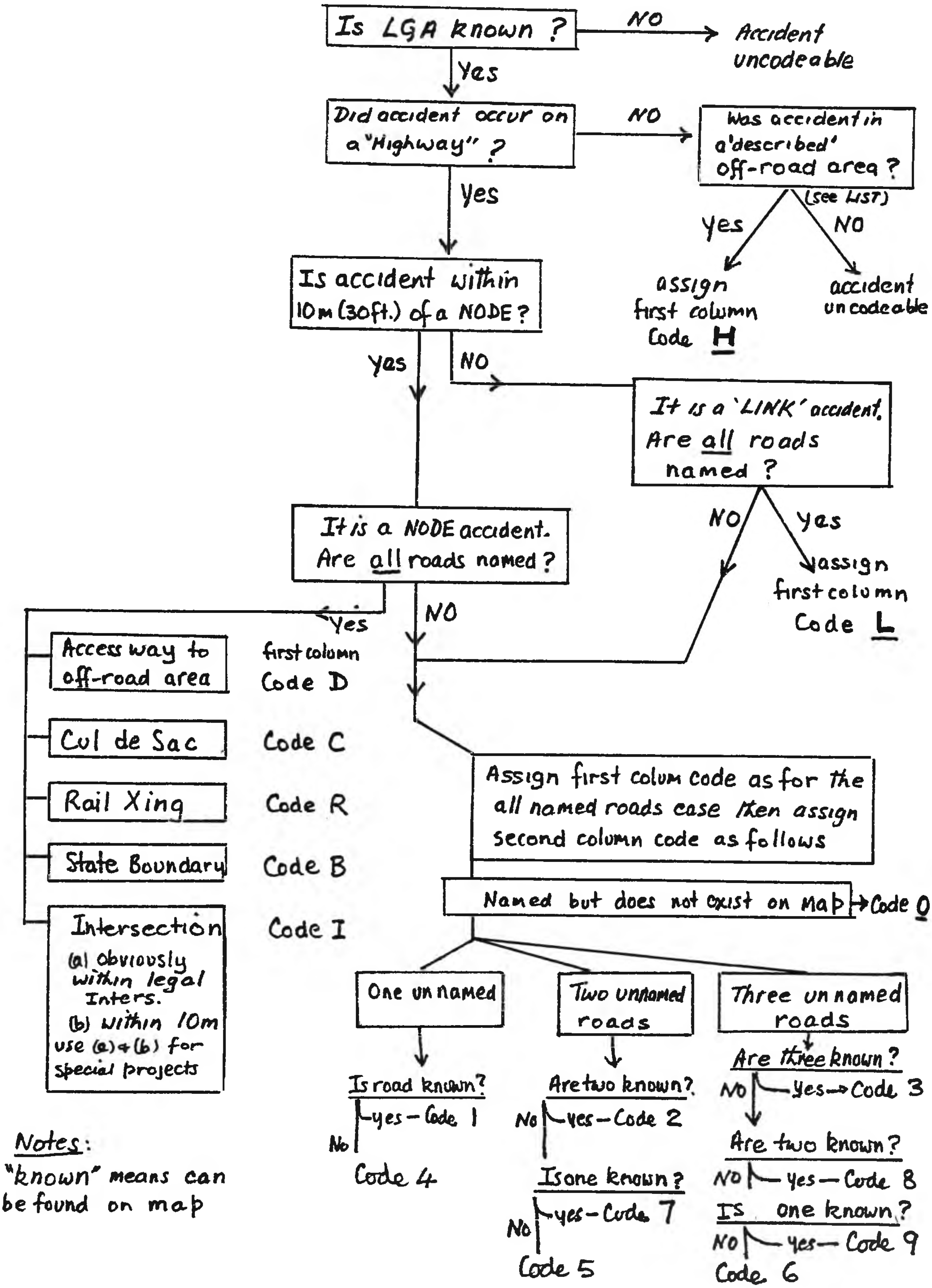


Figure 8.1.2

LOCATION CODES

(two column code)

[attachment to Figure 8.1.2]

Accidents can be categorised link or node by actual location description or by interpretation of the narrative sketch on the accident report form (513A).

If all location information is given then the accident is coded H, L, I, D, R etc., ONLY in the first column.

If some information is not given about the location, such as the name of a road, the road can be either 'unknown' or 'unnamed', and should be assigned a second column code accordingly.

Location co-ordinates are assigned to an accident if and only if all the roads are named or all roads and access ways are known and specifically identified on a map.

Co-ordinates are not assigned in any other situations.

Nodes are locations with a single co-ordinate.

Links are sections of "highway" between two nearest nodes and thus have two co-ordinates.

"Highway" is described by the 'Road Traffic Regulations' and the term road is used in the same sense. A driveway to an off-road shopping centre is not a "highway" and is referred to in this document as an 'accessway'.

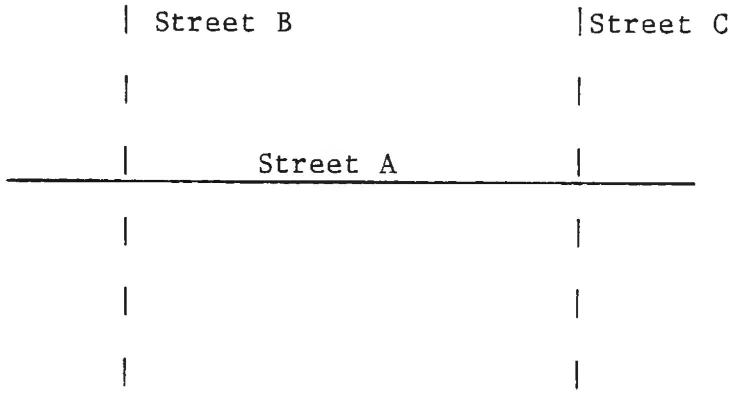
"Intersection" requires two "highways"

"Off-road area" - a list exists of presently approves sites with a

"Z . . . ." coding in lieu of the road names. The accessway is generally unnamed and is assigned a name such as "Z to Chadstone" in lieu of the road name leading to "Z Chadstone".

The node associated with an accessway would be referred to, for example, as "Williamsons Rd/North Z to Donc. Shopping Town"

In determining the second code the basic principle is that an intersection is defined by two named or known roads and that a link is defined by three named or known roads



LOCATION Coding

(two column codes)

Some examples of situations likely to be encountered:

1. an accident is somewhere along a known road and the road goes through two or more LGA's: classify as unknown LGA

   - accident uncodeable

2. Highway intersects unnamed (but "known") road - code I, 1

   note - this intersection would be given co-ords.

3. Highway intersects unknown road - code I, 4

   note - this intersection does NOT get co-ords.

4. Accident occurs an unspecified distance from a known intersection along a known road - code L, 4

   note- this is because a second node can not be "located" so that the link can be specifically determined

5. Accident occurs on a known road but location is not specific except for LGA - code L, 5

6. Accident occurs at an intersection of two unnamed and unknown roads, in one LGA - code I, 5

7. Accident occurs along a known but unnamed road but the location is not specific - code L, 9

8.2 Accident-type Classification

8.2.1 Introduction

8.2.1.1 Systems in Use.

Some of the basics related to accident-types were discussed in earlier Chapters (3.3, 3.4, 4.5). Several issues can be raised - what is an 'accident'? i.e., for the purpose of it being put into the records. Thence a 'motor-vehicle accident', a 'vehicle accident', a 'collision accident' a 'non-collision accident', etc. These are not all considered as accident-types in the context of this chapter but are germane to the setting of determining accident-type.

The "accident-type" as expressed herein is related to the "accident frequency method" described in Chapter 3 and can trace its origins to the "collision diagram".

Plummer (1972) discussed the need, in preparing collision diagrams, to include driver "intent". Driver intent is simply the intent of all drivers and pedestrians prior to the collision, it is not limited to those who actually began a manoeuvre but includes those who were planning a manoeuvre. Driver intent is indicated on the collision diagram by curving the arrow in the direction of the intent. Plummer also mentioned intersection-related accidents occurring outside the physical limits of the intersection. He considered that, for reporting and filing, all collisions should be processed according to where they occurred, but that when an investigation of an intersection was being made all the approaches to the intersection must be scanned as well as the intersection proper to find all the accidents related to the site being studied. Box (1976) in discussing accident pattern evaluation and countermeasures said "patterns of particular accident types can sometimes be identified from collision diagrams" he then went on to list countermeasures which were substantially those listed in the Manual of Traffic Engineering Studies, Study No. 2 - High Accident Frequency Locations, (1953). (see 4.5.3).

Hagmann (1974) described a computer-drawn collision diagram program used by the Oklahoma Department of Highways which is based on 33 'collision types'. Each accident is assigned a collision type and a quadrant (1 to 4) within the standard intersection design (caters for 3 or 4 approaches) at the initial coding stage. The computer plots each collision-type within the appropriate quandrant and indicates the number of each type. The printout for each intersection also divides the information into the four quadrants.

Litvin and Datta (1979) considered that each accident should have its own pictorial representation rather than the grouping utilised by Hagman, because they felt visual impact was important. They produced a computer collision diagram system for the Traffic Improvement Association of Oakland County, Michigan. Zogby in commenting on the paper said "there is no universal acceptance of the need for automated collision diagrams". His experience was that agencies had many varied approaches including those "who have the ability to automatically manipulate, aggregate and mathematically analyze accident data, and find the preparation of collision diagrams an unnecessary step in the study process". The authors did not give any details of the number of accident-types utilised in their system and the computer printout did not include an accident-type code or the quandrant in which the accident occurred which necessitated continued referenced to the collision diagram.

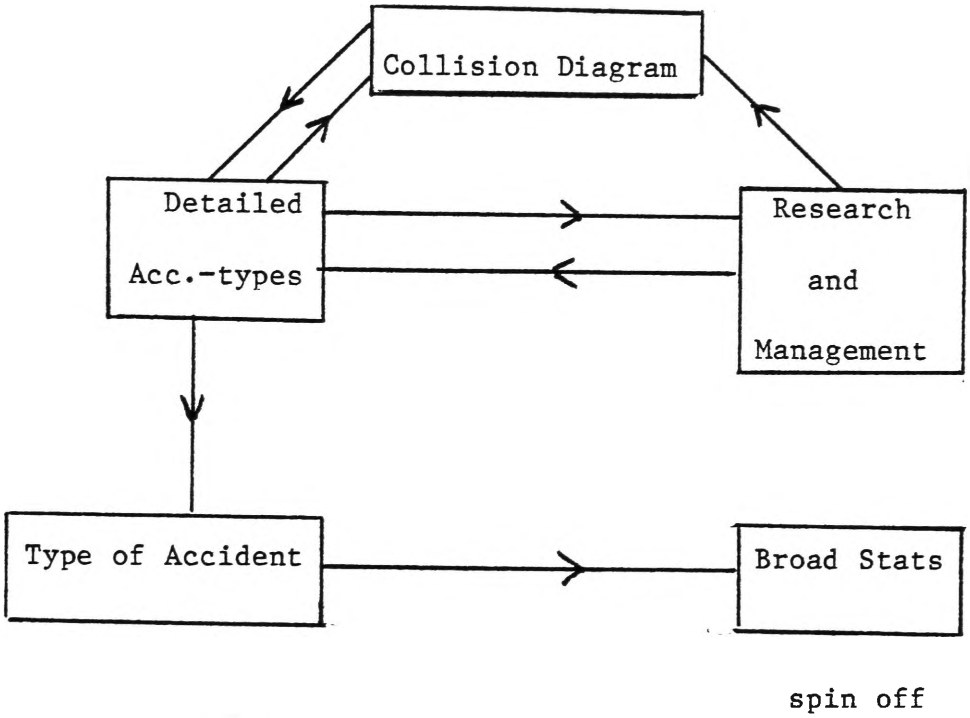
The connection between countermeasures, collision diagrams and accident-types is readily seen. The system adopted in Victoria has utilised as many subdivisions as were conceivable for collision diagrams. There was also some consideration of the limitations of the data to be put into the computer record when it was set up which lead to some extra accident types especially those for bicycles and trams.

The accident-type has to be able to be related to the counter-measure and vice versa and the assignment of accident-types must be consistent (or at least clearly stated) even if say the geometry of an intersection is changed by a roundabout being installed. Some of the systems of accident-types described in this section differ only by the extent to which the accident types are subdivided and the lack, in the published material of definitions for the accident types used. In some instances the lack of subdivisions will lead to a lack of understanding of existing accident problems and/or the effect of countermeasures.

Thus accident-types can be viewed as a continuum from the crudest subdivision e.g. multi-vehicle accident and single vehicle accident with no guidelines on how to classify into even these two subdivisions; through multiple subdivisions and the introduction of guidelines and definitions; to systems which intend to encapsulate the concepts of the collision diagram either by work or symbol. The following review covers some systems of accident-types which have few subdivisons but are reasonable well defined and generally intended for broad statistics, and some systems with many subdivisions which can be utilised in research as well as being aggregated for broad statistics.

See Figure 8.2.1.1 below:-

I



II

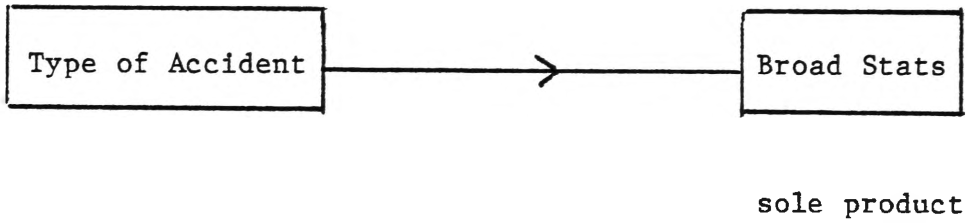


Figure 8.2.1.1 The place of detailed Accident-types

In American National Standard D1601-1970 (NSC. 1970) the following is said in relation to classification by types "the type classification for motor vehicle traffic accidents applies to the nature of the accident and the location of the motor vehicle in relation to the roadway at the time of the first injury or damage-producing event. This classification establishes categories to describe the nature of the accident". "Every motor vehicle traffic accident consists of a series of events. In classification by type, one of these events must be selected before further classification can be made. This event must be one which can be easily determined by whomsoever classifies the accident report from information about what occurred in the accident. For uniformity in classification, the event to be selected is the first injury or damage-producing event that can be determined to have have happened in the accident, such as overturning, catching on fire, or collision." Eleven mutually exclusive categories describing the nature of the accident are applicable to both on and off-roadway accidents. Here 'roadway' is defined to have a meaning similar to 'carriageway' in the Victorian Regulations and the National Road Traffic Code (Australia) except that 'roadway' excludes - 'shoulders' whereas carriageway includes them.

The eleven categories are -

A. Non-collision involving a motor vehicle in transport

1. Overturning
2. Other non-collision

B. Collision between a motor vehicle in transport and

3. Pedestrian
4. Motor vehicle in transport
5. Motor vehicle on other roadway
6. Parked motor vehicle
7. Railway train

8. Pedal cyclist

9. Animal

10. Fixed object

11. Other object

(5 which is perhaps not so obvious, includes - crossing median and colliding on opposite roadway).

This 1970 edition was a major revision of the previous edition (1962) and the Manual has existed in various editions for about 20 years prior to that including the period when it was known as Uniform Definitions of Motor Vehicle Accidents (1942).

Each of these eleven categories has a definition which generally gives the inclusions and exclusions, however the categories are not further subdivided. This is no doubt due to the purpose of the Manual being to promote uniformity and comparability of motor vehicle accident statistics rather than satisfy the needs of engineering investigations or safety research.

The "Merkblatt fur die Auswertung von Straßenverkehrs - unfallen, 1974" includes a manual for determining accident-types. It is expressed that the accident-type denotes the traffic event leading to the conflict situation which results in the accident. For the final determination of the accidnet type only the conflict situation is used, why and how the participants collide is not of significance and the relative blame of the participants (i.e. "accident cause") plays no part in the priciple of accident types.

There are seven broad accident-types as follows -

1. run off road

2. making turn

3. turning/crossing

4. conflicts involving pedestrians

5. accidents with stationary traffic

6. traffic lanes

7. other accidents

One of the earliest mentions of a detailed code (that the writer found) was in the 'Manual on the Uses of Traffic Accident Records' (1947) which said that "some agencies have very detailed codes which permit the recording of directional analyses, and other information not usually coded. The Oregon Highway Department, for example, codes data which permit the construction of accident collision diagrams directly from tabulated cards".

The State of New York has utilised 'directional analyses' as part of its system and includes them in its annual statistics (New York, DMV 1972, pp.13-20). Diagrams illustrate each of the directional analysis types and Figure 8.2.1.2 shows some of them.

Crowther (1967) described the accident-type coding used in the County of Hampshire. There were eleven multi-vehicle types and all single-vehicles accidents were grouped together. Seven suffix codes were available. See Figure 8.2.1.3.

Hotchkiss (1969) described the four-column alpha code used in N.S.W. to describe the movements of each of the pedestrians or vehicles concerned.

For example - CNSA = Car travelling North moving Straight Ahead

Andreassend (1970a) described the accident type classification known as "Road User Movement" (RUM) introduced for coding the 1968 accidents in Metro-Melbourne, see Figure 8.2.1.4.

Kritz (1970) outlined the system of accident-types used since 1 Jan 1966 by the Swedish Central Bureau of Statistics. He said "classify the accidents according to the traffic situations in which they occur and thereby obtaining a description of the situations the road users have difficulty in mastering. The leading principle should be to let the vehicle's or road user's position or behaviour immediately before the accident determine to which type the accident should belong. It is the manoeuvres leading up to the accident ... that constitute the grounds for the classification system". See Figure 8.2.1.5 for Kritz's code.

Palmer (1971) illustrated the "vehicle movement coding sheet" used in New Zealand, the chart has 15 main codes and a total of 82 codes (including an "other" for each main code). See Figure 8.2.1.6, this coding (which was a revised version of one in use since 1965) was being introduced at the same time that a new report form was being issued. In addition to the two-column alpha code to describe 'Vehicle Movement Coding', four other columns are available to describe the two vehicle types involved, the direction of the key vehicle (north, south, east or west) and any third vehicle type involved. The direction of the key vehicle is coded according to whether it was on the first mentioned or second mentioned road on the report. The "Vehicle Movement" type is utilised in the published annual statistics.

	DIRECTIONAL ANALYSIS Two Motor Vehicles - At Inter.		TOTAL	%
6	Entering at angle		60033	42
7	SAME DIRECTION	Both moving straight	7233	5
8		One straight - One turning	11600	8
9		One stopped	37498	27
		All others	907	1
10	OPPOSITE DIRECTION	Both moving straight	2720	2
11		One straight - One left	13773	10
12		One stopped	693	*
		All others	390	*
		Not Reported	155	*
13	All others, Backing, Parked cars		6633	5
	SUB-TOTALS		141635	100

*Under ½ percent

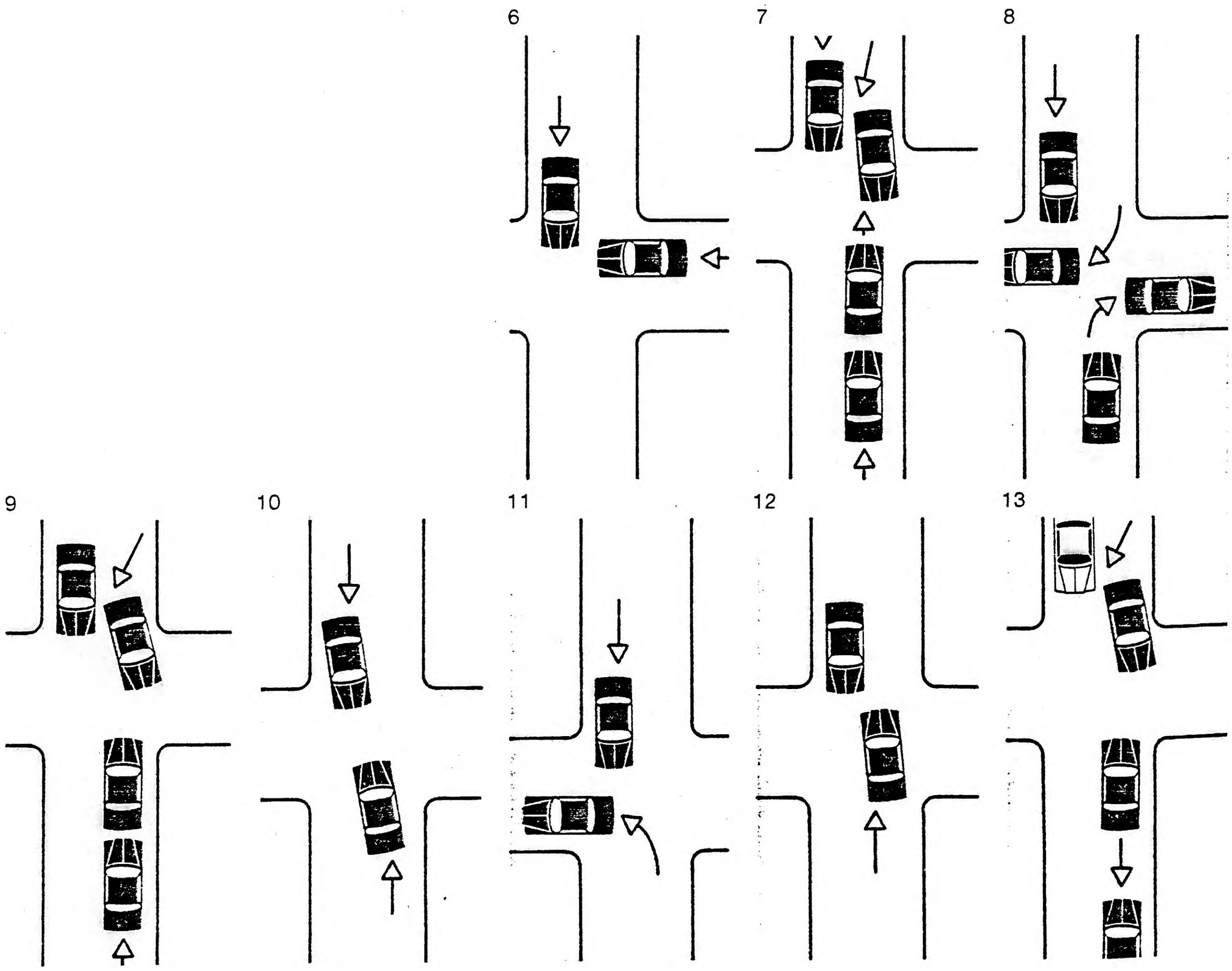


Figure 8·2·1·2 State of New York DMV - sample of accident types

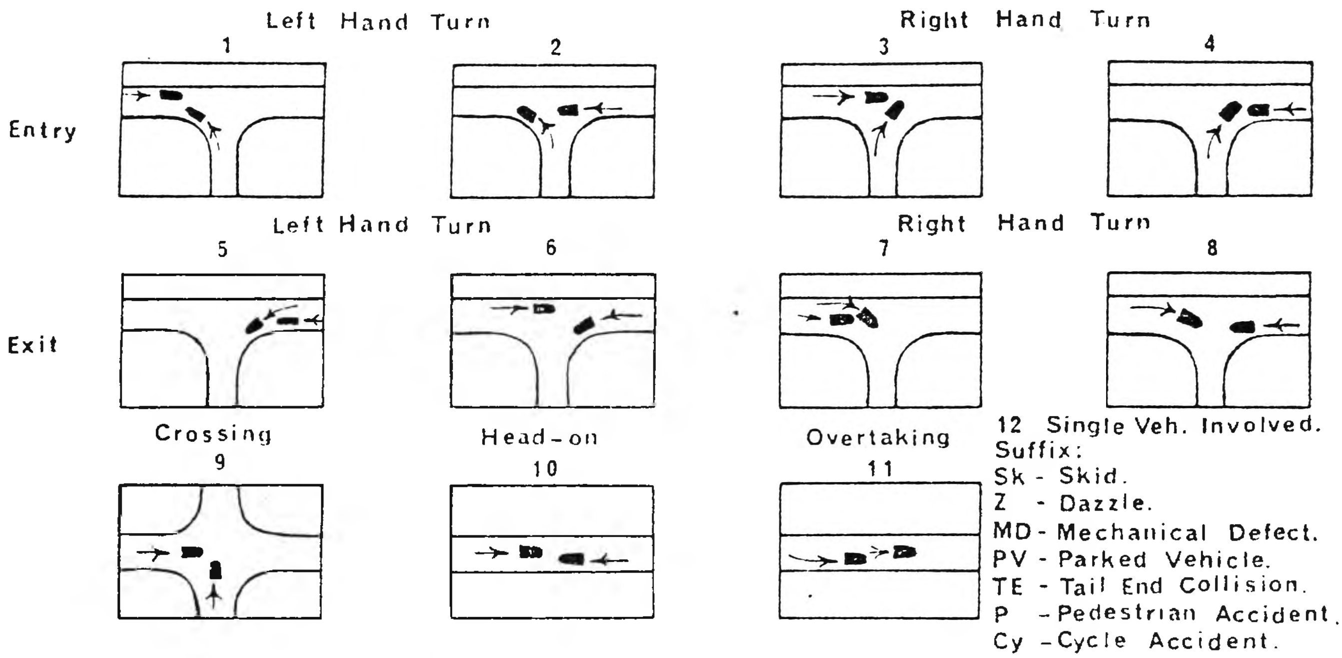


Figure 8·2·1·3 Hampshire accident types

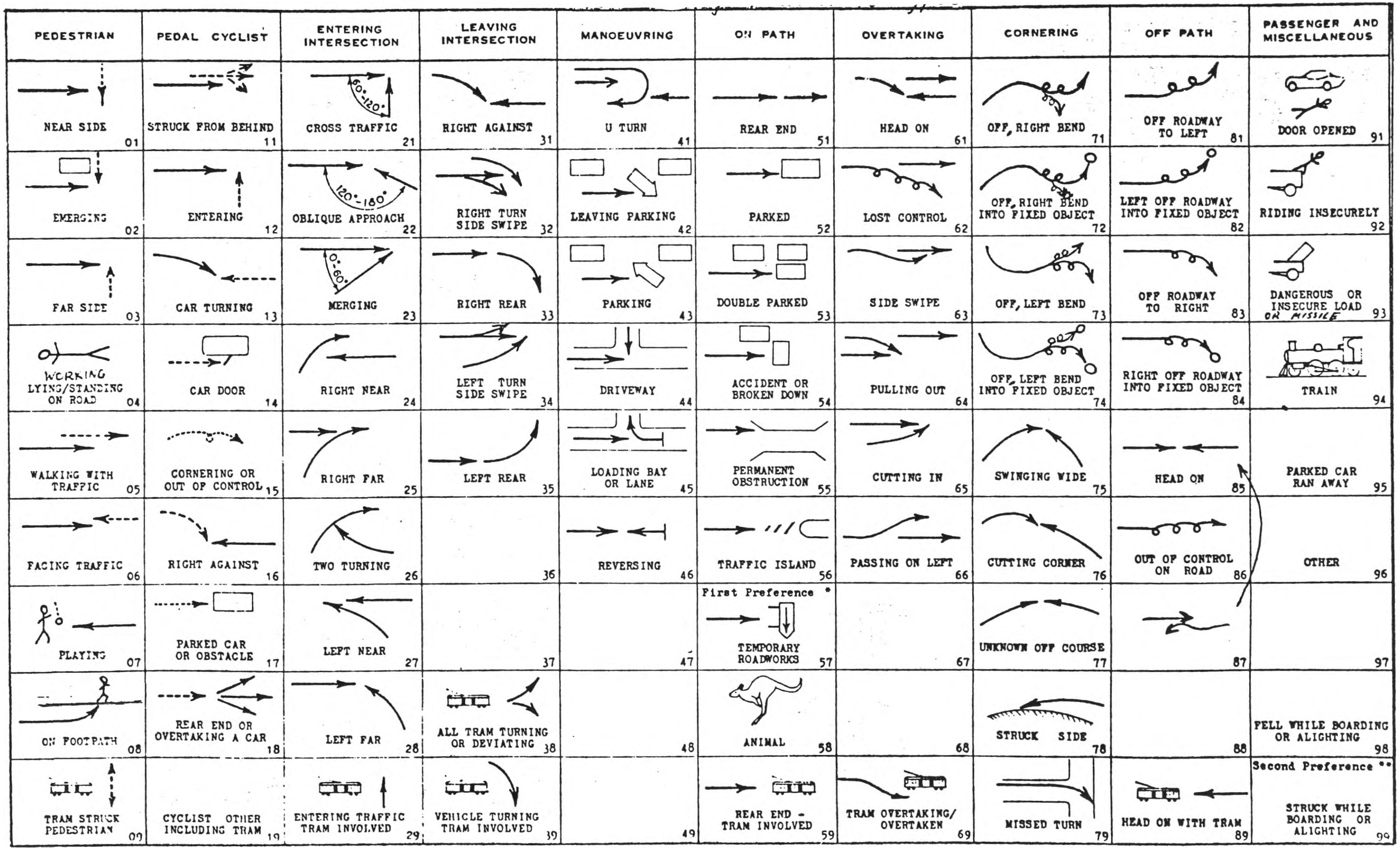


Figure 8.2.1.4 Early 1968 Codes

I	II	III	IV	V Temporary traffic disturbance
0 Motorvehicle (Single) Forwards	0	1 Without turn 2 With turn	0 1 "U-Turn" 2 To or from side road 3 To or from parking-place etc. 4 To or from roadway leading to house etc.	0, 1, 2, or 9
0 Backing	0	0	0	0, 1, 2 or 9
1 Cycle or moped (Single)	do. 0	do. 0	do. 0	do. 0
2 Other vehicle (Single) Forwards	do. 0	do. 0	do. 0	do. 0
2 Backing	0	0	0	0, 1, 2 or 9
3 Motor-vehicle - Motor-vehicle				0 No disturbance
Both forwards				1 Roadway partly blocked or object on roadway
On same road				
Without turn				2 Parked vehicle
Same direction	1 (Overtaking)	0	0	3 Pedestrian (passive) on roadway
	2 (Change of lane)	0	0	
	3 (Rear-end)	0	0	4 Moped or cycle (passive) on roadway
Opposite direction	4 (Head-on)	0	0	
With turn		3 Left turn	1-4	5 Turning vehicle
Same direction	5 (Turn)	4 Right turn		6 Vehicle from side road
		5 Intersecting courses		
Opposite direction	6 (Turn)	6 Converging courses	1-4	7 Vehicle in opposite direction
		7 Other courses		8 Vehicle in same direction
On different roads				
Without turn	7 (Intersection)	0	0	9 Other
		5 Intersecting courses		
With turn	8	6 Converging courses	1-4	
		7 Other courses		
Other	9 (Other)	0	0	
3 Backing	0	0	0	0
4 Motor vehicle - cycle or moped	do. 3	do. 3	do. 3	do. 3
5 Motor vehicle - other vehicle	do. 3	do. 3	do. 3	do. 3
6 Motor vehicle - pedestrian Motor vehicle forwards KDS	0	5 Intersecting courses 7 Other courses 9 Other	0 5 Same direction Ped. on left side 6 Same direction Ped. on right side 7 Opposite direction Ped. on left side 8 Opposite direction Ped. on right side	0-9
6 Backing	0	0	0	0
7 Motor vehicle - animal	0	0	0	0
8 Trackbound vehicle - other traffic element	do. 3	do. 3	do. 3	do. 3
9 Other				

Figure 8.2.1.5 Kritz's codes

NZ 1970

VEHICLE MOVEMENT CODING SHEET

	TYPE	A	B	C	D	E	F	G	O
A	Over-taking	Pulling Out	Head on	Cutting In	Lost Control	Left Turn			Other
B	Head On	Head On (On Straight)	Cutting Corner	Swinging Wide					Other
C	Lost Control or Off Road	Out of Control on Roadway	Off Roadway to Left	Off Roadway to Right					Other
D	Corner-ing	Lost Control Turning Right	Lost Control Turning Left	Missed In-tersection					Other
E	Collision with Obstruc-tions	Parked Vehicle	Accident or Broken Down	Non-Vehicular Obstruc-tions					Other
F	Rear End	Slow Vehicle	Stopping for cross Traffic	Sto[illegible] f[illegible] Pedes[illegible]rian	In Queue (2 or more)	Stopping for Signals			Other
G	Turning vs Same Direction	Rear of Left Turn Vehicle	Left Turn Side Swipe	Stopped or Turning from Left Side	Near Centre Line	Overtaking Vehicle			Other
H	Crossing (No Turns)	Right Angle (70° to 110°)	Acute Angle	Obtuse Angle					Other
J	Crossing (Vehicle Turning)	Right Turn Right Side	Right Turn Left Side	Two Turning	Left Turn Left Side	Left Turn Right Side			Other
K	Merging	Left Turn In	Right Turn In	Two Turns					Other
L	Right Turn Against	Stopped Waiting to Turn	Making Turn						Other
M	Manoeuvr-ing	Parking or Leaving	'U' Turn	Reversing	Driveway Manoeuvre				Other
N	Pedest-rians Crossing Road	Left Side	Right Side	Left Turn Left Side	Right Turn Right Side	Left Turn Right Side	Right Turn Left Side		Other
P	Pedest-rians Other	Walking With Traffic	Walking Facing Traffic	Walking on Footpath	Child Playing (Tricycle)	Attending to Vehicle	Entering or Leaving Vehicle		Other
Q	Miscellan-eous	Fell While Boarding or Alighting	Fell from Vehicle	Train	Parked Vehicle Ran Away				Other

Figure 8.2.1.6

8.2.1.2 The Uses of a detailed Accident-types

The first and most obvious use of detailed accident types is in the replacement of the collision-diagram sketches in the automatic searching and ranking of high accident frequency locations.

However a use that should be made before the search for high accident types is that of determining the most frequent accident-types in a country/a state/a region and determining a priority program for accident reduction - specific cures for specific problems (see Chapter 9 for the use of accident type combined with location descriptors).

The accident-type was used in analysing the effects of compulsory seat belt wearing in Victoria (Andreassend 1972). This enabled the varying effect by accident-type to be seen. The greatest benefits of the belts was seen in the 'Head-on' type collisions (apparent reduction 49%), 'Off-road into fixed object' (35%), 'Rear end' collisions (30%), and 'Right angle' collisions (25%). The overall effect for all accident types was an apparent reduction of 28%. Thus a conclusion could be drawn that given the great number of right-angle accidents that if vehicle design changes could be made to give greater lateral protection it would enhance the effect of the belts (i.e. more deceleration distance provided so that it was equivalent to that provided by the deformation of the front of a car in a head-on impact).

Accident-type was used in combination with road type to examine the distribution of 'parked rear end' [RUM 52] and 'moving rear end' [RUM 51, 37] accidents at night on various classes of road to assess various possible remedies for these accidents (Andreassend, 1976b). The data showed 'Moving rear end' accidents to be concentrated on arterials whereas the 'Parked rear end' accidents were still a marked problem in local streets.

The data is given below -

Table 8.2.1.1 Types of Rear-End accident by Road Type

	Moving Rear-End	Parked Rear-End	Total
Arterial	86%	50%	71%
Sub-arterial	11	25	17
Local	3	25	12
	100%	100%	100%

The location and accident-type systems were used to evaluate the effects of introducing a priority road system on 3000 km of road in Metro-Melbourne in 1975. The results were reported by Andreassend (1977), and Daltrey, Howie and Randall (1978).

The latter paper showed a decrease in RUM 20's on those roads that sign control had been applied to and an increase at intersections involving road types that had not had any sign control applied during the program (this last group being local roads).

As stated earlier the use of detailed accident-types is in the chain - accident types, collision diagram, pattern evaluation, appropriate countermeasure. However the collision diagram, per se, is not always needed as the preceding examples show that accident types can be used in many analytical situations. The non-use of detailed accident-types will lead to a lack of understanding of existing accident problems and/or the real effect of countermeasures.

8.2.2 The Victorian Accident-type classification

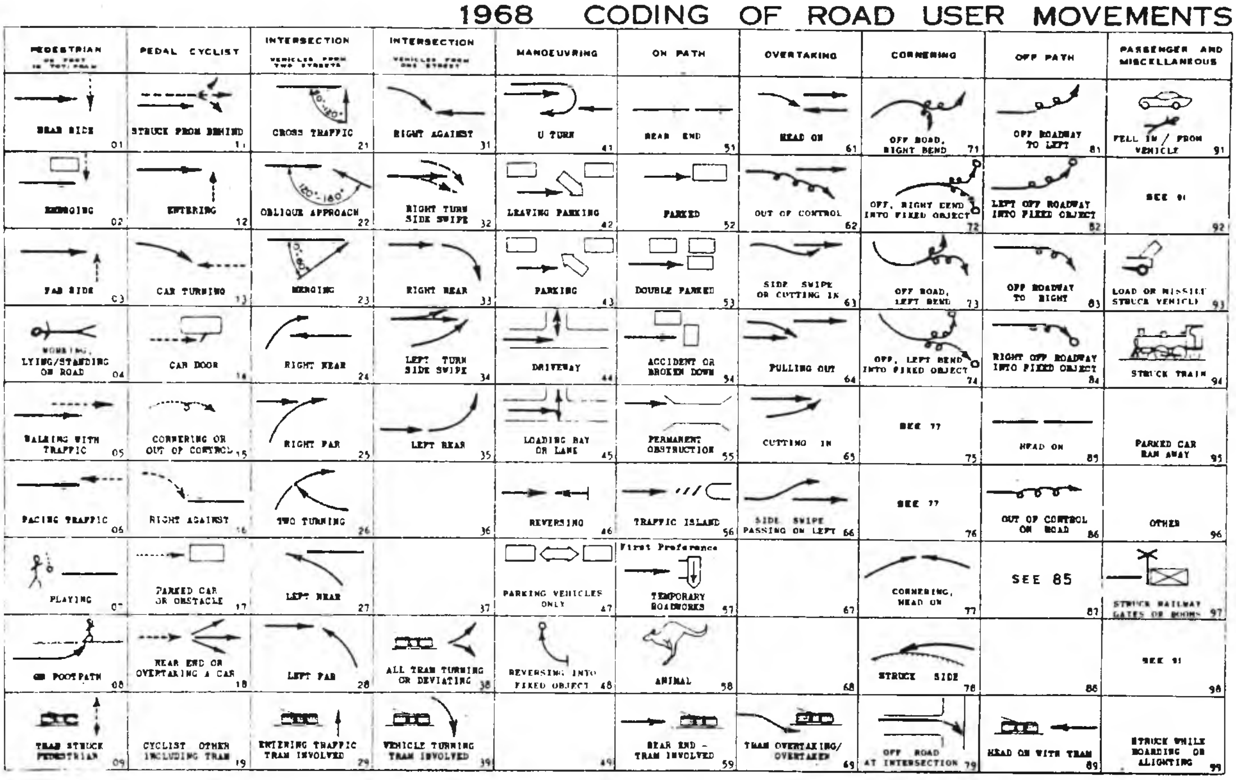
8.2.2.1 History of Coding changes

The accident-type coding known as Road User Movement (RUM) was introduced by the Writer into the accident location and details system as it was formulated in 1968. The system started in 1968 on 1968 accident forms but used only a few staff and it was not until June 1970 that formal computer output was available.

The following diagrams (see Figures 8.2.2.1 to 8.2.2.2) illustrate the initial changes. The RUM is described by a two-digit number on a chart that had 9 x 10 (90) cells. Originally there were 80 cells used, then four new cells were added and then five cells were deleted by combining them with other cells, so by the end of 1968 there were 79 cells in use.

During the 1969 coding a major change took place which added an "I" or a "M" to some of the cells to indicate that they should be occurring only at intersections or mid blocks (links) respectively. Four new cells were added two of which were due to the I & M separation and one other cell was modified by having one additional direction incorporated. During 1969 there were 83 cells in use.

1968 CODING OF ROAD USER MOVEMENTS

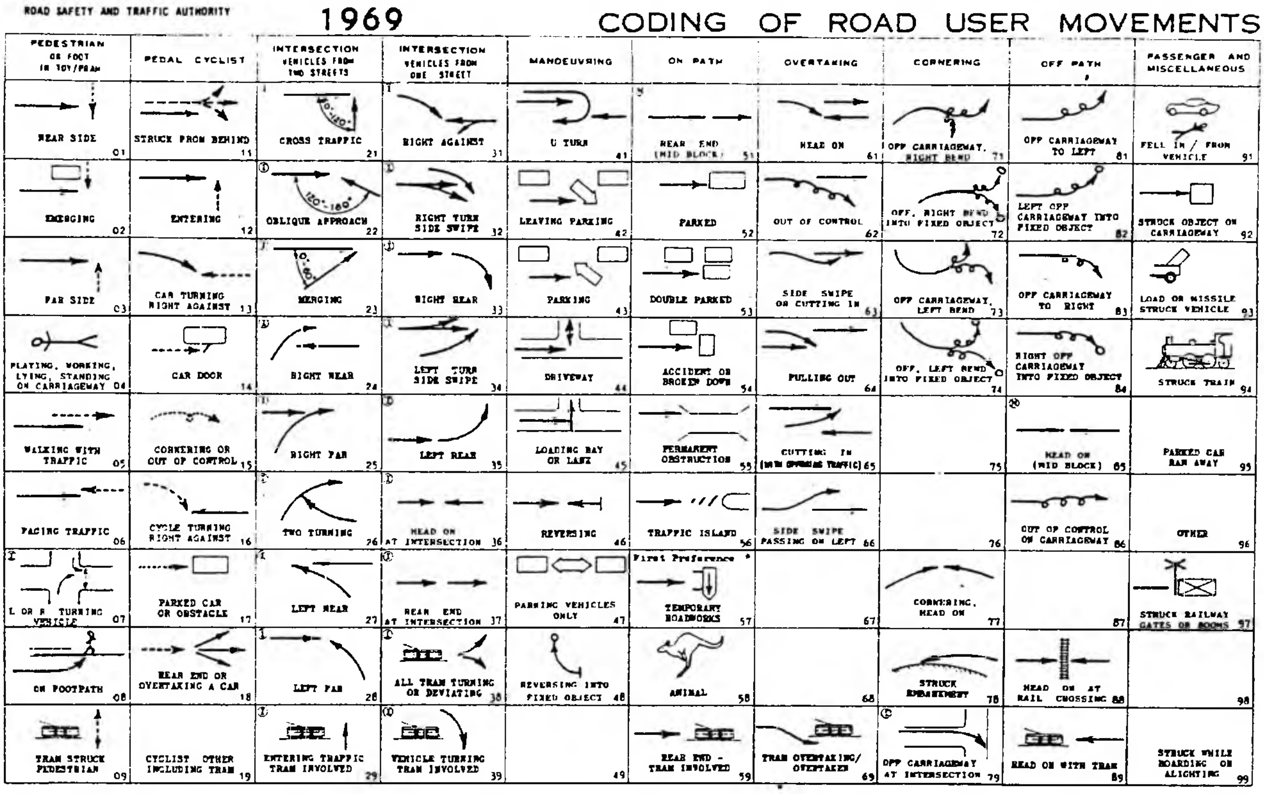


1. ROAD USER MOVEMENT IS CLASSIFIED FIRST BY THE COLUMN HEADINGS ALONG THE TOP OF THE CHART, AND THEN BY THE DIAGRAMATIC SUBDIVISIONS WITHIN THE COLUMN.

2. THE SUBDIVISION CHOSEN DESCRIBES AS ACCURATELY AS POSSIBLE THE GENERAL MOVEMENT EXECUTED BY THE VEHICLES HAVING THE INITIAL COLLISION. IT DOES NOT DESCRIBE THE CAUSE OF THE ACCIDENT; E.G. A CAR MIGHT CUT INTO A TRAFFIC STREAM AND WHILE NOT ACTUALLY COLLIDING WITH ANY VEHICLE, CAUSE ANOTHER VEHICLE TO RUN OFF THE ROAD. THIS HAS BEEN CODED AS "81, OFF ROADWAY TO LEFT".

3. PRIORITY HAS BEEN GIVEN TO 57, THEN TO SUBDIVISIONS IN NUMERICAL ORDER.

Figure 8·2·2·1 1968 codes



1. ROAD USER MOVEMENT SHOULD BE CLASSIFIED FIRST BY THE WRITTEN DIVISIONS ALONG THE TOP OF THE PAGE AND THEN BY THE THE DIAGRAMATIC SUBDIVISIONS.

2. THE SUBDIVISION CHOSEN SHOULD DESCRIBE AS ACCURATELY AS POSSIBLE THE GENERAL MOVEMENT EXECUTED BY THE VEHICLES HAVING THE INITIAL COLLISION. IT SHOULD NOT DESCRIBE THE CAUSE OF THE ACCIDENT: A CAR MIGHT CUT INTO A TRAFFIC STREAM AND WHILE NOT ACTUALLY COLLIDING WITH ANY VEHICLE, CAUSE ANOTHER VEHICLE TO RUN OFF THE ROAD. THIS SHOULD BE CODED AS "81, OFF ROADWAY TO LEFT".
IF THE CAR COLLIDED WITH THE OTHER VEHICLE WHEN CUTTING IN, IT SHOULD BE CODED AS "65, CUTTING IN".

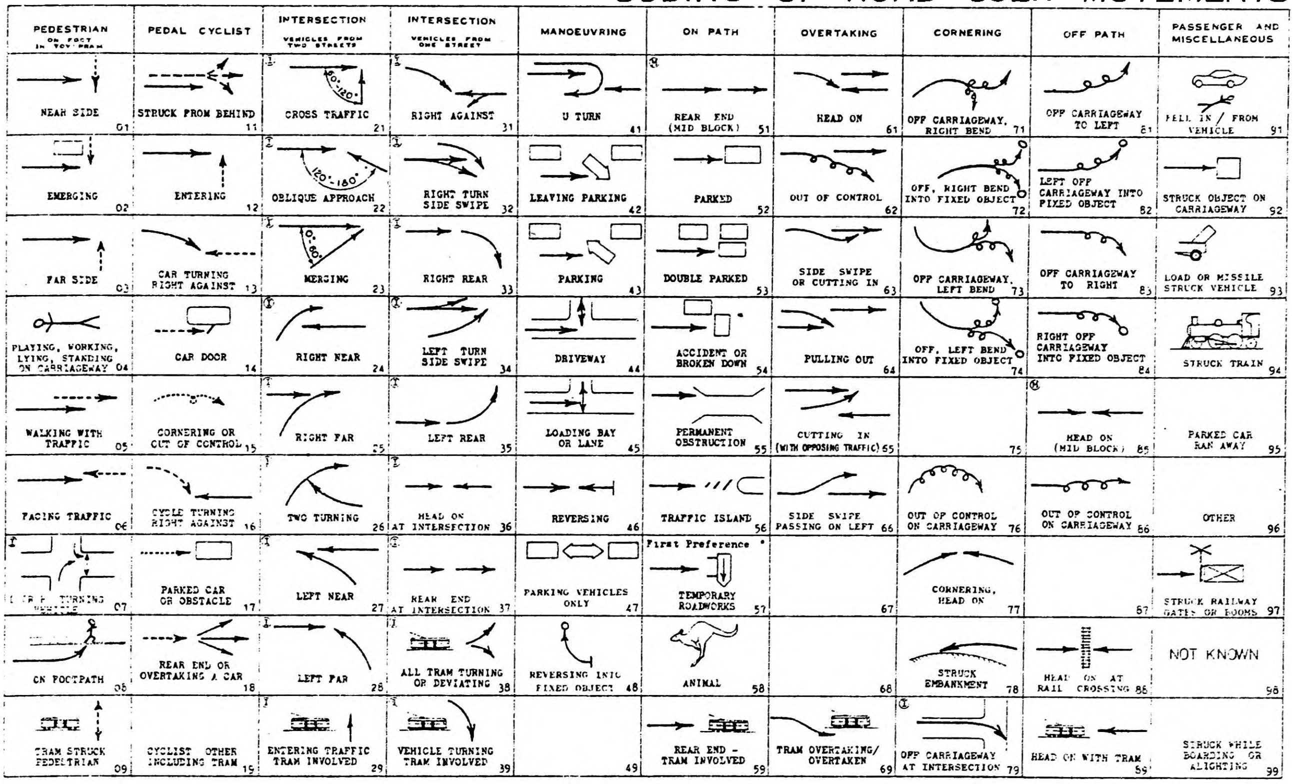
3. PRIORITY SHOULD BE GIVEN TO 57, THEN TO SUBDIVISIONS IN NUMERICAL ORDER.

4. ROAD USER MOVEMENTS MARKED (I) OR (M) MUST BE USED ONLY AT INTERSECTIONS OR MIDBLOCKS RESPECTIVELY.

Figure 8·2·2·2 1969 Codes

ROAD SAFETY AND TRAFFIC AUTHORITY

CODING OF ROAD USER MOVEMENTS



1. ROAD USER MOVEMENT SHOULD BE CLASSIFIED FIRST BY THE WRITTEN DIVISIONS ALONG THE TOP OF THE PAGE AND THEN BY THE DIAGRAMATIC SUBDIVISIONS.
2. THE SUBDIVISION CHOSEN SHOULD DESCRIBE AS ACCURATELY AS POSSIBLE THE GENERAL MOVEMENT EXECUTED BY THE VEHICLES HAVING THE INITIAL COLLISION. IT SHOULD NOT DESCRIBE THE CAUSE OF THE ACCIDENT. A CAR MIGHT CUT INTO A TRAFFIC STREAM AND WHILE NOT ACTUALLY COLLIDING WITH ANY VEHICLE, CAUSE ANOTHER VEHICLE TO RUN OFF THE ROAD. THIS SHOULD BE CODED AS '81, OFF ROADWAY TO LEFT'. IF THE CAR COLLIDED WITH THE OTHER VEHICLE WHEN CUTTING IN, IT SHOULD BE CODED AS '63, CUTTING IN'.
3. PRIORITY SHOULD BE GIVEN TO 01, THEN [illegible] SUBDIVISIONS IN NUMERICAL ORDER.
4. ROAD USER MOVEMENTS MARKED I OR M MUST BE USED ONLY AT INTERSECTIONS OR MIDBLOCKS RESPECTIVELY.

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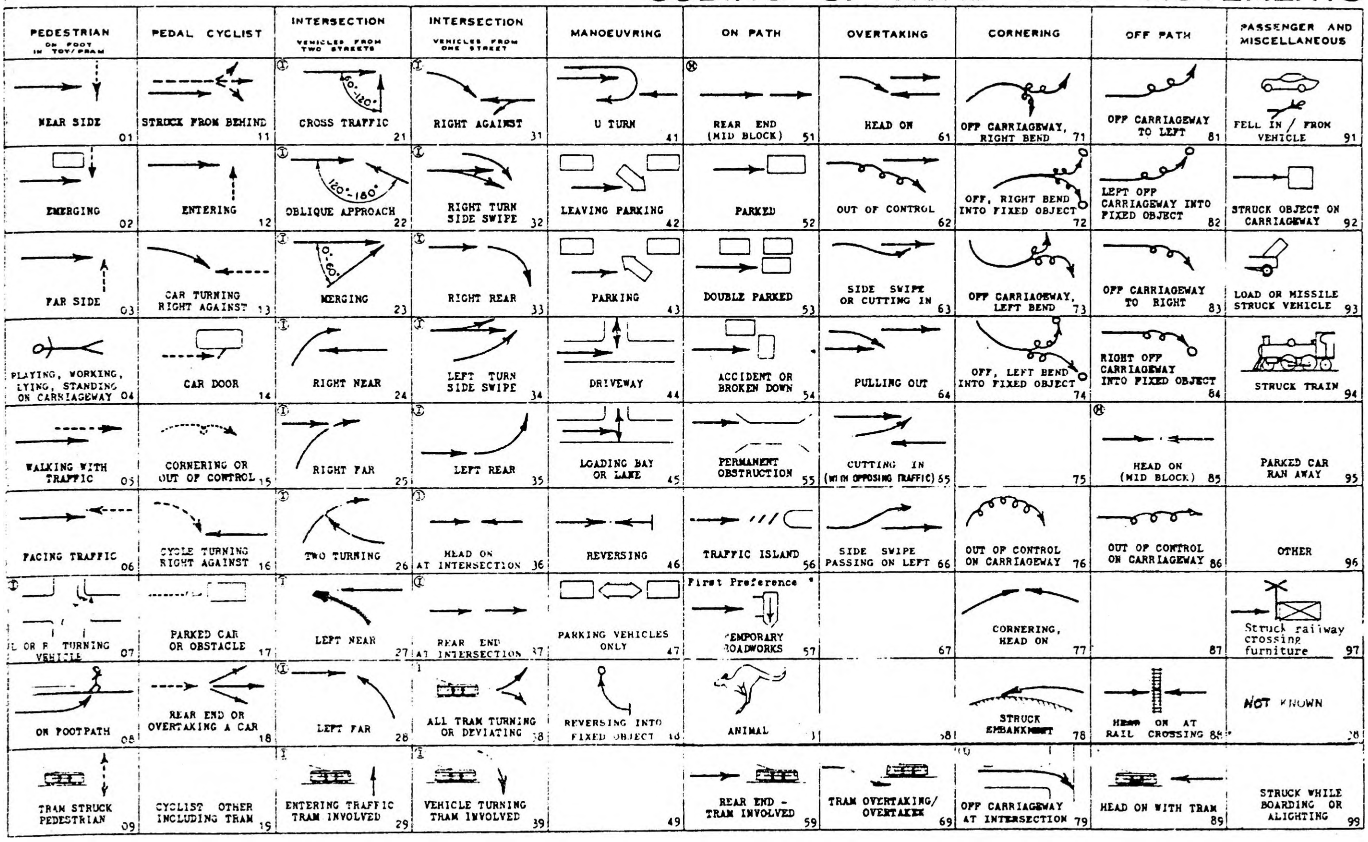
Figure 8.2.2.3 Codes used 1970 – 74

ROAD SAFETY AND TRAFFIC AUTHORITY

CODING OF ROAD USER MOVEMENTS



DATE OF ISSUE : 1/1/75

Figure 8.2.4 Codes used 1975-76

ROAD SAFETY AND TRAFFIC AUTHORITY

CODING OF ROAD USER MOVEMENTS.

Figure 8.2.2.5 Codes used 1979— codes 1977/78 same except "other" cells

PEDESTRIAN On foot in toy/pram	PEDAL CYCLIST	INTERSECTION Vehicles from two streets	INTERSECTION Vehicles from one street	MANOEUVRING	ON PATH	OVERTAKING	CORNERING	OFF PATH	PASSENGER AND MISCELLANEOUS
NEAR SIDE 01	STRUCK FROM BEHIND 11	CROSS TRAFFIC 21	RIGHT AGAINST 31	U TURN 41	REAR END (mid block) 51	HEAD ON 61	OFF CARRIAGEWAY RIGHT BEND 71	OFF CARRIAGEWAY TO LEFT 81	FELL IN/FROM VEHICLE 91
EMERGING 02	ENTERING 12	OBLIQUE APPROACH 22	RIGHT TURN SIDE SWIPE 32	LEAVING PARKING 42	PARKED 52	OUT OF CONTROL 62	OFF RIGHT BEND INTO FIXED OBJECT 72	LEFT OFF CARRIAGEWAY INTO FIXED OBJECT 82	STRUCK OBJECT ON CARRIAGEWAY 92
FAR SIDE 03	CAR TURNING RIGHT AGAINST 13	MERGING 23	RIGHT REAR 33	PARKING 43	DOUBLE PARKED 53	SIDE SWIPE OR CUTTING IN 63	OFF CARRIAGEWAY LEFT BEND 73	OFF CARRIAGEWAY TO RIGHT 83	Vehicle struck ① LOAD OR MISSILE STRUCK VEHICLE 93
PLAYING, WORKING, LYING STANDING ON CARRIAGEWAY 04	CAR DOOR 14	RIGHT NEAR 24	LEFT TURN SIDE SWIPE 34	DRIVEWAY 44	ACCIDENT OR BROKEN DOWN 54	PULLING OUT 64	OFF LEFT BEND INTO FIXED OBJECT 74	RIGHT OFF CARRIAGEWAY INTO FIXED OBJECT 84	Vehicle - ① STRUCK TRAIN 94
WALKING WITH TRAFFIC 05	CORNERING OR OUT OF CONTROL 15	RIGHT FAR 25	LEFT REAR 35	LOADING BAY OR LANE 45	PERMANENT OBSTRUCTION 55	CUTTING IN (with opposing traffic) 65	75	Ⓜ Wrong side - ① Other - ② HEAD ON (mid block) 85	Vehicle - ① PARKED CAR RUN AWAY 95
FACING TRAFFIC 06	CYCLE TURNING RIGHT AGAINST 16	TWO TURNING 26	① Wrong side - ① Other - ② HEAD ON AT INTERSECTION 36	REVERSING 46	TRAFFIC ISLAND 56	SIDE SWIPE PASSING ON LEFT 66	OUT OF CONTROL ON CARRIAGEWAY 76	OUT OF CONTROL ON CARRIAGEWAY 86	OTHER 96
L or R TURNING VEHICLE 07	PARKED CAR OR OBSTACLE 17	LEFT NEAR 27	REAR END AT INTERSECTION 37	PARKING VEHICLES ONLY 47	First Preference * TEMPORARY ROADWORKS 57	67	Wrong side - ① Other - ② CORNERING HEAD-ON 77	87	STRUCK RAILWAY XING FURNITURE 97
ON FOOTPATH 08	REAR END OR OVERTAKING CAR 18	LEFT FAR 28	① Tram - ① Other - ② ALL TRAM TURNING OR DEVIATING 38	REVERSING INTO FIXED OBJECT 48	ANIMAL 58	68	STRUCK EMBANKMENT 78	Wrong side - ① Other - ② HEAD ON AT RAIL CROSSING 88	NOT KNOWN 98
TRAM STRUCK PEDESTRIAN 09	Cyclist - ① Other - ② CYCLIST OTHER INCLUDING TRAM 19	ENTERING TRAFFIC TRAM INVOLVED 29	VEHICLE TURNING TRAM INVOLVED 39	49	REAR END - TRAM INVOLVED 59	TRAM OVERTAKING/ OVERTAKEN 69	① (Not used after 1978) OFF CARRIAGEWAY AT INTERSECTION 79	HEAD ON WITH TRAM 89	Vehicle - ① STRUCK WHILE BOARDING OR ALIGHTING 99
OTHER 00	SEE 19	OTHER 20	OTHER 30	OTHER 40	OTHER 50	OTHER 60	OTHER 70	OTHER 80	SEE 96

1 Road User Movement should be classified first by the written divisions along the top of the page and then by the diagramatic subdivisions
2 The subdivision chosen should describe as accurately as possible the general movement executed by the vehicles having the initial collision. It should not describe the cause of the accident. A car might cut into a traffic stream and while not actually colliding with any vehicle, cause another vehicles to run off the road. This should be coded as 81 Off roadway to left. If the car collided with the other vehicle when cutting in, it should be coded as 65, Cutting in
3 Priority should be given to 57, then subdivisions in numerical order
4 Road User Movements marked ① or Ⓜ must be used only at intersections or midblocks respectively
5 The numbers ① and ② indentify individual vehicles involved in the initial event when R.U.M is linked with other driver / vehicle information.

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PEDESTRIAN	PEDAL CYCLIST	ENTERING INTERSECTION	LEAVING INTERSECTION	MANOEUVRING	ON PATH	OVERTAKING	CORNERING	OFF PATH	PASSENGER AND MISCELLANEOUS
NEAR SIDE 01	STRUCK FROM BEHIND 11	CROSS TRAFFIC (60°–120°) 21	RIGHT AGAINST 31	U TURN 41	REAR END 51	HEAD ON 61	OFF, RIGHT BEND 71	OFF ROADWAY TO LEFT 81	DOOR OPENED 91
EMERGING 02	ENTERING 12	OBLIQUE APPROACH (120°–160°) 22	RIGHT TURN SIDE SWIPE 32	LEAVING PARKING 42	PARKED 52	LOST CONTROL 62	OFF, RIGHT BEND INTO FIXED OBJECT 72	LEFT OFF ROADWAY INTO FIXED OBJECT 82	RIDING INSECURELY 92
FAR SIDE 03	CAR TURNING 13	MERGING (0°–60°) 23	RIGHT REAR 33	PARKING 43	DOUBLE PARKED 53	SIDE SWIPE 63	OFF, LEFT BEND 73	OFF ROADWAY TO RIGHT 83	DANGEROUS OR INSECURE LOAD or MISSILE 93
WORKING LYING/STANDING ON ROAD 04	CAR DOOR 14	RIGHT NEAR 24	LEFT TURN SIDE SWIPE 34	DRIVEWAY 44	ACCIDENT OR BROKEN DOWN 54	PULLING OUT 64	OFF, LEFT BEND INTO FIXED OBJECT 74	RIGHT OFF ROADWAY INTO FIXED OBJECT 84	TRAIN 94
WALKING WITH TRAFFIC 05	CORNERING OR OUT OF CONTROL 15	RIGHT FAR 25	LEFT REAR 35	LOADING BAY OR LANE 45	PERMANENT OBSTRUCTION 55	CUTTING IN 65	SWINGING WIDE 75	HEAD ON 85	PARKED CAR RAN AWAY 95
FACING TRAFFIC 06	RIGHT AGAINST 16	TWO TURNING 26	36	REVERSING 46	TRAFFIC ISLAND 56	PASSING ON LEFT 66	CUTTING CORNER 76	OUT OF CONTROL ON ROAD 86	OTHER 96
PLAYING 07	PARKED CAR OR OBSTACLE 17	LEFT NEAR 27	37	47	First Preference * TEMPORARY ROADWORKS 57	67	UNKNOWN OFF COURSE 77	87	97
ON FOOTPATH 08	REAR END OR OVERTAKING A CAR 18	LEFT FAR 28	ALL TRAM TURNING OR DEVIATING 38	48	ANIMAL 58	68	STRUCK SIDE 78	88	FELL WHILE BOARDING OR ALIGHTING 98
TRAM STRUCK PEDESTRIAN 09	CYCLIST OTHER INCLUDING TRAM 19	ENTERING TRAFFIC TRAM INVOLVED 29	VEHICLE TURNING TRAM INVOLVED 39	49	REAR END - TRAM INVOLVED 59	TRAM OVERTAKING/OVERTAKEN 69	MISSED TURN 79	HEAD ON WITH TRAM 89	Second Preference ** STRUCK WHILE BOARDING OR ALIGHTING 99

Figure 8.2.2.6 Early 1968 Codes

In 1970 two further cells were added bringing the number to 85, this chart was then used for 1971, '72, '73 and '74. In 1975 there was a minor expansion of a cell to include collisions with all rail crossing furniture (not just gates and booms), the chart was then continued for 1976.

In 1977 a major addition occurred, when vehicle 1/vehicle 2 identification was added to each cell which permitted the types of vehicle and the occupants as reported on the form to be related to the individual vehicles depicted in the cell.

In 1979 an "other" cell was added to each column to allow for accidents which belonged to a column but did not "fit" any existing cell precisely. To complement this a description was produced of the accident type for each cell. [See Figures 8.2.2.1 to 8.2.2.6].

Table 8.2.2.1 - which follows, details the specific changes from 1968 - 1979.

Table 8.2.2.1 History of detailed RUM Coding Changes

1. 1968

Changes during 1968 (see Figure 8.2.2.1 and 8.2.2.6)

44 out only, made in or out
45 reversing in, made in or out

75 & 76 merged into 77 and renamed. (swinging wide, cutting corner) + (Unknown off course) → (cornering, head on)

87 added and deleted (absorbed into 85, head on)

92 (riding insecurely) merged with 91 (door opened) and renamed (fell in/from vehicle),
98 (fell while boarding or alighting) merged with 91

Added

47 parking vehicles only
48 reversing into fixed object

Name changes

62 lost control → out of control
63 side swipe → side swipe or cutting in
66 passing on left → side swipe passing on left

71 off, right bend → off road, right bend
73 off, left bend → off road, left bend
79 missed turn → off road at intersection

2. 1969

Changes during 1969
31 left-turn direction added to the straight ahead direction

Added
"I" and "M" codes
36 (head on at intersections)
37 (rear end at intersections)
88 (head on at rail crossing)
92 (struck object on carriageway)

Name Changes
71 off road, right bend → off carriageway, right bend
73 off road, left bend → off carriageway, left bend
81 off roadway to left → off carriageway to left
82 left off roadway into fixed object → left off carriageway into fixed object
83 roadway → carriageway
84 roadway → carriageway
85 head on → head on (mid block)
86 on road → on carriageway

3. 1970
Changes in 1970
65 cutting in → cutting in (with opposing traffic)

Added
76 out of control on carriageway
98 road user movement not known

4. 1971, 1972, 1973, 1974 as for 1970

5. 1975
97 struck railway gate or boom → struck railway crossing furniture

6. 1976 as for 1975

7. 1977

Added

Vehicle (1)/vehicle (2) identification introduced for each cell
31 right turn direction added to opposing movement

8. 1978 as for 1977

9. 1979

Added

- An "other" cell added for each column, to permit more appropriate filing within columns.
- Description for each cell introduced as a complement to the above.

8.2.2.2 Review of System (Pre-1979)

The system has been in operation for more than ten years. In 1975 the computer files were transferred from an IBM 1620 to a CDC 6600 computer which gave much greater scope for manipulations but surprisingly little has been done since that time. The only step was the vehicle 1/vehicle 2 identification which enabled a connection with the balance of the data on the accident form which was added to the computer file in 1975 (the original system used only nine (9) data items in addition to the street names).

Because the identification of vehicle 1/vehicle 2 has been added the restraint of allocating bicycle accidents to only eight defined cells can be removed. Similarly it is possible to describe tram accidents over a wider range of collision types.

The accident-type coding has lacked a description or definition for each cell because originally the number of people involved in the work was few and understanding of the concepts was easily checked; this was not the case when the number of coders trebled and it has been obvious, in retrospect, that varying emphases and interpretations would alter the consistency of coding over time. In order to assess the quality of the coding a sample was taken of eight cells which were amongst those with the highest cell frequencies. Also it was possible that over time the nature and frequency of accident types may have changed and that new cells were needed and some cells needed to be subdivided. The following cells were sampled from 1977 accident data:

RUM 33	(right rear)	Total No.	601
RUM 37	(rear end at intersection)		1024
RUM 44	(driveway)		958
RUM 51	(rear end, midblock)		1156
RUM 63	(sideswipe or cutting in)		502
RUM 64	(pulling out)		427
RUM 79	(off carriageway at intersection)		376
RUM 86	out of control		253

The sample sizes and analyses were as follows:

RUM 33, 50 forms were examined to decide whether the cell should be subdivided on the basis of the intended direction of the rear vehicle. This could not be determined since the detail for the rear vehicle was often incomplete.

RUM 37, 100 forms were examined to ascertain the accuracy of coding based on the origins of the vehicle (i.e., a possible miscoded 27). It was found that 83% happened on the approach side, 6% in the intersection and 10% on the departure side. Only in one case did the two vehicles not come from the same street (i.e., type 27 miscoded).

RUM 44, 50 forms were examined to determine the direction of the vehicle in the driveway. It was found that 77% of the vehicles were entering driveways and 23% of the involved vehicles were leaving the driveway. However of the vehicles entering driveways -

20% (10/50) of all the accidents were of a type equivalent to RUM 33 (right rear);

14% (7/50) were equivalent to RUM 31 (right against);

10% (5/50) were equivalent to RUM 32 (right turn sideswipe) and 6% (3/50) were equivalent to RUM 34 (left turn sideswipe).

Only 36% of the driveways were driveways to private residences.

RUM 51, 56 forms were examined to ascertain the accuracy of coding as a rear end type.

For 20/56, both vehicles were travelling straight ahead in the same lane (two vehicles only reported).

In 13/56 accidents, three or more vehicles were involved in rear end collision.

11/56 acidents involved two vehicles in the same lane but one was stationary.

9/56, the rear vehicle pulled out to overtake and hit the lead vehicle.

1/56, a RUM 66 (sideswipe passing on left) was altered to a RUM 51.

1/56, a RUM 76 (out of control) was changed to a RUM 51.

RUM 63, 50 forms were examined.

Only 1/50 represented genuine 'overtaking' (the name of the 60's column).

20/50 involved sideswiping.

23/50 involved lane changing to the left.

RUM 64, 50 forms were examined.

5/50 were "pulling-out" accidents.

8/50 involved sideswipes.

34/50 involved lane changing to the right.

RUM 79, 40 forms were examined and of these,

8/40 the vehicle went straight ahead from the stem at a tee junction.

7/40 the vehicle was turning right from the cross-bar at a tee and went off the road.

6/40 the vehicle was turning right at a cross intersection and went off the road on the far right.

5/40 the vehicle was turning left at a cross intersection and went off the road on the left.

3/40 the vehicle was turning left at a cross intersection and went off the road on the right.

4/40 the vehicle was turning left at a tee junction from the stem and went off the road.

RUM 86, 50 forms were examined to determine a definition of "out of control".

25/50 involved a single vehicle and it remained on the road, movement was generally straight ahead. (Examples were - rolled or skidded). (16 of these 25 were motorcycles).

21/50 involved a single vehicle but involved an object, the presence of another vehicle or a turning movement. (Examples were - hit kerb or median and lost control, attempted to avoid hitting another vehicle and then lost control, 9 of the 21 were motorcycles).

4/50 actually resulted in another moving vehicle being hit and was thus a multi-vehicle collision.

The conclusions from this study of samples were as follows:

RUM 33 - Leave as is.

RUM 37 - Leave as is, but stress use of vehicle origins to determine the accident-type.

RUM 44 - Convert to represent only vehicles leaving the driveway. Allow codes to be used to describe entering vehicle movements and add a supplementary code to denote driveway and class of driveway (i.e. residence, petrol station, factory, etc.).

RUM 51 - Define as two or more vehicles in same lane proceeding straight ahead, exclude lane changing movements (see 63 & 64).

RUM 63 & 64 - Introduce (1) a new cell for sideswipes

(2) a new cell for lane change to left

(3) a new cell for lane change to right

(4) if (2) & (3) uncertain, code as (1)

(5) delete RUM 63 and 66

(6) define RUM 64 as originally intended, i.e. "pulling-out".

RUM 79 - Delete RUM 79, use RUM 81-84 and use the column "other" for straight ahead at tee junctions.

RUM 86 - Any multi-vehicle accidents should be classified as such, use supplementary codes to designate kerb hit, etc.

General - Prepare definitions for all cells, and define "overtaking" and "out of control". Introduce an "other" cell for each column and work on the principle that an accident must fit the definition to be assigned to a defined cell.

8.2.2.3 Use of "Other" cells and Definitions (1979).

For the 1979 data the Writer introduced "other" cells for each coding column and a set of definitions for each cell on the chart. This was seen as a preliminary to the introduction of a revised chart (see 8.2.3.3) and as a means of 'fixing' the definition for each cell. The result of these two changes can be seen by an analysis of the whole of the 1979 year data. The "other" cells were provided so that "misfit" accidents were not "squeezed" into cells that did not really describe them. The "other" cells were examined for the year 1979 with the only subdivisions readily available, viz - Metro Melbourne and the Rest of the State.

Table 8.2.2.2 1979 "Other" Cells

	METRO			REST OF STATE		
	Total	"Other"	Percent	Total	"Other"	Percent
0 Pedestrian	1980	189	9.5	350	33	9.4
1 Pedal Cycle	955	164	17.2	311	51	16.4
2 Inters 2 st.	3872	77	2.0	1275	16	1.2
3 Inters 1 st.	3984	88	2.2	603	11	1.8
4 Manoeuvring	2162	304	14.1	617	80	13.0
5 On Path	3413	893	26.2	714	156	21.8
6 Overtaking	1144	870	76.0	253	80	31.6
7 Cornering	1024	14	1.4	1149	11	1.0
8 Off Path	2112	144	6.8	1309	57	4.3
9 Pass. & Misc.	394	32	8.1	140	13	9.3
Total	21040	2775	13.2	6721	508	7.6

Grand Total = 27,761; "Others" 3283 = 11.8%

The effect of introducing descriptions for the cells can be seen by comparing the above figure of 3283 with RUM 96, the "other" for the whole chart, for 1978 which was 327. Actually one should allow for the definitions for the Overtaking column which preclude lane change accidents which means for 1979 that they were classified in RUM 60 (overtaking other).

This change is clearly reflected in the figures which show 76% of the Metro Overtaking Column to be in RUM 60 (other) and 32% of the Rest of State Overtaking Column to be RUM 60.

This was confirmed by a sample study on the first six months of 1979 Metro Melbourne. Of 50 RUM 60 accidents examined

12 were lane change right

10 were lane change left

8 were side swipes

8 were lane changes left or right due to parked or stationary vehicle

5 were side swipes of a stationary vehicle

So basically 60% were lane changes left or right, and

26% were side swipes

This can be compared with the study of 1977 RUM 63 and 64 (see 8.2.2.2 earlier) which showed -

57% lane change left or right, and

28% side swipes

Allowing for these 950 "lane" accidents which went into RUM 60 due to redefining the cells, there were still 2333 accidents which formerly had been squeezed into the wrong cells. Of these the next greatest percentage of "others" is RUM 50. The sample of six months Metro Melbourne showed that 27/50 of RUM 50 accidents were hit-parked-vehicle accidents where the details of the second vehicle (the hitting vehicle) were not known (meaning technically the movements of the second vehicle were not known). The next largest other group is for the Pedal cycle column and as this is limited to eight defined cells as compared to 80 odd that other vehicles can be allocated to, it is not surprising.

The RUM 40 is the next greatest percent "other" and the sample of first six months of 1979 Metro Melbourne found the largest single group 13/50 involved an unparking vehicle reversing and hitting a parked vehicle (on either side of the road) 9/50 involved a vehicle "rolling" back and hitting the vehicle behind.

The brief look via the first six months sample of Metro Melbourne has shown a marked improvement in allocating accident types to defined cells and also highlights the need to introduce new cells related to 'lane change' accidents. (This type is provided for in the new chart, see Figure 8.2.3.1)

8.2.3 A New System

8.2.3.1 Grouping of cells

An appraisal of the "late additions" to the RUM coding chart (see 8.2.2.1) showed that the cells could be regrouped to advantage. One example was the accident to pedestrians "boarding or alighting" from, say, a tram which due to limitations in the pedestrian column was put in the Miscellaneous Column as RUM 99. Similarly "off carriageway at intersection" (RUM 79) was put in the "Cornering" column because originally there was no space in the "Off-path" column. Also "Struck object on carriageway" which should have gone in the "On-path" column was put in the Miscellaneous column due to space limitations in the former column. There were some, perhaps less obvious, examples within columns such as RUM 47 being more appropriate next to RUM 43, or RUM 97 being more appropriate next to RUM 94.

As the coding staff have been instructed to assign a RUM by starting at the top left of the chart it makes for easier and more accurate coding to have similar accident types adjacent to each other.

When an accident belongs to a general class but does not fit the description of any of the defined cells within that class, it should be put into an "Other" cell for that class, rather than wrongly coded.

In some cells, such as RUM 31, additional movements have been put in the cell. Originally it consisted of one right turning vehicle and an opposing straight ahead vehicle, then opposing left turn and right turn movements were added. Because of the different traffic reglations governing right of way between the right turning vehicle and the opposing movements it is desirable to code each conflict separately to avoid lengthy manual examination of the accident forms to provide a break-up.

8.2.3.2 Supplementary Codes

Some cells were duplicated on the chart as the result of introducing the "I" and "M" suffixes and considering the need to describe a variety of movements into driveways by cells which are presently restricted to be used at intersections leads to the notion of reducing the number of cells by using supplementary codes to indicate whether the accident was at an intersection, link or driveway. And further, if a driveway, to classify it by a further code to indicate what sort of driveway.

This then introduces a "third dimension" to the accident-type coding chart which permits a greater diversity of computer outputs. For example the cell for HEAD-ON accidents can have a supplementary code to indicate whether the accident occurred at an intersection, link, curve, or rail crossing. (This eliminates three cells from the RUM chart). Further, other supplementary codes can be used to indicate whether the vehicle crossed a median into another carriageway prior to hitting the other vehicle. One or all supplementary codes may be used depending on the circumstances of the accident.

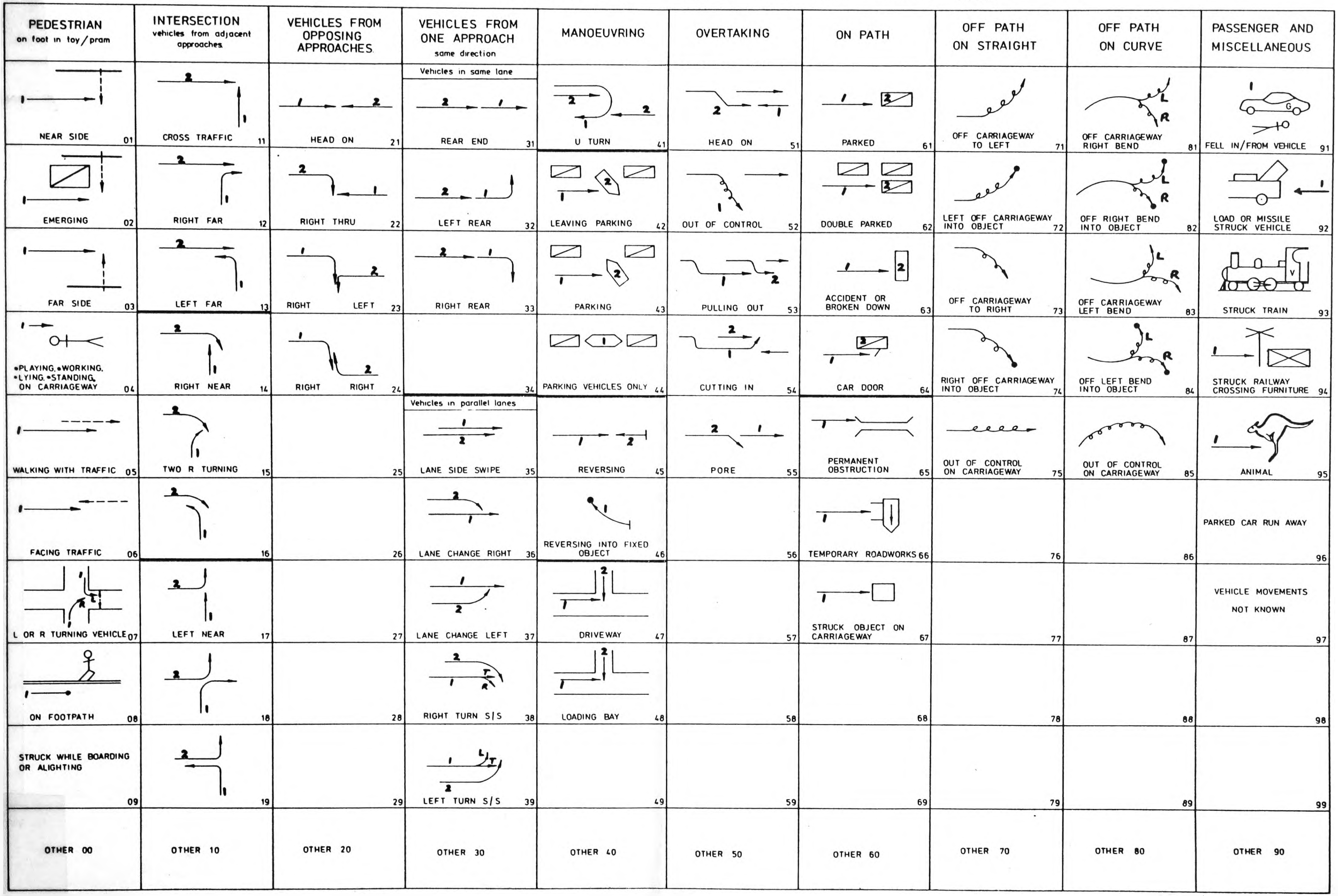
Another example is the case of two vehicles travelling in parallel lanes and one pulls out into the right hand lane hitting the vehicle in that lane. If the reason for the lane change was a parked vehicle in the left lane then a supplementary code can be given.

Thus, with the third dimension added to the chart, primary analysis would be made using the basic cells and subsequent analyses would use the supplementary codes as filters. Other items on the data file such as vehicle type or driver age could also be used as filters to allow an interaction of driver, vehicle and environment in any analysis combined with accident-type. Details of the supplementary codes are given in the Appendix.

8.2.3.3 New Coding Chart

A new coding chart has been prepared which could be regarded as a transitional chart with many of the original chart cells retained and translation between old and new charts facilitated. The new chart has to be consulted along with the definitions for the cells to classify an accident. The definitions/descriptions are to be found in the Appendix

DEFINITIONS FOR CODING ACCIDENTS - FIGURE 8.2.3.1



D ANDREASSEND

OLD/NEW

(Old = 1978)

01 01	11 *	21 11	31 22-24	41 41	51 31	61 51	71 81	81 71	91 91
02 02	12 *	22 11	32 38	42 42	52 61	62 52	72 82	82 72	92 67
03 03	13 *	23 11	33 33	43 43	53 62	63 54	73 83	83 73	93 92
04 04	14 64,*	24 14	34 39	44 47	54 63	64 53	74 84	84 74	94 93
05 05	15 *	25 12	35 32	45 48	55 65	65 54	/	85 21	95 96
06 06	16 *	26 15	36 21	46 45	56 71-74	66 35	76 85	86 75	96 90
07 07	17 *	27 17	37 31	47 44	57 66	/	77 21	/	97 94
08 08	18 *	28 16,19,13	38 *	48 46	58 95	/	78 84	88 21	98 97
09 09,00	19 *	29 *	39 *	/	59 *	69 *	79 71-75	89 *	99 09

* vehicle type identified over all cells

NEW/OLD

01 01	11 21	21 85,36	31 37	41 41	51 61	61 52	71 81	81 71	91 91
02 02	12 25	22 31	32 35	42 42	52 62	62 53	72 82	82 72	92 93
03 03	13 28	23 31	33 33	43 43	53 64	63 54	73 83	83 73	93 94
04 04	14 24	24 31	/	44 47	54 63,65	64 14	74 84	84 74	94 97
05 05	15 26	/	35 –	45 46	55 –	65 55	75 86	85 76	95 58
06 06	16 28	/	36 –	46 48	/	66 57	/	/	96 95
07 07	17 27	/	37 –	47 44	/	67 92	/	/	97 98
08 08	18 –	/	38 32	48 45	/	/	/	/	/
09 99	19 28	/	39 33	/	/	/	/	/	/
00 –	10 –	20 –	30 –	40 –	50 –	60 –	70 –	80 –	90 96

Figure 8.2.3.2 Conversion of accident types

entitled "Definitions for Coding Accidents". There are 77 cells which include 10 "other" cells so the number of defined cells has actually been reduced from 85 to 67 (a 21% drop). Figure 8.2.3.1 shows the new chart. Figure 8.2.3.2 is included to show how the RUM classification can be translated into the new accident types (keeping in mind that vehicle types are identified for all cells).

8.2.3.4 Determining the Accident Type

A matter not fully resolved is "by what event will the accident be classified into an accident-type"? The Victorian report form records initial event as primary classifier, it also records the vehicle movement. The U.S.A. Standard (NSC, 1970) suggests the use of the first injury OR damage-producing event that can be determined in the accident. Since reporting and inspection is after-the-event it becomes a subjective matter for the coder in a number of cases to guess when the first damage or injury occurred. For example the report might state that the car ran off the roadway and finally hit a tree, two occupants injured. Now in leaving the roadway the car may have mounted a kerb damaging a wheel in the process and it may have grazed a large rock before hitting the tree. As the accident report is not a forensic report it can only hope to convey the main event in the space available. How would the coder classify such an accident? Leaving roadway, or hitting rock, or hitting tree?

The writer believes that a coder or a policeman can consider two basic areas — did the accident occur on/off the roadway, and did it/not involve another vehicle?

In a simple system, if stress is laid on initial event then information of value can be lost, for example a car leaves the carriageway into the median (initial event), it continues across the median and collides with a vehicle in the other carriageway. This would be classified as "vehicle leaves carriageway" in the initial event system. If the highway had recently been duplicated for capacity and safety reasons the traffic engineer should evaluate the effects and in the before-period there would have been a number of "head-on" accidents and "overtaking" accidents. In the after-period there would be a marked reduction in head-on accidents if all accidents were classified by initial event since they would be typed as 'vehicle leaves carriageway'. One way to reduce a particular accident type is to alter the concept of classifying the accidents or at least not provide continuity/consistency. An example of this failure is in a study of Lalani (1975) [see 3.3], where in the before-period 95% of the accidents were classified into types but in the after-period only 30% of the accidents were classified, leaving a big question as to what were the unclassified accidents.

The Writer's proposition is to assign accident types firstly by whether another vehicle (or road user) is struck on a carriageway (the same carriageway or a different carriageway) or if no other vehicle is hit, then assign the type by the initial event. And, of course, supplementary codes should be used to include other significant events after the initial event or collision such as hit tree, rolled, caught fire, etc.

At intersections the definition of an accident-type should be referenced before it is assigned taking into account the origins of the vehicles involved in the collision not just the minutiae of the angle at which the vehicles collided. Indeed accidents at other locations should also consider where the vehicles came from and what movements were intended or in progress.

All of these aspects are important in 'pattern evaluation', as Box (1976) puts it, and in the determination of the appropriate counter-measure.

The primary classes (based on initial collision or event) would be as Table 8.2.3.1 below.

Table 8.2.3.1 Primary Accident Classes

- vehicle-hits-vehicle collision on any carriageway (incl. stationary or parked vehicle).
- single vehicle (on its carriageway)
  - hits pedestrian
  - hits animal (not ridden)
  - hits object (fixed/non fixed) = specify object
  - overturns
  - person falls in/from vehicle
  - other
- single vehicle leaves cariageway
  - events (see below), generally similar to those for single vehicle on carriageway.

The subsequent events particularly for vehicles leaving the carriageway are needed for the purposes of supplementary codes.

The secondary classes, the detailed accident-types, are detailed in Figure 8.2.3.1 and the Appendix.

The question of defining accident-types and the procedures are discussed again in Chapter 11.

9. Applications of the "Location and Accident-type" System

9.1 Introduction

In Chapter 8 the principles and varieties of location systems and accident-type systems were discussed. Some of the references quoted described joint location and accident-type systems oriented principally to the identification of high accident frequency locations according to varying priority philosophies.

An accident-type/location system could be simply described as a system in which a specific location description is codified and computerised and combined with accident-type classifications (also codified for processing) of the accidents occuring at that site. Once in the computer the data can be manipulated in any fashion to produce (desirably) any type of tabulation possible using any of the data items recorded on the report form. This Chapter will describe a technique developed by the Writer based on a Location and Accident-type system.

However, from the Writer's point of view, it should be stressed that the accident-type classification is the pivot of the system to be described. The cells in the accident-type chart (see 8.2) present a finely divided set of accident-types which can be aggregated into "groups" which can be varied according to the particular dictates of a study.

Some basic parameters which can provide some useful analyses are the WHEN, WHERE, WHAT, WHO and HOW associated with each accident.

Taking these in turn -

When - relates to the time of day, day of week, day of month and year which are essential items but light condition such as daylight, dark or twilight is a useful addition.

Where - describes the detailed location of the accident preferably by reference to the nearest node. Other locational information such as the suburb name, road class/type, and city complete the basic data. Other characteristics such as speed limit in the area, roadside development, level of traffic flow, presence of street lighting, general terrain, etc. could be collected if desired but would preferably come from an inventory file. Information on traffic control devices particularly relating to their operational condition should be collected, e.g. the intersection signals may not have been on due to a malfunction.

What - can be interpreted to mean what was the outcome of the accident in regard to property damage or death or injury to road users (i.e. the severity classification of the accident). Often the accident is classed as fatal, injury or damage only but if the recording system has more subdivisions these should be used or at least be directly accessible in the computer records. For devices which reduce or modify the severity of an accident (e.g. seat belt or crash helmet) the extra subdivisions of severity are most useful in analysing the effects. Clear definitions are needed for each of the subdivisions.

Who - This item can vary depending on the use to which the records are to be put. For example, at a basic level 'who' would mean the type of vehicles involved in the accident, i.e. car, bus, truck, etc. and the age and sex of the driver. For a more sophisticated accident record system the age and sex for all persons involved could be collected along with information such as licence number, occupation, etc. for the driver but each item should be weighed for its actual value and use and the possibility of obtaining it from another source.

How - , in this context, means the accident-type which relates to the paths of the vehicles and pedestrians just prior to the accident (see Chapter 8.2 for more details). The intended direction of travel is needed to allocate the accident-type and its use is illustrated by this example - two vehicles collide at an intersection, in what could be called a head-on type accident, one vehicle was intending to turn right and the other vehicle, say, could have either intended to travel straight on or turn right. These two alternatives could influence the subsequent treatment at one particular site or cause the review of a traffic law when aggregated over many sites. To take the particular site case further; if the accident involved the right-turner and the other vehicle intended to travel straight on then taken with other accidents of this sort the need for a right-turn phase is indicated at a signalised intersection. If the second vehicle had been intending to make a right-turn also then there could be a problem with the amount of physical space provided, etc.

When other record systems are available such as an inventory of traffic signs, control devices, street lighting, etc. then less information need be collected at the scene of the accident. Only items of a transitory nature need be collected such as street lights not on, light condition dark early due to storm, etc. Also more detailed investigation can be made using data previously recorded for example vehicle make, model, engine size, gear box type using the details in the vehicle registration files.

9.2 A Technique to Resolve Accident Problems

The next sub sections describe as a step process a technique to break accident problems into component parts and allow a systematic approach. It is written with one system in mind, but similar systems could use this technique.

9.2.1 Predominant Accident-types

Given a system which incorporates a location system and an accident-type system, as previously discussed, including if possible a road type classification as part of the location description, then the following technique developed by the Writer can be applied.

A first step is to analyse all the accident-types for a city (or other homogeneous area) with a division into node and link. For the primary analysis accident-types with like character should be aggregated into groups. In some instances the group may consist of a single accident-type and in others it will be a whole column from the chart.

The data for Metro-Melbourne 1975, on Table 9.2.1, shows grouped accident-types according to the severity of the reported accidents. The severity index is the number of casualty (fatal + injury) accidents divided by the total number of reported accidents for that group. The accidents reported/recorded are such that about half are classified as casualty accidents. As discussed in Chapter 6, the least degree of injury is classified, for national statistical purposes, as a property damage accident.

Table 9.2.1 Reported Accidents, Metro-Melbourne 1975
(node and link)

RUM group	Severity Index %,	Rank	Frequency	Rank	Joint Rank
01,02,03	90.0	1	1364	4	1
12	87.0	2	194	13	9
20's	56.3	6	3973	1	2
31	57.4	5	1149	5	3
32,34	32.0	11	322	12	13
33,35,37,51	39.4	10	1756	3	5
36,77,85	53.7	7	615	7	7
41	47.6	8	347	10	11
44	41.3	9	492	8	10
52,53,54	21.1	12	1884	2	8
63	16.4	13	438	9	12
72,74	66.2	3	334	11	6
82,84	60.3	4	938	6	4
			13,806		

= 84% of reported accidents
(n = 16,534)

From a ranking of the severity index and a ranking of the frequencies, a joint rank is produced giving equal weight to each characteristic (the weighting could be varied). This joint rank then gives a "priority" list for examining accident-types. For Metro-Melbourne "pedestrians hit while crossing the road"becomes the number one problem in terms of severity combined with frequency, the next greatest problem is the RUM group 20's (the 'right-angle' accidents), number three is RUM 31 (right-turn through), and fourth is RUM 82, 84 (off carriageway into object, left and right). These appear to form a group at the top of the list and then ranks 5-9 form another group, followed by 10 and 11 in a group and then 12 and 13.

Of course some accident types occur only at nodes and some only on links so the next step is to divide into node and link.

Tables 9.2.2 and 9.2.3 give the details and it can be seen that 59% of the reported accidents occurred at intersectons and 41% of these were RUM group 20's. Of the link accidents 23% were RUM group 52, 53, 54.

Table 9.2.2 Intersection accidents, Metro Melbourne 1975

RUM Group	Freq.	Sev. Index %	Joint Rank RUM Group	Joint Rank Freq.	Sev.
01,02,03	569	88.4	01,02,03	569	88.4
07	140	86.4	20's	3973	56.3
12	146	87.0	31	1149	57.4
20's	3973	56.3			
31	1149	57.4			
32,34	322	32.0			
33,35,37	1127	37.4	33,35,37	1127	37.4
36	122	52.5	82,84	275	57.1
52,53,54	352	24.2	12	146	87.0
63	168	19.6	07	140	86.4
79	192	43.2			
82,84	275	57.1	32,34	322	32.0
			52,53,54	352	24.2
	8535		79	192	43.2
(=87% of Inters. accs)					
(n = 9759)					
			63	168	19.6

Table 9.2.3 Link Accidents, Metro Melbourne 1975

Rum Group	Freq.	Sev. Index %	Joint Rank RUM Group	Joint Rank Freq.	Sev.
01,02,03	759	91.2	01,02,03	795	91.2
41	220	47.7			
42,43	157	19.1			
44	382	42.2			
51	629	42.9	82,84	663	61.7
52,53,54	1532	20.4	72,74	277	66.8
63	270	14.4	52,53,54	1532	20.4
64	117	12.1	77,85	463	57.5
72,74	277	66.8	51	629	42.9
77,85	463	57.5			
81,83	110	60.0	44	382	42.2
82,84	663	61.7	41	220	47.7
			81,83	110	60.0
	5615				
(= 83% of link accs)			63	270	14.4
(n = 6775)			42,43	157	19.1
			64	117	12.1

9.2.2 Site Analysis

Tables 9.2.2 and 9.2.3 are the starting points for the next step which is to find out how each particular accident-type group is distributed on the road network. That is, to ascertain if the group exhibits 'clustering' or if the group is diffused over the network. To do this the location system is utilised with the accident-types to produce a tabulation of the number of sites (node or link) having various numbers (e.g. 1,2,3,4,5, etc. per year) of (particular accident-types) accidents per site.

To illustrate this Figure 9.1 shows the graph of such data for the RUM group 20's, the frequency data has been transformed into cumulative percent. [The accident plot is produced by the product of the number of accidents per site and the number of such sites.] An inspection of the accident plot and the intersection plot will reveal any clustering. In Figure 9.1 50% of the RUM group 20's accidents occur at about 23% of the intersections that had such accidents, which is an example of 'clustering'. Clustering has the advantage that a few sites account for a large proportion of the accidents and thus improvements at these few sites can give a big overall reduction in the accidents.

The specific location of these high accident frequency sites can of course be read out from the computer records and investigation implemented on appropriate treatments.

Identification of this clustering of right-angle accidents in Melbourne (Andreassend, 1972) lead to a program of treatment of the high accident frequency sites and since 1969 the reductions as shown in Table 9.2.4 have occurred

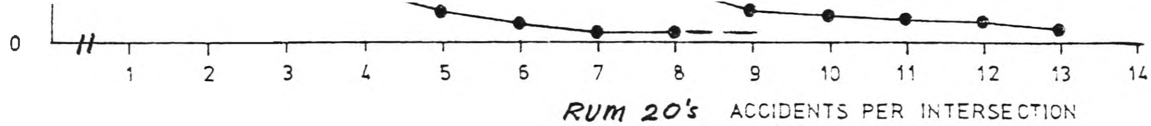


Figure 9.1 "Clustering" of RUM 20's

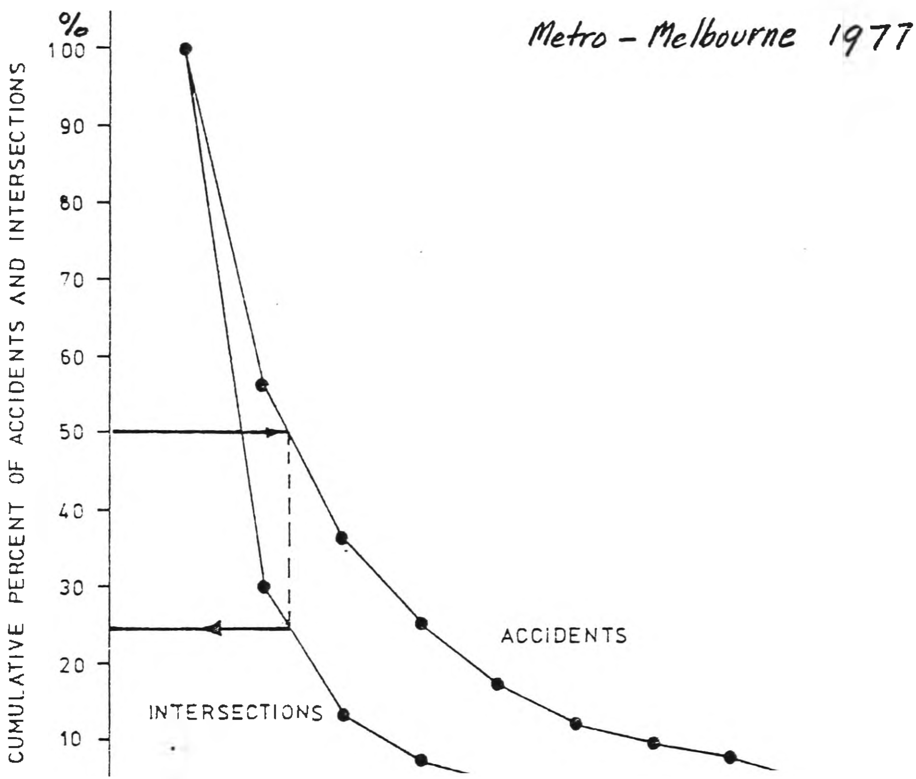

Metro - Melbourne 1977
%
100
90
80
70
60
50
40
30
20
10
CUMULATIVE PERCENT OF ACCIDENTS AND INTERSECTIONS
ACCIDENTS
INTERSECTIONS

Table 9.2.4 Change in Right angle accidents (Melbourne)

Ave. acc/Int.	Year	No. accidents	No. intersections	
1.85	1969	5726	3089	(≥ 1 acc.)
1.58	1975	3867	2443	(≥ 1 acc.)
(2.88)		1859 (= - 33%)	646	(= - 21%)
7.38	1969	1462	198	(≥ 5 accs.)
6.76	1975	534	79	(≥ 5 accs.)
(7.8)		928 (= - 64%)	119	(= - 60%)
1.47	1969	4264	2891	$1 \leq n \leq 4$
1.41	1975	3333	2364	
(1.77)		931 (- 22%)	527	(-18%)

An interesting comparison can be drawn from this -

Reductions	(Inters ≥ 5 acc)	928 acc. and 119 inters. (ave. 7.8)
	(Inters ≤ 4 acc)	931 acc. and 527 inters. (ave. 1.8)
Reduction 1969/1975 Total	(≥1 acc.)	1859 acc. and 646 inters. (ave. 2.9)

Looking at intersections with 5 or more accidents, these accounted for half of the total reduction of accidents and involved only 18% of the intersections. Or stated another way, to get the same total reduction in accidents for "high" and "low" frequency sites [i.e. ≥ 5 and ≤ 4] involved 527 low frequency sites but only 119 high frequency sites. [More correctly the equivalent of these numbers of intersections.]

As stated above if clustering is evident then there is some point in listing the high accident frequency sites, however, some accident-type groups may not exhibit clustering such as the RUM group 01,02,03 on Links in Metro-Melbourne. These are distributed such that 91% of the accidents are on 95% of the links involved, which stated another way is that they are mostly one accident per link with only a few links having two accidents. This is an example of accidents being "diffused" on the road network and are thus generally not amenable in Melbourne to site specific treatments. It would remain in further work on this RUM group to see if adjacent links along a particular route or in a particular area were involved.

Each of the RUM groups (per Tables 9.2.2 & 9.2.3) can be examined in turn by the "graphical" technique (per Figure 9.1) and lists of high accident frequency sites produced for those groups exhibiting clustering until one has a list of locations for site specific treatments, area treatments, or RUM groups for further investigation.

Separate graphs for a particular RUM group should be produced for a few years and compared to ensure that the shape has been reasonably consistent over those years. It is not likely that all of the same actual named locations will always appear at the same point in the location listings as there will be some stochastic element present. Of course once remedial treatments are started one would expect all the named higher frequency sites to disappear from among the high frequencies, perhaps appearing as a low frequency site or disappearing from the list depending on the effects of the treatments.

9.2.3 Road type analysis

Some accident-type groups are not related to specific locations but may occur all over the road network and by using road type classification in the location details (to indicate Arterial, Secondary, or Local roads) the distribution of accident-types over the network can be more readily studied. An illustration of this is given by Andreassend (1976b) in looking at the incidence of "moving rear end" accidents and "hitting parked vehicle" accidents at night. Table 9.2.5 shows the quite different distributions of these two groups according to road type, the moving rear end accidents being seen to be particularly an Arterial road problem whereas the parked rear end accidents were a prevalent problem even in Local (residential) streets.

Table 9.2.5 Rear End accidents by road type

Road Type	Moving RE	Parked RE	Total
Arterial	86	50	71
Secondary	11	25	17
Local	3	25	12
	100%	100%	100%

Thus possible solutions for these two accident types had to consider the different distribution on the network. On the basis of the hypothesis that these night rear end accidents were a function of seeing-difficulty and depth perception in the dark, whilst improved street lighting may have assisted the moving rear end accidents and the parked rear end accidents on Arterials it would not have been economic in any way to consider providing high standards of lighting on Secondary and Local streets. Banning parking on Arterial roads may also have reduced the parked rear end accidents on Arterials but would have not been an acceptable proposition for Secondary and Local streets.

The road type analysis can also be used for assessing street lighting, introduction of parking restrictions, priority roads and similar network treatments. The paper by Daltrey, Howie and Randall (1978) on the priority roads in a sample drawn from Metro Melbourne examined the change in RUM 20's accidents by the road types involved in the intersection.

The road type analysis should be made also for the non-clustering accident-types.

9.2.4 System or General Analysis

Site treatments such as traffic signals, etc., exhibit their benefits irrespective of the condition or type of driver or vehicle (provided they are installed where they are warranted). Whatever the distribution of driver/vehicle type or condition (e.g., drunk, over 70 years, faulty brakes,etc.) these characteristics have been present before and after the installation of the control devices and have not affected the efficacy of the devices [excepting perhaps that if the undesirable elements were removed then the reduction effect may be even greater]. Faulty analysis of the before accident situation and an inappropriate treatment might not lead to any improvement.

These characteristics of drivers and vehicles should certainly be investigated but the need to apply known site specific treatments is stressed because the effects are direct and measurable and capable of being measured by a basic data system. The proper investigation of the driver and vehicle disabilities would, the Writer suggests, require a very detailed and comprehensive data bank of which the accident report is only a small part.

In passing, it should be mentioned that there are serious problems related to the use of alcohol and drugs (both illicit and prescribed) by road users which arise often in the post-mortem findings. These are social problems and also present themselves in other arenas apart from the road accident one, as indeed do other 'human' problems such as aggression, poor eyesight, courting behaviour, illiteracy, low socio-economic status, etc. Social problems are seen as needing social solutions and not traffic engineering solutions, nor should these factors be taken as a 'scapegoat' as the "cause" of a significant number of accidents (i.e. the "sole cause") and thus no point in looking at the other factors involved.

This is a long-winded way to say that those acc.-type groups that didn't get sifted out earlier require to be examined further to identify other factors in common since the same intersection was not in common, the same road type may or/may not be in common. Any factors found to be in common for an acc-type group can be subjected to the same type of clustering analysis that was used for the site analysis. The five basic parameters discussed at the start of this Chapter [When, Where, What, Who, and How] are good starting points. Is there clustering by time of day, date, light condition, etc? Is there any clustering within the age/sex of the road users involved?

Eventually it will be determined for a particular acc.-type that all factors operate in a haphazard way or that some factors are in common. If it is then perceived that a solution would be in the 'Education' area the factors to be highlighted in the education will have been determined. To try to make a concrete example consider the pedestrian accidents in Melbourne. An unpublished study by Wood (1979) using 1977 accident data showed that 40% of the pedestrian accidents in Metro-

Melbourne involved children (age 0-16), and thus adults the remaining 60%. However when examined by road type there was a marked variation between adult and child accidents which became more marked when the age groups were used as in Table 9.2.6 below.

Table 9.2.6. Pedestrian age group by road types. Metro-Melbourne 1977.

Road type	1 & 2		3 & 4		5				
Age group							Total	n	
0 - 4 yrs.	32		28		40		100%	163	
5-11	48		32		20		100%	372	
12-16	80)	78	14)	15	6)	7	100%	181)	333
17-20	76)		17)		7)		100%	152)	
21-29	78		17		4		100%	180	
30-59	81		14		5		100%	420	
60+	83		14		3		100%	302	
Percent of Total	69		20		11		100%	= 1770	

Note: Road Types (after H.T. Wood)
1 & 2 = Arterials (and priority roads)
3 & 4 = priority roads (non-arterials)
5 = "other" roads

Source - H.T. WOOD (1979).

This shows that as age group increases a greater percentage of accidents occur on Arterial roads and a smaller percentage on "other" roads (= local streets). The pattern for approximately 80% of the pedestrian accidents of an age group occurring on arterials is set from the 12-16 year group onwards. For the youngest groups there is an apparent transfer of accidents from the local street to the Arterial road as age increases, leaving the secondary roads involvement about constant and then for the 12-16 age group there is an apparent further transfer from both the local streets and the secondary roads to the Arterials.

An analysis of accident-type involvement by road type is given in Table 9.2.7 below.

Table 9.2.7 - Pedestrian accident-type by road types.
Metro-Melbourne 1977.

Road Type	1 & 2	3 &4	5	
Accident-type				
Crossing, nearside	46	38	22	
Crossing, farside	23	19	10	
Crossing, emerge	22	32	49	
Work, play on road	5	7	10	
Walk along	2	1	2	
Other	2	3	7	
Total	100%	100%	100%	
n	1279	354	200	1883

Note: the first three accident types correspond with RUMs 01,03,02
Source - H.T. Wood (1979).

This demonstrates that the largest problem on local streets is the accident in which the pedestrian emerged from behind a parked vehicle and this accident-type is still marked on secondary roads. The biggest problem on Arterials is the pedestrian being hit on the first half of the carriageway (RUM 01).

It has been shown (Andreassend, 1980) that RUM (01, 02, 03) accidents on links lie very much in the one accident per link class and do not lend themselves readily to site specific solutions, but from this brief analysis some idea is obtained of the problem accident types (by road type) and problem age groups (by road type). It would still remain to cross-tabulate age group by accident type for each road class to obtain the actual connection but one could hypothesise that the children are involved in "emerging from behind parked vehicle" accidents predominantly in local streets and to some extent in secondary roads. Thus a "target group" and an accident-type is identified for an education program.

Accidents involving adults and children crossing Arterials remain a problem and further examination of the factors is needed.

In considering what treatments could be applied to these "non-site" acc-type groups a search of the literature would no doubt be appropriate but for any treatment suggested the essential aspect is the measurability of the treatment. It may not be known what specific effects a treatment might produce and what were random effects that were ascribed to the treatment. For example, if a general road safety campaign was run for six weeks in a particular city telling drivers to drive more safely, what effect could be expected and over what period would the effect last?

By contrast, the effect of a campaign explaining a new regulatory sign (or emphasising an existing one) could be measured by observing driver behaviour at a sample of signs several times before and after the campaign. The accidents at all sites associated with these signs could be analysed.

Repeatability is also important to ensure that the effect did not occur by chance alone, the treatment should be tried again and one must ensure that a similar effect is obtained to be confident of the effect.

9.3 Application of the Accident-type/location system to other Cities

9.3.1 Introduction

While the Writer was at the Asian Institute of Technology it became possible to utilise some of the elements of the accident-type and location system used in Victoria to develop a common study plan which was then applied to study accidents in Taipei (Hwang, 1978), Kuala Lumpur (Parkash, 1978) and Islamabad/Rawalpindi (Zaheer, 1979). A separate study was made of accidents on 100 km of the main northern highway from Bangkok (Hoque, 1978). For Taipei the RUM chart was modified to suit traffic driving on the righthand side of the road. (see Figure 9.3).

Selected tables of data for these three cities and Melbourne are given to illustrate some of the range of analyses possible. The common areas are compared below. Taking the four most frequent RUM groups in each city, the comparison in Table 9.3.1 is made.

Fig. 3.3 1977 CODING OF ROAD USER MOVEMENTS

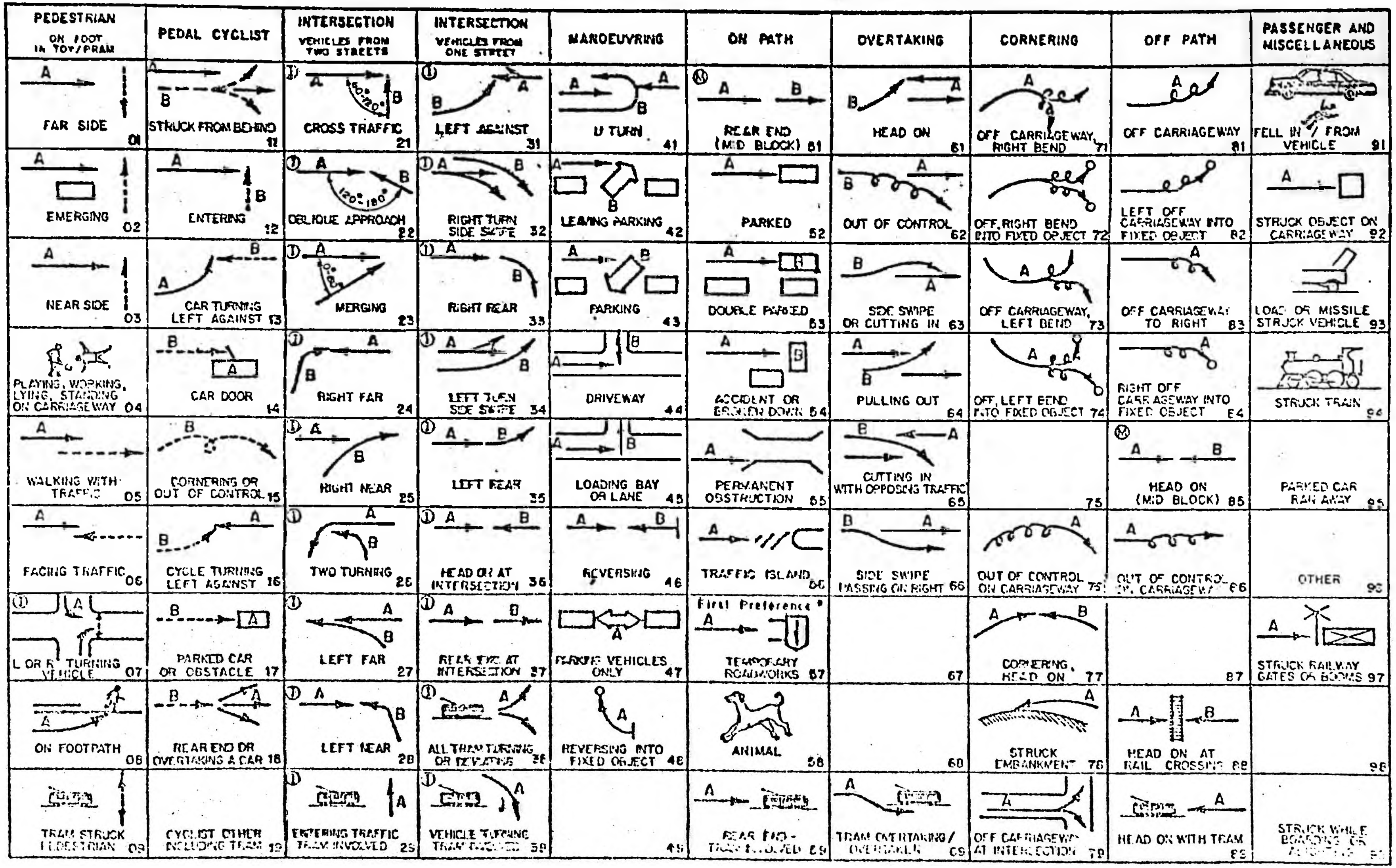


Figure 9.3

Codes adapted for driving on the right

a 9.17

Table 9.3.1 The most Frequent RUM Groups.

Melbourne		Kuala Lumpur		Taipei		Islamabad/ Rawalpindi	
RUM	%	RUM	%	RUM	%	RUM	%
20's	24.0	37,51 33,35	32.0	01-03	25.7	01-09	30.1
52-54	11.4	20's	11.1	20's	16.7	11	9.8
37,51, 33,35	10.6	01-03	10.1	31	10.2	37,51	6.1
01-03	8.2	32,34	8.6	37,51, 33,35	8.0	20's	4.9
Sub total for three groups [20s, RE, 01-03]	43		53		50.4		41

Although the relative frequencies differ between the cities it can be seen that the RUM groups 20's; 37,51 (rear-end); and pedestrian (01-03 or 01-09) are among the top four from each city. These three groups account respectively for 43%, 53%, 50% and 41% of each city's accidents. There are many other RUM groups common to the top nine or ten from each city.

Of course it is important to note that the reporting of damage only accidents varies between the cities and the proportion of casualty to total reported accidents is as follows:

Melbourne	48 per cent	(of recorded	accidents	are casualty)
Kuala Lumpur	17 per cent	"	"	"
Taipei	100 per cent	"	"	"
Islamabad/Rawalpindi	76 per cent	"	"	"

To allow for this in comparing frequencies of the cities, reference should be made to the "joint rank" listing which takes account of frequency and severity index. Thus Table 9.3.2 is a better comparison.

Table 9.3.2 Joint Rank List Comparison.

Melbourne	Kuala Lumpur	Taipei	Islamabad/ Rawalpindi
01-03	01-03	01-03	01-09
20's	20's	20's	11
31	37,51	31	20's
82,84	31	37,51	37,51
37,51	36,85	36,85	36,85

It can be seen that the first three cities have 01-03 and 20's as the two highest groups. The variation in Islam./Rawal. could be explained by the low degree of motorisation and a large bicycle population. For the four cities the levels of motorisation are:

Melbourne	2.7	persons	per motor	vehicle	(excl. motorcycle)
Kuala Lumpur	3.8	"	"	"	"
Taipei	6.4	"	"	"	"
Islamabad/Rawalpindi	21.4	"	"	"	"

(However the number of motorcycles in use is an important consideration as it affects these rates markedly particularly in the case of Taipei.) This hypothesis can be explored further by looking at the most frequent RUM groups for Islamabad and Rawalpindi separately [See Table 9.3.3].

Since Islamabad is the newly constructed national capital it is likely that the more affluent families as well as senior civil servants and

Embassy staff reside there rather than in Rawalpindi. Thus the degree of motorisation is no doubt higher in Islamabad than in Rawalpindi (a breakdown of vehicle registrations was not available). The two cities

Table 9.3.3. Most frequent RUMs separated

Rawalpindi RUM	%	Islamabad RUM	%
01-09	33.8	01-09	21.4
11	10.2	11	8.9
37,51,33,35	4.7	37,51,33,35	9.5
20s	4.4	20s	6.2
36,85	4.0	36,85	3.8

are contiguous and sharp boundaries as regards travel are not to be expected (i.e. all Islamabad residents do not travel only in Islamabad), but a shift in the relative frequencies of the accident-type is noticeable. In Islamabad compared to Rawalpindi relatively fewer pedestrian accidents and RUM 11 (bicycle) accidents occur and more RUM 37,51 (rear end) and RUM 20's (right angle).

The 'priority' list for intersections only shows RUM 20s and 01-03 to be the highest ranked in all cities.

9.3.2 Road Type Comparisons

Where available, a road classification system was used to identify road types and an examination of the accidents occurring on various classes of road gave Table 9.3.4 for Taipei and Kuala Lumpur.

Table 9.3.4 Accidents by Road Type, Taipei and Kuala Lumpur

	Arterial	Sub-Arterial	Local	Total
	%	%	%	%
Taipei				
No. of intersections with accidents	56	29	15	100
No. of accidents	62	25	13	100
No. of links with acidents	48	32	20	100
No. of accidents	46	33	21	100
Kuala Lumpur				
No. of intersections with accidents	58	18	24	100
No. of accidents	85	10	5	100
No. of links with accidents	66	19	15	100
No. of accidents	87	9	4	100

For both cities 56-58 per cent of the intersections (with accidents) are on arterial roads but a greater concentration of accidents occurs at these intersections in Kuala Lumpur than in Taipei. There is also a greater proportion of accident-intersections on local roads in Kuala Lumpur than in Taipei but the proportion of accidents is low at these intersections. There is a substantial difference in the proportion of accident-involved links between the cities. Kuala Lumpur has a concentration of accidents and accident-involved links on the arterials whereas in Taipei things are more spread on the three road types.

Table 9.3.5 shows that, compared to Rawalpindi, Islamabad has more of an accident problem on sub-arterial roads although both cities show this predominance in contrast to Taipei and Kuala Lumpur.

In Rawalpindi, although the proportion of accident-intersections on arterials is 47 per cent (which is smaller than Taipei and Kuala Lumpur) those intersections account for 66 per cent of all intersection accidents. However, Islamabad exhibits an odd situation with the biggest proportion of intersection accidents occurring on sub-arterial roads (73 per cent of the accident intersections and 58 per cent of the intersection accidents). It is possible that the classification of the roads involved could be faulty or that the sub-arterials are functioning as arterials. Further examination of RUM by road type is needed to throw more light on this question. For example, the overall preponderance of pedestrian accidents is marked and these could be on sub-arterials. The same remark can be made in relation to link accidents and road types for these two cities.

Table 9.3.5 Accidents by road type, Rawalpindi and Islamabad

	Arterial %	Sub-Arterial %	Local %	Total %
Rawalpindi				
No. of intersections with accidents	47	53	1	100
No. of accidents	66	33	1	100
No. of links with accidents	30	59	11	100
No. of accidents	55	41	4	100
Islamabad				
No. of intersections with accidents	27	73	0	100
No. of accidents	42	58	0	100
No. of links with accidents	25	70	5	100
No. of accidents	32	65	3	100

9.3.3 "Graphical" Analysis

The analysis made of the cumulative distribution of accidents and locations against the accident frequency per location is in the summary below.

Intersections:

- In Melbourne 50 per cent of RUM (20s, 12) were at 26 per cent of intersections.
- In Kuala Lumpur 50 per cent of RUM 20s were at 23 per cent of intersections.
- In Taipei 50 per cent of RUM (01-03, 20s, 12) were at 33 per cent of intersections.
- In Islamabad 50 per cent of RUM (01-03) were at 24 per cent of intersections.
- In Rawalpindi 50 per cent of RUM (01-03) were at 30 per cent of intersections.
- In Islamabad 50 per cent of RUM 20s were at 18 per cent of intersections.
- In Rawalpindi 50 per cent of RUM 20s were at 26 per cent of intersections.

Links:

- In Melbourne 91 per cent of RUM (01-03) were on 95 per cent of the links.
- In Kuala Lumpur 50 per cent of RUM (01-03) were on 29 per cent of the links.
- In Taipei 50 per cent of RUM (01-03) were on 33 per cent of the links.
- In Islamabad 50 per cent of RUM (05,06) were on 34 per cent of the links.
- In Rawalpindi 50 per cent of RUM (05,06) were on 32 per cent of the links.

In Melbourne 60 per cent of accidents occurred at intersections, Taipei 60 per cent, Kuala Lumpur 75 per cent and Rawalpindi/Islamabad 39 per cent. In all cities it can be seen that a few intersections account for a large proportion of the total number of intersection accidents. Treatment of those with high frequencies will give a useful reduction in the total number of accidents.

9.3.4 Costs

The data available on costs was extracted from the forms without any checks on reliability and costs were not reported on every form. However, it may be of some interest to compare the final result. In Taipei the average cost was $A720 (casualty accidents only) and in Kuala Lumpur the average was $A60 (damage and casualty). About 17 per cent of the Kuala Lumpur accidents were casualty. The only readily available Victorian data on costs is that published by the Motor Accident Board (1977) and related only to amounts paid out by them for persons injured or killed and relates mainly to medical costs. The average claim for the year to 30 June was around $600.

9.3.5 Comparative Data

The key to these Tables is that, for each city, the first column is the Road User Movement (RUM) (note, 20's means 21 to 29 inclusive) and the second column is the percentage of accidents in the RUM. An analysis of the data for individual cities is given.

Table 9.3.6 The Most Frequent Accident Type Groups

Melbourne	%	Taipei	%	Kuala Lumpur	%
20s	24.0	01-03	25.7	37,51,33,35	32.0
52-54	11.4	20s	16.7	20s	11.0
37,51,33,35	10.6	31	10.2	01-03	10.1
01-03	8.2	37,51,33,35	8.0	32,34	8.6
31	6.9	36,77,85	6.2	65	5.3
82,84	5.7	32,34	5.4	31	3.5
36,77,85	3.7	12	3.5	63	2.5
44	3.0	11	3.5	52-54	2.4
63	2.6	63	1.9	36,77,85	2.3

Rawalpindi	%	Islamabad	%	Rawalpindi/Islamabad	%
01,03	13.4	01,03	10.7	01,03	12.6
05,06	10.4	37,51	9.5	11	9.8
11	10.2	11	8.9	05,06	9.3
04	10.0	05,06	6.7	04	8.2
37,51,33,35	4.7	20s	6.2	37,51,33,35	6.1
20s	4.4	04	4.0	20s	4.9
36,85,77	4.0	36,85,77	3.8	36,85,77	3.9
13,16,31	4.0	63,65	3.2	13,16,31	3.4
12	2.8	13,16,31	2.0	63,65	2.5

Table 9.3.7 Most Frequent RUM at Links

Melbourne	%	Taipei	%	Kuala Lumpur	%
52-54	22.6	01-03	33.4	51	25.7
01-03	11.7	51	12.7	01-03	17.1
82,84	9.8	85,77	9.2	65	7.6
51	9.3	11	4.9	52	6.5
85,77	6.8			42,43	5.6
n = 6775		n = 965		n = 851	

Rawalpindi	%	Islamabad	%	Rawalpindi/Islamabad	%
05,06	12.8	11	12.8	11	12.2
01,03	12.6	01,03	9.2	05,06	11.6
11	12.0	05,06	8.9	01,03	11.5
04	10.9	51	8.6	04	9.0
77,85	4.9	63,65	4.6	51	5.6
n = 709		n = 304		n = 1013	

TABLE 9.3.8 Most frequent RUM at Intersections

Melbourne	%	Taipei	%	Kuala Lumpur	%
20s	40.7	20s	28.1	37,33,35	29.5
31	11.8	01-03	20.5	20s	14.7
37,33,35	11.5	31	17.1	01-03	8.0
01-03	5.8	32,24	9.0	31	4.7
52,54	3.6				
n=9759		n = 1418		n = 2516	

Rawalpindi	%	Islamabad	%	Rawalpindi/Islamabad	%
01,03	14.7	20	15.5	01,03	14.2
20s	11.4	01,03	13.0	20s	12.6
04	8.7	37,33,35	11.0	37,51,33,35	6.9
11	7.3	05	3.5	04	6.6
05,06	6.7	11	3.0	11	6.0
n = 449		n = 200		n = 649	

Data for Individual Cities

9.3.6 Melbourne

The city of Melbourne (Metro area) has a population of 2.7 million persons and more than 1 million motor vehicles. Approximately 60 per cent of the accidents for 1975 occurred at intersections. The major RUM groups were as given in Table 9.3.9.

TABLE 9.3.9. The Major RUM groups in Metro Melbourne

RUM Group	Frequency %	RUM Group	Joint Rank
20s	24.0	01-03	1
52-54	11.4	20s	2
37,51,33,35	10.6	31	3
01-03	8.2	82,84	4
31	6.9	37,51,33,35	5
82,84	5.7	72,74	6
36,77,85	3.7	36,77,85	7
44	3.0	52-54	8
63	2.6	12	9
41	2.1	44	10
72,74	2.0		
32,34	1.9		
12	1.2		
	84% of n = 16,534		

When intersection and links are considered separately Tables 9.3.10 and 9.3.11 result.

Table 9.3.10 Links - Metro Melbourne

RUM Group	Frequency %	RUM Group	Joint Rank
52-54	22.6	01-03	1
01-03	11.7	82,84	2
82,84	9.8	72,74	3
51	9.3	52-54	4
85,77	6.8	85,77	5
44	5.6	51	6
72,74	4.1	44	7
63	4.0	41	8
41	3.2		
Total n for links = 6775			

Table 9.3.11 Intersections - Metro Melbourne

RUM Group	Frequency %	RUM Group	Joint Rank
20s	40.7	01-03	1
31	11.8	20s	2
37,33,35	11.5	31	3
01-03	5.8	37,33,35	4
52-54	3.6	82,84	5
32,34	3.3	12	6
82,84	2.8	07	8
Total n for Inters. = 9759			

When 'graphical' analysis is carried out at intersections, 50 per cent of RUM (20s and 12) are at 26 per cent of intersections. The dissimilarity in the distributions of accidents and intersections has already been exploited in Metro-Melbourne and since 1969 the reductions in Table 9.3.12 have occurred.

Table 9.3.12 Reduction in RUM(20s,12) 1969 to 1975 (for 45 L.G.A's in Metro-Melbourne)

	Accidents (RUM 20s, 12)	Intersections
1969	5726	3089 (≥1 acc.)
1975	3867	2443 (≥1 acc.)
	-33%	-21%
1969	1462	198 (≥5 accs.)
1975	534	79 (≥5 accs.)
	-64%	-60%

On links, RUM 01-03 and 52-54 are mainly in the one accident per link category, 91 per cent of the 01-03 accidents on 95 per cent of the links and 88 per cent of the 52-54 accidents on 94 per cent of the links.

ROAD TYPE

Only a sub-group of these intersections with five or more RUM (20s and 12) were examined for 1969.

- Arterial road - 70 per cent of intersections
- Sub-arterial - 18 per cent of intersections
- Local - 22 per cent of intersections

100

A sample survey was made for RUM (37,51,33,35) and (52-54) given in Table 9.3.13

Table 9.3.13 Road type by Rear accidents. Metro Melbourne

	RUM (37,51, 33,35) %	RUM (52-54) %	Total %
Arterial	86	50	71
Sub-arterial	11	25	17
Local	3	25	12
	100%	100%	100%

Table 9.3.13 illustrates the quite different distributions of these two RUM groups, one of which RUM (52-54) is a rear-end collision with a parked vehicle and the other a rear-end collision between two 'moving'vehicles.

9.3.7 Kuala Lumpur

The city of Kuala Lumpur has a population of 1 million persons and 255,000 vehicles. The study in Kuala Lumpur used a one-third sample of the 10,000 reported accidents in 1975 (casualty and damage accidents) (210 fatal, 1500 injury accidents). Approximately 75 per cent of the 3367 accidents occurred at intersections.

The major RUM groups were as in Table 9.3.14.

Table 9.3.14 Major RUM groups in Kuala Lumpur

RUM		Frequency %
37,51	962	28.6
20s	371	11.0
Pedestrian	364	10.1
32,34	290	8.7
65	180	5.3
31	118	3.5
36,85	77	2.3
Total n = 3367		

When frequency and severity are considered the following Joint Rank list is produced.

Pedestrian	1
20s	2
37,51	3
31	4 1/2
36,85	4 1/2
65	6
32,34	7

INTERSECTION ACCIDENTS

When a similar consideration is given to the intersection component of these accidents the 'priority' list in Table 9.3.15 is produced.

Table 9.3.15 Joint rank list of major RUM at Intersections

RUM	Frequency %	RUM	Joint Rank
37,33,35	29.5	Ped 01-09	1 1/2
20s	14.7	20s	1 1/2
32,34	11.5	37,33,51	3
01-09	8.3	31	4
31	4.7	32,34	5
65	4.6	65	6
	73% of n = 2516		

When the 'graphical' analysis is carried out for these RUM groups considered on a specific site basis the following is obtained.

. RUM 20s - 50 per cent of the accidents at 23 per cent of 180 intersections.

. RUM 36 - 50 per cent of the accidents at 14 per cent of 174 intersections.

. RUM 31 - 50 per cent of the accidents at 14 per cent of 51 intersections.

. RUM (32,34) - 50 per cent of the accidents at 14 per cent of 73 intersections.

All exhibit an advantageous dissimilarity in the distribution of accidents and intersections.

LINK ACCIDENTS

For Links the similar results in Table 9.3.16.

Table 9.3.16 Joint rank list of major RUMs at links

Frequency RUM	%	Joint Rank RUM	
51	25.7	01-09	1
01-09	17.1	65	2
65	7.6	51	3
52	6.5	85	4
42-43	5.6	66	5
63	4.6	52	7=
66	3.5	42-43	7=
85	2.8	63	7=
	73.4% of n = 851		

The 'graphical' analysis gives the following:

- RUM 51 - 50 per cent of the accidents were at 11 per cent of 79 Links.
- RUM 01-09 - 50 per cent of the accidents were at 29 per cent of 72 Links.
- All RUM - 50 per cent of the accidents were at 12 per cent of 170 Links.

ROAD TYPE

Roads were classified into three categories and the number of locations having accidents were compared with the number of accidents in Table 9.3.17.

Table 9.3.17 Sites with Accidents by road type

	Intersection Accidents				Link Accidents		
	Arterial %	Sub-Arterial %	Local %		Arterial %	Sub-Arterial %	Local
No. of Intersections	58	18	24	No. of Links	66	19	15
No. of Accidents	85	10	5	No. of Accidents	87	9	4

In this investigation the road types were further investigated by the RUM groups with the results in Table 9.3.18.

Table 9.3.18 RUM group by road type

	Intersections					Links			
	RUM 37 %	Right Angle %	32,34 %	31 %	All RUM %	RUM 51 %	01-09 %	65 %	All RUM %
Arterial	90	74	94	90	85	93	80	90	87
Sub-arterial	7	15	5	5	10	4	16	8	9
Local	3	11	1	5	5	3	4	2	4
All roads	30	24	12	5	-	25	17	7	-

INTERSECTION CONTROLS

In Kuala Lumpur, roundabouts are used frequently compared with other near neighbour Asian cities (except perhaps Jakarta). In the study, 17 intersections controlled by roundabouts were found to have accident records (in this one third sample). An analysis of the RUM at these roundabouts gives Table 9.3.19.

Table 9.3.19 RUM at Roundabouts

RUM	%
37	36
34	17
32	14
Others	33
(n = 547)	

The roundabout intersections averaged 32 accidents of all RUM types. Of the total number of RUM (32,34) at intersections (294) 58 per cent occur at roundabouts, and by a consideration of the movements involved it can be seen that the (32,34) could be regarded as equivalent at a roundabout to RUM 20s or 31 at other intersections, depending on the origins of the colliding vehicles.

Accidents occurred at 57 intersections with signal control and averaged 14 accidents of all RUM types. The predominant accident types at the signals are given in Table 9.3.20 below.

Table 9.3.20 RUM at Signals

RUM	%
37	35
31	9
21	6
35	3
others	47
(n = 792)	

Thus it can be seen that the roundabouts average more than twice the number of accidents as the traffic signals. The proportion of RUM 37 accidents is similar at each type of control. RUM (32,34) at the roundabouts is very prominent and is indicative of congestion, poor operation and it is obvious that alternative forms of control should be investigated. Improvements to the operation and visibility of the signals should also be investigated to reduce the frequency of RUM 37.

For the city of Kuala Lumpur the predominant accident is the rear end collision (RUM 37,51). At intersections, 50 per cent of these accidents occurred at 14 per cent of the accident-intersections, and at links 50 per cent of the accidents occurred at 11 per cent of the accident involved links.

9.3.8 Taipei

The city of Taipei has a population of 2 million persons and 312,000 vehicles. The study in Taipei used only casualty accidents for the years 1975 and 1976, a total of 2383 accidents. Approximately 60 per cent of the accidents occurred at intersections. The major RUM groups were as in Table 9.3.21.

Table 9.3.21 Major RUM groups in Taipei (1975 & 1976)

RUM	%
01-03	25.7
20s	16.7
31	10.2
37,51,33,35	8.0
36,77,85	6.2
	66.8%

Total n = 2383

The major groups for the intersection and links separately are in Table 9.3.22.

Table 9.3.22 Major RUM Groups for Intersections and Links

Intersection RUM	%	Links RUM	%
20s	28.1	01-03	33.4
01-03	20.5	15	12.7
31	17.1	85	9.2
32,34	9.0	11	4.9
12	5.4		60.2%
37	4.7		
	84.8%		
Total n = 1418		Total n = 965	

GRAPHICAL ANALYSIS

When the 'graphical' analysis was carried out on a specific site basis, for intersections, RUM groups 01-03, 20s and 12 were taken together and for 1975 50 per cent of the accidents were at 32 per cent of 305 intersections and 1976 50 per cent of the accidents were at 35 per cent of 333 intersections. For Links, only RUM 01-03 was subjected to graphical analysis and for 1975 50 per cent of the accidents were at 32 per cent of 132 Links and for 1976 50 per cent of the accidents were at 35 per cent of 134 Links.

ROAD TYPE

The type of road was investigated using the classification of arterial, sub-arterial, and local. Intersection and Link accidents on various road types were as in Table 9.3.23.

Table 9.3.23 Sites with Accidents

	1975 Arterial %	1975 Sub-Arterial %	1975 Local %	1976 Arterial %	1976 Sub-Arterial %	1976 Local %
Intersection Accidents:						
Intersections	57	29	14	56	29	15
Accidents	64	25	11	62	25	13
Links						
Links	49	32	19	48	32	20
Accidents	51	31	18	46	33	21

TRAFFIC SIGNALS

For the two years, 21.5 per cent of accident-intersections had traffic signals. An analysis was made of the comparative distribution of RUM at intersections with signals and without signals and is given in Table 9.3.24.

Table 9.3.24 Accidents and Signals

	Control	RUM: Right Angle* %	RUM: 31 %	RUM: 37,11 %	RUM: Other %	
(I = 232)	Signals	39	29	10	23	n = 396
(I = 846)	No Signals	59	13	5	23	n = 1022

*Right Angle = 20s, 12, 01-03

As expected the intersections with signals have a lower percentage of Right Angle accidents and a higher percentage of RUM 31 than the non-signalised intersections.

VEHICLE TYPE

Of all accidents, 73 per cent involved at least one motor cycle. Motorcycles were 41 per cent of the number of vehicles involved in accidents. Motor cars were the next most frequent vehicle type involved with 23 per cent and then trucks with 9 per cent. The average number of vehicles involved per accident over the two years was 1.98 indicating a preponderance of multi-vehicle accidents reported. Motorcycles were involved in RUM as vehicle A or vehicle B in the proportions (see the RUM chart (Fig. 9.3, after p 9.17) for Vehicle A, Vehicle B identification) in Table 9.3.25.

Table 9.3.25 Motorcycles Involved in Accidents

	Intersection %	Link %	All Sites %
. as Vehicle A	55	45	60
. as Vehicle B	49	31	40
		n = 1915	

According to Lin & Lin (1981) the involvement of motorcycles for the whole of Taiwan (as opposed to the city of Taipei) is an even higher proportion of all motor vehicle accidents viz. 82-92%. See Table 9.3.26. This is due to the Urban/Rural split of motorcycle accidents which is 36% to 64%.

Table 9.3.26 Motorcycle Accidents for Whole of Taiwan

	1975	1976	1977	1978	1979
Motorcycles involved in accidents, per cent	82.6	84.0	86.2	90.0	91.6
Motorcycles as percent of Registered motor vehicles	85.3	85.8	85.9	85.8	85.2

(After Lin & Lin, 1981.)

They also showed the large increase of 100% in motor vehicles in Taiwan over the five-year period 1975-79.

Motor cycles	1.705 million	to	3.334 million	(+96%)
Other motor vehicles	.283 million	to	.580 million	(+105%)

The corresponding increases in accidents were -

Motor cycle	4183	to	6904	(+43%)
Other motor vehicles	5304	to	6860	(+29%)

Lin & Lin (1981) discuss the misdemeanors of motor cyclists and action needed to improve their safety, however there is no comment on why the other motor vehicles which form only 15% of the registered vehicles should contribute almost 50% of the total number of accidents.

The number of registered motor cycles apparently includes 'mopeds' to the amount of 0.433 million (1979).

9.3.9 Islamabad and Rawalpindi

The study of these two contiguous cities provides an interesting contrast of two quite different city layouts. Rawalpindi is an old city whereas Islamabad was constructed as the national capital for Pakistan and was laid out by Doxiadis on a grid-iron pattern.

The population of Rawalpindi in 1972 was 615,392 and that of Islamabad was 77,319. A recent census (1978) put the Islamabad population at 125,000 so the total urban complex would now exceed 750,000 persons. The number of motor vehicles in the complex was 53,811 in 1977 of which the two major groups were motor cycles 19,085 and cars 15,100. There are many non-motorised vehicles.

The accidents studied covered a period from January 1974 to September 1978. In Rawalpindi there were 1158 accidents (256F, 660I, 242D). In Islamabad there were 504 accidents (79F, 261I, 164D).

The major RUM groups were as in Table 9.3.27.

Table 9.3.27 Major RUM Groups in Rawalpindi and Islamabad

Rawalpindi		Islamabad	
RUM	%	RUM	%
01,03	13.4	01,03	10.7
05,06	10.4	37,51,33,35	9.5
11	10.2	11	8.9
04	10.0	05,06	6.7
37,51,33,35	4.7	21-28	6.2
21-28	4.4	04	4.0
36,77,85	4.0	36,77,85	3.8
13,16,31	4.0	63,65	3.2
12	2.8	13,16,31	2.0
91	2.3	52-54	1.6
63,65	2.3	91	1.6
52,54	1.3	12	1.6
	69.7%		59.8%
	of n = 1158		of n = 504

When intersections and links are considered separately Table 9.3.28 results:

Table 9.3.28 Major RUMs at Intersections and Links

Rawalpindi RUM	%	Islamabad RUM	%
Intersections			
01,03	14.7	21-28	15.5
21-28	11.4	01,03	13.0
04	8.7	37,33,35	11.0
11	7.3	05	3.5
05,06	6.7	11	3.0
12	6.7	12	2.5
37,33,35	5.1	36	2.5
36	3.1	04	2.0
13,16	3.1		
Total n = 499		Total n = 200	
Links			
05,06	12.8	11	12.8
01,03	12.6	01,03	9.2
11	12.0	05,06	8.9
04	10.9	51	8.6
77,85	4.9	63,65	4.6
51	4.4	77,85	4.6
13,16	3.7	04	4.6
63,65	3.2	52	2.3
91	2.7	91	1.6
Total n = 709		Total n = 304	

GRAPHICAL ANALYSIS

Graphical analysis of the data is as in Table 9.3.29.

Table 9.3.29 Clustering of RUM Groups

	RUM		Rawalpindi	Islamabad
For Intersections	01,03	-	50% of accidents at 30% of intersections	50% of accidents at 24% of intersections
	21-28	-	50% of accidents at 26% of intersections	50% of accidents at 18% of intersections
	37,33,35		50% of accidents at 18% of intersections	50% of accidents at 18% of intersections
For Links	05,06	-	50% of accidents at 32% of links	50% of accidents at 34% of links
	11	-	50% of acidents at 34% of links	50% of accidents at 40% of links
	77,85	-	50% of accidents at 26% of links	50% of accidents at 30% of links
	51	-	50% of accidents at 28% of links	50% of accidents at 30% of links

Intersection accidents tend to be more clustered in Islamabad than in Rawalpindi while Link accidents tend to be more clustered in Rawalpindi

ROAD TYPES

Road Types are as in Table 9.3.30.

Table 9.3.30 Sites with Accidents

	Rawalpindi Arterial %	Rawalpindi Sub-Arterial %	Rawalpindi Local %	Islamabad Arterial %	Islamabad Sub-Arterial %	Islamabad Local %
No. of Intersections	46.5	52.5	1.0	27.1	72.9	0
No. of Acidents	66.1	33.4	0.5	42.0	58.0	0
No. of Links	30.0	59.0	11.0	24.5	70.4	5.1
No. of Accidents	55.3	41.3	3.4	31.9	64.8	3.3

VEHICLE TYPE

In Rawalpindi 40 per cent of the accidents involved a motor car; buses, trucks and light trucks were involved in respectively 18 per cent, 16 per cent and 13 per cent of the accidents. For Islamabad the data tabled seemed to be in error as no cars at all were shown and the total did not match the number of accidents. [This comment refers to Zaheer (1979)].

The involvement of buses is very marked, 18 per cent of the accidents compared to about 5 per cent of the registered vehicles over the accident period. The motor cycle involvement is pretty much the converse - 6 per cent of the accidents and about 30 per cent of the registered vehicle over the period 1974-1978.

9.3.10 SUMMARY

For three different cities (i.e. Not Rawalpindi/Islamabad) it can be seen that the same RUM groups form the major problem, particularly RUM 01-03 and 20s, and the largest proportion of accidents occurs at intersections, at least 60 per cent. The majority of the accident-involved intersections are on arterial roads (at least 56 per cent). Additionally, in each city a large proportion of the intersection accidents occur at a few intersections (e.g. 50 per cent of the accidents (particular type) at 23 per cent of intersections).

In the fourth (twin) city the whole pedestrian accident group is the main problem and this is consistent with RUM 01-03 being high in the other three cities. The 'bicycle being struck from behind' accident is the next in importance and as this urban complex is the least motorised of the cities studied (seven times more persons per vehicle than Melbourne) it is perhaps not so surprising. The next two groups are RUM 37,51 and the 20s with the latter group being marginally more severe and thus perhaps deserving higher priority.

For all cities the pedestrian groups, the 20s group (right angle), and the 37,51 groups (rear end) are among the top five groups from each city.

Groups of accidents show clustering by road type and specific location. Typically a few links or intersections accounting for a reasonable proportion of specific accident types (e.g. 50 per cent of accident-type RUM 21-28 occur at 23 per cent of the accident-involved intersections) thus allowing appropriate treatments to affect a large reduction of accidents.

Jacobs and Bardsley (1977) in commenting on accident data collection in developing countries said that although "many ran a comprehensive system, few analysed the data in any great detail or in such a way as to obtain a clear understanding of the road accident situation. Thus there is little information on what type of acidents happened, to what class of road user and where they occurred. Without such information it is difficult to introduce effective remedial measures".

By the exercise conducted in three cities using the data they collect the Writer believes it has been demonstrated that it would require little effort to create useful accident data output.

9.4 Comparison of Victorian Data with New Zealand Data

As mentioned earlier New Zealand has an accident-type coding which is reasonably detailed. The version in use in 1965 is shown in Figure 9.4.1 and its replacement in 1970 is shown in Figure 9.4.2. There are many points in common between the New Zealand coding system and the Victorian one and this is due in part to correspondence between the Writer and M.R. Palmer (then Chief Traffic Engineer) of the N.Z. Ministry of Transport. Data the Writer supplied for Victoria is quoted by Palmer (1971) to compare rural accidents in New Zealand with those in Victoria (1970 and 1968 data respectively).

The 1970 N.Z. chart is not so readily translated to specific RUMs as the 1965 N.Z. chart so the following comparisons are more detailed for 1965 than for 1970.

ACCIDENT CODING SHEET

TYPE	10	20	30	40	50	60	70	80	90	00
	Over-taking	Cornering	Entering	Leaving	On Path	Off Path	Manoeuv-ring	Pedestrian	Cyclist	Passenger and Miscellaneous
1	Pulling Out	Off Right Bend	Cross traffic	Right Against	Rear End	Off Roadway to left	Parking	Near Side	Struck from behind	Fell while boarding or alighting
2	Side Swipe	Off left Bend	Merging	Right Rear	Accident or Broken down	Off Roadway to right	Leaving Parking space	Emerging	Rear end or overtaking a car	Struck while entering or leaving a Car
3	Lost control	Swinging wide	Oblique Approach	Left Rear	Parked	Out of control on r'way	"U" Turn	Far Side	Cornering or out of control	Door Opened
4	Head On	Cutting Corner	Left near	Right Turn Side Swipe	Double Parked	Head On	Reversing	Pedestrian Crossing	Entering	Riding Insecurely
5	Passing On Left	Struck inside	Left Far	Left Turn Side Swipe	Traffic Is-land Judder Bars		Driveway	Walking with Traffic	Right Against	Dangerous or Insecure Load
6	Cutting in	Missed Turn	Right near		Other Permanent Obstruction		Loading Bay	Facing Traffic	Car turning or Manoeuvring	Train
7		Unknown Off course	Right Far		Roadworks Temporary Obstructions			On footpath	Parked car or Obstacle	Parked car Ran away
8			Two Turning		Animal			Playing	Car Door	
9				Other Leaving				Lying standing On Road	Cyclist Other	Other

N.Z. 1965

Figure 9.4.1

1/2

VEHICLE MOVEMENT CODING SHEET

	TYPE	A	B	C	D	E	F	G	O
A	Over-taking	Pulling Out	Head on	Cutting In	Lost Control	Left Turn			Other
B	Head On	Head On (On Straight)	Cutting Corner	Swinging Wide					Other
C	Lost Control or Off Road	Out of Control on Roadway	Off Roadway to Left	Off Roadway to Right					Other
D	Corner-ing	Lost Control Turning Right	Lost Control Turning Left	Missed Intersection					Other
E	Collision with Obstruc-tions	Parked Vehicle	Accident or Broken Down	Non-Vehicular Obstruc-tions					Other
F	Rear End	Slow Vehicle	Stopping for cross Traffic	Stopping for Pedestrian	In Queue (2 or more)	Stopping for Signals			Other
G	Turning vs same Direction	Rear of Left Turn Vehicle	Left Turn Side Swipe	Stopped or Turning from Left Side	Near Centre Line	Overtaking Vehicle			Other
H	Crossing (No Turns)	Right Angle (70° to 110°)	Acute Angle	Obtuse Angle					Other
J	Crossing (Vehicle Turning)	Right Turn Right Side	Right Turn Left Side	Two Turning	Left Turn Left Side	Left Turn Right Side			Other
K	Merging	Left Turn In	Right Turn In	Two Turns					Other
L	Right Turn Against	Stopped Waiting to Turn	Making Turn						Other
M	Manoeuvring	Parking or Leaving	'U' Turn	Reversing	Driveway Manoeuvre				Other
N	Pedest-rians Crossing Road	Left Side	Right Side	Left Turn Left Side	Right Turn Right Side	Left Turn Right Side	Right Turn Left Side		Other
P	Pedest-rians Other	Walking With Traffic	Walking Facing Traffic	Walking on Footpath	Child Playing (Tricycle)	Attending to Vehicle	Entering or Leaving Vehicle		Other
Q	Miscellan-eous	Fell while Boarding or Alighting	Fell from Vehicle	Train	Parked Vehicle Ran Away				Other

Figure 9.4.2 N.Z. 1970 codes

The other important aspect in this comparison is that the N.Z. data contains casualty accident data only, so only the casualty accident data for Victoria is used although reported "property damage" accident data is also available and could be used in some comparisons because of the difference likely in the definition of a casualty accident. Palmer (1971) says "Although all injury accidents are required to be reported "... a significant number miss the net", "probably the great majority of serious injury accidents are reported but the proportion of accidents resulting in minor injury which eventually end up on the statistics form probably declines with the scale of injury until minor bruises and cuts are frequently not reported". This suggests that minor injury accidents, if reported, form part of the casualty accident data system in New Zealand, whereas in Victoria minor bruises and cuts which did "not require treatment by a medical practitioner" are presently classified as "property damage" accidents in the record system. Thus there is a case to include some at least of the Victorian property damage data in the comparison.

Table 9.4.1 below shows the casualty accidents for 1965 in decreasing accident-type frequency with the N.Z. codes and the RUM codes and Table 9.4.2 shows the 1965 data ranking in frequency order for the urban and rural separately using the equivalent RUM codes for identification.

Table 9.4.1 New Zealand - 1965 Casualty Accidents

RUM type	Equiv. N.Z. Code	Urban	Rural	Total	Percent
20s	30s	1633	204	1837	15.5
71-74	21,22	502	950	1452	12.2
01-03,07	81-83,84	1252	116	1368	11.5
HO(36,85,77,88)	64,23,24,27	411	525	936	7.9
RE(37,51,33,35)	42,43,51	655	234	889	7.5
81-84	61,62	328	399	727	6.1
31	41	529	61	590	5.0
52	53	389	76	465	3.9
86	63	173	199	372	3.1
32,34	44,45	245	106	351	2.9
11	91	287	60	347	2.9
12	92	329	2	331	2.8
55	56	90	88	178	1.5
41	73	154	23	177	1.5
Sub-total		6977	3043	10020	84.4
- Rest -		*	*	*	5.6
Total casualty accidents		8333	3538	11871	100.0
		70% +	30% =	100%	

Source: Reconstructed figures from "Traffic Eng'g. Data Book", N.Z. Transport Dept., c 1966.

Table 9.4.2 New Zealand 1965 Accidents: Urban vs. Rural

Urban Equiv. RUM	Percent	Rural Equiv. RUM	percent
20s	19.6	71-74	26.8
01-03,07	15.0	HO	14.8
RE (37,51,33,35)	7.9	81-84	11.3
31	6.3	RE	6.6
71-74	6.0	20s	5.8
HO (36,85,77,88)	4.9	86	5.6
52	4.7	01-03,07	3.3
81-84	3.9	55	2.5
12	3.9	52	2.1
11	3.4	31	1.7
32,34	2.9	58	1.7
Total n = 8333		Total n = 3538	

Table 9.4.3 lists the 1970 casualty accident data, the equivalence to RUM types is not quite as good as for 1965 and should only be regarded as approximate equivalents. Table 9.4.4 compares the 1965 and 1970 data and due to the changes in N.Z. coding there are differences in frequency order but there could also have been some change over time in frequency order.

Table 9.4.3 1970 N.Z. Casualty Accidents

RUM	Approx. Equiv. N.Z.	Percent
20s	H, J	17.0
71-74 (inc. 76)	DA,DB	16.0
01-03,07	N	12.0
81-84	CB,CC	9.0
RE (37,51,33,35)	F,GA,GD	7.5
HO (36,85,77,88)	B	6.9
31	L	6.1
52	EA	4.9
32,34	GB,GC,GE	4.1
86	CA	2.4
41	MB	2.2
55	EC	1.5
44	MD	0.9

n = 13,000 (approx.)

(Source - Palmer, 1971.)

Table 9.4.4 1965 and 1970 Data Compared

(Approx. equiv. RUM)	N.Z. 1970 percent	N.Z. 1965 percent
20s	17.0	15.5
71-74	16.0	12.2
01-03,07	12.0	11.5
81-84	9.0	*6.1
RE	7.5	*7.5
HO	6.9	*7.9
31	6.1	5.0
52	4.9	3.9
32,34	4.1	*2.9
86	2.4	*3.1
41	2.2	1.5
55	1.5	1.5
	n = 13,000 (approx.)	n = 11,871

Note: 1970, RUM11 included in RE 2.9%
RUM12 " " 20s 2.8%

* = change in rank order

Tables 9.4.5 and 9.4.6 list the Victorian data for 1977 subdivided into Metro, other urban and rural sections for casualty accidents and all reported accidents respectively. Table 9.4.6 lists the accidents in "Joint Rank" order.

Table 9.4.5 Victoria Casualty Accidents (1977)

Whole Vic.	percent	Metro.	percent	Other Towns, Cities	percent	Metro + Towns	percent	Rural Roads	percent
20s	21.6	20s	23.1	20s	29.8	20s	23.6	81-84	22.5
01-03,07	12.0	01-03,07	14.7	01-03,07	10.2	01-03,07	13.8	71-74	20.4
81-84	10.2	RE	10.7	81-84	7.4	RE	9.6	20s	10.6
RE (37, 51,33,35)	8.8	31	8.1	31	5.7	31	7.6	HO	9.1
71-74	6.9	81-84	7.5	RE	5.4	81-84	7.4	RE	4.0
31	6.6	52	4.2	71-74	5.0	52	3.9	01-03,07	2.5
HO (36, 85,77,88)	4.3	71-74	3.7	12	4.3	71-74	3.8	44	2.4
52	3.4	HO	3.4	44	4.2	HO	3.2	86	2.5
44	3.2	44	3.1	52	2.9	44	3.2	79	2.3
12	2.5	12	2.6	HO	2.5	12	2.8	78	2.2
41	2.0	41	2.2	11	2.3	41	2.1	76	2.1
11	1.3	11	1.3	41	1.9	11	1.4	62	1.9
86	1.25	32,34	1.2	86	1.7	32,34	1.2	58	1.8
32,34	1.25			32,34	1.3			31	1.6
07	1.2								
79	1.2								
76	1.0								
Total n = 14,823 (100%)		n = 10,344 (70%)		n = 1799 (12%)		n = 12,143 (82%)		n = 2667 (18%)	

Table 9.4.6 Victoria, all reported accidents 1977 "Joint Rank".

State		Metro		Cities, Towns		Rural Roads	
	Freq.		Freq.		Freq.		Freq.
01-03	1796	01-03	1545	01-03	182	81-84	723
71-74	1343	12	326	12	85	71-74	638
12	442	20s	4298	20s	903	20s	445
81-84	2248	31	1379	81-84	221	01-03	69
20s	5646	71-74	579	31	161	86	80
31	1611	07	190	71-74	126	HO	379
07	214	81-84	1304	11	49	79	86
H.O.	1098	RE	2558	86	36	76	65
11	240	HO	648	07	21	78	73
RE	2965	11	171	HO	72	62	59
86	253	04	113	44	132	RE	192
04	157	44	688	RE	215	12	31
44	958	52	2363	04	19	11	20
52	2818	41	486	13	14	04	25
41	621	86	137	76	29	44	128
76	199	99	79	19	18	31	71
				52	329	58	88

H.O. = 36,85,77,88

R.E. = 37,51,33,35

] = tied rank

The urban/rural split was available for 1965 NZ data and because of the closer equivalence of RUM accident types to the 1965 codes it was decided to use 1965 to compare with the Victorian data despite the time difference the two years represent. Table 9.4.7 shows the data listed by the relative frequency order of the NZ data with the corresponding relative frequency of the same accident-type of the Victorian casualty accident data.

Table 9.4.7 1965 N.Z. Ranks and frequency percent with corresponding Vic. frequency percent

A. 1965

Whole NZ Rank percent	Equiv. RUM	1977 Whole Vic. Cas. percent
15.5	20s	21.6
12.2	71-74	6.9
11.5	01-03,07	12.0
7.9	HO	4.3
7.5	RE	8.8
6.1	81-84	10.2
5.0	31	6.6
3.9	52	3.4
3.1	86	1.25
2.9	32,34	1.25
2.9	11	1.3
2.8	12	2.5
1.5	55	-

B.

	NZ Urban Rank %	Vic. Metro. & other towns %	Vic. Metro. %	Vic. Other towns %
20s	19.6	23.6	23.1	29.8
01-03,07	15.0	13.8	14.7	10.2
RE	7.9	9.6	10.7	5.4
31	6.3	7.6	8.1	5.7
71-74	6.0	3.8	3.7	5.0
HO	4.9	3.2	3.4	2.5
52	4.7	3.9	4.2	2.9
81-84	3.9	7.4	7.5	7.4
12	3.9	2.8	2.6	4.3
11	3.4	1.4	1.3	2.3
32,34	2.9	1.2	1.2	1.3

C.

	NZ Rural Rank	Vic. Rural
	%	%
71-74	26.8	20.4
HO	14.8	9.1
81-84	11.3	22.5
RE	6.6	4.0
20's	5.8	10.6
86	5.6	2.5
01-03,07	3.3	2.5
55	2.5	0.3

HO = 36,85,77,88

RE = 37,51,33,35

When the whole of NZ is compared to the whole of Victoria it is evident that the RUM 20's has the greatest frequency in both countries. When the urban areas are compared it is seen that RUM 20's is the most frequent casualty accident for all areas; followed by the pedestrian accident-type (01-03,07); and then the moving rear-end accident for all areas except "Vic. other Towns" for which RUM 81-84 takes third place and then rear end; the next type for all areas is RUM 31. And then there are some variations in order although there is reasonable agreement except for RUM 71-74 and RUM 81-84 wherein lies one of the most apparent differences, as pointed out by Palmer (1971). RUM 71-74 relates to running off the carriageway on bends while RUM 81-84 relates to running off the carriageway on the straight, and Palmer suggests this could be due to more bends in NZ, due to terrain, than in Victoria.

This difference in frequency order is also pronounced when the rural areas are compared, with RUM 71-74 being twice RUM 81-84 on NZ rural roads whereas it is about equal on Victorian rural roads. Head-on and rear-end and RUM 20's accidents are the other three types in the top five types on rural roads for both countries.

A greater percentage of the NZ rural accidents are head-on and rear-end than in Victoria while RUM 20's are a greater percentage in Victoria than in NZ. NZ also shows a greater percentage of RUM 55 accidents (hitting permanent obstruction) which could perhaps be related to design and environmental differences on the rural roads in both countries.

In order to test the similarity of the frequency order of the accident types in Table 9.4.7, ten accident types were selected (for this purpose RUM 81-84 and RUM 71-74 were combined, since they are both run-off carriageway types) and are displayed in Table 9.4.8. These were tested by the Kendall Coefficient of Concordance which gave a significant coefficient of concordance of 0.95 showing that the rank order of frequency of the selected accident types in the three urban areas is related.

Table 9.4.8. Comparison of Frequency Order of Casualty Accidents in Urban Areas

RUM	Metro-Melb.	Other Vic. Towns	N.Z.
20's	23.1%	29.8%	19.6%
01-03,07	14.7	10.2	15.1
81-84,71-74	11.8	13.6	9.9
RE	10.7	5.4	7.9
31	8.1	5.7	6.3
52	4.2	2.9	4.7
HO	3.4	2.5	4.9
32,34	1.2	1.3	2.9
11	1.3	2.3	3.4
12	1.2	4.3	3.9
Total N =	10,344	1799	8333

Kendall's coefficient of concordance W = 0.948

(x^2 = 25.6, 9 d.f., $p < .01$)

Note - The comparison is based on the most frequent RUM types in the New Zealand urban data and the corresponding frequencies for those RUM types in the Victorian data.

Thus an estimate of the "true" ranking of the RUM groups is given by:

Table 9.4.9 Overall rank

	RUM	S rank
1	20's	3
2	01-03,07	7
3	81-84,71-74	8
4	RE	13
5	31	14
6	52	20
7	HO	21
8	12	23 1/2
9	11	26
10	32,34	29 1/2

However this just represents a mix of the three areas and it is more useful to note that the three areas are closely related as regards to how these accident types are ranked in a similar order by the frequency of their occurrence in each area and perhaps could be regarded as samples drawn/representative of a population of urban accidents which might be fairly common throughout this world. Differences would be expected to exist between cities in countries with differing levels of motorisation (and mixes of vehicle types), but cities in countries with comparable levels of motorisation would be expected to show closer agreement.

Problems exist as described earlier on getting a base on which to compare (i.e. apart from RUM) using accident severity or level of reporting. As soon as all reported accidents are used for Metro Melbourne the rank ordering changes but RUM 20's remains at the top and the former top six types are still the top six.

The comparison above grouped 71-74 with 81-84 because they were both run off the road type accidents, this grouping is not "necessary to get significant results" since if the two groups are left separate and the comparison made with eleven groups instead of ten (see Table 9.4.7) then Kendall's Coefficient of Concordance is still significant [W = .919, x^2 = 27.6, 10 d.f., $p < .01$]

The basis for this comparison was the most frequent RUMs in the New Zealand urban data and the corresponding frequencies for the same RUMs in the Victorian data. The comparison could be made the reverse way (e.g. selecting the most frequent RUMs in Metro-Melbourne and determining the corresponding frequencies for Other Vic. towns and urban NZ.), however one particular RUM does not figure highly in the urban NZ data and that is RUM 44 (accidents involving vehicles entering or leaving driveways). In urban NZ RUM 44 is about 0.5 per cent of the casualty accidents whereas in Metro Melbourne it is about 3% (rank 9th) and in other Vic. towns about 4% (Rank 8th) of the casualty accidents.

As coding in Victorian classified all accidents at driveways as RUM44 while the NZ code sketch shows only departing vehicles from the driveway, it might be concluded that the differences lie in coding definition. An examination of RUM 44 coding (see 8.2.2.2) showed 77 per cent of RUM 44 accident to involve entering vehicles and 23 per cent departing vehicles and assuming these figures are representative then approximately 23 per cent of the RUM 44 involve departing vehicles only (i.e. 0.7 per cent) and would move RUM 44 considerably down the ranked frequency list. Since RUM 44 is not directly equivalent between N.Z. and Vic. codes it has been left out of the comparison.

9.5 Area-wide Analysis

The expression 'area-wide measures' has been used in some U.K. work and this term can be seen as the Writer's "Road-type Analysis".

Dalby (1979) says (about English towns) "outside central areas (?) only a relatively small proportion of urban accidents occur in clusters sufficiently large to justify site-specific remedies".

In the U.K. urban areas the proportion of use made of unclassified roads is 35% of urban travel and 46% of urban injury accidents occur on them. Dalby's study of four English towns showed that two-thirds of the injury accidents were at intersections and more than a half were on the arterial network outside the 'centre'. A sample of 102 km of arterial within these towns gave the results below.

Table 9.5.1 - Arterial Intersections

Inters. type	Total No. Inters.		No. with Accs.	
Arterial/Arterial	45	5.2%	37	13.9%
Arterial/Distributor	88	10.3	57	21.3
Arterial/Other	723	84.5	173	64.8
Total	856	100.0%	267	100.0%

(Source - R.G. Chapman, 1978)

The detail of the total number of accidents at each intersection type is not given and below is the closest derivation.

Table 9.5.2 No. of Accidents at Arterial Intersections

Int. type			
Art/Art	65 + (6 x ⩾ 6)		
Art/Dist.	112 + (3 x ⩾ 6)		53.0%
Art/Local	227 + (0 x ⩾ 6)	227	47.0%
	404 + 79 =	483	100.0%

In order to compare this with Melbourne data the number of intersections on Arterials was drawn from a paper by Andreassend (1976a) related to the priority road program and the accident data was taken from a paper by Daltrey, Howie and Randall (1978) who made a sample of ten inner municipal areas in Metro-Melbourne.

Table 9.5.3 Arterial Intersections and Accidents, Melbourne

Int. Type	No. all Inters.		No. Casualty accs	
Art/Art	533	5.7%	254	27.4%
Art/distrib.	1346	14.5	320	34.6
Art/local	7411	79.8	352	38.0
	9290	100.0%	926	100.0%

The obvious difference is in the proportion of accidents occurring at the intersection of arterial and local roads which is greater in the case of the English towns. Data from R.G. Chapman (1978) shows that about 92% of these latter intersections had neither roundabouts nor traffic signal control but presumably did have priority control.

It is incomplete to stop the analysis with just the Arterial roads, and for Metro-Melbourne the number of intersections by road class and the proportion of accidents (from the two sources for Table 9.5.3 above) are:—

Table 9.5.4 Intersections and accidents by road class, Metro Melbourne

	No. Inters. (all)	No. Casualty Accs. At. Inters.	At Links	(sample) Total
Arterial	21	58.6	54.5	57
Sub-art.	21	23.6	24.2	24
Local	58	17.7	21.3	19
	100%	100%	100%	100%
n =	45,065	1578	807	2385

The English data when subjected to 'graphical analysis' shows that 45% of the non-pedestrian intersection accidents on arterials are accounted for by 18% of the intersections with accidents.

Dalby gives examples of 'measures' which usually illustrate that road user type is the only subdivision e.g., for the De Beauvoir Town route access control scheme pedestrian accidents and 'other' accidents are the only divisons. Even for the pedestrian accidents no detail is given as to whether the pedestrians were crossing the road or playing/standing in the road, etc. The study he quotes for Swindon does give some information on whether certain road-user accidents are clustered on arterials or diffuse on residentials and while that is interesting, there does not appear to be any class of roaduser type accidents which is diffused on arterials or 'clustered' on residential streets.

Table 9.5.5 (Dalby, 1979).

	Percent of total injury accs.	
	Clusters on Arterials	Diffuse on Residential
Child Ped.	9	36
Adult Ped.	9	7
Child cyclist	3	12
Adult "	16	4
Motor cyclist	24	19
Veh. occupant	40	22
	101%	100%

This situation can be compared with Table 9.5.6 for Metro-Melbourne for the pedestrian accidents and there is no real clustering in Melbourne (see Chapter 9).

Table 9.5.6 Pedestrian Accidents on Nodes and Link, Metro Melbourne

	No. Inters.	No. Acc.(01-03,07)	No. Link	No. Acc(01-03)
Acc/yr. 1	707	707 (91%)	764	764 (88%)
2	61	122	38	76
3	9	27	4	12
4	1	4	1	4
5	-	-	2	10
	778	860	809	866

However connected links and adjacent node/links need to be studied before a definitive statement could be made (but see 9.2.4).

It seems that the distribution of accidents by road class in English towns differs from that of Melbourne (although more detailed information would make a better comparison possible) and the adoption of counter measures proposed in U.K. papers should be viewed with some caution as to their applicability to Melbourne.

The analyses in this chapter fall into two main groups, the first examining the trends in accident-type groups over the period 1973 - 1978 and the second the history of high accident frequency intersections in the Metro-Melbourne area over the period 1968 - 1978. These intersections were selected on the basis that in any one year in the period 1974 - 1978 they had nine or more reported RUM 20's accidents.

10.1 Accident-Type Groups

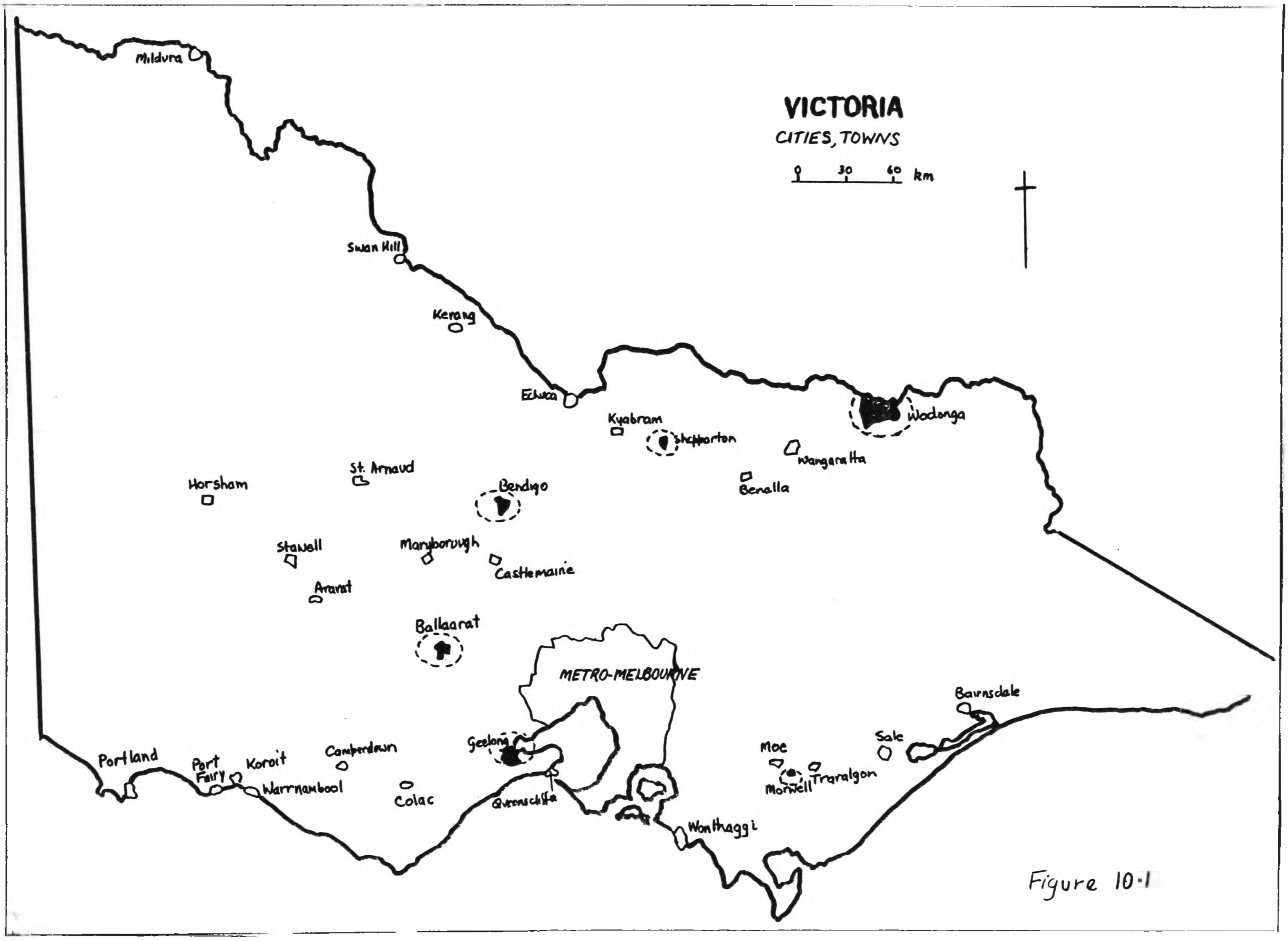
The data is subdivided into the following areas - Metro-Melborne, Other Cities and Towns, and the Rest of the State (essentially rural roads). Metro-Melbourne is an area defined for census and statistical purposes and consists of 56 local government areas of varying areas and populations. The population of Metro-Melbourne, in 1977, was approximately 2.7 million and the average population density was 441 persons per square kilometre in a total area of more than 6000 square kilometres. Population densities in the municipalities within Metro-Melbourne ranged from 25 persons per square kilometre, in a boundary municipality which was largely farmland, to 6250 persons per square kilometre in an inner municipality. The Metro area could be subdivided into those municipalities which are fully "urbanised" and those which are partly urbanised. The urban boundary is based on census collector districts having population densities of at least 200 persons per square kilometre. The present Metro Area boundary was declared in 1966 and was made well outside the urban boundary in order to avoid declaring a new metro area after each census, which had been the practice previously.

The urban boundary is thus movable and moving but the Metro Area boundary is fixed. An example of the use of a subdivided Metro-Melbourne area is given by Andreassend (1976,b) but for these analyses the Metro Area will be used as a whole.

The "Other Cities and Towns" group consists of the Geelong statistical area and all the other declared cities, towns and boroughs in Victoria, as detailed in Table 10.1.1 and their location within the State is shown in Figure 10.1. The Geelong statistical area has been in existance for some period as the next biggest urban centre after Melbourne. Five other urban centres were defined in 1976 for statistical purposes and these are also listed on Table 10.1.1 but due to lack of continuity over the study period are not used in the analyses.

The "Rest of State" or "Rural Road" group represents the balance of the data after the other two area groups are deducted and consists largely of rural areas. There will be the odd cluster of houses and shops encompassed in this group and of course the portions of urban development related to the five lately-defined urban centres outside cities but this should not greatly affect the characteristic of accident-type being sought by this area division.

The point of the area division is to separate out the accident-types characteristic of urban areas from those that relate to the use of rural roads.



VICTORIA
CITIES, TOWNS
0 30 60 km
Mildura
Swan Hill
Kerang
Echuca
Kyabram
Shepparton
Wodonga
Wangaratta
Benalla
Horsham
St. Arnaud
Bendigo
Stawell
Maryborough
Castlemaine
Ararat
Ballaarat
METRO-MELBOURNE
Bairnsdale
Sale
Moe
Traralgon
Morwell
Portland
Port Fairy
Koroit
Warrnambool
Camperdown
Colac
Geelong
Queenscliffe
Wonthaggi

Figure 10·1

TABLE 10.1.1 VICTORIA, Population 1977 of Cities and Towns

	Persons (x 1000)		Density (persons/ square kilometre)
Whole State		3,799.	16.7
Metro-Melbourne		2,694.	441
Geelong Stat. Division		138.4	-
Ballarat	38.8	45.1	1120
. Sebastopol	6.3		895
Bendigo	33.5	40.4	1031
. Eaglehawk	6.9		478
Shepparton		22.3	836
Warrnambool		21.9	761
Wodonga (Rural City)		17.0	49
Wangaratta		16.5	556
Moe		15.9	659
Traralgon		15.9	796
Mildura		15.0	520
Sale		12.5	419
Horsham		12.1	505
Colac		9.9	913
Hamilton		9.8	453
Bairnsdale		9.4	346
Ararat		8.7	454
Portland		8.6	251
Benalla		8.6	484
Echuca		8.3	317
Swan Hill		8.2	598
Maryborough		7.9	337
Castlemaine		6.9	478
Stawell		6.5	268

TABLE 10.1.1 VICTORIA, Population 1977 of Cities and Towns

	Persons (x 1000)	Density (persons/ square kilometre)
Kyabram	5.3	253
Wonthaggi	5.1	90
Kerang	4.1	181
Camperdown	3.7	257
Queenscliffe	3.2	371
St.Arnaud	2.9	114
Port Fairy	2.5	109
Koroit	1.5	63
Yallourn Works Area	1.4	52

Other 'Urban Centres', apart from Melbourne and Geelong which were defined in 1976 and surrounded some of the above cities are:

Ballarat Statistical Division	71.4×10^3	persons
Bendigo Statistical Division	57.9 "	"
Shepparton - Mooroopna	32.8 "	"
Wodonga	28.4 "	"
Morwell	16.6 "	"

(Source: Demography 1977, ABS Victoria Office, 1981)

The location of these Cities, Towns and Urban centres are shown in Figure 10.1.

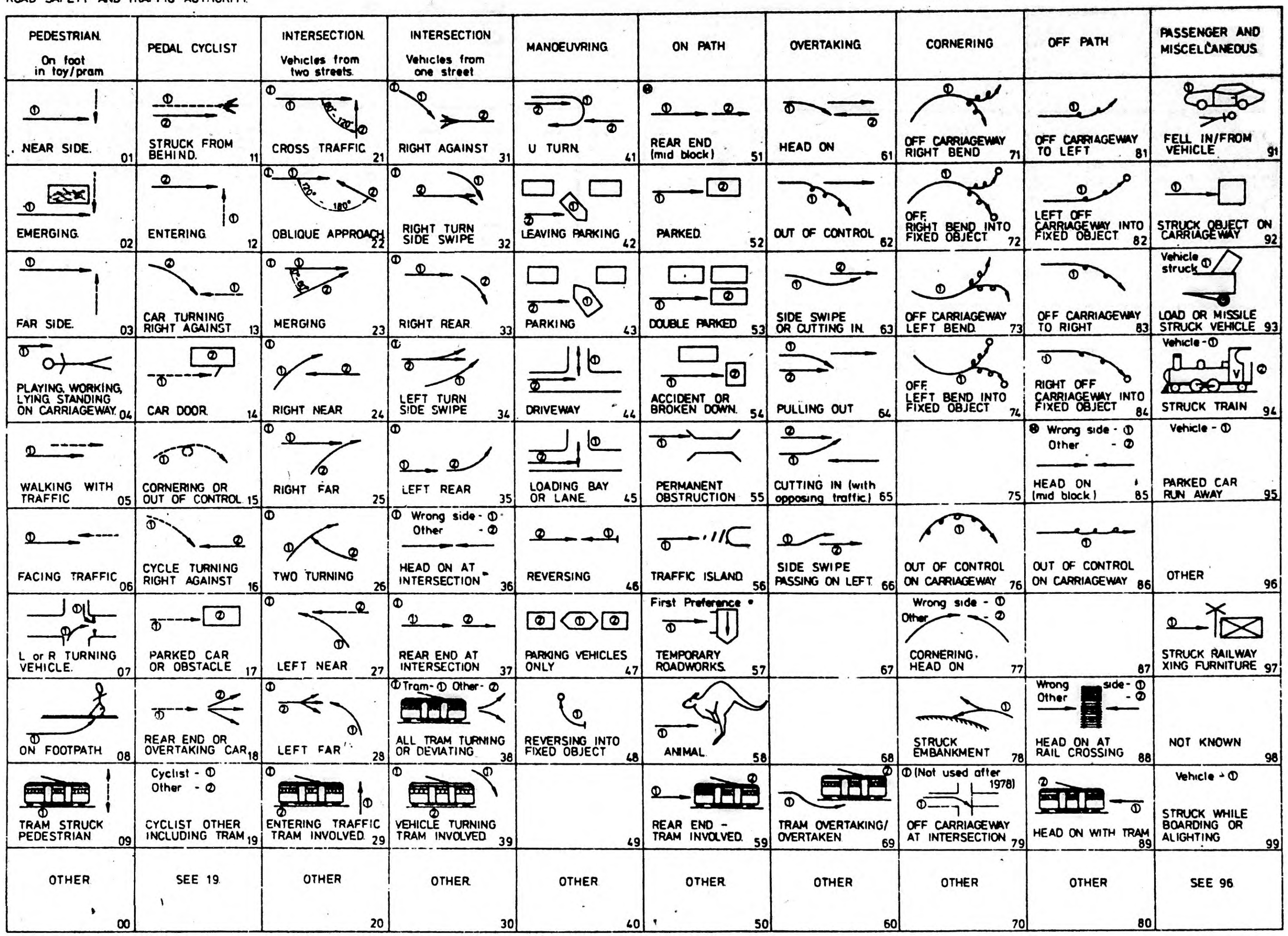
The accident-types were examined to ascertain the most frequent types (or groups of types) in each area. Then the data related to the number of sites involved and the number of accidents was extracted for the years 1973 to 1978.

(a) Metro-Melbourne

Table 10.1.2 lists the number of accidents and the number of sites, having those accidents, for nine accident-type groups from the RUM chart. (See Figure 10.2). Groups such as 81-84 refer to RUM 81,82,83 and 84.

ROAD SAFETY AND TRAFFIC AUTHORITY

CODING OF ROAD USER MOVEMENTS



1. Road User Movement should be classified first by the written divisions along the top of the page and then by the diagramatic subdivisions.
2. The subdivision chosen should describe as accurately as possible the general movement executed by the vehicles having the initial collision. It should not describe the cause of the accident: A car might cut into a traffic stream and while not actually colliding with any vehicle, cause another vehicles to run off the road. This should be coded as 81 Off roadway to left. If the car collided with the other vehicle when cutting in, it should be coded as 65. Cutting in.
3. Priority should be given to 57, then subdivisions in numerical order.
4. Road User Movements marked ① or ⊕ must be used only at intersections or midblocks respectively.
5. The numbers ① and ② indentify individual vehicles involved in the initial event when R.U.M. is linked with other driver/vehicle information.

DATE OF ISSUE 1/1/79

RUM Chart 1979

Figure 10.2

TABLE 10.1.2 Metro-Melbourne

(i) Number of Sites

RUM	1978	%	1977	%	1976	%	1975	%	1974	%	1973	%
20s	2546	22.4	2657	23.9	2497	26.0	2484	26.0	2584	27.7	2763	26.9
01-03,07	1587	14.0	1615	14.5	1424	14.8	1403	15.2	1466	15.7	1822	17.7
81-84	1345	11.8	1220	12.0	1059	11.0	1022	11.1	978	10.5	996	9.7
71-74	412	3.6	369	3.3	284	3.0	303	3.3	242	2.6	284	2.8
37,33,35	1298	11.4	1211	10.87	1012	10.5	883	9.6	967	10.4	1123	10.93
51	896	7.9	851	7.6	596	6.2	578	6.3	614	6.6	702	6.8
52	1821	16.0	1792	16.1	1542	16.06	1388	15.1	1394	14.9	1837	13.5
31	912	8.0	905	8.1	787	8.2	783	8.5	713	7.6	795	7.7
44	549	4.8	512	4.6	402	4.2	364	3.95	370	4.0	404	3.93
	11,366		11,132		9,603		9,208		9,328		10,276	

(ii) Number of Accidents

RUM	1978	%	1977	%	1976	%	1975	%	1974	%	1973	%
20s	1079	28.2	4281	30.4	4114	33.9	3948	34.0	4070	34.7	4522	34.1
01,03,07	1726	11.9	1733	12.3	1505	12.4	1502	12.9	1580	13.5	1993	15.0
81-84	1414	9.8	1282	9.06	1090	9.0	1062	9.14	1030	8.8	1040	7.8
71-74	449	3.1	428	3.0	307	2.5	337	2.90	263	2.2	387	2.91
37	1759	12.2	1572	11.1	1243	10.2	1122	9.7	1217	10.4	1413	10.6
51	1023	7.1	962	6.8	654	5.39	628	5.41	683	5.8	800	6.0
52	1948	13.5	1912	13.58	1648	13.57	1495	12.9	1468	12.5	1475	11.1
31	1482	10.3	1374	9.8	1151	9.5	1146	9.9	1040	8.9	1212	9.1
44	577	4.0	534	3.8	428	3.5	376	3.237	380	3.239	430	3.24
	14,457		14,078		12,140		11,616		11,733		13,272	

	1978	1977	1976	1975	1974	1973
Acc/Site	1.27	1.26	1.26	1.26	1.26	1.29

In order to examine trends of the groups within the table an adaption of Spearman's Rank Correlation test (Satterthwaite, 1976) was applied to the percentage of each year's total that each group represented. The test was based on the fact that if a group represented an ever increasing proportion each year then it would correlate positively with a value of one, if the groups decreased then it would correlate negatively.

TABLE 10.1.3 Trend Analysis of Table 10.1.2 (ii)

RUM	CORRELATION	SIGNIFICANCE
20's	-0.943	$p \approx .01$, one tail
01-03,07	-1.00	$p < .01$
81-84	0.871	$p < .05$
71-74	0.643	NS
37,33,35	0.486	NS
51	0.443	NS
52	0.786	NS
31	0.771	NS
44	0.829	$p \approx .05$

Thus it appears that RUMS 20's and 01-03,07 have become a smaller proportion of each year's total whilst RUM 81-84 and 44 have become a greater portion of each year's total. Reference to Table 10.1.2 shows that also in an absolute sense that RUM 20's have decreased while RUM 81-84 and 44 have increased. The 01-03,07 accidents while becoming a smaller portion of each year's total have shown an absolute increase in the last two years compared with the three earlier years.

(b) Other Cities, Towns

Table 10.1.4 lists the number of accidents and sites for nine particular RUM groups. These are the same nine RUM groups as for Metro-Melbourne but are not in the same frequency order.

TABLE 10.1.4. OTHER CITIES, TOWNS

(i) Number of Sites

RUM	1978	%	1977	%	1976	%	1976	%	1974	%	1973	%
20s	616	33.8	622	33.5	566	34.5	616	36.9	627	27.3	696	36.4
52	244	13.4	281	15.1	252	15.4	216	12.9	241	14.3	239	12.5
81-84	232	12.7	215	11.6	207	12.6	217	13.0	190	11.3	194	10.1
71-74	120	6.6	100	5.4	97	5.9	91	5.5	79	4.7	100	5.2
01-03,07	183	10.0	192	10.3	170	10.4	172	10.3	195	11.6	249	13.0
37,33,35	121	6.6	128	6.9	99	6.0	97	5.8	107	6.4	144	7.5
51	68	3.7	71	3.8	57	3.5	74	4.4	73	4.3	86	4.5
31	149	8.2	129	6.9	107	6.5	119	7.1	97	5.8	109	5.7
44	92	5.0	119	6.4	84	5.1	67	4.0	71	4.2	97	5.1
	1825		1857		1639		1669		1680		1914	

(ii) Number of Accidents

RUM	1978	%	1977	%	1976	%	1975	%	1974	%	1973	%
20s	914	41.1	903	40.6	758	39.6	843	42.9	880	43.82	1021	43.84
52	252	11.3	290	13.0	265	13.9	227	11.6	258	12.8	253	10.9
81-84	239	10.8	221	9.9	219	11.4	219	11.2	194	9.7	199	8.5
71-74	133	6.0	106	4.8	113	5.9	98	5.0	84	4.2	106	4.6
01-03,07	191	8.6	203	9.1	177	9.3	189	9.6	208	10.4	273	11.7
37,33,35	130	5.9	143	6.4	108	5.6	103	5.2	120	6.0	164	7.0
51	72	3.2	72	3.2	62	3.2	76	3.9	78	3.9	90	3.9
31	194	8.7	161	7.2	125	6.5	139	7.1	109	5.4	124	5.3
44	96	4.3	124	5.6	86	4.5	69	3.5	77	3.8	99	4.3
	2221		2223		1913		1963		2008		2329	
Acc./Site	1.22		1.20		1.17		1.18		1.20		1.22	

Testing for trends, as described above, produced the following results:

TABLE 10.1.5 Trend Analysis of Table 10.1.4 (ii)

RUM	CORRELATION	SIGNIFICANCE
20s	-0.771	NS
52	0.314	NS
81-84	0.543	NS
71-74	0.771	NS
01-03,07	-1.00	$p < .01$
37,33,35	-0.341	NS
51	-0.886	$p < .05$
31	0.943	$p \approx .01$
44	0.443	NS

Thus it appears that RUM 01-03,07 and 51 have become smaller portions of each year's total while RUM 31 has become a greater portion. In absolute numbers RUM 31 appears to be increasing, from reference to Table 10.1.4, while RUM 01-03,07 and 51 could be viewed as varying around fixed values.

(c) Rest of State/Rural Roads

Table 10.1.6 lists the number of sites and accidents for ten particular RUM groups. The frequency order is different to that of the other two areas.

TABLE 10.1.6 REST OF STATE

(i) Number of Sites

RUM	1978	%	1977	%	1976	%	1975	%	1974	%	1973	%
81-84	749	28.3	705	27.0	651	26.3	644	26.0	539	22.8	619	23.4
71-74	627	23.7	616	23.6	590	23.8	542	21.9	466	19.7	531	20.0
20's	369	13.9	386	14.8	365	14.8	402	16.2	387	16.4	407	15.4
85,77,88	357	13.5	345	13.2	342	13.8	334	13.5	352	14.9	356	13.4
37,33,35	77	2.9	77	2.9	60	2.4	68	2.7	82	3.5	75	2.8
51	120	4.5	116	4.4	97	3.9	111	4.5	121	5.1	144	5.4
86,76	117	4.4	123	4.7	153	6.2	149	6.0	178	7.5	221	8.3
44	113	4.3	116	4.4	112	4.5	136	5.5	125	5.3	137	5.2
31	67	2.5	69	2.6	63	2.5	57	2.2	53	2.2	81	3.1
01-03	54	2.0	58	2.2	41	1.7	36	1.5	58	2.5	76	2.9
	2650		2611		2474		2479		2361		2647	

(ii) Number of Accidents

RUM	1978	%	1977	%	1976	%	1975	%	1974	%	1973	%
81-84	785	27.9	745	26.4	679	25.6	692	25.9	587	23.1	651	22.7
71-74	664	23.6	657	23.3	636	24.0	579	21.6	491	19.3	582	20.3
20s	432	15.3	462	16.4	427	16.1	473	17.7	454	17.9	474	16.5
85,77,88	374	13.3	365	13.0	366	13.8	361	13.49	375	14.8	389	13.54
37,33,35	78	2.8	83	2.9	64	2.4	68	2.5	84	3.3	78	2.7
51	122	4.3	122	4.3	102	3.8	115	4.3	124	4.9	157	5.5
86,76	118	4.2	124	4.4	155	5.84	154	5.76	181	7.1	224	7.8
44	116	4.1	123	4.4	114	4.3	136	5.1	127	5.0	157	5.5
31	73	2.59	77	2.7	68	2.56	60	2.24	56	2.21	83	2.9
01-03	54	1.9	60	2.1	42	1.6	37	1.4	59	2.3	78	2.8
	2816		2818		2653		2675		2538		2871	
Acc/Site	1.06		1.08		1.07		1.08		1.07		1.08	

An examination of trends, as described earlier, produced the following:

TABLE 10.1.7 Trend analysis of Table 10.1.6(ii)

RUM	CORRELATION	SIGNIFICANCE
81-84	0.943	$p \approx .01$
71-74	0.771	NS
20s	-0.771	NS
85	-0.886	$p < .05$
37,33,35	0.029	NS
51	-0.60	NS
86,76	-0.943	$p \approx .01$
44	-0.886	$p < .05$
31	-0.086	NS
01-03	-0.486	NS

So over the period 1973-78 it appears that RUM 85, 44, and (86,76) became smaller portions of each year's total and RUM 81-84 became a larger portion. Reference to Table 10.1.6(ii) shows that in absolute numbers RUM 81-84 has increased while RUM 86,76 has decreased, RUM 85 has shown a dip and RUM 44 appears to be decreasing.

(d) Summary

Looking at the three areas, the following RUM groups had significant changes in their portion of the accidents for each year of the period 1973-78.

TABLE 10.1.8 Significant changes in proportion of accidents, 1973-78.

METRO	OTHER CITIES	RURAL
-20s		
-(01-03,07)	-(01-03,07)	
+(81-84)		+(81-84)
+44		-44
	-51	
	+31	
		-85
		-(86, 76)

For the Metro area RUM 20s (vehicles from two streets) have declined; RUM 01-03,07 (Pedestrian crossing road) accidents have declined in both the Metro and Other Cities areas; RUM 81-84 (running off the road, on the straight) has increased in both the Metro and Rural areas; RUM 44 (vehicles entering or leaving driveways) has increased in the Metro area but declined in the Rural area: In the Other Cities area RUM 51 (rear-end in traffic, midblock) has decreased and RUM 31 (right-turning at intersection hit by vehicle from opposite direction) has increased; and in the Rural Area RUM 85 (head-on, midblock) and RUM 86,76 (out of control on carriageway) have decreased.

All the other RUM groups, listed in the Tables for the three areas did not exhibit any significant trends to increase or decrease relatively over the period 1973-78 (for the method of testing employed), that is they remained a relatively constant proportion of each year's accidents.

In section 9.2.2 Site Analysis, the method of ascertaining how each particular accident-type is distributed on the road network is described. That is, does the accident-type exhibit "clustering" or is it diffused over the network? Figure 9.1 illustrated RUM group 20's for one year's data. In this section the site characteristics of a number of RUM groups is examined to ascertain clustering and the stability of the same across the period 1973-78.

Tables of the RUM groups are presented first by actual frequency for sites having 1,2,3, etc. accidents per year for each year, then tables of frequency percent of site number for each accident level are presented. (Tables 10.2.1-10.2.11 and 10.2.12-10.2.34 respectively). When the RUM group was of sufficient frequency then the data is given for all three area divisions (Metro, Other Cities, Rest of State).

The RUM Groups are as follows:

RUM	20s	(Vehicles from adjacent streets at Intersections)
	37,33,35	(Rear end at Intersection)
	51	(Rear end at Links)
	52	(Hit parked vehicle)
	81-84	(Off carriageway, straight)
	71-74	(Off carriageway, on curve)
	01-03	(Pedestrian crossing road)
	07	(Pedestrian crossing road)
	31	(Right-turning/opposing vehicle)
	85,77,88	(Head-on)
	44	(Driveway associated)
	86,76	(Out of control on carriageway)

Some of the frequency percent tables have been analysed by the Friedman test for differences between the years and, for example, when no difference was found for RUM 20s, the six years data have been combined and the corresponding accident data distribution of sites and accidents have then been generated in the same manner as in Section 9.2.2.

Trend analysis was also performed on these tables by the same method used in 10.1. Little came out of this analysis and the only comparisons made were between the 1 accident/site class and the remainder. The only significant trends detected were:

Rural RUM 85 significant trend to increase proportion each year.

With RUM 37 (Rear-end at Intersections) (Metro), if the data is divided 1973-75 and 1976-78 which is roughly pre-and post- METCON* then the 1 acc./site class shows a trend to decrease each year.

With RUM 51 (rear end on Links), if the data is divided as above then the 1 acc./site class shows a trend to decrease each year.

With RUM 20's if the 1 to 6 acc./site class is separated from the 7 + acc./site class and divided 1973-75 and 1976-78 then the 1 to 6 class shows a trend to increase each year and thus the 7 + classes shows a trend to decrease.

The examination of trends can be summarised as follows:

Rural RUM 85 (Head-on) has become more diffused on the road network during the period 1973-78. RUM 37 and RUM 51 have shown some indication of becoming more clustered since the introduction of METCON* (priority

* See 10.17

roads). RUM 20's shows some indication for these accidents to become less clustered in respect of the higher frequency sites (7 and more accidents/site) since the introduction of METCON* and the associated intersection signalling program. This change is probably due to the selective signalisation of sites with high frequencies of reported RUM 20's accidents.

It is not considered that much reliance should be put on the trend tests since with six years of data the trend must be very strong to produce a significant result.

The Friedman test however utilizes all the data in the matrix and should produce a more reliable result.

The tabled data follows.

* METCON - Metropolitan Intersection Control Program - was the installation of 3000 km of Priority Rd in Metro-Melbourne by the erection of STOP or GIVE WAY signs. This was carried out in the first four months of 1975. All major Arterials and sub Arterials became part of the priority road network. An accelerated program of intersection signal installation followed METCON.

TABLE 10.2.1 RUM 20s
Number of Intersections
(a) Metro-Melbourne

Acc/Int	1978	1977	1976	1975	1974	1973
1	1788	1871	1726	1710	1835	1880
2	429	433	433	464	416	495
3	158	164	165	150	166	181
4	68	84	64	78	73	94
5	43	44	37	38	38	50
6	19	18	23	16	22	29
7	14	14	19	9	16	10
8	10	14	12	5	7	8
9	9	3	5	5	5	8
10	2	2	1	3	2	2
11	3	2	.	2	1	2
12	.	3	3	.	.	1
13	.	2	2	.	.	.
14	1	.	2	3	1	1
15	1	2	.	.	1	1
16	.	.	2	.	.	.
17	1	1	1	.	.	.
18			1	.	1	.
19			.	.		.
20			.	1		1
21			1			
Total Int.	2546	2657	2497	2484	2584	2763
Total Acc.	4079	4281	4128	3948	4070	4522
Acc./Site	1.60	1.61	1.65	1.59	1.58	1.64
No. Int $\geq$ 9	17	15	18	14	11	16

TABLE 10.2.1 (b)

RUM 20's, OTHER CITIES, TOWNS

Acc./Int.	1978	1977	1976	1975	1974	1973	TOTAL
1	440	462	433	464	470	495	2764
2	105	98	95	98	112	131	639
3	38	32	26	39	25	44	204
4	15	12	5	10	9	13	64
5	9	11	5	4	5	5	39
6	5	4	2	1	1	3	16
7	2	2	-	-	3	3	10
8	2	1	-	-	-	2	5
9	-	-	-	-	1	-	1
:					.		
14					1		1
Total Int.	616	622	566	616	627	696	3743
Total Acc.	914	903	758	843	880	1021	
Acc/Int.	1.48	1.45	1.34	1.37	1.40	1.47	

TABLE 10.2.1 (c)

RUM 20's, RURAL ROADS (i.e. REST OF STATE)

Acc./Int	1978	1977	1976	1975	1974	1973	TOTAL
1	321	339	314	353	334	356	2017
2	40	32	40	37	44	40	233
3	4	6	7	4	7	7	35
4	2	5	3	5	1	3	19
5	1	3	.	3	.	1	8
6	1	1	.		.		2
7			.		1		1
8			1				1
Total Int.	369	386	365	402	387	407	2316

Continued over

TABLE 10.2.1. (c)

RUM 20's, RURAL ROADS (i.e. REST OF STATE) - Continued

Acc./Int	1978	1977	1976	1975	1974	1973	TOTAL
Total Int.	369	386	365	402	387	407	2316
Total Acc.	432	462	427	473	454	474	
Acc/Int.	1.17	1.20	1.17	1.18	1.17	1.16	
Total Int. (b) & (c)	985	1008	931	1018	1014	1103	

TABLE 10.2.2 RUM 37, 33, 35 (Rear-end at Intersection)

(a) Metro-Melbourne

Acc./Int.	1978	1977	1976	1975	1974	1973	TOTAL
1	1011	978	855	718	795	926	5283
2	175	156	113	120	126	147	837
3	70	44	29	31	28	26	228
4	28	17	10	5	11	15	86
5	11	9	2	4	4	4	34
6	1	3	1	4	1	2	12
7	1	3	.	1	1	2	8
8	1	1	1		.	.	3
9			.		1	1	2
10			.				–
11			1				1
Total Int.	1298	1211	1012	883	967	1123	6494
Total Acc.	1759	1572	1243	1122	1217	1413	
Acc/Int.	1.36	1.30	1.23	1.27	1.26	1.26	

(b) Other Cities, Towns

Acc./Int	1978	1977	1976	1975	1974	1973
1	113	117	90	91	95	127
2	7	8	9	6	11	14
3	1	2			1	3
4		1				
Total Int	121	128	99	97	107	144
Total Acc.	130	143	108	103	120	164
Acc./Int.	1.07	1.12	1.09	1.06	1.12	1.14

(c) Rural Roads

Acc./Int	1978	1977	1976	1975	1974	1973
1	76	73	56	68	80	72
2	1	2	4		2	3
3		2				
Total Int.	77	77	60	68	82	75
Total Acc.	78	83	64	68	84	78
Acc./Int.	1.01	1.08	1.07	1.0	1.02	1.04

TABLE 10.2.3 RUM 51 (Rear-end at Link)

(a) Metro-Melbourne

Acc./Site	1978	1977	1976	1975	1974	1973	TOTAL
1	804	771	544	535	557	637	3848
2	75	57	47	36	48	48	311
3	12	17	4	7	7	11	58
4	1	4	1		1	1	8
5	.	2			1	2	5
6	3					2	5
7	.					-	-
8	.					1	1
9,10	.						-
11	1						1
Total Sites	896	851	596	578	614	702	4237
Total Acc.	1023	962	654	628	683	800	
Acc./Site	1.14	1.13	1.10	1.09	1.11	1.14	

(b) Other Cities, Towns

Acc.Site	1978	1977	1976	1975	1974	1973
1	64	70	53	72	68	83
2	4	1	3	2	5	2
3			1			1
Total Sites	68	71	57	74	73	86
Total.Acc.	72	72	62	76	78	90
Acc./Site	1.06	1.01	1.09	1.03	1.07	1.05

TABLE 10.2.3 RUM 51 (Rear-end at Link) - Continued

(c) Rural Roads

Acc.Site	1978	1977	1976	1975	1974	1973
1	118	110	92	107	118	133
2	2	6	5	4	3	9
3						2
Total Sites	120	116	97	111	121	144
Total Acc.	122	122	102	115	124	157
Acc./Site	1.02	1.05	1.05	1.04	1.02	1.09

TABLE 10.2.4 RUM 52 (Hit parked vehicle)

(a) Metro-Melbourne

Acc./Site	1978	1977	1976	1975	1974	1973	TOTAL
1	1713	1676	1453	1301	1328	1306	8777
2	94	105	78	72	59	74	482
3	10	9	7	10	6	7	49
4	3	2	3	5	1		14
5	1						1
6			1				1
Total Sites	1821	1792	1542	1388	1394	1387	9324
Total Acc.	1948	1912	1648	1495	1468	1475	
Acc./Site	1.07	1.07	1.07	1.08	1.05	1.06	

(b) Other Cities, Towns

Acc./Site	1978	1977	1976	1975	1974	1973	TOTAL
1	237	272	241	206	225	226	1407
2	6	9	9	9	15	12	60
3	1		2	1	1	1	6
Total Sites	244	281	252	216	241	239	1473
Total Acc.	252	290	265	227	258	253	
Acc./Site	1.03	1.03	1.05	1.05	1.07	1.06	

TABLE 10.2.5 RUM 81-84 (Int. and Link)

(a) Metro - Melbourne

Acc/Site	1978	1977	1976	1975	1974	1973	TOTAL
1	1280	1171	1029	987	935	957	6359
2	58	40	29	30	35	35	227
3	6	7	1	5	6	3	28
4	.	1			1	1	3
5	.	.			1		1
6	.	1			.		1
7	1						1
Total Sites	1345	1220	1059	1022	978	996	6620
Total Acc.	1414	1282	1090	1062	1032	1040	
Acc./Site	1.05	1.05	1.03	1.04	1.05	1.04	

(b) Other Cities, Towns

Acc/Site	1978	1977	1976	1975	1974	1973	TOTAL
1	226	210	196	215	186	189	1222
2	5	4	10	2	4	5	30
3	1	1	1				3
Total Sites	232	215	207	217	190	194	1225
Total Acc.	239	221	219	219	194	199	
Acc./Site	1.03	1.03	1.06	1.01	1.02	1.03	

(c) Rural Roads

Acc/Site	1978	1977	1976	1975	1974	1973	TOTAL
1	717	667	626	607	497	587	3701
2	29	36	23	28	38	32	186
3	2	2	1	7	3		15
4	1		1	2	.		4
5					1		1
Total Sites	749	705	651	644	539	619	3907
Total Acc.	785	745	679	692	587	651	
Acc./Site	1.05	1.06	1.04	1.07	1.09	1.05	

TABLE 10.2.6. RUM 71 - 74 (off c'way, on curve)

(a) Metro-Melbourne

Acc./Site	1978	1977	1976	1975	1974	1973	TOTAL
1	381	327	263	276	222	260	1729
2	25	30	19	20	19	20	133
3	6	8	1	7	1	2	26
4		3				2	2
5		1					1
Total Sites	412	369	284	303	242	284	1894
Total Accs.	449	428	307	337	263	387	
Acc./Site	1.09	1.16	1.08	1.11	1.09	1.36	

(b) Other Cities, Towns

Acc./Site	1978	1977	1976	1975	1974	1973
1	111	94	84	84	75	94
2	6	6	10	7	3	6
3	2		3		1	
4	1					
Total Sites	120	100	97	91	79	100
Total Accs.	133	106	114	98	84	106
Acc./Site	1.11	1.06	1.16	1.08	1.06	1.06

(c) Rural Roads

Acc./Site	1978	1977	1976	1975	1974	1973	TOTAL
1	595	579	550	507	442	491	3164
2	29	34	36	33	23	30	185
3	2	2	2	2	1	9	18
4		1	2			1	4
5	1						1
Total Sites	627	616	590	542	466	531	3372
Total Accs.	664	657	636	579	491	582	
Acc./Site	1.06	1.07	1.08	1.07	1.05	1.10	

TABLE 10.2.7 (a) Metro-Melbourne

(i) RUM 01 - 03 at Intersection

Acc./Int.	1978	1977	1976	1975	1974	1973	TOTAL
1	555	537	502	502	503	558	3157
2	42	30	21	27	30	45	195
3	8	6	5	3	8	8	38
4	1	1	.	1	1	2	6
5					.		-
6					1		1
Total Int.	606	574	528	533	543	613	3397
Total Acc.	667	619	559	569	597	680	
Acc./Int.	1.10	1.08	1.06	1.07	1.10	1.11	

(ii) RUM 01 - 03 at Links

Acc./Site	1978	1977	1976	1975	1974	1973	TOTAL
1	764	825	730	712	739	938	4708
2	38	46	34	36	35	65	254
3	4	1	2	3	7	7	24
4	1		1			2	4
5	2						2
Total Sites	809	872	767	751	781	1012	4992
Total Acc.	866	924	808	793	830	1097	
Acc./Site	1.07	1.06	1.05	1.06	1.06	1.08	

(iii) RUM 07 at Intersection

Acc./Int	1978	1977	1976	1975	1974	1973
1	152	150	120	118	132	181
2	19	17	9	11	9	13
3	1	2			1	3
Total Int.	172	169	129	129	142	197
Total Acc.	193	190	138	140	153	216
Acc./Int.	1.12	1.12	1.07	1.09	1.08	1.10

TABLE 10.2.7 (b) Other Cities, Towns

(i) 01 - 03 at Intersection

Acc./Int.	1978	1977	1976	1975	1974	1973	TOTAL
1	53	54	51	62	59	64	343
2	.	1	1	4	5	8	19
3						1	1
Total Int.	53	55	52	66	64	73	363
Total Acc.	53	56	53	70	69	83	
Acc./Int.	1.0	1.04	1.02	1.06	1.08	1.14	

(ii) 01 - 03 at Links

Acc./Site	1978	1977	1976	1975	1974	1973	
1	108	110	99	93	113	137	660
2	6	8	4	1	4	11	34
3				1	.	1	2
4					1		1
Total Sites	114	118	103	95	118	149	697
Total Acc.	120	126	107	98	125	162	
Acc./Site	1.05	1.07	1.04	1.03	1.06	1.09	

(iii) RUM 07 at Intersection

Acc./Int.	1978	1977	1976	1975	1974	1973
1	14	17	13	11	12	26
2	2	2	2		1	1
Total Int.	16	19	15	11	13	27
Total Acc.	18	21	17	11	14	28
Acc./Int.	1.13	1.11	1.13	1.0	1.08	1.04

TABLE 10.2.7 (c) Rural Roads

RUM 01 - 03 at Links

Acc./Site	1978	1977	1976	1975	1974	1973	TOTAL
1	54	56	40	35	57	74	316
2		2	1	1	1	2	7
Total Sites	54	58	41	36	58	76	323
Total Acc.	54	60	42	37	59	78	
Acc./Site	1.0	1.03	1.02	1.03	1.02	1.03	

(a) Metro-Melbourne - Frequency

Acc./Int.	1978	1977	1976	1975	1974	1973
1	639	678	594	589	537	589
2	145	124	107	114	91	108
3	49	44	46	47	52	55
4	40	26	21	11	14	16
5	18	14	9	9	9	13
6	10	9	3	4	7	5
7	3	4	3	4	2	2
8	2	2	2	2	1	2
9	2	2	.	1		2
10	3	.	1	1		.
11	1	1	1	.		2
12		.		1		.
13		.				1
14		1				
Total Int.	912	905	787	783	713	795
Total Acc.	1482	1374	1151	1146	1040	1212
Acc./Int.	1.63	1.52	1.46	1.46	1.46	1.52

TABLE 10.2.8 (b)

(b) Other Cities, Towns, - Frequency

Acc./Int.	1978	1977	1976	1975	1974	1973	TOTAL
1	121	103	93	103	87	99	606
2	15	20	10	12	9	7	73
3	9	6	4	4	.	2	25
4	4	.		.	1	.	5
5	.					1	1
Total Int.	149	129	107	119	97	109	710
Total Acc.	194	161	125	139	109	124	
Acc./Int.	1.30	1.25	1.17	1.17	1.12	1.15	

TABLE 10.2.8 (c)

(c) Rural Roads - Frequency

Acc./Int.	1978	1977	1976	1975	1974	1973
1	63	63	59	55	51	79
2	2	4	3	1	1	2
3	2	2	1	1	1	.
Total Int.	67	69	63	57	53	81
Total Acc.	73	77	68	60	56	83
Acc./Int.	1.09	1.12	1.08	1.05	1.06	1.02
Total Int. (b) & (c)	226	198	170	176	150	190

TABLE 10.2.9 RUM 85, 77, 88 (Head-On)

(a) Metro-Melbourne

Acc./Site	1978	1977	1976	1975	1974	1973	TOTAL
1	416	426	381	370	386	455	2434
2	35	25	31	22	24	26	163
3	2	2	3	5	5	5	22
4	1	2	1	1	3	1	9
5	1					1	2
Total Sites	455	455	416	398	418	488	2630
Total Acc.	501	490	456	433	461	531	
Acc./Site	1.10	1.08	1.10	1.09	1.10	1.09	

(b) Other Cities, Towns

Acc./Site	1978	1977	1976	1975	1974	1973
1	57	56	63	64	74	69
2	2	1	5	1	4	2
Total Sites	59	57	68	65	78	71
Total Acc.	61	58	73	66	82	73
Acc./Site	1.03	1.02	1.07	1.02	1.05	1.03

(c) Rural Roads

Acc./Site	1978	1977	1976	1975	1974	1973	TOTAL
1	343	327	328	315	332	330	1975
2	12	16	8	15	15	21	87
3	1	2	3	1	4	4	15
4	1		2	2	.	.	5
5			1	1	1	1	4
Total Sites	357	345	342	334	352	356	2086
Total Accs.	374	365	366	361	375	389	
Acc./Site	1.05	1.06	1.07	1.08	1.07	1.09	

TABLE 10.2.10 RUM 44

(a) Metro-Melbourne

Acc./Site	1978	1977	1976	1975	1974	1973	TOTAL
1	522	491	379	354	360	382	2488
2	26	20	20	8	10	19	103
3	1	1	3	2		2	9
4						1	1
Total Sites	549	512	402	364	370	404	2601
Total Accs.	577	534	428	376	380	430	
Acc./Site	1.05	1.04	1.06	1.03	1.03	1.06	

(b) Other Cities, Towns

Acc./Site						
1	88	115	82	65	65	95
2	4	3	2	2	6	2
3	.	1				
Total Sites	92	119	84	67	71	97
Total Acc.	96	124	86	69	77	99
Acc./Site	1.04	1.04	1.02	1.03	1.08	1.02

(c) Rural Roads

Acc./Site						
1	110	109	111	136	123	133
2	3	7	.	.	2	9
3	.		1			2
Total Sites	113	116	112	136	125	144
Total Accs.	116	123	114	136	127	157
Acc./Site	1.03	1.06	1.02	1.0	1.02	1.09

TABLE 10.2.11 RUM 86, 76

Rural Roads

Acc./Site	1978	1977	1976	1975	1974	1973
1	116	122	151	144	175	219
2	1	1	2	5	3	1
3						1
Total Sites	117	123	153	149	178	221
Total Acc.	118	124	155	154	181	224
Acc./Site	1.01	1.01	1.01	1.03	1.02	1.01

TABLE 10.2.12 METRO RUM 20's Number of Sites

Individual Frequency Percent

Acc./Int	1978	1977	1976	1975	1974	1973
1	70.23	70.42	69.12	68.84	71.01	68.04
2	16.85	16.30	17.34	18.69	16.10	17.90
3	6.21	6.17	6.61	6.04	6.42	6.55
4	2.67	3.16	2.56	3.14	2.83	3.40
5	1.69	1.66	1.48	1.53	1.47	1.81
6	.746	.677	.921	.644	.851	1.05
7	.550	.527	.761	.3623	.619	.3619
8	.393	.527	.481	.201	.271	.290
9	.353	.113	.200	.201	.193	.290
10	.079	.075	.040	.120	.077	.072
11	.118	.075	-	.08	.039	.072
≥ 12	.118	.30	.481	.16	.116	.145
n =	2546	2657	2497	2484	2584	2763

Friedman Test X^2 = 4.62 (5 d.f.), no significant difference between years.

TABLE 10.2.13 METRO RUM 20s, Individual Frequences

Six Years Combined (1973 - 1978)

Accs./Int	N°.Int.	F%		N°.Accs.	F%	
1	10810	69.60		10810	43.19	
2	2670	17.19		5340	21.34	
3	984	6.34		2952	11.79	
4	461	2.97		1844	7.37	
5	250	1.61		1250	4.99	
6	127	.818		762	3.04	
7	82	.528		574	2.29	
8	56	.361		448	1.79	
9	35	.225		315	1.26	
10	12	.077		120	.479	
11	10	.064		110	.440	
12	7	.045	.219	84	.336	2.01
13	4	.026		52	.208	
14	8	.052		112	.447	
15	5	.032		75	.300	
16	2	.013		32	.128	
17	3	.020		51	.204	
18	2	.013		36	.144	
19	0	0		0	0	
20	2	.013		40	.160	
21	1	.006		21	.084	
Total	15,531			25,028		

TABLE 10.2.14 METRO RUM 20s

Acc./Int.	Cumulative Percent Int.	Cumulative Percent Accs.
1	100.0	100.0
2	30.4	56.8
3	13.2	35.5
4	6.9	23.7
5	3.9	16.3
6	2.3	11.3
7	1.5	8.3
8	.95	6.0
9	.59	4.2
10	.36	2.93
11	.28	2.45
≥ 12	.22	2.01

Six year total 15,531 25,028

Average Acc./Int 1.61

TABLE 10.2.15 RUM 20's (1973-78 Combined)

(a) Other Cities, Towns

Acc./Int.	Int.	F%	Acc.	F%
1	2764	73.84	2764	51.82
2	639	17.07	1278	23.96
3	204	5.45	612	11.47
4	64	1.71	256	4.80
5	39	1.04	195	2.66
6	16	.43	96	1.80
7	10	.27	70	1.31
8	5	.13	40	.75
9	1	.03	9	.17
:	-	-	-	
14	1	.03	14	.26
Total	3743		5334	

Average Acc./Site 1.425

(b) Rural

Acc./Int.	Int.	F%	Acc.	F%
1	2017	87.09	2017	73.86
2	233	10.06	466	17.06
3	35	1.51	105	3.84
4	19	.82	76	2.78
5	8	.35	40	1.46
6	2	.09	12	.44
7	1	.04	7	.26
8	1	.04	8	.29
Total	2316		2731	

Average Acc./Site 1.179

TABLE 10.2.16 METRO RUM 37,33,35 Number of Intersections

Acc./Int.	Individual Frequency Percent 1978	1977	1976	1975	1974	1973
1	77.89	80.76	84.49	81.31	82.21	82.46
2	13.48	12.88	11.17	13.59	13.03	13.09
3	5.39	3.63	2.87	3.51	2.90	2.32
4	2.16	1.40	.99	.57	1.14	1.36
5	.85	.74	.20	.45	.41	.36
6	.08	.25	.10	.45	.10	.18
7	.08	.25	–	.11	.10	.18
8	.08	.08	.10		–	–
9			–		.10	.09
10			–			
11			.10			

TABLE 10.2.17 METRO RUM 51 Number of Sites

Acc./Site	Individual Frequency Percent 1978	1977	1976	1975	1974	1973
1	89.73	90.60	91.28	92.56	90.72	90.74
2	8.37	6.70	7.89	6.23	7.82	6.84
3	1.34	2.00	.67	1.21	1.14	1.57
4	.11	.47	.17		.16	.14
5	–	.24			.16	.28
6	.33					.28
7	–					–
8	–					.14
9,10	–					
11	.11					

TABLE 10.2.18 RUM 37, 33, 35

Metro (1973 - 78 Combined)

Acc./Site	Site	F%	Acc.	F%
1	5283	81.35	5283	63.38
2	837	12.89	1674	20.08
3	228	3.51	684	8.21
4	86	1.32	344	4.13
5	34	.52	170	2.04
6	12	.18	72	.86
7	8	.12	56	.67
8	3	.05	24	.29
9	2	.03	18	.22
10	-	-	-	-
11	1	.02	11	.13
Total	6496		8336	

Average Acc./Site 1.28

TABLE 10.2.19 METRO RUM 51 (1973 - 78 Combined)

Acc./Site	No.Site	F%	No.Acc.	F%
1	3848	90.82	3848	81.01
2	311	7.34	622	13.09
3	58	1.37	174	3.66
4	8	.19	32	,67
5	5	.12	25	.53
6	5	.12	30	.63
7	-	-	-	-
8	1	.02	8	.17
9,10	-	-	-	-
11	1	.02	11	.23
Total	4237		4750	
Average Acc./Site		1.12		

TABLE 10.2.20 'RURAL' RUM 85 Number of Sites

Individual Frequency Percent

Acc./Site	1978	1977	1976	1975	1974	1973
1	96.08	94.78	95.91	94.31	94.32	92.70
2	3.36	4.64	2.34	4.49	4.26	5.90
3	.28	.58	.88	.30	1.14	1.12
4	.28		.58	.60	-	-
5			.29	.30	.28	.28

1 acc/site $r_s = +.886$, $p < .05$; trend for 1 acc/site group to increase each year (as a proportion of each year's total).

TABLE 10.2.21 METRO RUM 52 Number of Sites

Individual Frequency Percent

Acc./Site	1978	1977	1976	1975	1974	1973
1	94.07	93.53	94.23	93.73	95.27	94.16
2	5.16	5.86	5.06	5.19	4.23	5.34
3	.55	.50	.45	.72	.43	.50
4	.16	.11	.19	.36	.07	
5	.05		-			
6			.06			

TABLE 10.2.22 RUM 52 (1973 - 78 Combined)

(a) Metro-Melbourne

Acc./Site	Sites	F%	Acc.	F%
1	8777	94.13	8777	88.17
2	482	5.17	964	9.68
3	49	.53	147	1.48
4	14	.15	56	.56
5	1	.01	5	.05
6	1	.01	6	.05
Total	9324		9955	
Average Acc./Site		1.07		

(b) Other Cities, Towns

Acc./Site	Sites	F%	Acc.	F%
1	1407	95.52	1407	91.07
2	60	4.07	120	7.77
3	6	.41	18	1.17
Total	1473		1545	
Average Acc./Site		1.05		

TABLE 10.2.23 RUM 81 - 84 (1973 - 1978)

(a) Metro-Melbourne

Acc./Site	Site	F%	Acc.	F%
1	6359	96.06	6359	91.93
2	227	3.43	454	6.56
3	28	.42	74	1.07
4	3	.05	12	.17
5	1	.02	5	.07
6	1	.02	6	.09
7	1	.02	7	.10
Total	6620		6917	

Average Acc./Site 1.045

(b) Other Cities, Towns

Acc./Site	Site	F%	Acc.	F%
1	1222	97.37	1222	94.66
2	30	2.39	60	4.65
3	3	.24	9	.70
Total	1255		1291	

Average Acc./Site 1.029

(c) Rural

Acc./Site	Site	F%	Acc.	F%
1	3701	94.73	3701	89.63
2	186	4.76	362	8.77
3	15	.38	45	1.09
4	4	.10	16	.39
5	1	.03	5	.12
Total	3907		4129	

Average Acc./Site 1.057

TABLE 10.2.24 RUM 01 - 03 (1973 - 1978)

(a) Metro at Links

Acc./Site	Site	F%	Acc.	F%
1	4708	94.31	4708	88.60
2	254	5.09	508	9.56
3	24	.48	72	1.35
4	4	.08	16	.30
5	2	.04	10	.19
Total	4992		5314	
Average Acc./Site		1.06		

(b) Metro at Intersections

Acc./Site	Site	F%	Acc.	F%
1	3157	92.93	3157	85.53
2	195	5.74	390	10.57
3	38	1.12	114	3.09
4	6	.18	24	.65
5	-	-	-	-
6	1	.03	6	.16
Total	3397		3691	
Average Acc./Site		1.09		

(c) Other Cities, Town at Links

Acc./Site	Site	F%	Acc.	F%
1	660	94.69	660	89.43
2	34	4.88	68	9.21
3	2	.29	6	.81
4	1	.14	4	.54
Total	697		738	
Average Acc./Site		1.058		

TABLE 10.2.24 RUM 01 - 03 (1973 - 78) - Continued

(d) Other Cities, Towns at Intersections

Acc./Site	Site	F%	Acc.	F%
1	343	94.49	343	89.32
2	19	5.23	38	9.90
3	1	.28	3	.78
Total	363		384	

Average Acc./Site 1.058

TABLE 10.2.25 RUM 85 METRO, Number of Sites

	Individual Frequency Percent					
Acc./Site	1978	1977	1976	1975	1974	1973
1	91.43	93.63	91.59	92.96	92.34	93.24
2	7.69	5.49	7.45	5.53	5.74	5.33
3	.44	.44	.72	1.26	1.20	1.02
4	.22	.44	.24	.25	.72	.20
5	.22	-				.20

TABLE 10.2.26 RUM 71 - 74 RURAL, Number of Sites

	Individual Frequency Percent					
Acc./Site	1978	1977	1976	1975	1974	1973
1	94.90	93.99	93.22	93.54	94.85	92.47
2	4.63	5.52	6.10	6.09	4.94	5.65
3	.32	.32	.34	.37	.21	1.69
4	-	.16	.34			.19
5	.16					

TABLE 10.2.27 RUM 44 METRO , Number of Sites

	Individual Frequency Percent					
Acc./Site	1978	1977	1976	1975	1974	1973
1	95.08	95.90	94.28	97.25	97.30	94.55
2	4.73	3.90	4.97	2.20	2.70	4.70
3	.18	.19	.75	.55		.50
4						.25

TABLE 10.2.28 RUM 85 (1973 - 78)

(a) Metro

Acc./Site	Site	F%	Acc.	F%
1	2434	92.55	2434	84.75
2	163	6.20	326	11.35
3	22	.84	66	2.30
4	9	.34	36	1.25
5	2	.08	10	.35
Total	2630		2872	

Average Acc./Site 1.092

(b) Rural

Acc./Site	Site	F%	Acc.	F%
1	1975	94.68	1975	88.41
2	87	4.17	174	7.79
3	15	.72	45	2.01
4	5	.24	20	.90
5	4	.19	20	.90
Total	2086		2234	

Average Acc./Site 1.071

TABLE 10.2.29 RUM 71 - 74 (1973 - 1978)

(a) Metro

Acc./Site	Site	F%	Acc.	F%
1	1729	91.29	1729	82.41
2	133	7.02	266	12.68
3	26	1.37	78	3.72
4	5	.26	20	.95
5	1	.05	5	.24
Total	1894		2098	
Average Acc./Site		1.11		

(b) Rural

Acc./Site	Site	F%	Acc.	F%
1	3164	93.83	3164	87.67
2	185	5.49	370	10.25
3	18	.53	54	1.50
4	4	.12	16	.44
5	1	.03	5	.14
Total	3372		3609	
Average Acc./Site		1.07		

TABLE 10.2.30 RUM 44 Metro (1973 - 1978)

Acc./Site	Site	F%	Acc.	F%
1	2488	95.66	2488	91.30
2	103	3.96	206	7.56
3	9	.35	27	.99
4	1	.04	4	.15
Total	2601		2725	

Average Acc./Site 1.048

TABLE 10.2.31 METRO RUM 31 - Number of Intersections

Individual Frequency Percent

Acc./Int.	1978	1977	1976	1975	1974	1973
1	70.1	74.9	75.5	75.2	75.3	74.1
2	15.9	13.7	13.60	14.6	12.8	13.58
3	5.4	4.9	5.8	6.0	7.3	6.9
4	4.4	2.9	2.7	1.4	1.96	2.01
5	2.0	1.55	1.14	1.15	1.3	1.64
6	1.1	0.99	0.4	0.5	0.98	0.6
7	.33	.44	.38	.51	.28	.25
8	.219	.221	.254	.255	.14	.252
≥ 9	.658	.442	.254	.383	0	.377
n =	912	905	787	783	713	795

Friedman Test X^2 = 1.4 (5 d.f.), no significant difference between years.

TABLE 10.2.32 METRO RUM 31

Six Years Combined (1973 - 1978)

Acc./Int.	F%		No.Ints.	No.Accs	F%	
1	74.08		3626	3626	48.97	
2	14.08		689	1378	18.61	
3	5.96		293	879	11.87	
4	2.61		128	512	6.92	
5	1.47		72	360	4.86	
6	.776		38	228	3.08	
7	.368		18	126	1.70	
8	.225		11	88	1.19	
9	.143	.409 ↓	7	63	.851	2.80 ↓
10	.102		5	50	.675	
11	.102		5	55	.743	
12	.020		1	12	.162	
13	.020		1	13	.176	
14	.020		1	14	.189	
Total			4895	7404		

TABLE 10.2.33 RUM 31, METRO

Cumulative Frequency Percent

	Int.	Acc.
≥ 1	100	100
2	25.9	51.0
3	11.8	32.5
4	5.9	20.6
5	3.2	13.7
6	1.8	8.9
7	1.0	5.8
8	.64	4.0
≥ 9	.41	2.8

Six year total 4895 7404

Average Acc./Int. 1.51

TABLE 10.2.34 RUM 31 (1973 - 1978

		Other Cities, Towns		
Acc./Int.	Int.	F%	Acc.	F%
1	606	85.35	606	71.13
2	73	10.28	146	17.14
3	25	3.52	75	8.80
4	5	.70	20	2.35
5	1	.14	5	.59
Total	710		852	
Average Acc./Site		1.20		

10.3 RUM 20's ACCIDENT-TYPES

Amongst the tabled data in 10.2 is a table of combined six years data of number of intersections vs. number of accidents per site (Table 10.2.1). Since the frequency percent distribution did not show significant variation over the years it appears reasonable to suspect that the frequency percent distribution represents some underlying characteristics of the distribution of accident number among intersections in a specified network. (See Tables 10.3.1 to 10.3.4).

A paper by Gipps (1980) on the variation of accidents at a site and between sites approaches the same problem from a theoretical viewpoint. Gipps supposed that the number of accidents at a particular site during a fixed period of time is Poisson distributed and that the average number of accidents derived from the Poisson will vary between sites according to a Gamma distribution. The combination of these two distributions produced a Negative Binomial distribution and from this a conditional probability density function for $\lambda (\lambda \geqslant 0)$ was derived which showed that the number of accidents that would be expected to occur at an intersection given that γ actually occurred was $[\alpha + \gamma][\beta/(1 + \beta)]$ where α, β were parameters in the Gamma and Negative Binomial distributions. Gipps said considerable work is needed to determine which distribution is most suitable to describe the variability of accident rates at different sites, but the Gamma distribution offers a high degree of flexibility.

Abbess et al (1981) have also examined intersection accident data for 1975-79 using (a Poisson/Gamma combination resulting in) a Negative

Binomial distribution. The sample of intersections used was stated to be "potential blacknodes" which may have been a subset of all intersections but this was not clear in their paper. They stated that they obtained satisfactory fits but because of a problem with too many sites with zero accidents they also used the Truncated negative binomial distribution and obtained good fits except for 1979. They concluded that it seemed unlikely that any unimodal distribution would fit the data significantly better than the negative binomial.

The computer subroutine developed by Wyshak (1974) was used on the Melbourne data in Table 10.3.1 to estimate the parameters of a truncated negative binomial for intersections having one or more RUM 20's accidents. This produced a negative estimate for one of the parameters indicating that the distribution was not appropriate and so the limiting form of the negative binomial distribution, the Logarithmic Series Distribution was investigated. If the exponent (-N) of the negative binomial approaches zero it corresponds to increasing variability among the λ's of the Gamma distribution.

For the Logarithmic series distribution

$$Pr[x=k] = \alpha\, \theta^{k}/k \quad \text{where } k = 1,2,3 \ldots \text{ and } 0 < \theta < 1 \text{ and } \alpha = -[\ln(1-\theta)]^{-1}$$

This distribution excludes the zero accident class, and has the advantage of depending on only one parameter Θ, instead of two (N and P) for the negative binomial distribution.

The expected number of intersections for this distribution and the observed number are given in Table 10.3.5, however testing for goodnes-of-fit with the CHI-squared test rejected the null hypothesis. The question can be raised as to how appropriate the CHI-squared test is for the purpose of finding a model that is a sufficiently good approximation to reality rather than an exact representation of the conditions that produced the data. Gipps (1981) has demonstrated that when large total counts are involved (say 10,000 or more) the likelihood of good models being rejected is a major problem, and he proposes an alternative test based on the multiple correlation coefficient determined by regression analysis.

The data in Table 10.3.1 can be fitted, with an acceptable CHI - squared value, using a polynomial of the fourth order. However such an equation does not suit the construct of the probability distributions that were considered earlier and as the purpose of constructing a model is to be able to make predictions it would be more useful to have a model that fits into useable distributions.

Further work is required in this area. Some subdivision by road classes may be desirable (i.e. arterial, sub-arterial and local streets) as there could be different forms to the probability distributions on each road class. Obviously the locations with the highest frequencies are on arterials and more likely the intersections of two arterials. Intersections of two local streets would tend to have a small range of accidents per year e.g. 0-3 RUM 20's. The pooling of data may be masking some effects. More detailed information is necessary to examine the problem.

TABLE 10.3.1 RUM 20's ACCIDENTS.
METRO-MELBOURNE COMBINED DATA

1973 - 1978 (6 YEARS)

Accs./Inters.	No.Inters.	F%	No.Accs.	F%
1	10810	69.60	10810	43.19
2	2670	17.19	5340	21.34
3	984	6.34	2952	11.79
4	461	2.97	1844	7.37
5	250	1.61	1250	4.99
6	127	.818	762	3.04
7	82	.528	574	2.29
8	56	.361	448	1.70
9	35	.225	315	1.26
10	12	.077	120	.479
11	10	.064	110	.440
12	7	.045	84	.336
13	4	.026	52	.208
14	8	.052	112	.447
15	5	.032	75	.300
16	2	.013	32	.128
17	3	.020	51	.204
18	2	.013	36	.144
19	0	0	0	0
20	2	.013	40	.160
21	1	.006	21	.084
	15.531		25.028	

m 1.6115		m 2.758
s 1.3595		s 2.709
s^2 1.848		

TABLE 10.3.2 METRO RUM 20's

CUMULATIVE PERCENT

Acc./Int.	Int.	Accs.
≥ 1	100.0	100.0
2	30.4	56.8
3	13.2	35.5
4	6.9	23.7
5	3.9	16.3
6	2.3	11.3
7	1.5	8.3
8	.95	6.0
9	.59	4.2
10	.36	2.93
11	.28	2.45
12	.220	2.011
13	.175	1.675
14	.149	1.467
15	.097	1.02
16	.065	.720
17	.052	.592
18	.032	.388
19	.019	.244
20	.019	.244
21	.006	.084

Six year total 15,531 25,028

Average Acc./Int. 1.6115

TABLE 10.3.3 RUM 20's

NUMBER OF INTERSECTIONS

Metro-Melbourne

Acc./Inters.	1978	1977	1976	1975	1974	1973
1	1788	1871	1726	1710	1835	1880
2	429	433	433	464	416	495
3	158	164	165	150	166	181
4	68	84	64	78	73	94
5	43	44	37	38	38	50
6	19	18	23	16	22	29
7	14	14	19	9	16	10
8	10	14	12	5	7	8
9	9	3	5	5	5	8
10	2	2	1	3	2	2
11	3	2	.	2	1	2
12	.	3	3	.	.	1
13	.	2	2	.	.	.
14	1	.	2	3	1	1
15	1	2	.	.	1	1
16	.	.	2	.	.	.
17	1	1	1	.	.	.
18			1	.	1	.
19			.	.		.
20			.	1		1
21			1			
Total Inters.	2546	2657	2497	2484	2584	2763
Total Acc.	4079	4281	4128	3948	4070	4522
Acc./Site	1.60	1.61	1.65	1.59	1.58	1.64

TABLE 10.3.4 METRO RUM 20's Number of Sites

Individual Frequency Percent

Acc./Inters.	1978 %	1977 %	1976 %	1975 %	1974 %	1973 %
1	70.23	70.42	69.12	68.84	71.01	68.04
2	16.85	16.30	17.34	18.69	16.10	17.90
3	6.21	6.17	6.61	6.04	6.42	6.55
4	2.67	3.16	2.56	3.14	2.83	3.40
5	1.69	1.66	1.48	1.53	1.47	1.81
6	.746	.677	.921	.644	.851	1.05
7	.550	.527	.761	.3623	.619	.3619
8	.393	.527	.481	.201	.271	.290
9	.353	.113	.200	.201	.193	.290
10	.079	.075	.04	.120	.077	.072
11	.118	.075	-	.08	.039	.072
≥ 12	.118	.30	.481	.16	.116	.145
n =	2546	2657	2497	2484	2584	2763

Friedman Test X^2 = 4.62 (5 d.f.), no significant difference between years.

TABLE 10.3.5 FITTING of LOGARITHMIC SERIES Distribution

Acc./Int.	No. Int.	Expected No.
1	10810.0	10289.2
2	2670.00	3029.62
3	984.000	1189.41
4	461.000	525.325
5	250.000	247.488
6	127.000	121.453
7	82.0000	61.3050
8	56.0000	31.5892
9	35.0000	16.5357
10	12.0000	8.76394
11	10.0000	4.69182
12	7.00000	2.53273
13	4.00000	1.37677
14	8.00000	0.752856
15	5.00000	0.413794
16	2.00000	0.228449
17	3.00000	0.126618
18	2.00000	0.704219E-01
19	0.00000	0.392882E-01
20	2.00000	0.219796E-01
21	1.00000	0.123273E-01
Total	15,531	15,530.956

sample mean = 1.61149

θ = .5888918

(β = 1.43245)

10.4 THE HISTORY OF HIGH RUM 20's ACCIDENT FREQUENCY INTERSECTIONS

To examine the variation of accidents at individual sites, intersections were selected which recorded nine or more RUM 20's accidents in any year of the period 1974-78. The history of RUM 20's accidents at these intersections was then determined for the total period 1968-78. The number of intersections in any one year of the period 1974-78 is given below.

Year	1974	1975	1976	1977	1978
No.$\geq$ 9	11	14	18	15	17

Thus the total number of intersections over the five year period was 75 but the number of separate intersections was 60 meaning that the same sites appeared more than once in the period.

The intersections were classified into the following groups:

(1) Those that were signalised prior to 1968

(2) Those which remained unsignalised 1968-78

(3) Those that were unsignalised 1968-78 but were signalised in 1979 [a further set of (2)]

(4) Those that were signalised during 1974-78 (date given)

(5) The obvious remaining group, i.e. those that were signalised 1968-1973, did not record any annual RUM 20's frequencies as high as nine so there was in effect no fifth group.

The data for these groups is given in Tables 10.4.1 - 10.4.4.

The sites unsignalised 1968-78 were broken into two groups because group 3 reflects the decision-making process enacted which resulted in signals in 1979 whilst group 2 were still on the "pending" list. Group 3 also has much in common with group 4 (signalised 1974-78) as group 4 also reflects the process of decision to signalise, it just happens to be a year later than the writer's abitrary period of 1974-78 that the signals went in.

The group means and standard deviations are given below:

	GROUP	YEARLY MEAN	TOTAL ACCIDENTS.	NO.INT.	$\bar{S}$
Signals Pre 1968	1	5.41	536	9	3.31
No Signals (1968-78)	2	4.32	523	11	3.53
Signals, in 1979	3	4.36	384	8	4.09
Signals 1974-78	4	5.88/1.13	1626	32	3.69 Total

If group 4 is separated into the accidents before the year the signals were installed and the accidents that occurred after the year the signals were installed (i.e. the year of installation is ignored and installations in 1978 are ignored), then for 27 intersections the average number of accidents per year before signals was 5.88 and after signals was 1.13, a reduction of 80%, in RUM 20's accidents.

The group 1 intersections have been signalised generally for a long time and the equipment and intersections would, by the accident record, be due for remodelling. Such remodelling would normally reduce the frequency of RUM 20's accidents (Andreassend, 1970b).

The yearly average of 5.41 for group 1 can be compared with the pre-signal average of 5.88 for group 4.

A detailed look at the tables will identify some intersections which have no substantial record before or after the year that 9 or more accidents was recorded. For example on Table 10.4.3, the sixth intersection has nine years with a zero then a one and an eleven.

If it is assumed that the accidents followed a Poisson distribution with a mean of nine then the standard deviation would be three. An arbitrary rule can then be formulated, that in addition to the year with the nine or more accidents there must be at least one other year with six or more accidents.

When locations that do not conform to this rule are excluded from the groups the following are the average annual accident frequencies.

Group 1	6.38	signals pre 1968	7 intersections
Group 2	4.79	no signals	9 intersections
Group 3	4.83	signals 1979	7 intersections
Group 4	6.34/1.23	(80.6% reduction)	23 intersections

The four intersections removed from group 4 averaged 3.42 accidents per year before signalisation. The two intersections removed from group 1 averaged 2.05 accidents per year, the two removed from group 2 averaged 2.23 and the one removed from group 3 averaged 1.09.

There is reason to suspect that some locations have little or no record of accidents and then suddenly record a high record for one year and then resume a low record. The reasons for this are, no doubt, many and varied but one case for two intersections in the Tables can be related. The intersections are Edgars/Main (Table 10.4.2) and Edgars/Mahoneys (Table 10.4.3). The first intersection is fairly central in a developing suburb known as Thomastown in northern Metro-Melbourne and could be regarded as the intersection of two distributor/collector roads (see Figure 10.4.1). The second intersection was an intersection on a main arterial road with only local housing. The two sections of Edgars Road did not join until 1977. Once joined Edgars Road offered an alternative outlet to a main arterial and a traffic flow was generated and thus a new hazard was produced at Edgars/Mahoneys which in turn altered the situation at Edgars/Main.

The two sites present a further interesting contrast by looking at the accident records for 1979 and 1980. At Edgars/Mahoneys in 1978 there were eleven RUM 20's accidents, then in the eight months prior to signalisation there were three further RUM 20's accidents which would suggest an expected lower frequency than for 1978 without signals. After the signals were installed there were no RUM 20's accidents in the remaining four months and in 1980 there were two accidents.

At Edgars/Main the number of RUM 20's accidents for 1978 was nine and continued at the level of nine. This comparison raises the question of the need for signals at Edgars/Mahoneys; was the sharp rise due to a change in traffic flows and the following drop due to some adjustment in drivers' behaviour or expectations at the intersection? During the time that accidents have actually been recorded at these two intersections the Edgars/Main intersection has demonstrated a

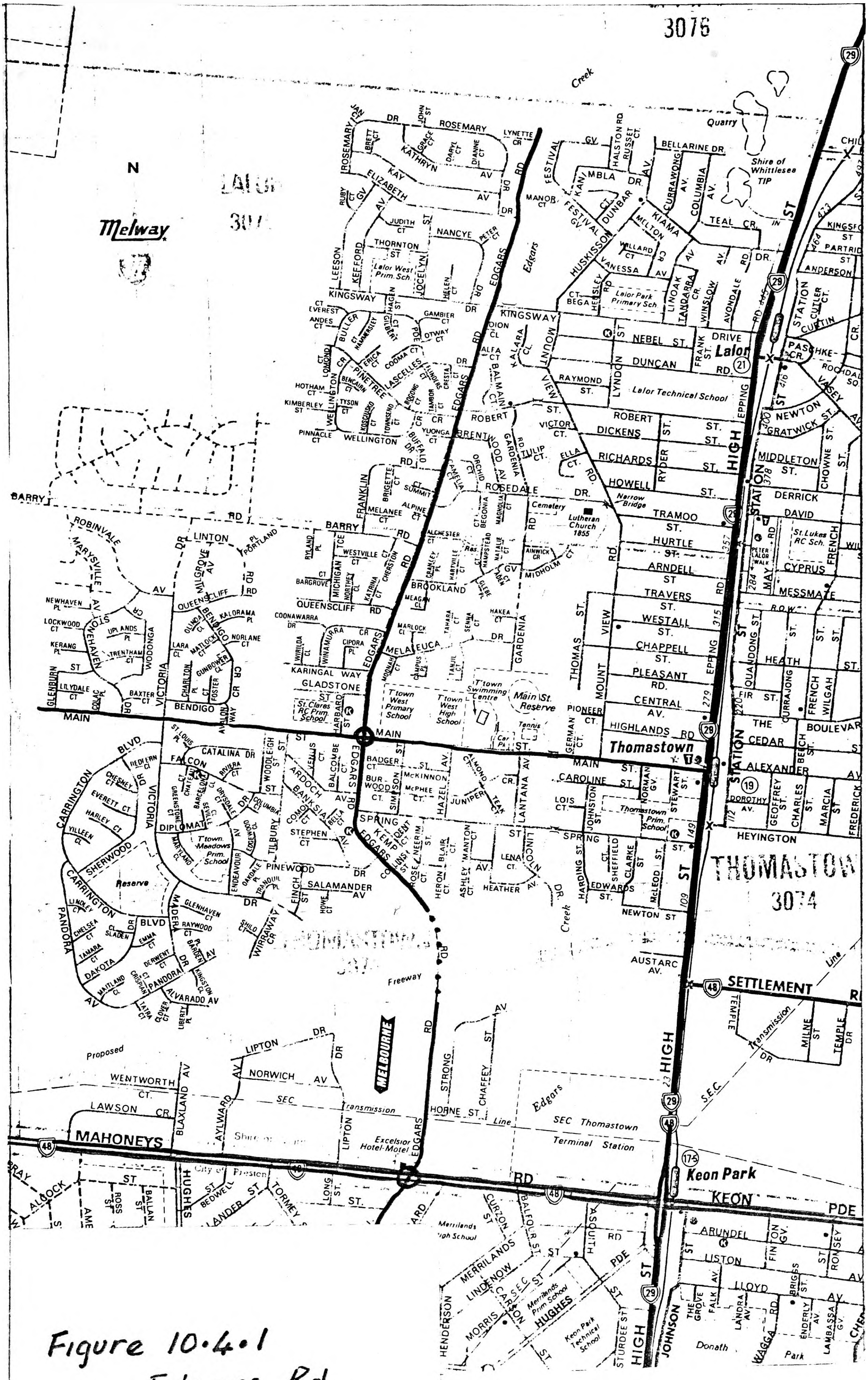


Figure 10·4·1
Edgars Rd

history of more accidents than Edgars/Mahoneys yet the latter was signalised.

Returning to the question of other intersections, it would require many hours of detective work to ascertain whether changes in traffic movements at the locations or in adjoining areas took place and thus altered or may have effected the accident experience. Certainly in some parts of Metro-Melbourne local street traffic schemes have caused diversion of traffic into different routes. The closure of streets, the installation of restrictive roundabouts, the imposition of vehicle weight limit on specific streets, and the introduction of turn bans must all have some effect on the choice of routes by individual drivers. Thus it would seem reasonable that an intersection should be able to "prove" that it is a problem in terms of accident frequency for more than one year to justify the expenditure on installation and maintenance of traffic signals. More work on the theory of the distribution of accidents among intersections may be able to aid the situation.

TABLE 10.4.1 SIGNALS PRIOR TO 1968, RUM 20

Intersection Name	1968	69	70	71	72
CWL, Burke/Toorak	2	4	1	5	0
FITZ, Alexandra/Brunswick	1	3	9	7	9
FOO, Geelong/Roberts	3	3	3	1	5
MBN, Rathdowne/Victoria	0	3	1	5	3
MBN, Arnold/Kingsway	3	16	13	11	5
MBN, Flinders/Swanston	20	15	16	12	8
MBM, Lonsdale/Spring	1	2	1	2	0
MBN, Elizabeth/Queensbury	5	5	4	4	1
MBN, Flinders/Spencer	16	8	9	7	5

's ACCIDENTS

73	74	75	76	77	78	TOTAL	MEAN	S
3	1	0	1	9	1	* 27	2.45	2.70
8	8	7	5	12	6	75	6.82	3.03
0	2	2	9	5	6	39	3.55	2.54
6	6	6	9	2	6	47	4.27	2.69
9	3	10	1	6	9	86	7.82	4.64
6	7	9	6	8	7	114	10.36	4.72
0	2	9	1	0	0	* 18	1.64	2.58
4	5	2	3	10	9	52	4.73	2.69
5	6	0	9	9	2	76	6.91	4.21
				TOTAL		536	$\bar{M}$=5.39	$\bar{S}$=3.31
				M =		5.41	2.80	0.93

10.69

TABLE 10.4.2 NO SIGNALS, RUM 20's

Intersection Name	1968	69	70	71
BRS, Hilton/Widford	4	7	1	1
CWL, Prospect Hill/Stanhope	0	1	1	0
DAN, David/James	2	2	2	2
MBN, Freeman/Hoddle	4	4	3	3
MOO, Boundary/Lower Dandenong	10	5	4	2
PMB, Liardet/Pickles	1	7	6	5
SKI, Inkerman/Westbury	0	4	5	2
SMB, Albert/Aughtie	4	2	4	2
SMB, Grant/Moray	2	2	9	3
SPR, Corrigan/Lightwood	13	14	6	6
WHI, Edgars/Main (See Edgars/Mahoneys on Table 10.4.3)	0	0	0	0

s ACCIDENTS

72	73	74	75	76	77	78	TOTAL	MEAN	S
4	4	1	5	17	6	9	59	5.36	4.63
0	0	0	0	0	7	10	19	1.73	3.44
2	2	2	1	3	4	9	* 31	2.82	2.18
5	5	4	9	12	13	9	71	6.45	3.64
2	0	6	6	6	13	17	71	6.45	5.07
4	2	10	2	3	1	1	42	3.82	2.93
1	2	7	1	1	9	3	35	3.18	2.82
3	9	7	4	2	6	9	52	4.73	2.65
0	1	3	8	12	12	7	59	5.36	4.39
8	3	4	2	3	2	9	70	6.36	4.23
0	0	0	3	2	4	9	* 18	1.64	2.84
						TOTAL	523	$\bar{m}$ 4.35	$\bar{s}$3.53
						m =	4.32	1.82	0.94

10.70

TABLE 10.4.3 SIGNALS AFTER 1978 (i.e.

Intersection Name	1968	69	70	71
FRA, Frankston Fwy/F-Dandenong Road	7	11	7	7
KNO, Boronia/Wantirna	0	0	0	0
KNO, Dorset/Mountain Hwy.	2	6	2	1
MOO, Boundary/Centre D'nong	9	3	2	3
MOO, Centre/East Bounday	3	1	4	1
PRE, Edgars/Mahoneys	0	0	0	0
SPR, Cheltenham/Springvale	0	0	0	0
SUN, Ballarat/Churchill	0	4	3	3

. 1979), RUM 20's ACCIDENTS (all reported)

72	73	74	75	76	77	78	TOTAL	MEAN	S
2	3	4	9	4	1	2	57	5.18	3.22
0	0	4	10	8	4	15	41	3.73	5.18
3	0	4	5	4	10	9	46	4.18	3.16
8	3	9	14	18	15	15	99	9.0	5.8
2	2	2	4	8	9	10	46	4.18	3.28
0	0	0	0	0	1	11	* 12	1.09	3.3
0	7	2	3	21	0	2	35	3.18	6.29
4	5	6	5	3	8	9	50	4.55	2.50

TOTAL = 384 $\bar{m}$ 4.39 , $\bar{s}$ 4.09

m = 4.36, s of $\bar{m}$ = 2.23, s of $\bar{s}$ = 1.43

TABLE 10.4.4 SIGNALS INSTALLED DURING

Intersection Name		1968	69
BRN,	North/St.Kilda	4	4
	Bambra/North	9	4
BRS,	Glenlyon/Lygon	5	5
CAU,	Hawthorn/Inkerman	5	7
	Glenhuntly/Hawthorn	9	10
	Bambra/Glen Eira	4	0
	Glen Eira/Kooyong	4	2
CBG,	O'Heas/Sussex	5	0
CWD,	Alexandra/Smith	7	5
CRO,	Canterbury/Dorset	6	5
DAN,	Gladstone/ Heatherton	1	3
	Chandler/Dandenong	3	4
	Foster/McCrae	3	0
	Chandler/Heatherton	7	6
	Jacksons/Police	0	0
FOO,	Francis/Hyde	3	3
FRA,	Frankston Fwy./Seaford	5	0
KEW,	Glenferrie/Wellington	4	1
KNO,	Bayswater/Mountain Highway	0	1
MLV,	Darling/Waverley	3	3
MBN,	Pigdon/Rathdowne	0	0
MOO,	East Boundary/South	2	10
MRC,	Nepean Hwy./White	1	8
NOR,	Darebin/Grange	2	2
OAK,	Clayton/Ferntree Gully	2	6
PRE,	Cramer/Gilbert	10	3
SMB,	Moray/Park	2	2
SPR,	Corrigan/Heatherton	5	1
SPR,	Edithvale/Wells	5	1
SPR,	Centre/Dandenong	2	13
SUN,	Anderson/Durham	1	0
	Ashley/Churchill	2	5

Then

1974 O 1978, RUM 20's ACCIDENTS

70	71	72	73	74	75	76	77	78	DATE	∑	M	S
7	3	5	8	18	3	0	0	1	25 Nov.75	53	4.82	5.08
1	2	4	9	11	1	2	1	1	14 May.75	45	4.09	3.78
3	0	3	5	2	2	7	2	11	?	45	4.09	3.02
3	5	5	7	3	5	13	1	0	18 Mar.77	54	4.91	3.48
12	9	9	15	14	1	3	2	1	18 Mar.75	85	7.73	5.16
10	3	1	3	8	20	5	0	0	28 Mar.77	54	4.91	5.99
4	4	5	2	11	5	0	2	0	15 May 76	*39	3.55	3.05
2	1	0	4	2	2	6	9	4	3 May 78	35	3.18	2.75
9	7	8	4	8	7	12	13	5	Feb.78	85	7.73	2.80
4	2	3	7	6	9	16	7	4	12 July 77	69	6.27	3.80
2	1	1	5	5	11	10	2	1	16 July 76	42	3.82	3.63
3	12	11	8	9	4	3	1	2	14 Mar.77	60	5.45	3.83
0	0	2	5	9	7	5	0	1	8 Nov.76	32	2.91	3.18
2	1	1	1	4	3	4	.8	10	28 June 78	47	4.27	3.10
1	0	0	0	1	0	1	5	9	15 Dec.78	17	1.55	2.88
5	4	5	11	5	6	9	17	4	4 Aug.77	72	6.55	4.25
0	2	3	9	9	1	3	1	0	14 Oct.77	33	3.0	3.35
3	3	2	1	4	4	9	5	0	10 Nov.77	*36	3.27	2.45
1	1	6	2	7	9	8	5	1	17 Oct.77	42	3.82	3.25
7	1	2	2	1	6	9	0	0	2 May 77	35	3.18	2.93
2	0	2	1	3	3	9	5	0	11 Nov.77	*25	2.27	2.76
16	5	3	6	6	11	7	0	3	1 Nov.77	69	6.27	4.61
2	4	4	8	5	3	9	4	2	21 Dec.77	50	4.55	2.70
3	3	4	3	9	4	5	4	0	12 Aug.77	*39	3.55	2.25
8	4	5	5	9	5	1	1	2	13 May 75	48	4.36	2.69
2	4	5	7	1	3	9	3	0	26 Oct.77	46	4.13	3.25
3	2	3	2	7	9	1	0	0	17 Jan.77	31	2.82	2.79
3	4	4	3	7	8	16	4	2	30 Mar.77	57	5.18	4.12
2	4	4	20	16	11	7	0	0	16 Dec.76	67	6.09	6.82
11	5	5	1	9	14	13	11	4	14 Dec.77	110	10.0	5.76
2	1	1	3	6	4	14	0	0	1 June 77	38	3.45	4.25
2	1	1	7	8	14	13	2	2	1 July 77	66	6.0	4.40

TOTAL 1626

m= 4.62 $\bar{m}$= 4.62 $\bar{s}$ 3.69

1.78 1.11

If year of installation ignored and 1978 installations ignored, 27 intersections remain.

Before Accs. = 1352 Before years = 230 5.878 accs./year

After Accs. = 45 After years = 40 1.125 accs./year

Reduction = 80.8%

11. THE NEED, IN AUSTRALIA, FOR ACCIDENT DEFINITIONS AND SYSTEMS.

11.1 History and discussion.

The Expert Group on Road Safety (EGORS) in reporting to the Minister for Shipping and Transport (1972) on the road accident situation in Australia said in relation to accident information "the collection, tabulation and publication of uniform and consistent accident statistics on a national basis is an urgent necessity. Many previous attempts to this end have achieved little. It is essential that the authorities concerned co-operate fully to ensure that no further delays occur." Some specific recomendations were made as follows -

- Routine accident data should be reported in a uniform basis throughout Australia

- The more important accident data and details of research should be readily available on a national basis from a central information service

- Records of driver/rider licences, traffic convictions and motor vehicle registrations should be capable of integration with accident data

- A study be made to establish an optimum system of data collection, including such aspects as the design of forms, ancillary equipment and training of personnel.

A further report of EGORS in 1975, published in 1977, dealt again with accident information in a slightly different light. "There is an urgent need to establish a national data system which would provide information for meaningful national analyses, interstate comparisons and research. At the same time it must satisfy State needs and, although decentralised, work to common guidelines." It was recommended that -

- The Australian Government provide financial and technical assistance to the States to enable them to set up integrated statistical systems covering accidents, licence holders and motor vehicle registrations. Special consideration should be given to additional grants to any State able to incorporate detailed injury and alcohol data

- Each State and Territory should require the reporting of accidents in which at least one vehicle is towed away as well as accidents involving death or personal injury

- A core of uniformly defined data, items to be used by all States in reporting accidents, be developed to provide a basis for national statistical tabulations, interstate comparisons and research

There was recognition of the limitations of manpower which limit the amount of data which can be collected about large numbers of accidents and hence a need to define the relevant and high priority data that should be collected. Such definitions naturally being uniform throughout Australia and their application standardised.

Historically, as EGORS related, there had been some attempts at uniform national statistics but one with which the writer is familiar bears some mention and that is the work of COSTCE (The Conference of State Traffic Control Engineers). The following is from a report by J.D. Crinion (November 1968) [Then the Excutive Engineer of S.A. Road Traffic Board] to other COSTCE members - "Difficulties have been experienced in the past in endeavouring to compare accident statistics because of the differing practices and/or definitions. It is desirable to standardise reporting on a national basis and to reach agreement on some of the fundamental definitions, e.g. nature of the accident and the locaton of the accident." There followed definitions for Fatal, Injury and Property Damage and Intersection/Non-intersection; and a list of suggested statistical tables. Comments were generated at the Victorian Traffic Commission which elaborated on the "definition" theme (and related also to a discussion held earlier in 1968 with the Victorian Office of the Bureau of Statistics). Further exchanges were made during 1969 on definitions and data items to be collected.

In the meantime the Commonwealth Bureau of Roads (CBR) had become involved in the topic via the National Association of Australian State Road Authorities (NAASRA) for whom it undertook in 1969 to prepare a draft standard accident report form.

So in March 1970 a meeting was held between COSTCE representatives and representatives of CBR and as a result a list prepared of 20 items which required definitions and suggested definitions. These were the definitions derived by COSTCE discussions. It was also suggested that "accident-types" be defined since various names were used to describe the same or similar accidents and sometimes the same name was used to describe quite different accidents (in fact the RUM system was proposed).

These 20 definitions were later referenced by Watkins (1971) as the CBR definitions and were used by Watkins basically as was as "suggested items and proposed definitions." Watkins went on to list 14 Types (nature) of accidents consisting of eight single vehicle accidents and six multi-vehicle accidents. These definitions are not stated as serving any particular purpose and to the Writer it appears they serve little useful purpose. For example, "Angle collision" is defined firstly as "Initial event involves vehicles travelling in different roads before collision, or one vehicle leaving private driveway", the Note to this definition going on to say "a vehicle making a right turn across oncoming traffic when struck by an approaching vehicle constitutes an angle collision unless the right turning vehicle is stationary and to the left of centre of the carriageway in which case it it would be head-on or side swipe opposite direction collision. Collisions involving angle parked vehicles are classed as angle collisions. Collisions involving U-turning vehicles are classed as angle collisions. Collisions between a train or railway trolley and a vehicle at a railway crossing are classed as angle collisions." The Note contradicts the definition in as much as the right turning accident involves vehicles from the same road not different roads. [The definition for head-on collision says "vehicle travelling in same road but in opposite directions."] It is something of a puzzle as to why the fact that the right turning vehicle was stationary should change the collision to a head-on, perhaps there is some unexplained rationale behind the system.

Another example is the "Struck pedestrian" type where the definition is "vehicle strikes pedestrian", this then is referenced to the "Ran off road and struck object" type which is defined as "vehicle leaves carriageway followed by collision with object, pedestrian, animal or vehicle." Should it be inferred that the "struck pedestrian" type refers only to accidents on the carriageway.

The item definition for "Object" says "any feature, other than a vehicle, pedestrian or animal with which a vehicle collides". The accident-type definition has added back items excluded by the item definition.

A further example is given by the "Overturned on road" type which by Watkins' Note to the definition includes a motor cyclist (or bicyclist) falling off motorcycle (or bicycle) without having a collision. The definition for "Person fell from moving vehicle" stated as "person falling from moving vehicle without vehicle having a collision..." seems to also encompass a motor cyclist falling from a motorcycle. Overturning for a four wheel vehicle conjures a different scene to that for a two wheel vehicle, perhaps a type of "out of control" would more readily enfold the motor cyclist falling off and would perhaps also be more of an initial event prior to a four wheel vehicle overturning.

The general comment to be made about Watkins' accident-types is that there is no defined use and that they are neither clearly defined nor are there enough types.

The Watkins proposed accident report form includes all of those 14 accident-types.

The Advisory Committee on Road User Performance and Traffic Codes (ACRUPTC) issued "A Common Core of Road Traffic Accident Data Items" in 1978 in which it is stated that the Australian Transport Advisory Council (ATAC) had endorsed, in July 1977, a common core of data items to be collected in all States, the details of which were in the report. The report bravely states that the endorsement represented the success for a different approach from that pursued in the past. Instead of seeking complete uniformity in accident reporting throughout Australia, a common core of items was defined which could be incorporated into the accident report forms used in individual States. Unfortunately endorsement by ATAC and actual implementation by individual States are two different things.

The Committee agreed that the inclusion of an item in the common core did not imply that it had to be collected by the means of an accident report form, indeed certain items might be collected in a more satisfactory way through driver licence and vehicle registration records.

The common core includes only 10 item definitions and despite having 13 accident-types does not define any of them, a lack which should be given greater condemnation than a set of poor definitions. Indeed no attempt is made to define the levels of extent of injury succinctly. For example, Level 1 is given as "killed or died within 30 days". Watkins said "killed at the time of the accident, or whose death within 30 days is attributable to a road accident". The COSTCE set said "killed at the time of the accident, or succumbs to injuries received in a road accident, up to 30 days after the accident". The ACRUPTC definition of an accident is an event resulting in death, injury or property damage attributable directly or indirectly to the movement of a vehicle on a road. This does not say that the death, etc. is attributable directly or indirectly to the accident but rather that the death, etc. was attributable to the movement of a vehicle. The Writer wonders if this does not rule out passenger accidents where the vehicle was stationary.

There is not a definition of a casualty accident to be found despite listing four levels of extent of injury which includes "Injured, not requiring medical treatment" as Level 4. In Victoria and for National Statistics it is usual to define a casualty accident as including Levels 1 to 3 of the Extent of injury scale. Considering the amount of detail the ACRUPTC report goes into on the question of Vehicle Damage Data it is surprising that fundamental definitions are not included in what purports to be a document for national uniformity in accident statistics.

In the preamble of the report in a section entitled "The need for common road accident statistics" the following is stated, "Present national statistics do not differentiate collisions between vehicles on the basis of the nature of accident, nor are they related to place of occurrence. As a result the extent of the intersection accident problem is known only in the most general terms. Although identification of locations for site improvement is possible at a State level the national tabulations do not provide a basis for remedial traffic management measures to be developed for application on a system-wide basis." The provision of this detailed data is seen as desirable but the report goes only as far as the most basic accident-types (i.e. multi-vehicle or 10 single-vehicle accident-types) something which does not give the detail desired.

In Victoria in 1973 the Parliamentary Road Safety Committee in reporting on statistical data for road safety purposes said they believed that "uniformity of definition to be a fundamental requirement for all parties recording data relating to road safety" and recommended that urgent consultations between the States be arranged to achieve the maximum uniformity of definition and compatibility of systems.

The Australian House of Representatives Select Committee on Road Safety reported also in 1973 on statistical needs but took the longer tack of recommending the creation of a Central Information Service within the National Authority on Road Safety and Standards [also to be created] which would work with relevant authorities toward the development and use of uniform definitions and concepts. [The National Authority did not come into effective existence before being rescinded.] The Committee when making a further report in 1974 on roads and their environment suggested that the CBR ask the State road authorities to include in the next Roads Survey statistics of accidents by type and by specific location.

The Committee when it reported on motorcycle and bicycle safety in 1978 was deeply concerned about the inadequacy of accident data available at the national level. The quoted examples of accident data, related to bicycle accidents, used Victorian data and gave details of accident-types such as 'right-angle', 'struck from behind', etc. and naturally similar detailed types would be needed from other States to make national analyses. The Committee recommended that States include on their report forms the 'common items' endorsed by ATAC, but unfortunately the common items do not include the detailed accident-types the Committee would need.

Included in the Committee's first report was a table of data items collected on the various State forms (part of the ABS submission) and multi-vehicle accident-types such as angle collision, rear-end collison, head-on collision and side swipe collision were collected in New South Wales, Victoria, Queensland, South Australian and Tasmania. As these States represent more than 90% of the population of Australia it seems a reasonable basis for justifying the inclusion of these accident-types (suitably defined) in any national core items. As mentioned above, without detailed accident-types it is not possible to make any national analyses about specific aspects of the road safety problem.

It is clear that the ACRUPTC document fails to provide sufficient definitions for the purposes of national statistics. One has only to compare the document with the USA Manual on Classification of Motor Vehicle Traffic Accidents (NSC, 1970) [some 72 pages] to appreciate the gulf between the two. Further the USA Manual is only for general purpose statistics and it is expected that various agencies would provide more detailed classifications to suit their own needs. In the area of accident-type the USA Manual defines 11 primary motor vehicle accident-types which may occur on or off the roadway whilst the ACRUPTC refers to seven primary vehicle accident-types that occur on the carriageway and five that occur off the carriageway. Table 11.1 compares the two lists using the USA types as the base for comparison.

Table 11.1 Comparison of Primary accident-types

USA Standard [on or off roadway]		ACRUPTC [approx. equivalents]
A.	Non collision involving a motor vehicle in transport -	
1.	Overturning	(SV on cwy) Overturning
2.	Other noncollision*	(SV off cwy) without colliding.
B.	Collision between a motor vehicle in transport and -	
3.	Motor vehicle	(V to V) vehicles in traffic
4.	Motor vehicle on other roadway	.
5.	Parked motor vehicle	(V to V) vehicles parked
6.	Railway train	.
7.	Pedestrian	struck pedestrian [on cwy, off cwy]
8.	Pedal cyclist	.
9.	Animal	struck animal [on cwy, off cwy]
10.	Fixed object	struck object [on cwy, off cwy]
11.	Other object**	
	.	Passenger accident (on cwy)

Notes

Roadway, approx = carriageway in Aust. National Road Traffic Code
** Includes animal drawn vehicles, trams
* Includes passenger accident.

Notes

(1) Road vehicle includes Railway trains

Some examples of National data uses that will not be possible with the ACRUPTC accident-types are:

(1) Vehicle overturns - this type could be used to assess problems of vehicle design related to integrity of structure, stability, etc. The ACRUPTC list would only provide the data for overturning on the carriageway. It is likely that more overturning occurs after a vehicle leaves the carriageway due to the presence of drains, embankments, cuttings, etc.

(2) Bicyclist accidents - the immediate separate of bicycle accidents is not available, reference to the type of road user would be necessary. With an apparent growing use of bicycles the monitoring of these accidents is important.

(3) Railway train accidents - these are included in the totals and reference to vehicle type would be required to extract them.

Unfortunately it is not stated in the ACRUPTC document what national tabulations are proposed.

It is a vexed question as to what items should be collected and tabulated since the question of purpose has also to be asked and that is a question that many times should be asked before a decision is made as to what data items should be collected. Perhaps the purpose for uniform definitions for national collection is for compiling general purpose statistics to measure the magnitude of the traffic accident problem, as the USA Manual says. However, the USA definitions provide a guideline for the further subdivisions of accident-type necessary for accident research.

Looking at the published national data offers some comment on the changes over the years in Australia. Table 11.2 lists the remarks found in the national tabulations.

It is interesting to note how Victoria reported/recorded ALL accidents in 1937, then in 1948 changed to reporting casualty and damage above £10 and then at a later stage (1958) it changed to reporting casualty accidents.

The national tabulation of all reported accidents ceased with the Dec. 1957 issue because of inconsistencies between States.

It is also of historic interest to note that ACRUPTC's predecessor the Australian Road Traffic Code Committee recommended early in 1959 that all States should adopt a system similar to that developed in Victoria. Retrospectively it would appear that little action followed that recommendation.

One can perhaps sympathise with the view of using the lowest common denominator for national statistics, that is fatal and admission to hospital accidents but it does not provide a base for national research. As the cost to the community of accidents is spread across all severities (see 6.4) so that the total costs of each of fatal accidents, injury accidents and damage accidents are approximately equal (although damage accidents may be the greatest) and it is evident that within severity classes the rank order of accident-types differ, then selecting the most severe-injury classes would give a biased sample.

Table 11.2 Notes from ABS Tabulations on Road Accidents

(1) 1937/8. Figures are not entirely comparable between States, as some like NSW had not enforced the reporting of minor accidents, while others like VIC & SA require that all accidents should be reported.

Amending legislation however was then provided in most States for the reporting of all accidents.

(2) 1948/49. Accidents reported are those involving casualty and damage above £10. This had operated since 1 July 1948 in VIC, SA, TAS and ACT, in other States had operated for part of fiscal year.

(3) 1949/50. All accidents reported to Police that -

(a) occurred on road open to the public, and involved
- any road vehicle that was in motion at the time of the accident.
- an animal in motion and being used for transport or travel.
- any train over a level crossing open to the public; and

(b) accident resulted in
- death within 30 days of accident

or
- bodily injury requiring medical or surgical treatment

or
- damage to property in excess of £10.

(4) 1956/57. Tasmania - some variation in damage accident reporting (presume only minor injury).

(5) From 1 Jan 1958, "Total accidents reported" was suspended due to inconsistency between States in relation to "damage only" accidents.

(6) 1963/64

Changeover to 31 December periods from 30 June years.

(7) 1967, prior to 1 October 1967, South Australia included minor injuries in injuries, now corrected and minor injury incl. in damage accidents.

If as Ashton (1966) said in relation to accident research that the accident-types involved are relevant, but the seriousness or otherwise of an accident may have little connection with the causation, then a sample, heavily biased in severity, will not be much assistance toward accident prevention programs.

Accidents are required to be reported to a greater extent in some States than others and that greater amount of data could be useful to researchers at a National level provided the scope of national definitions and concepts was extended to cover all levels of accident severity and detailed accident-types. The scope of uniformity in definitions should be extended to vehicle accident insurance reports and in fact all reports dealing with aspects of vehicle accidents (e.g. no fault compensation). Thus without overloading the basic report form, research data could be obtained from other sources and be readily integrated with the data arriving on the police report forms. For some years in South Australia the Third Party Insurance figures for each accident have been matched to the Police report enabling, for example, cost figures to be assigned to specific locations.

If half of the motor vehicles registered carried comprehensive insurance (or Third Party property) then if every accident involvement was required to be reported by the insured to the insurance company and if reporting was perfect one could expect more than $\frac{3}{4}$ of multi-vehicle accidents of all severities to be reported and half of the single-vehicle accidents, at least $(\frac{3}{4} \times \frac{2}{3} + \frac{1}{2} \times \frac{1}{3} = \frac{2}{3})$. Hence nearly 70% of all accidents potentially should be reported (but not necessarily claimed) to Insurers. It is likely that the single vehicle accidents will be the poorest reported group in fact. As the reporting of all levels of incidence is not likely to be well observed, although some places do require the reporting of all accidents, it would be more practical to collect information on all accidents which resulted in claims being made. This alone would usefully expand the data pool.

11.2 Definition from other Sources

In discussing the ACRUPTC set of common core items and definitions, the accident-types used in the USA standard were introduced to provide a comparison. A sample of definitions has been taken from the following:

WHO (1977)	International Classification of Diseases, etc. - Definitions and examples related to transport accidents.
UNECE (1978)	[United Nations Economic Commission for Europe] Statistics of Road Accidents in Europe - Definitions and general notes.
UNECE (1979)	Transport Statistics for Europe - Definitions.
Japan	"Statistics '78" of Road Traffic Accidents.
New Zealand (1978)	Motor Accidents in New Zealand M.o.T.
United Kingdom	Road Accidents 1977 and 'Stats 19' (1960).
West Germany	Unfallverhütungsbericht strassenverkehr 1977.
Sweden	Some data about traffic and traffic accidents, 1972.
United States of America	Manual on Classification of Motor Vehicle Traffic Accidents 1970.
UN (1968)	Convention on Road Traffic - Definitions.
Australia	• The National Road Traffic Code, 1976. • COSTCE/CBR - 1970, • Watkins, 1971. • Victoria 1978 ABS Bulletin. Definitions on 513A folder.

The extracted definitions are to be found in the Appendix.

It is evident that a number of countries are tending to uniformity of definition, however it is possible that there are subsets of uniformity since, for example, the UNECE does not mention the WHO document amongst its references, whereas the USA standard does reference it (or at least the version adapted for use in the USA).

In the move for national statistics it is reasonable to consider the question of international statistics and the comparability of local definitions to those international definitions. The history of the definitions listed in the WHO Manual dates back to at least 1855, pertaining to causes of death, and perhaps the pedigree of ancestors should have some weight in this matter. Are the statistics to be a count of persons killed and injured or the conditions that produced injury or death?

The classification of external causes is to permit the listing of environmental events, and conditions as the cause of injury and other adverse effects.

A motor vehicle traffic accident is defined as any "motor vehicle accident" occurring on a public highway [i.e. originating, terminating or involving vehicle partially on the highway]. This definition leads to one of the specific accident classes - "E811 motor vehicle traffic accident involving re-entrant collision with another motor vehicle" which includes the following - a collision between a motor vehicle, which accidentally leaves the roadway then re-enters (a) the same roadway or (b) the opposite roadway on a divided highway, and another motor vehicle. This is interesting because the system described in Sec. 8.2.3.4 to classify an accident into a primary accident class is in keeping with this WHO definition.

Further the accident class, "E816 - motor vehicle traffic accident due to loss of control, without collision on the highway" includes - failure to make curve or going out of control, and overturning or colliding with an object off the highway or stopping off the highway, and excludes - any collision on the highway following loss of control or loss of control following a collision on the highway. This suggest that a collision of any nature on the highway takes precedence over any collision or noncollision off the highway and that a collision following a loss of control such that a vehicle leaves a roadway and then collides with a vehicle on re-entering the same or other roadway takes precedence. [It should be noted in passing that the classes of accident in the 1977 WHO Manual are not the same as those in the 1957 WHO Manual.]

The 1970 USA Accident Manual has an accident-type where a vehicle crosses a median and collides with another motor vehicle on the opposite roadway but the application of this type is at first sight confused by their principle of the accident-type being determined by the first injury or damage producing event. The clarification of this principle relates to whether the accident is a collision or a noncollision accident. For a noncollision accident the location of the motor vehicle, at the time of the accident, determines whether it is on or off the roadway.

For a collision accident, the on or off roadway classification is determined by the location of the accident or point of impact, in relation to the boundaries of the roadway. [A collision accident involves a motor vehicle in transport colliding with other things such as motor vehicles, trains, pedestrians, animals, or objects.]

Figure 11.1 is the writer's attempt to clarify this clarification.

However for more than one damage or injury producing event the accident should be classified by the location and nature of the first event to occur. It is in this instance that degrees of damage become pertinent because if a vehicle leaves a roadway, crosses a median and collides with a vehicle in another roadway it is likely that it suffered at least minor damage against the kerb, or trees and shrubs on the way. The collision with the other vehicle may produce more severe damage or injury.

Indeed if the "collision" with the other vehicle is not recorded as such then this <u>one</u> accident has to be recorded as <u>two</u> accidents, viz. one accident where a vehicle leaves a roadway, sustaining damage and a second accident where one vehicle is hit by another vehicle which emerges onto the roadway from the median. Since a "stabilised situation" has not occurred between the two events, it would not seem reasonable to count them as two accidents.

The divided highway case appears to be a special case for recording the median-crossing events. [In Sec. 8.2.3.2 it is proposed that supplementary codes be used to distinguish all such events.]

There appears to be a difference between the WHO Manual and the USA Manual. The WHO Manual talks of collisions "off the highway" (E816) while the USA Manual refers to accidents "off the roadway" [both have same/similar definitions and use of roadway and highway].

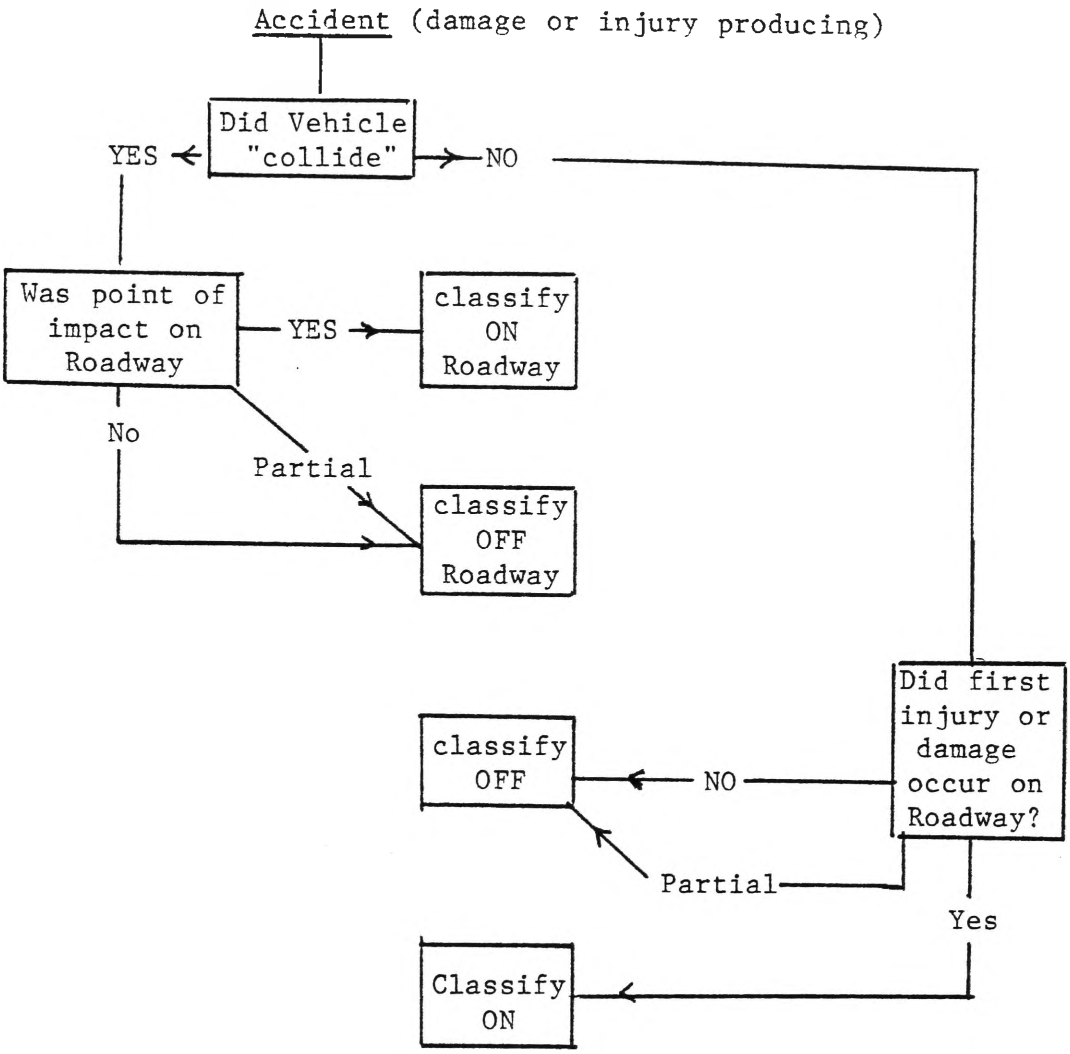


Figure 11.1 Classification procedure - USA Manual.

It would appear from its own context that the WHO Manual could speak of collisions "off the roadway" since a vehicle would have to go beyond the property boundary lines to be "off highway" (it would at that point be both off roadway and off highway). It is conceivable that the WHO Manual means to lump together all collisions with objects and animals "on" and "off" the roadway in one category (E815) and also collect collisions that do occur off the highway. Whatever the intention there is a difference with the USA Manual which has "on" and "off" roadway separated and has no "off highway" category.

Detailed accident-types can be aggregated into wider groups for purposes of national statistics but the detailed types are needed for research and would aid in clearly defining what types are included in the wider groups.

The WHO Manual offers a reasonable base for a list of primary accident classes with clarity as to what subgroups would be grouped into these primary classes. The nature of its classes also offers at least one basic principle for classification and that deals with the divided highway situation.

The system of assigning the underlying causes of the death or injury established in the WHO Manual is also of relevance. In Victoria, for example, 4% of the road deaths (see Sec. 6.7) are currently being dropped from the "official figures". In the WHO Manual, usually the underlying cause is the disease or injury which initiated the train of morbid events leading directly to death (or injury) OR the circumstances of the accident which produced the injury.

The External Causes code (indicating environmental events, circumstances, and conditions as the cause of injury, E800 - E829) is used in addition to a code indicating the nature of the condition.

CCRAM (1973) quoting from a sample of Victorian post mortems said that 7% of car occupants die as a result of inhalation (blood or vomit) without suffering any injury which by itself was sufficiently severe to cause death. The same source quoted a study of 300 driver post mortems in which 10% of the drivers died due to "natural causes" and of these half resulted in no crash. CCRAM considered knowledge of these details essential as in one case the ignorance of health education in the public was such that victims were left lying on their backs for fear that moving them might cause some damage whereas the danger of not moving them into a position where they will not inhale blood or vomit is far more important. Also the number of drivers who collapse or die at the wheel and are responsible for death or injury to other people was considered to be important to be known.

11.3 A possible procedure for Australia

There is still a need for a standard set of definitions for adoption by the accident record agencies in each State so that a set of comparable statistics can be produced for the whole of Australia and further should be capable of international utilisation. The definitions should therefore be based on an internationally accepted set of definitions with departures from these when only absolutely necessary.

The purpose of the national statistics should be clarified; are the statistics to be a count of persons killed and injured or the conditions that produced death and injury? If the use of the statistics is to enable overall assessments of accident countermeasures or the comparability of effects between States then the statistics should be oriented to the conditions that produced the death and injury (i.e. the type of accident occurring and associated details, and not the type of severity and associated details).

The units (vehicles, road users) involved and site characteristics should be defined, and accident severity and accident-type/class require guidelines.

The determination of severity of injury must relate to that observed at the scene of the accident or entail a follow-up for each person involved to ascertain the final effect of the accident. For example, the person who has no visible signs of injury, leaves the scene of the accident and some days later is diagnosed as having a broken rib which is treated by his local doctor. In Victoria, this form of injury can become known to the Motor Accidents Board as the result of a claim, although the person was probably recorded on the accident report form as a non-injured person.

In most cases there is no feedback to the Police about subsequent changes in the level of severity of the injuries sustained, except for the case of fatal injuries and the person dies within 30 days of the accident. For each such death there is quite an amount of paper work and changing of records, so if the process was extended to include any changes involving any of the persons involved it would generate a lot of work in the present reporting system and certainly prolong the close-date for any given year (or period) of statistics. It would be possible in Victoria to use a data input generated from the Motor Accident Board's files to correct the accident report form in so far as the detail for persons who have made claims on the Board. Road accidents which do not involve a Victorian registered motor vehicle are not eligible for a claim and so there is no prospect of collecting the detail of such accidents (e.g. pedal cycle hits pedestrian) at present. So apart from other reasons, the use of severity as a primary orientation of the statistics is not recommended on the basis of the reliability and extent of information on the actual severity of injury received by the persons involved (for the present system). The present system does not produce sharp dividing lines between classes of severity (except the "admission" to hospital class) and to some degree the classifications will be wrong (e.g. "non-injured" who are later found to be injured, and vice versa).

The purposes of road safety measures could perhaps be expressed as:

(1) to reduce occurrence of accidents; and/or

(2) to reduce severity of injury to specific road users; and/or

(3) to reduce the cost of damage.

The system of event classification allows the application of these three purposes. The accident (event) occurs and the injury (or non injury) results although in some cases the injury or the most severe injury may result from a subsequent event. For example, a driver loses control on a curve, the vehicle leaves the roadway and then hits a tree. Injury is sustained in hitting the tree. Countermeasures would aim to reduce the accidents by improving the curve, and to reduce severity and cost by removing the tree or erecting a guard rail. Cutting down the tree without doing anything about the curve will not reduce accident occurrence but might result in fewer "reported" accidents since the consequences would then be less severe and some drivers could drive away from their accident scene.

As suggested earlier the detailed accident-type should be supplemented by a further code where appropriate to indicate relevant subsequent events, e.g. a collision involving minor injury may be immediately followed by a collision or noncollision with fatal or severe injury involved, a supplementary code could be used to indicate the nature of the second more severe event.

A possible procedure for classifying traffic accidents based on W.H.O. (1977) definitions and concepts is set out on the following Figures 11.2 to 11.4.

Each of the accident classes in Figure 11.4 can be further sub-divided into accident types as detailed in Section 8.2.3 and vehicle-type (i.e. car, truck, etc.) can also be identified with the accident-type as Vehicle 1 or Vehicle 2.

For each accident-type the type of road user injured can be recorded; the classes of road user could be as follows:

Driver

Passenger

Motor cyclist

Passenger on M/c

Occupant of tram

Rider of animal, occupant of animal drawn vehicle

Pedal cyclist

Pedestrian

Other specified person

Unspecified person

Each road user should be identified with Vehicle 1 or Vehicle 2 as appropriate, and each of these classes requires a definition.

The degree of severity of injury of each road user should be according to at least the five following classes -

- Fatal
- Hospital "admission"
- Injured, treated by a medical practitioner
- Injured, not treated by a medical practitioner
- Not injured

These classes will be determined as at the scene except for fatal injuries where death within 30 days will require the records to be amended. As stated earlier this means there will be a degree of unreliability with this classification. For detailed research it is desireable that a continuous scale of injury be employed with detail of the number, type and degree of injuries sustained for all involved road users from the lowest severity class through to the fatal class which involved a number of fatal-injuries and non-fatal injuries. Obviously this detail must be obtained from sources other than the Police report form.

"Traffic" Accident

Involving a device designed primarily for (or being used primarily at time for) conveying persons or goods.

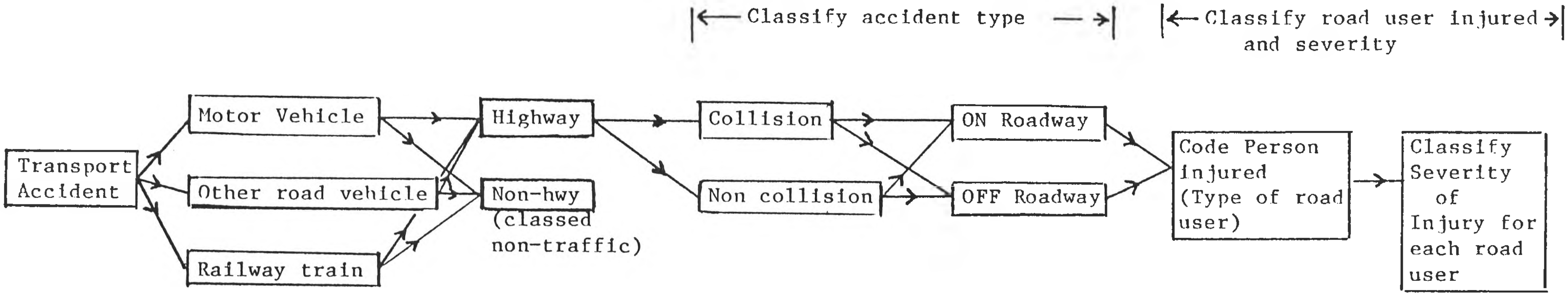
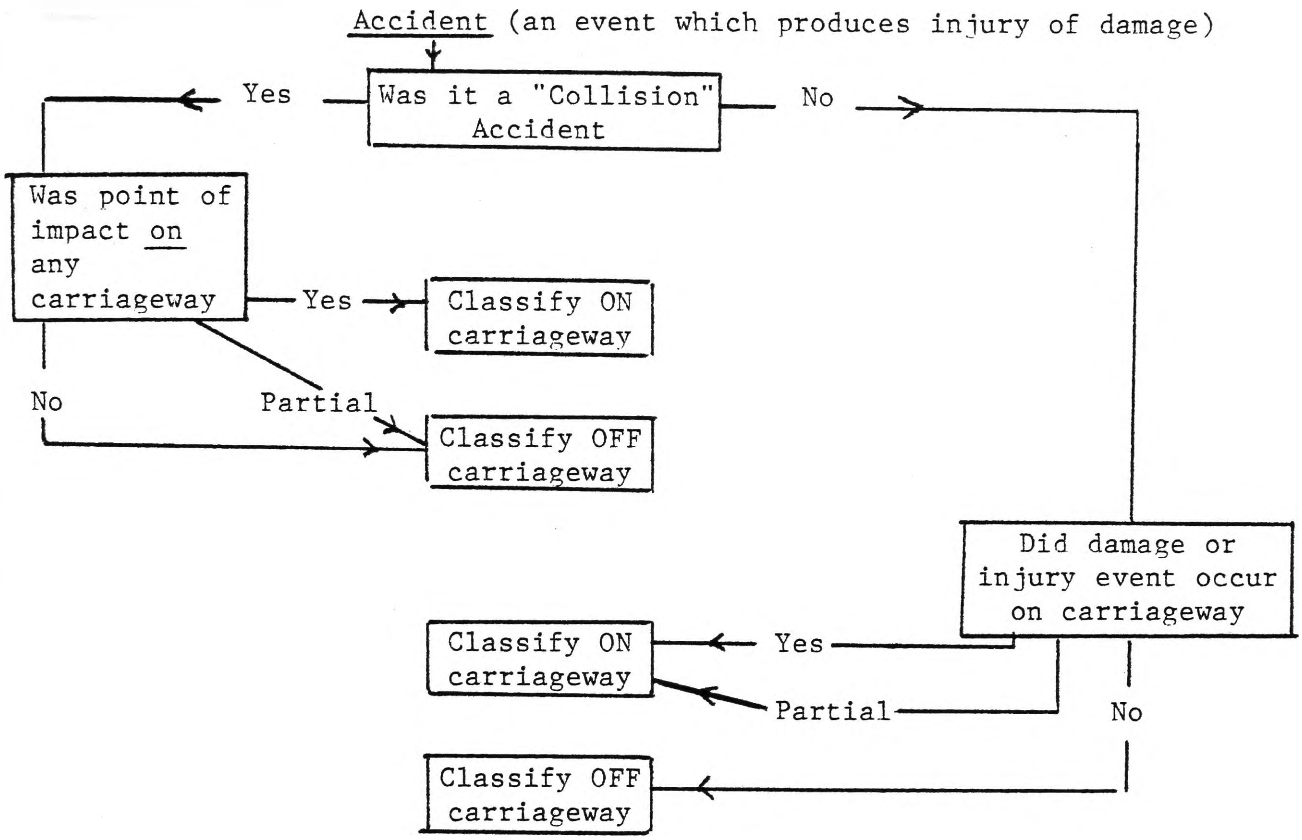


Fig. 11.2 Classification by accident-type and then associated detail.



Note: "Collision" takes priority for classifying irrespective of whether it was the first damage or injury producing event (in most instances collision would involve at least damage).

Fig. 11.3 Suggested Procedure for use with WHO classes.

A. Motor Vehicle Accidents

Motor Vehicle	with		[collisions]
		(1)	Train
			Motor vehicle
			Other road veh.
			Re-entrant collision
			Pedestrian
			Other collisions - objects, animals
		(2)	non collision - overturn, run off road
			- boarding/alighting
			- other
		(3)	other, unspecified

B. Other Road Vehicle Accidents

Pedal cycle	with	(1)	Pedal Cycle
			Pedestrian
			Animal
			object
			non-motor vehicle
		(2)	non collision
		(3)	other, unspecified
Animal-drawn vehicle		(1)	Pedestrian
			Animal
			object
			non-motor vehicle (except for pedal cycle
		(2)	non collision
		(3)	other
Ridden Animal	with	(1)	Pedestrian
			Animal
			object
			non-motor vehicle (except pedal cycle, animal drawn
		(2)	non collison
		(3)	other
Other road vehicles (inc. tram)	with	(1)	Pedestrian
			Animal
			object
			non-motor vehicle (except pedal cycle, animal drawn ridden animal
		(2)	non collision (inc. boarding/alighting
		(3)	other, unspecified
Railway train	with	(1)	Other non-motor vehicle, tram, object, pedestrian.

Figure 11.4 W.H.O. Primary Accident Classes.

12. SUMMARY and CONCLUSIONS

12.1 Summary

Accidents occur and cause death, injury, damage, pain and suffering, inconvenience, and economic loss; some are reported; the reports are collected and collated and various outputs of information are produced. The outputs are used in many ways, some quite non-productive in affecting the occurrence or severity of accidents.

This thesis examines certain aspects of what data should/could be collected, how it can be classified after collection, how the accidents can be located and assigned an accident-type and then how this transformed data can be used to "size-up" the particular accident problems in a city or country, and provide a systematic approach to the reduction of accidents and/or their severity and cost.

Certain topics are included in this thesis because there was a need to make mention of them although these topics are perhaps not drawn into the technique as described. In some instances this is because the data can not yet be integrated with the accident data (i.e. for sources available to the Writer) and in other cases the data itself has not been developed to a sufficient level to be of use.

The use of accident "rates" was discussed in Chapter 5 as they are often misused to "prove" a point, perhaps for political reasons although one hopes that at some stage politicians will be given scientific evidence to substantiate reasons for or against any changes.

Today the collection and processing of accident data must be viewed in relation to the legal requirements for reporting accidents; the definitions (legal or otherwise) related to roads, intersections and other physical features; and the regulations that govern the registration of vehicles, the equipment on/in vehicles and the manner of usage of vehicles on roads. The legal obligations imposed on road users by traffic signs, signals and other controls should also be taken into account.

To resolve accident problems requires an appreciation of the road user movements leading up to the accident and the location of the accident. The "accident frequency/accident-type" method is recommended as a technique which allows a classification system to be used which can be related to the effect of all forms of countermeasures.

This technique could be illustrated by the diagram below:

ACCIDENT

↓

Data Collection

↓

Accident-types and definitions

↓

Ranking of problems

↓

Location

↓

Determine clusters/non clusters

For location clusters

↓

Determine site names

↓

Site treatments

For non-clusters (diffuse locations)

↓

Examine other factors

↓

Determine clusters by other factors

↓

Treatments

When an accident occurs the outcome, depending on the circumstances involved, may be - no damage, damage, injury, or death, or a combination of these. The purpose of road safety is accident occurrence reduction and/or injury severity reduction and/or damage reduction. As something of a simplification, the following data is needed for research on -

(i) For occurrence reduction one needs information on accident-type, location and frequency and, as an aim the reports of ALL accidents

(ii) For injury severity reduction, one needs -

- reports of all injury accidents
- comparison against all accidents
- detail of type of injury
- injury "caused" by (interior/exterior of vehicle)
- number of death-causing injuries
- cause of death and days after accident death happened
- costs associated with the injury
- relationship to accident-type.

(iii) For damage reduction, one needs -

Details of all claims for repairs
Comparison against all accidents
Vehicle types involved in each accident
Area of vehicle damaged
Damage "caused" by
Relationship to accident-type

It is not necessary to collect a large amount of information on a Police report form to have an effective system of identifying predominant accident-types occurring within a given system and to determine whether these accidents cluster at specific sites or not. It is however desirable to collect more reports on the less severe injury and non-injury accidents so that accident reduction programs can be carried out sooner, that is, as soon as a clear pattern of accident types can be discerned which in turn determines the countermeasure to be used. Without the extra reports a longer period is required to collect sufficient data to identify the form of the accident problem and thus the appropriate countermeasure. If the reports are restricted to injury accidents it means more people will be killed or injured before there are sufficient accident reports to establish a pattern, at the same time it is likely that a number of unreported damage accidents have occurred and the combined total cost of these accidents to the community could be equal to the total costs of the injury accidents. If the accident-type is one that usually results in a low proportion of injuries then it is possible that a large number of these accidents will occur before records based on injury accidents have a sufficient score to initiate action.

When considering specific locations it is unacceptable and unreliable to use macroscopic scaling factors to estimate the total accident situation at one location. This applies whether it is a scaling factor for costs, for the level of reporting casualty accidents or for the estimate of the number of damage accidents. Again a small amount of information on each of these "unreported" accidents is all that is needed to pinpoint accident-type and location. Section 6.4 gave a view of the type of data to be collected and put priority for collection on the various items. It is not necessary that the information on "unreported" accidents be collected through the Police reporting system as it could come from the insurance companies having comprehensive or third party property insurance. Possibly two thirds . of all accidents would be reported to insurance companies provided the insured had a requirement to report all accidents they have (even if they are not making a claim). At the moment reporting to the Insurer is optional if one is not claiming. Even if only the accidents on which claims were being made were to find their way to the accident record system it would enhance the system very considerably.

Supplementary data can be collected from sources other than the police report to extend the range of research and analysis and these aspects are discussed in Chapter 7. Getting data from other sources within one State presupposes the use of common terms and definitions being used in that State. The problems encountered in going outside the system, say, for Interstate data are discussed in Chapter 11. The need for definitions is still extant in Australia and a possible procedure is proposed for the classification of accidents.

The technique recommended by the Writer to resolve accident problems was detailed in Section 9.2, was applied to data from four cities in different countries in Section 9.3, and was used to compare similar data from Victoria and New Zealand in Section 9.4. The technique demonstrates not only the similarities but also the differences in the accident profiles of these places.

The pivot of the technique is the classification of accident-type, and an examination of the nature and quality of the coding of Road User Movements (RUM), the accident-type used in Victoria, has lead to the development of a new coding chart which provides for types of accident not previously identified and at the same time reduces the number of cells on the chart. Also to ensure consistency/uniformity of coding it was necessary to devise "Definitions for Coding Accidents" which gives a definition for each of the cells on the coding chart. A further refinement provides Supplementary Codes to be applied to the cells, to add a third dimension, which allows the recording of further useful information which in turn permits the further subdivision or analysis of each cell. It is then possible to record the primary event and also the injury-producing event. For example, two vehicles collide on the road, no one is injured, but one vehicle is deflected so that it leaves the road and goes over a bank and occupants are injured. (Of course it may not be possible to know which event did produce injuries.) The accident would be classified according to the two-vehicle collision and the action of the vehicle going over the bank would be recorded by a supplementary code. All supplementary codes would be capable of computer interrogation independently of the cells to which they were originally part. For example, it would be possible to ascertain all the accidents in which a vehicle caught fire and have the total subdivided by accident-type. The new accident-type system has been described in Section 8.2.3.

Returning to the Writer's recommended technique, there are accident-types which do not exhibit clustering by specific sites, but may exhibit clustering by other characteristics e.g. road type, area, age of pedestrian, age of driver, time of day, etc., or a combination of two or more factors. Research into some of these will require the collection of complementary data partic\ularly appropriate exposure data. For example, it is quite inadequate for all purposes except the crudest comparison to compare the number of accidents reported for particular licence holders and the number of those particular licences issued against the number of accidents and licences for other licence types.

The usage of the roads by those particular licence holders for different days and times of the day on various types of roads would be required to give some idea of comparative risk/exposure.

Such research requires the establishment of "data banks" of information, which were discussed in Chapter 7, and the use of in-depth studies from time to time (see 6.5).

Comparison of data or results against those from other states or countries would be facilitated if the concepts and classifications were based on common definitions. The lack of such definitions in Australia hinders worthwhile research on an interstate or national basis so that the varying effects of topography, road design, control philosophies, etc., in the different states can not be examined. This problem was discussed in Chapter 11 and a possible procedure for Australia is recommended.

The decision to install traffic control devices is often based on the accident record alone or in conjunction with the traffic flows. When the number of accidents at a particular site (recorded or observed) becomes high pressure is often applied from local residents or the local municipality for action to be taken however a question that is being raised as a current issue is how much of the accident frequency in any one year is due to the "hazard" of the site and how much is due to stochastic variation. If a site has a high record for one year should any action be taken or should one wait to see if the problem establishes itself or whether it goes away. Chapter 10 traced the history of a number of Metro-Melbourne high accident frequency intersections that had more than nine RUM 20's accidents in any one year in the period 1974-78.

The variation in accident occurrence across this period have been discussed.

The techniques and procedures recommended by the Writer are intended to provide a base for a scientific and systematic approach to road accident problems, so that this most poorly appreciated aspect of road transportation might, in Potts' (1870) terms, achieve the rank of a science.

12.2 Conclusions

The purpose of this work was to present a systematic way to examine the components of the accident problem and to give some examples of the application of this technique. The chapters and sections in which specific conclusions and recommendations are made are listed below in numerical order -

Section	Title
3.4	Understanding the effectiveness of treatments
6.4.4	A view of what to collect
8.1.3.2	Victorian system refinements (location)
8.2.3	A new system (accident-types)
9.2	A technique to resolve accident problems
11.3	A possible procedure for Australia (definitions and procedures)

The processes involved in the technique can be seen as -

- the collection of appropriate data
- the conversion of the data (accident-type and location assigned)
- the processing of data
- the determination of appropriate treatments

and subsequently the study of the effects of the treatment.

When the sections in the table above are ordered in this fashion they become -

Process	Section
Data	6.4.4
Acc-type and definitions	8.2.3, 11.3
Location	8.1.3.2
Analysis	9.2 (9.3, 9.4)
Study of effects	3.4

Some specific conclusions and recommendations can be made in relation to Victoria, which will probably also apply to other places and systems, these are:

1) Collect data on non-motor vehicle accidents (i.e. copies of 513B forms) and resolve the misunderstanding of the police about the need/requirements for formal reporting
2) Obtain data on more accidents from claims lodged with insurance companies
3) Record all deaths occurring on roads and list the specific cause of death and number of days till death.

The causes of death could be grouped within the following classes -

- directly related to accident i.e. injuries received
- related to post crash period, but not due to injuries received
- died before the accident
- unrelated
- not determined.

4) Add road class to the location description and introduce (into the computer processing) the ability to examine areas and adjacent links

5) Introduce revised accident-types and definitions consistent with W.H.O. classifications

6) Use the A.B.S. conglomerate urban area codes in locating accidents (the five new urban centres in addition to Metro-Melbourne and the Geelong Area). This would enable urban type accidents to be grouped separately from rural type accidents.

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14.1 APPENDIX 1

Accident Report Forms, Victoria

1959 - 1977

ACCIDENT STATISTICS SHEET

MEMBERS OF THE FORCE IN CHARGE OF STATIONS ARE HELD RESPONSIBLE THAT THESE REPORTS ARE MADE OUT AS FULLY AND INTELLIGENTLY AS POSSIBLE BEFORE FORWARDING TO OFFICERS IN CHARGE OF DISTRICTS OR DIVISIONS.

F / Pt / PD

FOR TRAFFIC OFFICE USE ONLY
Acc. File No.
Checked by
Date Checked / /

ACCIDENT OCCURRED IN MUNICIPALITY OF Nunawading On 6/8/59 TIME 6/5 A.M. [ ] P.M. [XXX] DAY OF WEEK Thursday

(1) LOCATION

IF IN A BUILT UP AREA

Name of Town, City, or Suburb Blackburn

Occurred on South Parade (Give name of Street or Highway)

[ ] At or [ ] near Intersection with (Give name of Street or Highway)

AND, IF NOT AT INTERSECTION (80) Feet, North [ ] South [ ] East [XXX] West [ ] of Main Street (Show nearest intersection, bridge, rail crossing, or lane. Show exact distances.)

IF ON A COUNTRY ROAD

Name of Road or Highway

Between Towns of (Miles from)

and (Miles from)

(Give names of towns and distances from each)

AND Miles Yards Feet ( ) North [ ] South [ ] East [ ] West [ ] of (Show nearest intersecting road or highway, bridge, rail crossing, or mile post. Show exact distances, two if necessary.)

(2) TYPE

ACCIDENT INVOLVED Motor vehicle and :— (Check one or more)

[ ] Pedestrian [XXX] Other motor vehicle [ ] Train [ ] Tram [ ] Animal drawn vehicle
[ ] Bicycle [ ] Animal [ ] Ran off roadway [ ] Overturned on roadway
[ ] Other non-collision (Fell from vehicle, &c.)
[ ] Hit fixed object (Name object)
[ ] Others (explain)

DESCRIPTION OF LOCALITY

(3) ROAD CONDITIONS

(Check one): [ ] 1. Dry; [XXX] 2. Wet; [ ] 3. Muddy; [ ] 4. Snowy; [ ] 5. Icy; [ ] Detour

(Check one or more): [ ] 1. Defective shoulders; [ ] 2. Holes, deep ruts; [ ] 3. Loose material on surface; [ ] 4. Other defects; [XX] 5. No defects; [ ] Road under construction

(4) ROAD SURFACE (Check one)

[ ] 1. Concrete
[XX] 2. Sealed
[ ] 3. Unsealed
[ ] 4. Other (specify)

(5) WEATHER (Check one)

[XX] 1. Clear
[ ] 2. Cloudy
[ ] 3. Raining
[ ] 4. Snowing
[ ] 5. Fog
[ ] 6. Other (specify)

(6) ROAD WIDTHS AND LANES

1. Width of pavement or road surface for traffic .. 48 ft.
2. Additional width of shoulders .. nil. ft.
3. Total number of traffic lanes .. nil.

	YES	NO
4. Was it a one-way street ?	[ ]	[XX]
5. Were lanes marked ?	[ ]	[XX]
6. Were opposing lanes separated ?	[ ]	[XX]

By what ?

(7) KIND OF LOCALITY

(Check one to show that area within 300 feet was primarily)—

[ ] 1. Manufacturing or industrial
[XX] 2. Shopping or business
[ ] 3. Residential district
[ ] 4. School or child's playground
[ ] 5. Open country
[ ] 6. Other (specify)

(8) LIGHTING (Check one)

[ ] 1. Daylight
[ ] 2. Dusk
[ ] 3. Dawn
[XXX] 4. Dark (street lighted)
[ ] 5. Dark (street unlighted)

(9) TRAFFIC CONTROL (Check one or more)

Functioning	Not functioning	
[ ]	[ ]	1. Police
[ ]	[ ]	2. Flashing red
[ ]	[ ]	3. Flashing amber
[ ]	[ ]	4. Stop-go light
[ ]	[ ]	5. Warning sign or signal
[ ]	[ ]	6. V.R. crossing gates
[ ]	[ ]	7. V.R. automatic signal
[XX]	[XX]	8. No control present
[ ]	[ ]	9. Others (specify)

(10) DAMAGE TO PROPERTY (Other than vehicles)

Give nature of damage and amount) nil.

(11) VEHICLES

Vehicle No.	Year Made	TYPE (Car, Taxi, Bus, School-bus), (Trailer attached), &c.	OWNER (private, P.M.G., M.M.T.B.) &c.	State in which Registered	Approximate Amount of Damage £	Direction Travelling (North, &c.)
1.	1957	10 HP Sedan	Private	Vic	£9/0/0	West
2.	1953	10HP Sedan	Private	Vic	Nil.	East
3.						
4.						

(12) DRIVERS

Vehicle No.	Town or suburb in which Residing	State	Age	Sex	Driving Experience	Occupation	Type of Licence (private, Commercial, and Endorsements)
1.	Blackburn	Vic	49	M	30yrs	Bricklayer	Private
2.	Blackburn	Vic	40	F	16yrs	Home Dut	Private.
3.							
4.							

(13) PEDESTRIAN

PEDESTRIAN'S MOVEMENTS (Check one)

[ ] 1. Crossing at intersection with signal
[ ] 2. Same against signal
[ ] 3. Same no signal
[ ] 4. Same diagonally
[ ] 5. Crossing not at intersection
[ ] 6. Coming from behind parked cars
[ ] 7. Standing in safety zone
[ ] 8. Getting on or off tram
[ ] 9. Getting on or off other vehicle
[ ] 10. On Pedestrian crossing
[ ] 11. Within 100 feet of same
[ ] 12. On school crossing
[ ] 13. Within 100 feet of same
[ ] 14. Within 100 feet of traffic lights
[ ] 15. Working in roadway
[ ] 16. Playing in roadway
[ ] 17. Hitching on vehicle
[ ] 18. Lying on roadway

(Check where applicable)

[ ] 19. Not in roadway
[ ] 20. Walking in roadway
[ ] (a) Walking with traffic
[ ] (b) Walking against traffic
[ ] (c) Footpath available
[ ] (d) Footpath not available
[ ] 21. Pushing or working on car

Pedestrian's Occupation

NOTE.—TO BE DETACHED ONLY AT HQ. T. DIST.

NOTE.—TO BE DETACHED ONLY AT HQ. T. DIST.

(14) WHAT DRIVERS WERE DOING

(Check one for each vehicle)

Vehicle 1.	2.	3.	4.	
				1. Going straight ahead
				2. Right turn
				3. Left turn
				4. U turn at intersection
				5. U turn not at intersection
				6. Slowing or stopping
				7. Starting in traffic lane
X	X			8. Starting from parked position
				9. Stopped in traffic lane
				10. Parked
	X			11. Backing

(Check if applicable)

Vehicle 1.	2.	3.	4.	
				1. Passing or overtaking
				2. Avoiding pedestrian, animal, &c.
				3. Skidded-before applying brakes
				4. Skidded-after applying brakes
				5. Other 'Out of Control'
				6. Hit and run
				7. Driverless moving vehicle
				8. Collided with crashed vehicle
				9. Entering intersection
				10. Within intersection
				11. Leaving intersection

(15) VEHICLE CONDITION

(Check one or more for each vehicle)

Vehicle 1.	2.	3.	4.	
				1. Defective brakes
				2. Improper lights
				3. No lights
				4. Defective steering
				5. Defective tyres
				6. Other defects
X	X			7. No defects
				8. Defects not known

(16) ROAD CHARACTER

(Check one or more for each vehicle)

Vehicle 1.	2.	3.	4.	
X	X			1. Straight
				2. Sharp curves or turn
				3. Other curves
				4. Cross intersection
				5. T. Intersection
				6. Y. Intersection
				7. Multiple Intersection
				8. Drive way or alley
X	X			9. Level road
				10. Up grade
				11. Hillcrest
				12. Downgrade

(17) DRIVERS OFFENCES INDICATED

(Check one or more)

Vehicle 1.	2.	3.	4.	
				1. Exceeding lawful speed limit
				2. Did not have right of way.
				3. Following too closely
				4. Drove through safety zone
				5. Passing standing tram
				6. Passing on crest of hill
				7. Passing on curve
				8. Cutting in
				9. Other improper passing (explain)
				10. On wrong side of road
				11. Failure to signal or improper signal
				12. Improper turn-wide left turn
				13. Same cut corner on right turn
				14. Same turned from wrong lane
				15. Other improper turn (explain)
				16. Disregard Policeman
				17. Disregard Stop-go light
				18. Disregard stop sign or flashing red
				19. Disregard flashing amber
				20. Disregard warning sign or signal
				21. Improper starting from parked position
				22. Improper parking location (explain)
				23. Other improper actions (explain)
				24. Illegally using vehicle
				25. Cyclist clinging to other vehicle
X	X			26. No improper driving indicated

(18) CONDITION OF DRIVERS AND PEDESTRIAN

(Check one or more for each driver or pedestrian)

Vehicle 1.	2.	3.	4.	Ped.	
					1. Physical defects (eyesight, &c.)
					2. Ill
					3. Fatigued
					4. Apparently asleep
					5. Wearing glasses
					6. Wearing sunglasses
					7. Other handicaps (specify)
X	X				8. Apparently normal
					9. Condition not known

(Check one)

Vehicle 1.	2.	3.	4.	Ped.	
X	X				1. Had not been drinking
					2. Had been drinking
					(a) Obviously drunk
					(b) Ability impaired
					(c) Ability not impaired
					(d) Not known whether impaired
					3. Not known whether drinking

Alcohol test given ? Yes [ ] No [X] % alcohol in blood if known ....

Given by.......... ....

(19) DRIVERS VISION OBSCURED

(Check one or more)

VEHICLE

Vehicle 1.	2.	3.	4.	
				1. Rain, snow &c., on windscreen
				2. Windscreen otherwise obscured
				3. Vision obscured by load
				4. Sun, dazzle or glare
				5. Headlights, dazzle or glare
				6. Others (specify)
X	X			7. Vision not obscured

HIGHWAY

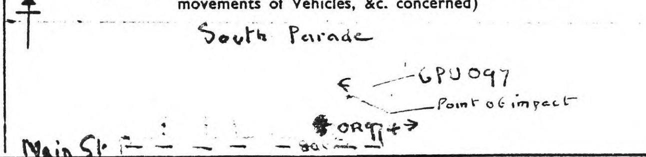
Vehicle 1.	2.	3.	4.	
				1. Trees, crops, &c.
				2. Buildings
				3. Embankment
				4. Signboards
				5. Hillcrest
				6. Parked cars
				7. Moving cars
				8. Others (specify)
X	X			9. Vision not obscured

SPEED (20)

	Vehicles 1.	2.	3.	4.
1. Lawful speed limit	30	30		
2. Speed at moment of accident	5	Reverse		

(21) SKETCH OF ACCIDENT

(Give outline sketch of locality showing road boundaries and movements of Vehicles, &c. concerned)



(22) CASUALTIES

Casualty No.	Town or suburb in which residing	State	Age	Sex	Occupant of Vehicle No.	Driver, passenger, Pedestrian, &c. Other, (explain)	Killed, severely or slightly injured
1.	Nil.						
2.							
3.							
4.							
5.							
6.							

(23) DESCRIBE BRIEFLY WHAT HAPPENED

(Refer to vehicles by number)
(Also include additional information and explanations)

It appears that both cars were parked at the south kerb in South Par Blackburn. Car 1 swung out from the kerb around car 2 and car 2 apparently reversed at the same time and the vehicles collided.

Signature [signature] Rank Const No. 11847 Station Blackburn.

W. M. Houston, Government Printer, Melbourne

14.3

1960 Ed. 21971

TRAFFIC COMMISSION—VICTORIA V.P. Form No. 513A

ROAD TRAFFIC ACCIDENT STATISTICS SHEET

D
PI
PD

FOR TRAFFIC OFFICE USE ONLY
Acc. File No. 21471
Checked by
Date checked

Members of the Force in Charge of Stations are held responsible that these Reports are made out as fully and intelligently as possible before forwarding to the Officer in Charge, "T" District

Accident occurred in Municipality of Box Hill on 27/10/60 Time 3.35 ~~a.m.~~* p.m. Day of Week Thursday

PART A: LOCATION, TYPE AND CONDITIONS OF ACCIDENT—

1. Location—

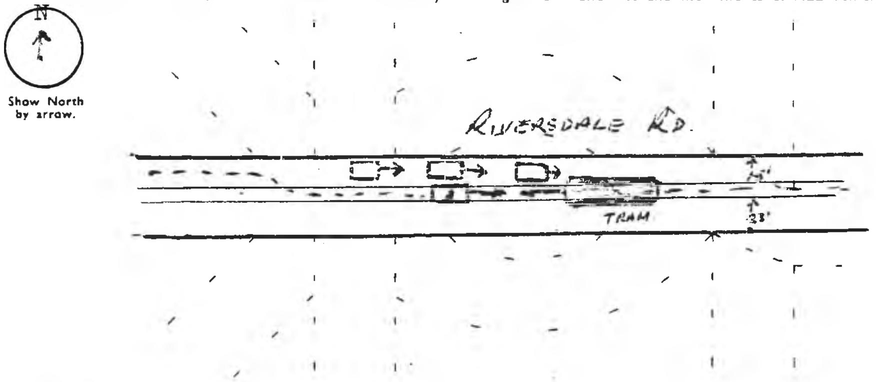
IF IN A BUILT UP AREA
Name of Town, City or Suburb Box Hill
Occurred on Riversdale Rd (Give name of street or highway)
~~At~~ / Near* Intersection with Elgar Rd. (Give name of street or highway)
And if not at Intersection (600 feet ~~North~~ ~~South~~ ~~East~~ West of it.

IF ON A COUNTRY ROAD
Name of Road or Highway
Between Towns of ... (Miles from ...)
and ... (Miles from ...)
(Give names of towns and distances from each)
And Miles* Yards (...) North* South East West of ... (Show nearest identifiable feature such as intersecting road, or bridge, rail crossing, mile post) (Show exact distance)

* Strike out words not required.

2. Sketch of Accident—(Give outline sketch of locality showing road boundaries and movements of ALL vehicles, &c., concerned.)

Show North by arrow.



INSTRUCTIONS.
(1) Use dash lines as guides to draw heavy lines which will show outline of roadway at place of accident.
(2) Letter each vehicle and show direction of travel by arrow → A ◁B ←
(3) Number each pedestrian and show by → ①
(4) Use solid line to show path of vehicle before accident → A; dotted line after accident - - → A
(5) Show railway by —|—|—|—
(6) Show distance and direction to landmarks, identify by name.

3. Describe briefly what happened. Refer to vehicles and pedestrians by the same numbers and letters as on sketch.

The driver of car HBB 512 was travelling west along Riversdale Road, and pulled out to overtake, he then collided head on with the on coming tram, The tram track is only single line. and it was stated by SCHWAB that visibility was hampered by the sun.

4. Vehicle to Vehicle Collision. (Cross one) (18)
0 Angle
1 Rear End
2 Head-on [X]
3 Side swipe—same direction
4 Side swipe—opposite direction

5. Other Accidents.
5 Ran off roadway
6 Overturned on roadway
7 All other accidents

6. Characteristics of Locality. (Cross one or more to show predominant nature of fronting development within 300 ft.) (19)
0 Manufacturing or industrial
1 Shopping or business
2 Residential district [X]
3 School or children's playground
4 Other, including open country or parkland

7. Road Surface. (Cross one)
5 Concrete or bitumen [X]
6 Unsealed

8. Zone Speed Limit. (Cross one)
7 30 m.p.h. [X]
8 35 m.p.h.
9 40 m.p.h.
X De-restricted
Y Other

9. Traffic Control. (Cross one or more) (20)
0 Police
1 Stop-go light
2 Flashing amber
3 Flashing red
4 Stop sign
5 Warning sign
6 Railway level crossing with gates, booms or automatic signal
7 Railway level crossing uncontrolled
8 Pedestrian crossing
9 School crossing
X Others
Y No control or control not functioning [X]

10. Road Conditions. (Cross one) (21)
0 Dry [X]
1 Wet
2 Muddy
3 Snowy
4 Icy
(Cross one or more)
5 Holes, deep ruts
6 Loose material on surface
7 Defective shoulders
8 Other defects
9 No defects [X]
X Road under construction

11. Width of roadway for traffic 40 ft.

12. Road Character. (Cross one or more) (24)
0 Straight [X]
1 Sharp curves or turn
2 Other curves
3 Cross intersection
4 "T" intersection
5 "Y" intersection
6 Multiple intersection
7 Level road
8 Up or down grade
9 Hillcrest
X Bridge, culvert or causeway

13. Road Marks, &c. (Cross one or more) (25)
0 No line marking [X]
1 Centre line only marked
2 Lane lines marked
3 Opposing lanes separated

14. Weather. (Cross one)
4 Fine [X]
5 Raining
6 Snowing
7 Fog

15. Lighting. (Cross one)
8 Daylight [X]
9 Dusk or Dawn
X Dark (street lighted)
Y Dark (street unlighted)

16. No. of Vehicles in Accident 2

PART B: PARTICULARS OF CASUALTIES. (Use same letter for same casualty in all questions in this part.)

17. Total Number of Casualties 1

18. Type of Road User. (Cross one for each casualty) (27) (28) (29)

	a	b	c	d	e	f	
Motor vehicle driver	X						0
Motor cyclist							1
Pedal cyclist							2
Passenger (excl. pillion rider)							3
Pillion rider							4
Pedestrian							5
Others							6

19. (Cross one for each motor cyclist and pillion rider)

Was casualty wearing crash helmet?	a	b	c	d	e	f	
Yes							7
No							8
Not known							9

20. Sex. (Cross one for each casualty)

	a	b	c	d	e	f	
Male	X						X
Female							Y

21. Type of Casualty. (Cross one for each casualty). (30)

	a	b	c	d	e	f	
Killed or died within 30 days							0-3-6
Injured, requiring medical treatment	X						1-4-7
Injured, not requiring medical treatment							2-5-8

22. Age. (Cross one for each casualty) (31) (32) (33)

	a	b	c	d	e	f	
Under 5							0
5 and under 7							1
7 12							2
12 17							3
17 21							4
21 30	X						5
30 40							6
40 50							7
50 60							8
60 70							9
70 and over							X
Not known							Y

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PART C : PARTICULARS OF VEHICLES ETC., INVOLVED IN INITIAL IMPACT.

23. Units Involved in Accident. (34) (35) (Cross one for each unit) A B
- 0 Private Car
- 1 Utility or panel van
- 2 Taxi or Hire Car
- 3 Motor Cycle
- 4 Bicycle
- 5 Animal Drawn Vehicle
- 6 Articulated Vehicle
- 7 Truck other
- 8 Bus
- 9 Tram
- X Railway Train
- Y Other vehicle

(36) (37)
- 0 Pedestrian
- 1 Animal
- 2 Fixed Object

24. Age of Vehicle. (Cross one for each vehicle) A B
- 3 Less than 2 years
- 4 2 and less than 5 years
- 5 5 „ „ 10 „
- 6 10 „ „ 15 „
- 7 15 „ „ 20 „
- 8 20 years and over

25. Estimated Total Damage to Vehicles and Property. (Cross one)
- 9 Less than £50
- X £50 and less than £400
- Y £400 and over

26. Colour. (Cross one for each vehicle) (38) A B
- 0-2 Dark colour
- 1-3 Light colour

27. State of Registration. (39) (40) (Cross one for each vehicle) A B
- 0 Victoria
- 1 Outside Victoria
- 2 Unregistered

28. Was a trailer or caravan being towed or a side car attached. A B
- 3 Yes
- 4 No

29. Vehicle Condition. (Cross one or more for each vehicle) A B
- 5 Not examined
- Vehicle examined revealing—
- 6 Defective or improper lights
- 7 Defective brakes
- 8 Defective tyres
- 9 Defective steering
- X Other defects
- Y No defects

30. Speed. A B

Estimated speed when driver realized accident likely (Nearest 5.m.p.h.) A: 25 B: 20

31. Motor Vehicle details A B
- Make: Volkswagen
- Year of Manufacture: 59
- Rated Horsepower: 12

32. Vehicle Movements. (Cross one or more for each vehicle) (56) A B
- 0 Going straight ahead
- 1 Right turn
- 2 Left turn
- 3 "U" turn
- 4 Slowing or stopping
- 5 Starting in traffic lane
- 6 Stopped in traffic lane
- 7 Parking
- 8 Unparking
- 9 Backing
- X Entering private driveway
- Y Leaving private driveway

(Cross those applicable) (57) (58)
- 0 Overtaking
- 1 Avoiding pedestrian, animal, &c.
- 2 Skidded—before applying brakes
- 3 Skidded—after applying brakes
- 4 Other "out of control"
- 5 Driverless moving vehicle
- 6 Entering intersection
- 7 Within intersection
- 8 Leaving intersection
- 9 Parked vehicle
- X Crashed vehicle

PART D : PARTICULARS OF DRIVERS (INCLUDING RIDERS) INVOLVED IN INITIAL IMPACT.

33. Did Driver Speak reasonable English (59) (60) A B
- 0 Yes
- 1 No
- 2 Not known

34. Age. (Cross one for driver of each vehicle) A B
- 3 Under 18
- 4 18 and under 21
- 5 21 „ „ 25
- 6 25 „ „ 30
- 7 30 „ „ 45
- 8 45 „ „ 60
- 9 60 „ „ 70
- X 70 and over
- Y Not known

35. Sobriety. (Cross one or more for driver of each vehicle) (61) (62) A B
- 0 Had not been drinking
- Had been drinking—
- 1 Obviously drunk
- 2 Not obv. drunk but ability impaired
- 3 Ability not impaired
- 4 Not known if impaired
- 5 Not known whether drinking
- 6 Blood test not taken
- 7 Blood test taken
- % alcohol in blood (if known)

36. State of Issue of Licence. (Cross one for driver of each vehicle) A B
- 8 Victoria
- 9 Outside Victoria
- X Unlicensed driver

37. Driving Experience. (Driver of vehicle) (63) A B

A: 2 Yrs. Mths. B: Yrs. Mths.

38. Sex. (Cross one for driver of each vehicle) (64) (65) A B
- 0 Male
- 1 Female

39. Vision. (Cross one or more for driver of each vehicle) A B

ROAD Vision obscured by—
- 2 Trees, hedges, crops, &c.
- 3 Buildings
- 4 Embankments
- 5 Signboards
- 6 Hillcrest
- 7 Parked cars
- 8 Moving cars
- 9 Other
- X Vision not obscured

VEHICLE Forward vision obscured by— (66) (67)
- 0 Mud, dust, &c., on wind-screen
- 1 Rain on wind-screen
- 2 Load
- 3 Sun—dazzle or glare
- 4 Headlights—dazzle or glare
- 5 Side or rear vision obscured
- 6 Vision not obscured

40. Contributory Errors apparently committed by Driver. (Cross one or more for driver of each vehicle) A B
- 7 On wrong side of road
- 8 Incorrectly parked
- 9 Cyclist clinging to other vehicle
- X Overtaking on wrong side
- Y Changing lane without care

40. (Con.) Contributory Errors apparently committed by Driver. (Cross one or more for driver of each vehicle) (68) (69) A B
- 0 Excessive speed for circumstances
- 1 Passed stationary tram
- 2 Passed on crest of hill
- 3 Passed on curve
- 4 Cut in
- 5 Other dangerous or incorrect passing
- 6 Over double lines
- 7 Cut corner on right turn
- 8 Turned from wrong lane
- 9 Other incorrect turning
- X Failed to use headlights
- Y Failed to use rear lights

(70) (71)
- 0 Disregarded police signal
- 1 Disregarded stop-go light
- 2 Disregarded stop sign
- 3 Disregarded flashing amber
- 4 Disregarded flashing red
- 5 Disregarded warning sign
- 6 Failed to give right of way
- 7 Followed too closely
- 8 Drove on a safety zone
- 9 Failed to give signal or gave incorrect signal
- X Other errors
- Y No errors indicated

41. Physical Condition (other than sobriety) (Cross one or more for driver of each vehicle) (72) (73) A B
- 0 Physical defects (amputations, &c.)
- 1 Ill
- 2 Very tired
- 3 Apparently asleep
- 4 Apparently normal

PART E : PARTICULARS OF FIRST TWO PEDESTRIANS TO BE HIT. (Use same number for same pedestrian in all questions).

42. Pedestrians' Movements. (Cross one or more for each pedestrian) (74) (75) 1 2
- 0 Crossing with police or lights signal
- 1 Crossing against police or lights signal
- 2 Crossing road with no control present
- 3 Crossing at intersection
- 4 Crossing, not at intersection
- 5 Coming from behind parked car(s)
- 6 Standing in safety zone
- 7 On pedestrian crossing
- 8 Within 100 ft. of pedestrian crossing
- 9 On school crossing
- X Within 100 ft. of school crossing
- Y Within 100 ft. of police or lights signal

Pedestrians' Movements—*continued* (76) (77) 1 2
- 0 Getting on or off tram
- 1 Getting on or off other vehicle
- 2 Working on roadway
- 3 Playing on roadway
- 4 Lying on roadway
- 5 Not on roadway
- Walking along roadway—
- 6 With traffic (footpath available)
- 7 With traffic (footpath not available)
- 8 Against traffic (footpath available)
- 9 Against traffic (footpath not available)
- X Pushing or working on vehicle

43. Did Pedestrian speak reasonable English ? (78) 1 2
- 0-3 Yes
- 1-4 No
- 2-5 Not known

44. Physical Condition (other than sobriety) (Cross one or more for each pedestrian) (79) (80) 1 2
- 0 Physical defects (amputations, &c.)
- 1 Ill
- 2 Very tired
- 3 Apparently normal

45. Sobriety (Cross one or more for each pedestrian) 1 2
- 4 Had not been drinking
- Had been drinking—
- 5 Obviously drunk
- 6 Not obv. drunk but ability impaired
- 7 Ability not impaired
- 8 Not known if impaired
- 9 Not known whether drinking
- X Blood test not taken
- Y Blood test taken
- % alcohol in blood (if known)

Signature W. K. Lodge Rank Const No. 13299 Station Box Hill Date 20/11/60

PART F : To be filled in by Causing Officer at Headquarters "T" District.

Cause of accident [illegible]

Party considered responsible Age Sex

For use of Statistician			
Type		Location	
Number Killed	–	Number Injured	

8189/59—PL

14.5

1961 Ed.

TRAFFIC COMMISSION—VICTORIA V.P. Form No. **513A**

ROAD TRAFFIC ACCIDENT STATISTICS SHEET

D (1) 1 | PI 2 | PD 3

FOR TRAFFIC OFFICE USE ONLY

Acc. File No. 17769

Checked ___ Date 14/8/62

Members of the Force in Charge of Stations are held responsible that these Reports are made out as fully and intelligently as possible before forwarding to the Officer in Charge, "T" District

Accident occurred in Municipality of [redacted] (013) on 28/7/62 Time 10.5 ~~a.m.~~/p.m.* Day of Week Sat. (23) (6)

PART A: LOCATION OF ACCIDENT—

1. Location—

IF IN A BUILT UP AREA

Name of Town, City or Suburb North Altona

Occurred on Millers Road.
(Give name of street or highway)

At* ~~Near~~ intersection with Beevers Street.
(Give name of street or highway)

And if not at Intersection ___ feet { North* / South / East / West } of it. (17-18) (19-20)

* Strike out words not required.

IF ON A COUNTRY ROAD

Name of Road or Highway ___

Between Towns of ___ (Miles from ___)

and ___ (Miles from ___)

(Give names of towns and distances from each)

And Miles* / Yards { North* / South / East / West } of ___

(Show exact distance)

(Show nearest identifiable feature such as intersecting road, or bridge, rail crossing, mile post)

PART B: PARTICULARS OF TYPE OF ACCIDENT AND LOCALITY.

2. Vehicle to Vehicle Collision. (Cross one) (21)

0 Angle		0
1 Rear End		1
2 Head-on	X	2
3 Side swipe—same direction		3
4 Side swipe—opposite direction		4

3. Single Vehicle Accidents.

5 Ran off roadway		5
6 Overturned on roadway		6
7 All other single vehicle accidents		7

4. Characteristics of Locality. (Cross one) (22)

0 Built-up area	X	0
1 Open country or parkland		1

5. Road Grade. (Cross one)

2 Level Road	X	2
3 Up or down grade		3
4 Hillcrest		4

6. Zone Speed Limit. (Cross one)

5 30 m.p.h.	X	5
6 35 m.p.h.		6
7 40 m.p.h.		7
8 De-restricted		8
9 Other		9

7. Traffic Control. (Cross one or more) (23)

0 Police		0
1 Stop-go signals		1
2 Flashing amber		2
3 Flashing red		3
4 Stop sign		4
5 Give way sign		5
6 Warning sign		6
7 Railway level crossing with gates, booms or automatic signal.		7
8 Pedestrian crossing		8
9 School crossing		9
X Traffic island		X
Y No control or control not functioning	X	Y

8. Road Character. (Cross one or more) (24)

0 Straight		0
1 Curves-view obscured		1
2 Curves-view not obscured	X	2
3 Cross intersection		3
4 "T" intersection		4
5 "Y" intersection		5
6 Multiple intersection		6
7 Bridge, culvert or causeway		7
8 Railway level crossing		8

9. Road Conditions. (Cross one) (25)

0 Dry		0
1 Wet		1
2 Muddy	X	2
3 Snowy		3
4 Icy		4

(Cross one or more)

5 Holes, deep ruts		5
6 Loose material on surface		6
7 Defective shoulders	X	7
8 Road under construction		8
9 Other defects		9
X No defects		X

10. Did One Road Have a Dividing Plantation? (26)

Yes		0
No	X	1

11. Weather. (Cross one)

2 Fine	X	2
3 Raining		3
4 Snowing		4
5 Fog		5

12. Lighting. (Cross one)

6 Daylight		6
7 Dusk or Dawn		7
8 Dark (street lighted)	X	8
9 Dark (street unlighted)		9

PART C: PARTICULARS OF VEHICLES ETC., INVOLVED IN INITIAL IMPACT.

13. Vehicles Involved in Accident. (27) (28) (Cross one for each unit)

	A	B	
0 Car or Station Wagon	X	X	0
1 Taxi or Hire Car			1
2 Utility or panel van			2
3 Articulated Vehicle			3
4 Truck other			4
5 Motor Cycle			5
6 Bicycle			6
7 Animal Drawn Vehicle			7
8 Bus			8
9 Tram			9
X Railway Train			X
Y Other type of vehicle			Y

14. Object, &c. Struck in Initial Impact. (Cross one if applicable) (29)

0 Pedestrian		0
1 Animal		1
2 Fixed Object		2
3 Parked Vehicle		3

15. Was Any Vehicle Towed Away?

Yes	X	4
No		5
Not known		6

16. Colour. (Cross one for each vehicle) (30) (31)

	A	B	
0 Entirely black or dark blue			0
1 All other colours	X	X	1
2 Colour not known			2

17. Vehicle Condition. (Cross one or more for each vehicle)

	A	B	
3 Vehicle not examined	X	X	3
Vehicle examined revealing—			
4 Defective or improper lights			4
5 Defective brakes			5
6 Defective tyres			6
7 Defective steering			7
8 Other defects			8
9 No defects			9

18. Speed. Police estimate of speed when driver realized accident likely (Nearest 5 m.p.h.)

A (32) (6)	B (33) (6)
30	30

19. Vehicle Movements. (Cross one or more for each vehicle) (34) (35)

	A	B	
0 Going straight ahead	X	X	0
1 Right turning			1
2 Left turning	X		2
3 "U" turning			3
4 Slowing or stopping			4
5 Stationary or Starting in traffic lane			5
6 Parked			6
7 Parking			7
8 Unparking			8
9 Backing			9
X Entering private driveway			X
Y Leaving private driveway			Y

(Cross those applicable) (36) (37)

	A	B	
0 Overtaking			0
1 Avoiding pedestrian, animal, &c.			1
2 Skidded—before applying brakes	X		2
3 Skidded—after applying brakes			3
4 Other "out of control"		X	4
5 Driverless moving vehicle			5
6 Entering intersection			6
7 Within intersection			7
8 Leaving intersection			8
9 Crashed vehicle			9

20. Total No. of Vehicles in Accident (38) 2

PART D: PARTICULARS OF DRIVERS (INCL. RIDERS) INVOLVED IN INITIAL IMPACT.

22. Sex. (Cross one for each driver) (51) (52)

	A	B	
0 Male	X	X	0
1 Female			1

23. Age. (Cross one for each driver)

	A	B	
Under 18			2
18 and under 21			3
21 " " 25			4
25 " " 30			5
30 " " 45	X		6
45 " " 60			7
60 " " 70			8
70 and over			9
Not known			X

24. Driving Experience. (Driver of vehicle)

A (53) 20 Yrs. 7 Mths. | B (54) 2 Yrs. 6 Mths.

25. Police Opinion of Sobriety. (55) (56) (Cross one or more for each driver)

	A	B	
Had been drinking—			
0 Obviously drunk			0
1 Not obv. drunk but ability impaired			1
2 Ability not impaired			2
3 Not known if impaired			3
4 Had not been drinking	X	X	4
5 Not known whether drinking			5
6 Blood or Breath test not taken			6
7 Blood or Breath test taken			7
% alcohol in blood (if known)			

26. Physical Condition (other than sobriety) (Cross one or more for each driver) (57) (58)

	A	B	
0 Physical defects			0
1 Ill			1
2 Very tired			2
3 Apparently asleep			3
4 Apparently normal	X	X	4

27. Forward Vision Obscured By (Cross one or more for each driver)

	A	B	
5 Mud, dust, &c., on wind-screen			5
6 Rain on wind-screen			6
7 Load			7
8 Sun or Headlights—dazzle or glare			8
9 Dust in air			9
X Side or rear vision obscured			X
Y Vision not obscured	X	X	Y

28. Errors apparently committed by Driver. (Cross one or more for each driver) (59) (60)

	A	B	
0 Excessive speed for circumstances			0
1 Passed stationary tram			1
2 Passed on crest of hill			2
3 Passed on curve			3
4 Cut in			4
5 Other dangerous or incorrect passing			5
6 Over double lines			6
7 Cut corner on right turn			7
8 Turned from wrong lane			8
9 Other incorrect turning			9
X Failed to use headlights			X
Y Failed to use rear lights			Y

(61) (62)

	A	B	
0 Disregarded police signal			0
1 Disregarded stop-go light			1
2 Disregarded stop sign			2
3 Disregarded flashing amber			3
4 Disregarded flashing red			4
5 Disregarded warning sign			5
6 Failed to give right of way			6
7 Followed too closely			7
8 Drove on a safety zone			8
9 Failed to give signal or gave incorrect signal			9
X Overtaking on wrong side			X
Y Changing lane without care			Y

(63) (64)

	A	B	
0 On wrong side of road	X		0
1 Incorrectly parked			1
2 Cyclist clinging to other vehicle			2
3 Other errors			3
4 No errors indicated		X	4

21. Motor Vehicle details.

	A (39-44)	B (45-50)
Make	Holden (35)	HOLDEN (35)
Year of Manufacture	56 (56)	52 (52)
Rated Horsepower (R.A.C.)	21 (21)	21 (21)

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14.6

PART E : PARTICULARS OF FIRST TWO PEDESTRIANS TO BE HIT. (Use same number for same pedestrian in all questions).

29. Pedestrians' Movements. (Cross one or more for each pedestrian)

	(65) 1	(66) 2	
0 Crossing with police or lights signal			0
1 Crossing against police or lights signal			1
2 Crossing road with no control present			2
3 Crossing at intersection			3
4 Crossing, not at intersection			4
5 Coming from behind parked car(s)			5
6 Standing in safety zone			6
7 On pedestrian crossing			7
8 Within 100 ft. of pedestrian crossing			8
9 On school crossing			9
X Within 100 ft. of school crossing			X
Y Within 100 ft. of police or lights signal			Y

	(67)	(68)	
0 Walking to, from or boarding tram			0
1 Walking to, from or boarding other vehicle			1
2 Working on roadway			2
3 Playing on roadway			3
4 Lying on roadway			4
5 Not on roadway			5
Walking along roadway— 6 With traffic (footpath available)			6
7 With traffic (footpath not available)			7
8 Against traffic (footpath available)			8
9 Against traffic (footpath not available)			9
X Pushing or working on vehicle			X

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30. Police Opinion of Sobriety. (Cross one or more for each pedestrian)

Had been drinking—	(69) 1	(70) 2	
0 Obviously drunk			0
1 Not obv. drunk but ability impaired			1
2 Ability not impaired			2
3 Not known if impaired			3
4 Had not been drinking			4
5 Not known whether drinking			5
6 Blood or Breath test not taken			6
7 Blood or Breath test taken			7
% alcohol in blood (if known)			

31. Physical Condition (other than sobriety) (Cross one or more for each pedestrian)

	1	2	
8 Physical defects			8
9 Ill			9
X Very tired			X
Y Apparently normal			Y

PART F : PARTICULARS OF CASUALTIES. (Use same number for same casualty in all questions)

32. Total Number of Casualties 3

33. Type of Road User Killed and Injured. (Cross one for each casualty) (71) (74) (77)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	
0 Motor vehicle driver	X									0
1 Motor cyclist										1
2 Pedal cyclist										2
3 Passenger (excl. pillion rider)										3
4 Pillion rider										4
5 Pedestrian										5
6 Others	X		X							6

34. (Cross one for each motor cyclist and pillion rider casualty)

Was casualty wearing crash helmet ?	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	
Yes										7
No										8
Not known										9

35. Sex. (Cross one for each casualty)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	
Male										X
Female	X		X							Y

36. Age. (Cross one for each casualty) (72) (75) (78)

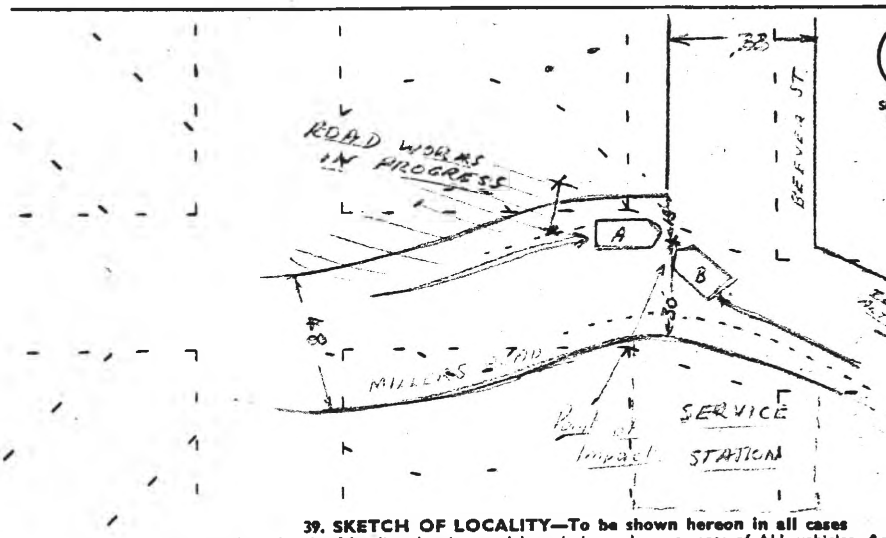
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	
Under 5										0
5 and under 7										1
7 „ „ 12										2
12 „ „ 17										3
17 „ „ 21	X		X							4
21 „ „ 30										5
30 „ „ 40										6
40 „ „ 50										7
50 „ „ 60										8
60 „ „ 70										9
70 and over										X
Not known										Y

37. Persons Killed and Injured. (73) (76) (79) (Cross one for each casualty).

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	
Killed or died within 30 days										0
Injured, requiring medical treatment										1
Injured, not req. medical treatment	X		X							2

38. Describe briefly what happened. Refer to vehicles and pedestrians by the same letters and numbers as in Parts C, D and E and on sketch.

A was [illegible] Millers Road [illegible] on S Road (which [illegible]) B was coming toward him [illegible] Control [illegible]



INSTRUCTIONS.

(1) Use dash lines as guides to draw heavy lines which will show outline of roadway at place of accident.
(2) Letter each vehicle and show direction of travel by arrow A B
(3) Number each pedestrian and show by → ①
(4) Use solid line to show path of vehicle before accident → A; dotted line after accident - - → A
(5) Show railway by —|—|—|—|—|—
(6) Show distance and direction to landmarks, identify by name.

39. SKETCH OF LOCALITY—To be shown hereon in all cases (Give outline sketch of locality showing road boundaries and movements of ALL vehicles, &c., concerned.)

Signature R J Davies Rank Const No. 13934 Station [illegible] Date 3 / 2 / 72

PART G : To be filled in by Causing Officer at Headquarters "T" District.

Cause of accident Driver losing control after hitting shoulder of Road

Age

Sex

Party considered responsible	(80)	
0 Driver A		0
1 Driver B		1
2 Vehicle A Defective		2
3 Vehicle B Defective		3
4 Pedestrian 1		4
5 Pedestrian 2		5
6 Passenger		6
7 Animal (involved)		7
8 Road	X	8
9 Weather		9
X Party not involved		X
Y Animal not involved		Y

PART H : For use of Commonwealth Statistician only.

Cause (17-19)	Resp. (20-21)	Speed (22)	Exp. (23)	Sob. (24)	Age (25-26)	Sex (27)	Type (28-30)	Loc. (31-32)	Killed (33-34)	Inj. (35-36)
614	51						001	03		02

8659/60—PL

14.7

Do NOT detach from Form No. 513

1963 Ed.

TRAFFIC COMMISSION—VICTORIA **V.P. Form No. 513A**

ROAD TRAFFIC ACCIDENT STATISTICS SHEET

Members of the Force in Charge of Stations are held responsible that these Reports are made out as fully and intelligently as possible before forwarding to the Officer in Charge, "T" District

(1)	
F	0
PI	1
PD	2

FOR TRAFFIC OFFICE USE ONLY

Acc. File No. 6415

Checked [initials] Date

PART A: (16) PARTICULARS OF TIME, DAY, DATE AND LOCATION OF ACCIDENT

1. Time 3-55 ~~a.m.~~/p.m.* Day of Week Saturday (6) Date (29) (2) 1964. (073)

2. Location Accident occurred in Municipality of Footscray.

IF IN A BUILT UP AREA

Name of Town, City or Suburb Brooklyn.

Occurred on Geelong Rd. (street or highway)

At* ~~Near~~ Intersection with Cromwell Pde. (Give name of street or highway)

And if not at Intersection .... feet North* / South / East / West of it. (17-18) (19-20)

* Strike out words not required.

IF ON A COUNTRY ROAD

Name of Road or Highway

Between Towns of .... (Miles from ....)

and .... (Miles from ....)

(Give names of towns and distances from each)

And Miles* / Yards .... (Show exact distance) North* / South / East / West of .... (Show nearest identifiable feature such as intersecting road, or bridge, rail crossing, mile post)

PART B: PARTICULARS OF TYPE OF ACCIDENT AND LOCALITY.

3. Vehicle to Vehicle Collision. (Cross one) (21)
- 0 Angle
- 1 Rear End
- 2 Head-on
- 3 Side swipe—same direction
- 4 Side swipe—opposite direction

4. Single Vehicle Accidents.
- 5 Ran off roadway
- 6 Overturned on roadway
- 7 All other single vehicle accidents [X]

5. Characteristics of Locality. (Cross one) (22)
- 0 Built-up area [X]
- 1 Open country or parkland

6. Road Grade. (Cross one)
- 2 Level Road [X]
- 3 Steep Hill
- 4 Hillcrest

7. Zone Speed Limit. (Cross one)
- 5 30 m.p.h.
- 6 35 m.p.h. [X]
- 7 40 m.p.h.
- 8 De-restricted
- 9 Other

8. Traffic Control. (Cross one or more) (23)
- 0 Police
- 1 Stop-go signals at intersection
- 2 Flashing red and/or amber at intersection
- 3 Stop-go ped. sigs. not controlling intersctn.
- 4 School crossing with flags
- 5 School crossing site but no flags out
- 6 Pedestrian crossing with flashing lights
- 7 Stop sign
- 8 Give way sign
- 9 Railway level crossing with gates, booms or automatic signals.
- X Control checked above not operating
- Y No control [X]

9. Road Character. (Cross one or more) (24)
- 0 Straight [X]
- 1 Curves-view obscured
- 2 Curves-view not obscured
- 3 Cross intersection [X]
- 4 "T" intersection
- 5 "Y" intersection
- 6 Multiple intersection
- 7 Bridge, culvert or causeway
- 8 Railway level crossing

10. Road Conditions. (Cross one) (25)
- 0 Dry [X]
- 1 Wet
- 2 Muddy
- 3 Snowy
- 4 Icy

(Cross one or more)
- 5 Holes, deep ruts
- 6 Loose material on surface
- 7 Defective shoulders
- 8 Road under construction
- 9 Other defects
- X No defects [X]

11. Did One Road Have a Dividing Plantation? (26)
- Yes 0 [X]
- No 1

12. Weather. (Cross one)
- 2 Fine [X]
- 3 Raining
- 4 Snowing
- 5 Fog

13. Lighting. (Cross one)
- 6 Daylight [X]
- 7 Dusk or Dawn
- 8 Dark (street lighted)
- 9 Dark (street unlighted)

PART C: PARTICULARS OF VEHICLES ETC., INVOLVED IN INITIAL IMPACT.

14. Vehicles Involved in Accident. (27) (28) (Cross one for each unit) A B
- 0 Car or Station Wagon [X A]
- 1 Taxi or Hire Car
- 2 Utility or panel van
- 3 Articulated Vehicle
- 4 Truck other
- 5 Motor Cycle or Motor Scooter
- 6 Bicycle
- 7 Animal Drawn Vehicle
- 8 Bus
- 9 Tram
- X Railway Train
- Y Other type of vehicle

15. Object, &c. Struck in Initial Impact. (Cross one if applicable) (29)
- 0 Pedestrian [X]
- 1 Animal
- 2 Fixed Object
- 3 Parked Vehicle

16. Was Any Vehicle Towed Away?
- Yes 4
- No 5 [X]
- Not known 6

17. Was Driver's Seat Fitted With Safety Belt? (Cross one for each vehicle) (30) (31) A B
- Yes 0 [X A]
- No 1
- Not known 2

18. Was Driver Wearing Safety Belt? (Cross one for each vehicle)
- Yes 3 [X A]
- No 4
- Not known 5

19. Speed. Police estimate of speed when driver realized accident likely (Nearest 5 m.p.h.) A (32) (8) B (33)

A: 40

20. Vehicle Movements. (Cross one or more for each vehicle) (34) (35) A B
- 0 Going straight ahead [X A]
- 1 Right turning
- 2 Left turning
- 3 "U" turning
- 4 Slowing or stopping
- 5 Stationary or Starting in traffic lane
- 6 Parked
- 7 Parking
- 8 Unparking
- 9 Backing
- X Entering private driveway
- Y Leaving private driveway

(Cross those applicable) (36) (37)
- 0 Overtaking
- 1 Avoiding pedestrian, animal, &c.
- 2 Skidded—before applying brakes
- 3 Skidded—after applying brakes [X A]
- 4 Other "out of control"
- 5 Driverless moving vehicle
- 6 Entering intersection
- 7 Within intersection
- 8 Leaving intersection
- 9 Crashed vehicle

21. Total No. of Vehicles in Accident (38) 1.

PART D: PARTICULARS OF DRIVERS (INCL. RIDERS) INVOLVED IN INITIAL IMPACT.

23. Sex. (Cross one for each driver) (51) (52) A B
- 0 Male [X A]
- 1 Female

24. Age. (Cross one for each driver)
- 2 Under 18
- 3 18 to 20 incl.
- 4 21 „ 24 „
- 5 25 „ 29 „
- 6 30 „ 44 „ [X A]
- 7 45 „ 59 „
- 8 60 „ 69 „
- 9 70 and over
- X Not known

25. Driving Experience. (Driver of vehicle) A (53) (7) B (54)

A: 7 Yrs. Mths. B: Yrs. Mths.

26. Police Opinion of Sobriety. (55) (56) (Cross one or more for each driver) A B

Had been drinking—
- 0 Obviously drunk
- 1 Not obv. drunk but ability impaired
- 2 Ability not impaired
- 3 Not known if impaired
- 4 Had not been drinking [X A]
- 5 Not known whether drinking
- 6 Blood or Breath test not taken
- 7 Blood or Breath test taken
- % alcohol in blood (if known)

27. Physical Condition (other than sobriety) (Cross one or more for each driver) (57) (58) A B
- 0 Physical defects
- 1 Ill
- 2 Very tired
- 3 Apparently asleep
- 4 Apparently normal [X A]

28. Forward Vision Obscured By (Cross one or more for each driver)
- 5 Mud, dust, &c., on wind-screen
- 6 Rain on wind-screen
- 7 Load
- 8 Sun or Headlights—dazzle or glare
- 9 Dust in air
- X Side or rear vision obscured
- Y Vision not obscured [X A]

29. Errors apparently committed by Driver. (Cross one or more for each driver) (59) (60) A B
- 0 Excessive speed for circumstances [X A]
- 1 Passed stationary tram
- 2 Passed on crest of hill
- 3 Passed on curve
- 4 Cut in
- 5 Other dangerous or incorrect passing
- 6 Over double lines
- 7 Cut corner on right turn
- 8 Turned from wrong lane
- 9 Other incorrect turning
- X Failed to use headlights
- Y Failed to use rear lights

(61) (62)
- 0 Disregarded police signal
- 1 Disregarded stop-go light
- 2 Disregarded stop sign
- 3 Disregarded flashing amber
- 4 Disregarded flashing red
- 5 Disregarded warning sign
- 6 Failed to give right of way
- 7 Followed too closely
- 8 Drove on a safety zone
- 9 Failed to give signal or gave incorrect signal
- X Overtaking on wrong side
- Y Changing lane without care

(63) (64)
- 0 On wrong side of road
- 1 Incorrectly parked
- 2 Cyclist clinging to other vehicle
- 3 Other errors
- 4 No errors indicated

22. Motor Vehicle details.

	A (39-44)	B (45-50)
Make	Volkswagen. (93)	Pedestrian.
Year of Manufacture	1963. (63)	1961
Rated Horsepower (R.A.C.)	14. (14)	

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PART E: PARTICULARS OF FIRST TWO PEDESTRIANS TO BE HIT.
(Use same column for same pedestrian in all questions)

30. Pedestrians' Movements. (66) (67)
(Cross one or more for each pedestrian)

	1	2	
0 Crossing with police or lights signal			0
1 Crossing against police or lights signal			1
2 Crossing road with no control present	X		2
3 Crossing at intersection	X		3
4 Crossing, not at intersection ..			4
5 Coming from behind parked car(s) ..			5
6 Standing in safety zone			6
7 On pedestrian crossing			7
8 Within 100 ft. of pedestrian crossing			8
9 On school crossing			9
X Within 100 ft. of school crossing ..			X
Y Within 100 ft. of police or lights signal			Y

(68) (69)

	1	2	
0 Walking to, from or boarding tram ..			0
1 Walking to, from or boarding other vehicle			1
2 Working on roadway			2
3 Playing on roadway			3
4 Lying on roadway			4
5 Not on roadway			5
Walking along roadway— 6 With traffic (footpath available) ..			6
7 With traffic (footpath not available)			7
8 Against traffic (footpath available) ..			8
9 Against traffic (footpath not available)			9
X Pushing or working on vehicle ..			X

31. Police Opinion of Sobriety. (70) (71)
(Cross one or more for each pedestrian)

Had been drinking—

	1	2	
0 Obviously drunk			0
1 Not obv. drunk but ability impaired			1
2 Ability not impaired			2
3 Not known if impaired			3
4 Had not been drinking	X		4
5 Not known whether drinking ..			5
6 Blood or Breath test not taken ..			6
7 Blood or Breath test taken			7
% alcohol in blood (if known) ..			

32. Physical Condition (other than sobriety)
(Cross one or more for each pedestrian)

	1	2	
8 Physical defects			8
9 Ill			9
X Very tired			X
Y Apparently normal	X		Y

PART F: PARTICULARS OF CASUALTIES.
(Use same column for same casualty in all questions)

33. Total Number of Casualties 1

34. Type of Road User Killed or Injured. (72) (75) (78)
(Cross one for each casualty)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
0 Motor vehicle driver									
1 Motor cyclist									
2 Pedal cyclist									
3 Passenger (excl. pillion rider)									
4 Pillion rider									
5 Pedestrian	X								
6 Others									

35. (Cross one for each motor cyclist and pillion rider casualty)

Was casualty wearing crash helmet?	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
7 Yes									
8 No									
9 Not known									

36. Sex.
(Cross one for each casualty)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
X Male	X								
Y Female									

37. Age. (73) (76) (79)
(Cross one for each casualty)

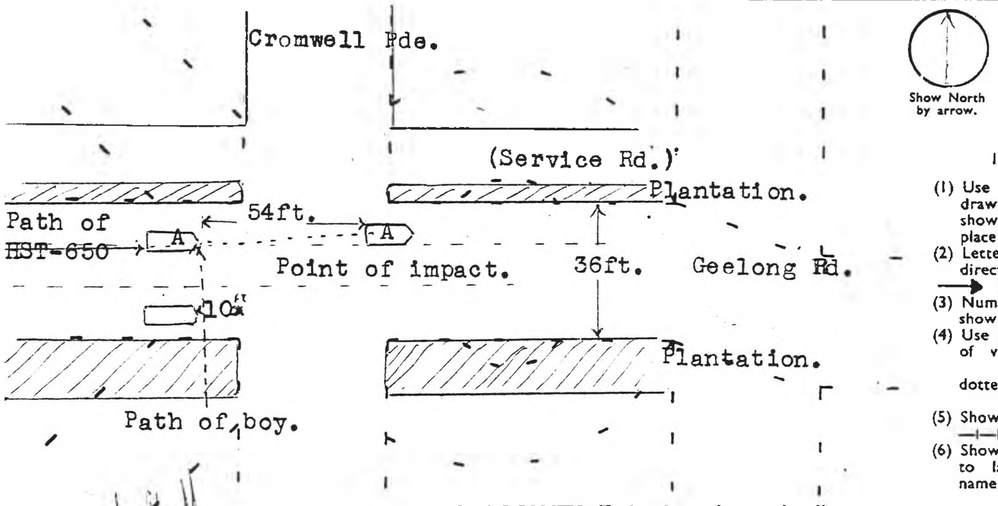
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
0 Under 5	X								
1 5 to 6 incl.									
2 7 „ 11 „									
3 12 „ 16 „									
4 17 „ 20 „									
5 21 „ 29 „									
6 30 „ 39 „									
7 40 „ 49 „									
8 50 „ 59 „									
9 60 „ 69 „									
X 70 and over ..									
Y Not known ..									

38. Persons Killed or Injured. (74) (77) (80)
(Cross one for each casualty).

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
0 Killed or died within 30 days									
1 Injured, requiring medical treatment	X								
2 Injured, not req. medical treatment									

39. Describe briefly what happened. Refer to vehicles and pedestrians by the same letters and numbers as in Parts C, D and E and on sketch.

"A" was being driven at a fast speed along Geelong Road, and was travelling towards Melbourne. Another car that was travelling in the same direction, was going to make a right hand turn. The driver saw a boy running across the plantation, so stopped. The boy ran across in front of this car and was struck by "A".



Show North by arrow.

INSTRUCTIONS.

(1) Use dash lines as guides to draw heavy lines which will show outline of roadway at place of accident.
(2) Letter each vehicle and show direction of travel by arrow → A B ←
(3) Number each pedestrian and show by → ①
(4) Use solid line to show path of vehicle before accident → A dotted line after accident - - → A
(5) Show railway by —|—|—|—|—
(6) Show distance and direction to landmarks, identify by name.

40. SKETCH OF LOCALITY—To be shown hereon in all cases
(Give outline sketch of locality showing road boundaries and movements of ALL vehicles, &c., concerned.)

Signature [signature] N. H. MILLER. Rank 1/Const. No. 11933 Station Kingsville Date 21/3/64.

PART G: To be filled in by Causing Officer at Headquarters "T" District.

Cause of accident Running across road.

Age 3
Sex M

Party considered responsible (Cross one) (65)

0 Driver A		0
1 Driver B		1
2 Vehicle A Defective ..		2
3 Vehicle B Defective ..		3
4 Pedestrian 1 ..	X	4
5 Pedestrian 2 ..		5
6 Passenger		6
7 Animal (involved) ..		7
8 Road		8
9 Weather		9
X Party not involved ..		X
Y Animal not involved ..		Y

PART H: For use of Commonwealth Statistician only.

Cause (17-19)	Resp. (20-21)	Speed (22)	Exp. (23)	Sob. (24)	Age (25-26)	Sex (27)	Type (28-30)	Loc. (31-32)	Killed (33-34)	Inj. (35-36)
409	41	—	—	49	03	1	015	03	—	01

7132/62—PL

Do NOT detach from Form No. 513

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Cross appropriate squares thus [X] Do NOT detach from Form No. 513

FOR TRAFFIC OFFICE USE ONLY

(1) F 0 PI 1 PD 2 — Acc. File No. 3517 (2-6) Checked ... Date 21/6/1965.

1965 Ed. TRAFFIC COMMISSION—VICTORIA V.P. Form No. 513A

ROAD TRAFFIC ACCIDENT STATISTICS SHEET

Members of the Force in Charge of Stations are held responsible that these Reports are made out as fully and intelligently as possible before forwarding to the Officer in Charge, "T" District

L.G.A. (17-19) → 091

PART A: PARTICULARS OF TIME, DAY, DATE AND LOCATION OF ACCIDENT

1. Time— (7-8) 9.55 a.m. ... p.m. (10) Day of Week Sunday (7) (9) Date (10-12) 30/5/65

Route No. (13-16)

2. Location—IF IN A BUILT-UP AREA
Municipality of Melbourne
Name of Town, City or Suburb Carlton
Occurred on Drummond Street (Give name of street or highway)
[X] At / [ ] Near Intersection with Queensberry Street (Give name of street or highway)
And if not at Intersection ... feet North / South / East / West

IF ON A COUNTRY ROAD
Municipality of ...
Name of Road or Highway ...
Between Towns of ... (Miles from ...)
and ... (Miles from ...)
(Give names of towns and distances from each)
And Miles / Yards — North / South / East / West (Show exact distance)
(Show nearest identifiable feature such as intersecting road, or bridge, rail crossing, mile post)

PART B: PARTICULARS OF LOCALITY.

3. Characteristics of Locality. (Cross one) (20)
0 Built-up area [X]
1 Open country or parkland

4. Zone Speed Limit. (Cross one)
2 35 m.p.h. [X]
3 40 m.p.h.
4 De-restricted
5 Other

5. Road Grade. (Cross one)
6 Level Road [X]
7 On Hill
8 Hillcrest

6. Atmospheric Conditions. (Cross one) (21)
0 Clear [X]
1 Raining or Snowing
2 Fog
3 Smoke or Dust in air

7. Road Condition. (Cross one)
4 Dry [X]
5 Wet
6 Muddy
7 Snowy or Icy

8. Lighting. (Cross one) (22)
0 Daylight [X]
1 Dusk or Dawn
2 Dark (street lighted)
3 Dark (street unlighted)

9. Obstructions to Visibility at Site of Accident. (Cross one)
4 No obstruction [X]
Visibility obscured by—
5 Embankment
6 Trees
7 Buildings, fences, hedges
8 Illegally parked vehicles
9 Legally parked vehicles
X Other feature
Y Not known if obscured

10. Road Character. (Cross those applicable) (23)
0 Cross intersection [X]
1 "T" intersection
2 "Y" intersection
3 Multiple intersection
4 Railway level crossing
5 Straight
6 Curve—view obscured
7 Curve—view not obscured
8 Bridge, culvert or causeway

11. Traffic Control. (Cross those applicable) (24)
Automatic Signals—
0 Stop-go signals at intersection
1 Flashing red and/or amber at intersection
2 Stop-go ped. sigs. not controlling interstn.
3 Pedestrian crossing with flashing lights
4 Railway level crossing with gates, booms or automatic signals.
5 Signals marked above not operating
Other Control—
6 Police
7 Stop sign
8 Give way sign
9 School crossing with flags
X School crossing site but no flags out
Y No control [X]

PART C: TYPE OF ACCIDENT (INITIAL EVENT ONLY)

12. Single Vehicle Accidents. (Cross one) (25)
0 Ran off roadway
1 Overturned on roadway
2 Struck Pedestrian
3 Struck Animal (incl. ridden horse)
4 Struck Fixed Object
5 Fall from moving Vehicle
Vehicle to Vehicle Collision.
6 Angle [X]
7 Rear End
8 Head-on
9 Side swipe—same direction
X Side swipe—opposite direction
Y Other accident

13. Total No. of Vehicles in Accident (26) Two

PART D: PARTICULARS OF UNITS INVOLVED IN INITIAL EVENT.

14. Units Involved in Accident. (Cross one for each unit) (27) (28)

		A	B
0	Car or Station Wagon	X	X
1	Taxi or Hire Car		
2	Utility or panel van		
3	Articulated Vehicle		
4	Truck other		
5	Bus		
6	Motor Cycle or Motor Scooter		
7	Bicycle		
8	Animal Drawn Vehicle		
9	Tram		
X	Railway Train, trolley, &c.		
Y	Other type of vehicle		

15. Motor Vehicle

Details	A (29-33)	B (34-38)
Make (e.g., Ford)	(353) Holden	(295) Ford
Model Name (Cars only) (e.g., Fairlane)	—	Custom-line.
Year of Manufacture	57	53

16. Speed. Police estimate of speed when driver realized accident likely (Nearest 5 m.p.h.) A (39) (6) 30 B (40) (6) 30

17. Vehicle Movements. (Cross one or more for each vehicle) (41) (42)

		A	B
0	Going straight ahead	X	X
1	Turning right at inters. or into driveway		
2	Turning left at inters. or into driveway		
3	"U" turning		
4	Stopped in traffic lane		
5	Stationary after being in an accident		
6	Parked		
7	Parking or Unparking		
8	Backing		
9	Leaving private driveway		

(Cross those applicable) (43) (44)

		A	B
0	Overtaking		
1	Skidding out of control		
2	Other "out of control"		
3	Swerving to avoid pedestrian, animal, &c.		
4	Driverless moving vehicle		

18. Condition of Wind-screens of Vehicles. (Cross one for each vehicle)

		A	B
5	Mud, dust, rain, &c., on wind-screen		
6	Misted wind-screen		
7	Clear wind-screen	X	X
8	Condition not known		

19. Were Proper Vehicle Lamps Alight? (Cross one)

		A	B
9	Yes	X	X
X	No		
Y	Not known		

20. Was Any Vehicle Towed Away? Yes [X] No [ ] Not known [ ]

PART E: ERRORS APPARENTLY COMMITTED BY DRIVER

21. (Cross those applicable for each driver) (45) (46)

		A	B
0	Speed too fast for conditions		
1	Failed to give right of way	X	
2	Incorrect turn		
3	Followed too closely		
4	Wholly or partly on wrong side of road		
5	Dangerous or incorrect overtaking		
6	Reversing without care		
7	Ignored stop sign or flashing red light		
8	Ignored stop-go signals		
9	Apparently asleep		
X	Other errors		
Y	No errors		X

PART F: PARTICULARS OF DRIVERS (INCL. RIDERS) INVOLVED IN INITIAL EVENT.

22. Sex. (Cross one for each driver) (47) (48)

	Driver of vehicle	A	B
0	Male	X	X
1	Female		

23. Age. (Cross one for each driver)

Age		A	B
Under 18	2		
18 to 19 incl.	3		
20 „ 21 „	4		
22 „ 24 „	5		
25 „ 29 „	6		
30 „ 44 „	7	X	X
45 „ 59 „	8		
60 „ 69 „	9		
70 and over	X		
Not known	Y		

24. Driving Experience. (Driver of Vehicle)
A (49) (7) 14 Yrs. ... Mths. B (50) (7) 12 Yrs. ... Mths.

25. Driver's Licence Number.
Driver of A (51-57) State Vic No. 904338
Driver of B (58-64) State Vic No. 1033190

26. Police Opinion of Sobriety. (65) (66) (Cross one or more for each driver)

	Driver of vehicle	A	B
0	Had not been drinking	X	X
1	Not known whether drinking		
	Had been drinking—		
2	Obviously drunk		
3	Not obv. drunk—ability impaired		
4	Ability not impaired		
5	Not known if impaired		
6	Blood or Breath test taken		
	% alcohol in blood (if known)		

27. Physical Condition (other than sobriety) (Cross one for each driver)

Was driver ill or had he some infirmity affecting driving?		A	B
Yes	7		
No	8	X	X
Not known	9		

28. Use of Safety Belts. (67) (68) (Cross one for each driver)

Was driver—		A	B
Killed or died within 30 days	0		
Injured, requiring medical treatment	1	X	
Injured, not req. medical treatment	2		
Not injured	3		X

(Cross one for each driver)

Was driver ejected from vehicle?		A	B
Yes	4		
No	5	X	X
Not known	6		

(Cross one for each driver)

Was driver wearing Safety Belt?		A	B
Yes	7		
No	8	X	X
Not known	9		

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Cross appropriate squares thus [X]

PART G: PARTICULARS OF FIRST PEDESTRIAN TO BE HIT

29. Pedestrian's Movements. (Cross one or more) (70)

Crossing road at intersection—
- 0 With police or lights signal
- 1 Against police or lights signal
- 2 On pedestrian crossing with flashing lights
- 3 At school crossing with flags displayed
- 4 With no control present

Crossing road not at intersection—
- 5 With police or lights signal
- 6 Against police or light signal
- 7 On pedestrian crossing with flashing lights
- 8 On school crossing with flags displayed
- 9 With no control present

Crossing road within 60 ft. of —
- X Police or light signal
- Y School crossing with flags or pedestrian crossing with flashing lights

(71)
- 0 Coming from behind parked car(s)
- 1 Walking to, from or boarding tram
- 2 Walking to, from or boarding other vehicle
- 3 Working on roadway
- 4 Playing on roadway
- 5 Lying on roadway

Walking along roadway—
- 6 With traffic (footpath available)
- 7 With traffic (footpath not available)
- 8 Against traffic (footpath available)
- 9 Against traffic (footpath not available)
- X Pushing or working on vehicle
- Y Not on roadway

30. Police Opinion of Sobriety. (Cross one) (72)
- 0 Had not been drinking
- 1 Not known whether drinking

Had been drinking—
- 2 Obviously drunk
- 3 Not obv. drunk but ability impaired
- 4 Ability not impaired
- 5 Not known if impaired

PART H: PARTICULARS OF CASUALTIES.

31. Total Number of Casualties.

Killed Nil (73) Injured req. med. treatment One (74) Injured not req. med. treatment Nil

32. Persons Killed or Injured. (Cross one for each casualty). (75) (77) (79) (Use same column for same casualty in all questions)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
0 Killed or died within 30 days									
1 Injured, requiring medical treatment	X								
2 Injured, not req. medical treatment									

33. Type of Road User Killed or Injured. (Cross one for each casualty)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
3 Motor vehicle driver	X								
4 Motor cyclist									
5 Pedal cyclist									
6 Passenger (excl. pillion rider)									
7 Pillion rider									
8 Pedestrian									
9 Others									

34. Sex. (Cross one for each casualty)

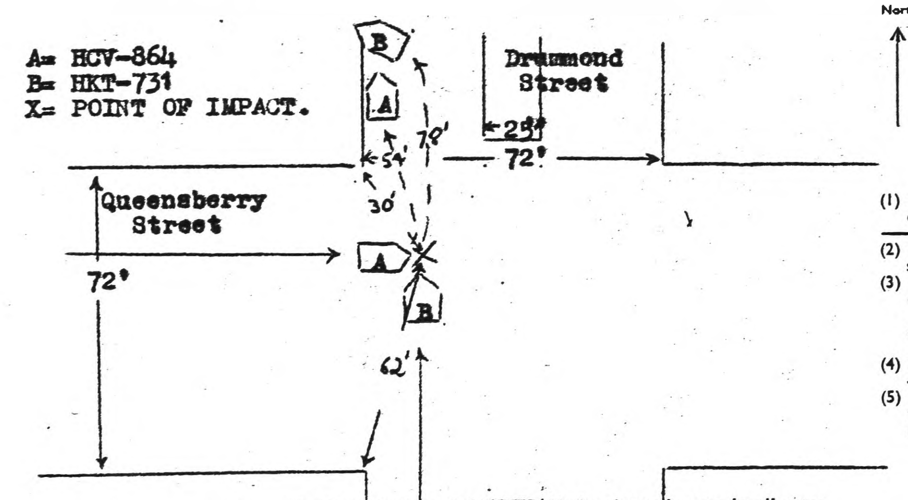
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
X Male	X								
Y Female									

35. Age. (Cross one for each casualty) (76) (78) (80)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
0 Under 5									
1 5 to 6 incl.									
2 7 „ 11 „									
3 12 „ 16 „									
4 17 „ 20 „									
5 21 „ 29 „									
6 30 „ 39 „	X								
7 40 „ 49 „									
8 50 „ 59 „									
9 60 „ 69 „									
X 70 and over									
Y Not known									

36. Describe briefly what happened. Refer to vehicles and pedestrians by the same letters and numbers as in Parts D, E, F and G and on sketch.

(A) was travelling east in Queensberry Street and at the intersection of this street with Drummond Street came into collision with (B) which had been travelling north along Drummond Street.



INSTRUCTIONS.

(1) Letter each vehicle and show direction of travel by arrow → [A] [B] ←
(2) Number each pedestrian and show by → ①
(3) Use solid line to show path of vehicle before accident → [A] dotted line after accident - - → [A]
(4) Show railway by —|—|—|—|—
(5) Show distance and direction to landmarks, identify by name.

37. SKETCH OF LOCALITY—To be shown hereon in all cases
(Give outline sketch of locality showing road boundaries and movements of ALL vehicles, &c., concerned.)

Signature John J. Ryan JOHN. J. RYAN Rank CONSTABLE No. 14606 Station CARLTON Date 6/6/65

PART I: To be filled in by Causing Officer at Headquarters "T" District.

Cause of accident Driver 'A' fail to give right of way

Age 32 Sex M

Party considered responsible (Cross one) (69)
- 0 Driver A [X]
- 1 Driver B
- 2 Vehicle A Defective
- 3 Vehicle B Defective
- 4 Pedestrian
- 5 Passenger
- 6 Animal (involved)
- 7 Road
- 8 Weather
- 9 Party not involved
- X Animal not involved

PART J: For use of Commonwealth Statistician only.

Cause (17-19)	Resp. (20-21)	Speed (22)	Exp. (23)	Sob. (24)	Age (25-26)	Sex (27)	Type (28-30)	Loc. (31-32)	Killed (33-34)	Inj. (35-36)
003	01	6	7	09	32	1	001	03	—	01

6802/64—PL

Do NOT detach from Form No. 513

14.11

Cross appropriate squares thus [X] Do NOT detach from Form No. 513

FOR TRAFFIC OFFICE USE ONLY

Revised 1.1.67

TRAFFIC COMMISSION—VICTORIA V.P. Form No. 513A

ROAD TRAFFIC ACCIDENT STATISTICS SHEET

Members of the Force in Charge of Stations are held responsible that these Reports are made out as fully and intelligently as possible before forwarding to the Officer in Charge, "T" District

(1)	
F 0	Acc. File No. .... (2-6)
PI 1	Checked........
PD 2	Date ..../......../ 19......

PART A: PARTICULARS OF TIME, DAY, DATE AND LOCATION OF ACCIDENT

Route No. (13-14) L.G.A. (15-17)

1. Time— (7-8) ....a.m. ....p.m. Day of Week........ (9) Date......../......../........ (10-12)

2. Location—IF IN A BUILT UP AREA

Municipality of........

Name of Town, City or Suburb........

Occurred on........ (Give name of street or highway)

[ ] At [ ] Near Intersection with........ (Give name of street or highway)

And if not at Intersection .... feet North [ ] South [ ] East [ ] West [ ]

IF ON A COUNTRY ROAD

Municipality of........

Name of Road or Highway........

Between Towns of........(Miles from........)

and........(Miles from........)

(Give names of towns and distances from each)

And Miles [ ] Yards [ ] North [ ] South [ ] East [ ] West [ ] (Show exact distance)

.... (Show nearest identifiable feature such as intersecting road, or bridge, rail crossing, mile post)

PART B: PARTICULARS OF LOCALITY.

3. Characteristics of Locality. (Cross one) (18)
- 0 Built-up area .. .. .. [ ] 0
- 1 Open country, or parkland on both sides [ ] 1

4. Zone Speed Limit. (Cross one)
- 2 35 m.p.h. .. [ ] 2
- 3 40 m.p.h. .. [ ] 3
- 4 De-restricted .. [ ] 4
- 5 Other .. .. [ ] 5

5. Road Grade. (Cross one)
- 6 Level Road .. [ ] 6
- 7 On Hill .. [ ] 7
- 8 Hillcrest .. [ ] 8

6. Atmospheric Conditions. (Cross one) (19)
- 0 Clear .. .. [ ] 0
- 1 Raining or Snowing [ ] 1
- 2 Fog .. .. [ ] 2
- 3 Smoke or Dust in air [ ] 3

7. Road Condition. (Cross one)
- 4 Dry .. .. [ ] 4
- 5 Wet .. .. [ ] 5
- 6 Muddy .. .. [ ] 6
- 7 Snowy or Icy .. [ ] 7

8. Lighting. (Cross one) (20)
- 0 Daylight .. .. [ ] 0
- 1 Dusk or Dawn .. [ ] 1
- 2 Dark (street lighted) [ ] 2
- 3 Dark (street unlighted) [ ] 3

9. Obstructions to Visibility at Site of Accident. (Cross one)
- 4 No obstruction .. .. [ ] 4
- Visibility obscured by—
- 5 Embankment .. .. [ ] 5
- 6 Trees .. .. [ ] 6
- 7 Buildings, fences, hedges .. .. [ ] 7
- 8 Illegally parked vehicles .. .. [ ] 8
- 9 Legally parked vehicles .. .. [ ] 9
- X Other feature .. .. .. [ ] X
- Y Not known if obscured .. .. .. [ ] Y

10. Road Character. (Cross those applicable) (21)
- 0 Cross intersection .. .. .. [ ] 0
- 1 "T" intersection .. .. .. [ ] 1
- 2 "Y" intersection .. .. .. [ ] 2
- 3 Multiple intersection .. .. .. [ ] 3
- 4 Railway level crossing .. .. .. [ ] 4
- 5 Straight .. .. [ ] 5
- 6 Curve—view obscured .. .. [ ] 6
- 7 Curve—view not obscured .. .. [ ] 7
- 8 Bridge, culvert or causeway .. .. [ ] 8

11. Traffic Control. (Cross those applicable) (22)
- Automatic Signals—
- 0 Stop-go signals at intersection .. .. [ ] 0
- 1 Flashing red and/or amber at intersection [ ] 1
- 2 Stop-go ped. sigs. not controlling intersctn. [ ] 2
- 3 Pedestrian crossing with flashing lights .. [ ] 3
- 4 Railway level crossing with gates, booms or automatic signals. .. [ ] 4
- 5 Signals marked above not operating .. [ ] 5
- Other Control—
- 6 Police .. .. [ ] 6
- 7 Stop sign .. .. [ ] 7
- 8 Give way sign .. .. .. [ ] 8
- 9 School crossing with flags .. .. [ ] 9
- X School crossing site but no flags out .. [ ] X
- Y No control .. .. [ ] Y

PART C: TYPE OF ACCIDENT (INITIAL EVENT ONLY)

12. Single Vehicle Accidents. (Cross one) (23)
- 0 Ran off roadway .. .. .. [ ] 0
- 1 Overturned on roadway .. .. [ ] 1
- 2 Struck Pedestrian .. .. .. [ ] 2
- 3 Struck Animal (incl. ridden horse) .. [ ] 3
- 4 Struck Fixed Object .. .. .. [ ] 4
- 5 Fall from moving Vehicle .. .. [ ] 5

Vehicle to Vehicle Collision.
- 6 Angle .. .. [ ] 6
- 7 Rear End .. .. [ ] 7
- 8 Head-on .. .. [ ] 8
- 9 Side swipe—same direction .. .. [ ] 9
- X Side swipe—opposite direction .. .. [ ] X
- Y **Other accident** .. .. .. [ ] Y

13. Total No. of Vehicles in Accident .... (24)

PART D: PARTICULARS OF UNITS INVOLVED IN INITIAL EVENT.

14. Units Involved in Accident. (Cross one for each unit) (25) (26)

	A	B	
0 Car or Station Wagon	[ ]	[ ]	0
1 Taxi or Hire Car	[ ]	[ ]	1
2 Utility or panel van	[ ]	[ ]	2
3 Articulated Vehicle	[ ]	[ ]	3
4 Truck other	[ ]	[ ]	4
5 Bus	[ ]	[ ]	5
6 Motor Cycle or Motor Scooter	[ ]	[ ]	6
7 Bicycle	[ ]	[ ]	7
8 Animal Drawn Vehicle	[ ]	[ ]	8
9 Tram	[ ]	[ ]	9
X Railway Train, trolley, &c.	[ ]	[ ]	X
Y Other type of vehicle	[ ]	[ ]	Y

15. Motor Vehicle Details

	A (27-31)	B (32-36)
Make (e.g., Ford)		
Model Name (Cars only) (e.g., Fairlane)		
Year of Manufacture		

16. Speed. Police estimate of speed when driver realized accident likely (Nearest 5 m.p.h.) A (37) B (38)

17. Vehicle Movements. (Cross one or more for each vehicle) (39) (40)

	A	B	
0 Going straight ahead	[ ]	[ ]	0
1 Turning right at inters. or into driveway	[ ]	[ ]	1
2 Turning left at inters. or into driveway	[ ]	[ ]	2
3 "U" turning	[ ]	[ ]	3
4 Stopped in traffic lane	[ ]	[ ]	4
5 Stationary after being in an accident	[ ]	[ ]	5
6 Parked	[ ]	[ ]	6
7 Parking or Unparking	[ ]	[ ]	7
8 Backing	[ ]	[ ]	8
9 Leaving private driveway	[ ]	[ ]	9

(Cross those applicable) (41) (42)

	A	B	
0 Overtaking	[ ]	[ ]	0
1 Skidding out of control	[ ]	[ ]	1
2 Other "out of control"	[ ]	[ ]	2
3 Swerving to avoid pedestrian, animal, &c.	[ ]	[ ]	3
4 Driverless moving vehicle	[ ]	[ ]	4

18. Condition of Wind-screens of Vehicles. (Cross one for each vehicle)

	A	B	
5 Mud, dust, rain, &c., on wind-screen	[ ]	[ ]	5
6 Misted wind-screen	[ ]	[ ]	6
7 Clear wind-screen	[ ]	[ ]	7
8 Condition not known	[ ]	[ ]	8

19. Were Proper Vehicle Lamps Alight? (Cross one)
- Yes .. [ ] 9
- No .. [ ] X
- Not known [ ] Y

20. Was Any Vehicle Towed Away? Yes [ ] No [ ] Not known [ ]

PART E: ERRORS APPARENTLY COMMITTED BY DRIVER

21. (Cross those applicable for each driver) (43) (44)

	A	B	
0 Speed too fast for conditions	[ ]	[ ]	0
1 Failed to give right of way	[ ]	[ ]	1
2 Incorrect turn	[ ]	[ ]	2
3 Followed too closely	[ ]	[ ]	3
4 Wholly or partly on wrong side of road	[ ]	[ ]	4
5 Dangerous or incorrect overtaking	[ ]	[ ]	5
6 Reversing without care	[ ]	[ ]	6
7 Ignored stop sign or flashing red light	[ ]	[ ]	7
8 Ignored stop-go signals	[ ]	[ ]	8
9 Apparently asleep	[ ]	[ ]	9
X Other errors	[ ]	[ ]	X
Y No errors	[ ]	[ ]	Y

PART F: PARTICULARS OF DRIVERS (INCL. RIDERS) INVOLVED IN INITIAL EVENT.

	Driver of A	Driver of B
	(45-46)	(55-56)
22 Sex.	Male [ ] X Female [ ] Y	Male [ ] X Female [ ] Y
23. Age.	........Yrs.	........Yrs.
	(47)	(57)
24. Driving Experience.	........Yrs. ....Mths.	........Yrs. ....Mths.
25. Driver's Licence Number.	(48-54) State........ No........	(58-64) State........ No........

26. Police Opinion of Sobriety. (65) (66) (Cross one or more for each driver)

Driver of vehicle	A	B	
0 Had not been drinking	[ ]	[ ]	0
1 Not known whether drinking	[ ]	[ ]	1
Had been drinking—			
2 Obviously drunk	[ ]	[ ]	2
3 Not obv. drunk—ability impaired	[ ]	[ ]	3
4 Ability not impaired	[ ]	[ ]	4
5 Not known if impaired	[ ]	[ ]	5
6 Blood or Breath test taken	[ ]	[ ]	6
% alcohol in blood (if known)	[ ]	[ ]	

27. Physical Condition (other than sobriety) (Cross one for each driver)

Driver of Vehicle	A	B	
Was driver ill or had he some infirmity affecting driving? 7 Yes	[ ]	[ ]	7
8 No	[ ]	[ ]	8
9 Not known	[ ]	[ ]	9

28. Extent of Driver Injury. (67) (68) (Cross one for each driver)

Was driver—	A	B	
0 Not injured	[ ]	[ ]	0
1 Killed or died within 30 days	[ ]	[ ]	1
2 Injured, requiring medical treatment	[ ]	[ ]	2
3 Injured, not req. medical treatment	[ ]	[ ]	3

29. Use of Seat Belts. (Cross one for each driver)

Type of seat belt fitted—	A	B	
4 None fitted	[ ]	[ ]	4
5 Lap belt only	[ ]	[ ]	5
6 Diagonal only	[ ]	[ ]	6
7 Lap-Sash or full harness	[ ]	[ ]	7
8 Type not known	[ ]	[ ]	8

(Cross one for each driver)

Was driver wearing seat Belt?	A	B	
9 Yes	[ ]	[ ]	9
X No	[ ]	[ ]	X
Y Not known	[ ]	[ ]	Y

CONFIDENTIAL AND PRIVILEGED DOCUMENT

14-12

Cross appropriate squares thus [X]

PART G: PARTICULARS OF FIRST PEDESTRIAN TO BE HIT

30. Pedestrian's Movements. (Cross one or more) (70)

Crossing road at intersection—
- 0 With police or lights signal .. 0
- 1 Against police or lights signal .. 1
- 2 On pedestrian crossing with flashing lights .. 2
- 3 At school crossing with flags displayed .. 3
- 4 With no control present .. 4

Crossing road not at intersection—
- 5 With police or lights signal .. 5
- 6 Against police or light signal .. 6
- 7 On pedestrian crossing with flashing lights .. 7
- 8 On school crossing with flags displayed .. 8
- 9 With no control present .. 9

Crossing road within 60 ft. of —
- X Police or light signal .. X
- Y School crossing with flags or pedestrian crossing with flashing lights .. Y

(71)
- 0 Coming from behind parked car(s) .. 0
- 1 Walking to, from or boarding tram .. 1
- 2 Walking to, from or boarding other vehicle .. 2
- 3 Working on roadway .. 3
- 4 Playing on roadway .. 4
- 5 Lying on roadway .. 5

Walking along roadway—
- 6 With traffic (footpath available) .. 6
- 7 With traffic (footpath not available) .. 7
- 8 Against traffic (footpath available) .. 8
- 9 Against traffic (footpath not available) .. 9
- X Pushing or working on vehicle .. X
- Y Not on roadway .. Y

31. Police Opinion of Sobriety. (Cross one) (72)
- 0 Had not been drinking .. 0
- 1 Not known whether drinking .. 1

Had been drinking—
- 2 Obviously drunk .. 2
- 3 Not obv. drunk but ability impaired .. 3
- 4 Ability not impaired .. 4
- 5 Not known if impaired .. 5

PART H: PARTICULARS OF CASUALTIES.

32. Total Number of Casualties.

Killed.......... (73) Injured req. med. treatment.......... (74) Injured not req. med. treatment..........

33. Persons Killed or Injured. (Cross one for each casualty). (75) (77) (79) (Use same column for same casualty in all questions)

	(i) (ii) (iii)	(iv) (v) (vi)	(vii) (viii) (ix)
Killed or died within 30 days	0	0	0
Injured, requiring medical treatment	1	1	1
Injured, not req. medical treatment	2	2	2

34. Type of Road User Killed or Injured. (Cross one for each casualty)

3 Motor vehicle driver ..	3	3	3
4 Motor cyclist ..	4	4	4
5 Pedal cyclist ..	5	5	5
6 Passenger (excl. pillion rider) ..	6	6	6
7 Pillion rider ..	7	7	7
8 Pedestrian ..	8	8	8
9 Others ..	9	9	9

35. Sex. (Cross one for each casualty)

Male	X	X	X
Female	Y	Y	Y

36. Age. (Cross one for each casualty) (76) (78) (80)

Under 5	0	0	0
5 to 6 incl.	1	1	1
7 „ 11 „	2	2	2
12 „ 16 „	3	3	3
17 „ 20 „	4	4	4
21 „ 29 „	5	5	5
30 „ 39 „	6	6	6
40 „ 49 „	7	7	7
50 „ 59 „	8	8	8
60 „ 69 „	9	9	9
70 and over ..	X	X	X
Not known ..	Y	Y	Y

37. Describe briefly what happened. Refer to vehicles and pedestrians by the same letters and numbers as in Parts D, E, F and G and on sketch.

....

North ↑

INSTRUCTIONS.

(1) Letter each vehicle and show direction of travel by arrow ⟶ [A] [B] ⟵
(2) Number each pedestrian and show by ⟶ ①
(3) Use solid line to show path of vehicle before accident ⟶ [A]; dotted line after accident ----→ [A]
(4) Show railway by —|—|—|—|—|—|—
(5) Show distance and direction to landmarks, identify by name.

38. SKETCH OF LOCALITY—To be shown hereon in all cases

(Give outline sketch of locality showing road boundaries and movements of ALL vehicles, &c., concerned.)

Signature.......... Rank.......... No.......... Station.......... Date ....../....../......

PART I: To be filled in by Causing Officer at Headquarters "T" District.

Cause of accident.......... Age.......... Sex..........

Party considered responsible (Cross one) (69)
- 0 Driver A .. 0
- 1 Driver B .. 1
- 2 Vehicle A Defective .. 2
- 3 Vehicle B Defective .. 3
- 4 Pedestrian .. 4
- 5 Passenger .. 5
- 6 Animal (involved) .. 6
- 7 Road .. 7
- 8 Weather .. 8
- 9 Party not involved .. 9
- X Animal not involved .. X

PART J: For use of Commonwealth Statistician only.

Responsible Driver Details							Accident Details				Involved Driver: Vehicle A			Involved Driver: Vehicle B		
Cause (12–19)	Resp. (20–21)	Sp. (22)	Ex. (23)	Sob. (24)	Age (25–26)	Sex (27)	Type (28–30)	Loc. (31–32)	Killed (33–34)	Inj. (35–36)	Un. (37)	Sex (38)	Age (39–40)	Un. (41)	Sex (42)	Age (43–44)

9996 66—PL

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14.13

Revised 1.1.69

Form No. 513

FOR TRAFFIC OFFICE USE ONLY
File No. ....
Date Received ....19....
Statist Sheet Forwarded / /

VICTORIA POLICE

ACCIDENT REPORT FORM

Date of Accident.......... *Time*..........*h'rs Day of Week*..........
(24 h'rs clock system)

Nature of Accident ....

....

PLACE OF ACCIDENT ....

....

TYPE OF STREET LIGHTING AT SCENE—White ☐ Orange ☐ Blue ☐ No Street Lights ☐

IS STREET LIGHTING ADEQUATE ?.......... WHAT SPEED LIMITS, IF ANY, APPLY..........

PARTICULARS OF PERSONS INJURED (including Drivers or Riders)

Name	Address	Age	Sex	Details and Description of Injuries

What became of injured persons?..........

If removed to hospital were they admitted and friends informed?..........

....

Personal Effects: If unconscious, how disposed of?..........

PARTICULARS OF DRIVERS OR RIDERS (not Passengers)

Type of Vehicle	Reg'd No.	Name	Address	Licence No.	Date of Expiry	Age	Sex	Driving Experience

PARTICULARS OF VEHICLES

Reg'd No.	Car	Name of Owner	Address of Owner	Expiry Date of Registration	Direction Travelling	Damage	$200 Over	$200 Under
	A						☐	☐
	B						☐	☐
	C						☐	☐
	D						☐	☐
	E						☐	☐
	F						☐	☐

WITNESSES (Other than Drivers or Riders, but including Passengers)

Name	Address	Viewed Accident From	Was written statement made?

WEATHER CONDITIONS—Clear ☐ Heavy Rain ☐ Light Rain ☐ Hail ☐ Fog ☐ Other Conditions..........

ROAD—Width..........Type.......... STATE OF ROAD—Dry ☐ Wet ☐

ROAD CONDITIONS—Normal ☐ Too Narrow ☐ Bottle Neck ☐ Steep Grade ☐ Under Repair ☐
Bad Surface ☐ State any Other Conditions..........

FEATURES OF ROAD—Straight Road ☐ Junction—good view ☐ Junction—bad view ☐ Fork ☐ Any other
Road Features which may have contributed to accident..........

State if scene of accident was controlled or not. Automatic Signal Light ☐ Police Controlled ☐

TRAFFIC CONDITIONS—Heavy ☐ Medium ☐ Light ☐

State if accident witnessed by police..........
If not, state source of information

Where applicable mark appropriate squares thus [X]

8727/68—PL

14.14

Police action taken or proposed ....

DO NOT WRITE IN HERE

OPINION OF POLICE—Accidental or negligence of drivers or others

....

Opinion must be expressed if possible

State if any of the above Drivers Suffer any Physical Defects ....

SOBRIETY OF PERSONS INVOLVED (Sober, smelt of liquor, under the influence of liquor or drugs)..

GENERAL DESCRIPTION OF ACCIDENT (EXCLUDING ANY VERBAL STATEMENT OR ADMISSION MADE BY PERSONS CONNECTED)

(These particulars must be furnished in all cases. Brief to be attached when any breach of law committed)

....

....

....

....

....

....

....

....

....

....

....

....

....

SKETCH OF LOCALITY—To be shown hereon in all cases—MUST BE IN INK

(Skid marks and width of road to be indicated)

North ↑

INSTRUCTIONS.

(1) Letter each vehicle and show direction of travel by arrow → A B ←
(2) Number each pedestrian and show by → ①
(3) Use solid line to show path of vehicle before accident → A
dotted line after accident ----→ A
(4) Show railway by —I—I—I—I—I—I—
(5) Show distance and direction to landmarks, identify by name.

If it is considered that any improvements are necessary (traffic lights, lighting, road markings, &c.) to improve traffic facilities at the scene of this accident, a separate report, accompanied by a rough sketch of the locality, setting out requirements, should be submitted to Superintendent, T. District, for consideration and this report endorsed by the Officer in Charge to the effect that this phase is receiving attention on separate papers.

Member of Force Reporting Accident :—

Signature..

Rank..*No*..

Date......../......../........ *Station*..

Form 512 to Traffic Control Branch :—......../......../........

Additional Particulars marked* entered by :—

Signature..

Rank..*No*..

Station..*Date*......../......../........

NOTE—Members of the Force in charge of Station are held responsible that these reports are made out as fully and intelligently as possible before forwarding them to Officers in Charge of Districts or Divisions.

14.15

Cross appropriate squares thus [X] Do NOT detach from Form No. 513

FOR TRAFFIC OFFICE USE ONLY

Revised 1.1.69

TRAFFIC COMMISSION—VICTORIA V.P. Form No. 513A

ROAD TRAFFIC ACCIDENT STATISTICS SHEET

Members of the Force in Charge of Stations are held responsible that these Reports are made out as fully and intelligently as possible before forwarding to the Officer in Charge, "T" District

1. F 0 / PI 1 / PD 2

2. Acc. File No.

Checked

Date ____/____/19____

PART A: PARTICULARS OF TIME, DAY, DATE AND LOCATION OF ACCIDENT

3. Time— [ ][ ][ ][ ] hours 4. Day of Week ______ 5. Date ____/____/____

6. L.G.A. [ ][ ][ ][ ]

7. Location—IF IN A BUILT-UP AREA
Municipality of ______
Name of Town, City or Suburb ______
Occurred on ______ (Give name of street or highway)
[ ] At / [ ] Near Intersection with ______ (Give name of street or highway)
If not at Intersection ______ feet {North / South / East / West} of intersection

IF ON A COUNTRY ROAD
Municipality of ______
Name of Road ______ 8. State Highway No. [ ][ ]
Between Towns of ______
and ______
[ ] At / [ ] Near Intersection with ______ (Give name of street or highway)
If not at intersection ______ Miles / Yards {North / South / East / West} of intersection
And ______ Miles / Yards {North / South / East / West} of ______ (Show exact distance) (Show nearest identifiable feature such as bridge, rail crossing, or mile post)

PART B: PARTICULARS OF LOCALITY

9. Zone Speed Limit. (Cross one)
0 35 m.p.h.
1 40 m.p.h.
2 45 m.p.h.
3 50 m.p.h.
4 De-restricted
5 Other, Specify ______

10. Obstructions to Visibility at Site of Accident. (Cross one)
0 No obstruction
Visibility obscured by—
1 Embankment
2 Other feature, Specify ______

11. Atmospheric Conditions. (Cross one)
0 Clear
1 Raining or Snowing
2 Fog
3 Smoke or Dust in air

12. Road Condition. (Cross one)
0 Dry
1 Wet
2 Muddy
3 Snowy or Icy

13. Light Condition. (Cross one)
0 Daylight
1 Dusk or Dawn
2 Dark

14. Road Character. (Cross one)
+ Cross intersection
– "T" intersection
0 "Y" intersection
1 Multiple intersection
2 Straight
3 Curve

(Cross those applicable)
4 Divided Highway
5 Median Opening
6 Bridge, culvert or causeway
7 Railway level crossing
8 Gravel road or unmade road

15. Traffic Control. (Cross those applicable)
Automatic Signals—
5 Stop-go signals at intersection
6 Flashing red and/or amber at intersection
7 Stop-go ped. sig's not controlling intersect'n
8 Pedestrian crossing with flashing lights
9 Railway level crossing with gates, booms or automatic signals
+ Signals marked above not operating
Other Control—
– Police
0 Stop sign
1 Give way sign
2 School crossing with flags
3 School crossing site but no flags out
4 No control

PART C: TYPE OF ACCIDENT (Initial Event)

16. Vehicle to Vehicle Collision. (Cross one)
+ Angle
– Rear end
0 Head-on
1 Sideswipe—same direction
2 Sideswipe—opposite direction

Single Vehicle Accidents
3 Struck Pedestrian
4 Struck Animal (incl. ridden horse)
5 Fall from moving vehicle
6 Overturned on roadway
7 Ran off roadway and struck fixed object
Specify object ______
8 Ran off roadway, no object struck
9 Struck object on roadway
Specify object ______
* Other accident

PART D: PARTICULARS OF UNITS INVOLVED IN INITIAL EVENT

17. Total No. of Vehicles in Accident ______

18. Units Involved in Accident. (Cross one for each unit) A B
+ Car or Station Wagon
– Taxi or Hire Car
0 Utility or Panel Van
1 Articulated Vehicle
2 Truck, other
3 Bus
4 Motor Cycle or Motor Scooter
5 Bicycle
6 Horse-Drawn Vehicle
7 Tram
8 Railway Train, Trolley, &c.
9 Ridden Horse
* Other, Specify ______

19. Motor Vehicle Details	A	B
Make (e.g., Ford)		
Model Name (Cars only) (e.g., Fairlane)		
Year of Manufacture		
20. Speed Police estimate of speed		

21. Vehicle Movements. (Cross one for each vehicle) A B
– Overtaking
0 Going straight ahead
1 Turning right at inters. or into driveway
2 Turning left at inters. or into driveway
3 "U" turning
4 Stopped in traffic lane
5 Stationary after being in an accident
6 Parked
7 Parking or Unparking
8 Backing
9 Leaving private driveway

22. (Cross one if applicable)
0 Skidding on roadway
1 Skidding on gravel shoulder
2 Swerving to avoid pedestrian, animal, &c.
3 Driverless moving vehicle

23. Vehicle Defects Contributing to Accident. (Cross one) A B
0 None
1 Not known
2 Yes, Specify ______

24. Were Prescribed Lamps Alight? (Cross one) A B
0 Not Applicable
1 No
2 Yes
3 Not known

25. Was Vehicle Engaged in Towing? (Cross one) A B
0 Not towing
1 Not known
Towing—
2 Caravan
3 Trailer
4 Other, Specify ______

PART E: PARTICULARS OF DRIVERS (INCL. RIDERS) INVOLVED IN INITIAL EVENT

	Driver of A	Driver of B
26. Sex	Male 0 [ ] Female 1 [ ]	Male 0 [ ] Female 1 [ ]
27. Age.	____Y'rs	____Y'rs
28. Driving Experience.	____Y'rs ____M'ths	____Y'rs ____M'ths
29. Driver's Licence Details.	No. ______ State ______	No. ______ State ______
(Cross if applicable) Probationary	0 [ ]	0 [ ]
Conditional	1 [ ]	1 [ ]

30. Police Opinion of Sobriety. (Cross one or more for driver of each vehicle) A B
Had not been drinking 0
Not known whether drinking 1
Had been drinking—
Obviously affected 2
Not obviously affected 3
Breath or Blood test taken 4
% alcohol in blood (if known)

31. Physical Condition (other than sobriety) (Cross one for driver of each vehicle) A B
Was driver ill or had he some infirmity affecting driving? No .. 0 / Not known 1 / Yes .. 2
Specify ______

32. Use of Seat Belts. (Cross one for each driver and for any left-hand front passenger) Driver A B / Passenger (L.H.F.) A B
None fitted .. 0
Not known if fitted .. 1
Type of seat belt fitted—
Lap belt only .. 2
Diagonal only .. 3
Lap-sash or full harness 4
Type not known .. 5
Was seat belt being worn?
No 6
Not known .. 7
Yes 8

CONFIDENTIAL AND PRIVILEGED DOCUMENT

14.16

PART F : DETAILS OF VEHICLE OCCUPANCY

33. Number of Persons :

	Vehicle A (X)	Vehicle B (Y)	Other Specify.......... (Z)
Killed or Died within 30 Days			
Injured, Admitted to Hospital			
Other Injured requiring medical treatment			
Other Injured not requiring medical treatment ..			
Not Injured			
Total Persons ..			

PART G : PARTICULARS OF CASUALTIES

(Cross same column for same casualty in all questions)

34. Extent of Injury:

		I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	
Killed or Died within 30 days	0											0
Injured, admitted to hospital	1											1
Other injured requiring medical treatment	2											2
Other injured not requiring medical treatment	3											3

Person Involved

		I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	
Vehicle A. Driver or Rider	0											0
Left-hand front passenger ..	1											1
Other front passenger ..	2											2
Rear passenger	3											3
Vehicle B. Driver or Rider	4											4
Left-hand front passenger ..	5											5
Other front passenger ..	6											6
Rear passenger	7											7
Pedestrian	8											8
Other												

Sex

		I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	
Male ..	0											0
Female ..	1											1

Age

		I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	
Under 5 ..	+											+
5 to 6 incl.	–											–
7 „ 11 „	0											0
12 „ 16 „	1											1
17 „ 20 „	2											2
21 „ 29 „	3											3
30 „ 39 „	4											4
40 „ 49 „	5											5
50 „ 59 „	6											6
60 „ 69 „	7											7
70 and over ..	8											8
Not known ..	9											9

PART H : PARTICULARS OF FIRST PEDESTRIAN TO BE HIT

35. Pedestrian's Movements. (Cross one or more)

Crossing road at intersection—

- + ☐ With police or lights signal
- – ☐ Against police or lights signal
- 0 ☐ On pedestrian crossing with flashing lights
- 1 ☐ On school crossing with flags displayed
- 2 ☐ With no control present

Crossing road not at intersection—

- 3 ☐ With police or lights signal
- 4 ☐ Against police or lights signal
- 5 ☐ On pedestrian crossing with flashing lights
- 6 ☐ At school crossing with flags displayed
- 7 ☐ With no control present
- 8 ☐ Monitored Crossing

Crossing road within 60 ft. of—

- 9 ☐ Police or lights signal
- A ☐ School crossing with flags or pedestrian crossing with flashing lights
- B ☐ Coming from behind parked car(s)
- C ☐ Walking to, from or boarding tram
- D ☐ Walking to, from (or boarding) other vehicle

Specify veh. (e.g., Bus, Ice Cream Van, &c.)..........

- E ☐ Working on roadway
- F ☐ Playing on roadway
- G ☐ Lying on roadway

Walking along roadway—

- H ☐ With traffic (footpath available)
- I ☐ With traffic (footpath not available)
- J ☐ Against traffic (footpath available)
- K ☐ Against traffic (footpath not available)
- L ☐ Pushing or working on vehicle
- M ☐ Not on roadway

36. Sex..........

37. Age..........(years)

38. Police Opinion of Pedestrian's Sobriety. (Cross one)

- 0 ☐ Not known whether drinking
- 1 ☐ Had not been drinking

Had been drinking—

- 2 ☐ Obviously affected
- 3 ☐ Not obviously affected

North

INSTRUCTIONS.

(1) Letter each vehicle and show direction of travel by arrow → [A] [B] ←

(2) Number each pedestrian and show by → ①

(3) Use solid line to show path of vehicle before accident → [A] dotted line after accident - - -→ [A]

(4) Show railway by —I—I—I—I—I—I—

(5) Show distance and direction to landmarks, identify by name.

SKETCH OF LOCALITY—To be shown hereon in all cases

(Give outline sketch of locality showing road boundaries and movements of ALL vehicles, &c., concerned, and stop/give way signs)

Describe briefly what happened. Refer to vehicles and pedestrians by the same letters and numbers as in body of form and on sketch

....

....

....

....

....

Station.......... Rank.......... No.......... Signature.......... Date...../...../.....

14.17

Cross appropriate squares thus [X] detach from Form No. 513

Revised 1.7.74

Road Safety and Traffic Authority
801 Glenferrie-road, Hawthorn 3122 V.P. Form No. 513A

ROAD TRAFFIC ACCIDENT STATISTICS SHEET

Members of the Force in Charge of Stations are held responsible that these Reports are made out as fully and intelligently as possible before forwarding to the above Authority

FOR OFFICE USE ONLY

Date

1. F 1 Pl 2 PD 3

2. Acc. File No.................

3. L.G.A. [ ][ ][ ]

4. Location code

5. RUM [ ][ ] 6. O.H. [ ][ ]

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M

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PART A: PARTICULARS OF TIME, DAY, DATE AND LOCATION OF ACCIDENT

7. Time— [ ][ ][ ][ ] hours 8. Day of Week.................. 9. Date......./......./.......

10. Location—
Municipality of..............................
Occurred on..............................
(Give name of street, road or highway)
[ ] At
[ ] Near Intersection with..............................
(Give name of street, road or highway)
If not at Intersection..........metres / kilometres North [ ] / South [ ] / East [ ] / West [ ] of intersection

11. ALSO FOR COUNTRY
In/Between Town/s of..............................
And.............. (kilometres) North [ ] / South [ ] / East [ ] / West [ ] of..............................
(Show exact distance)
(Show nearest identifiable feature such as bridge, rail crossing, or mile post)

PART B: PARTICULARS OF LOCALITY

12. Zone Speed Limit. (Cross one)
1 [ ] 60 km/h
2 [ ] 75 km/h
3 [ ] 80 km/h
4 [ ] 90 km/h
5 [ ] 100 km/h
6 [ ] 110 km/h
7 [ ] Other, Specify..................

13. Atmospheric Conditions. (Cross those applicable)
1 [ ] Clear
2 [ ] Raining or Snowing
3 [ ] Fog
4 [ ] Smoke or Dust in air
5 [ ] Strong wind

14. Road Condition. (Cross one)
1 [ ] Dry
2 [ ] Wet
3 [ ] Muddy
4 [ ] Snowy or Icy

15. Light Condition. (Cross one)
1 [ ] Daylight
2 [ ] Dusk or Dawn
3 [ ] Dark

16. Road Character. (Cross one)
1 [ ] Cross intersection
2 [ ] "T" intersection
3 [ ] "Y" intersection
4 [ ] Multiple intersection
5 [ ] Straight
6 [ ] Curve

(Cross those applicable)
7 [ ] Divided Highway
8 [ ] Median Opening
9 [ ] Bridge, culvert or causeway
10 [ ] Railway level crossing
11 [ ] Gravel road or unmade road

17. Traffic Control. (Cross those applicable)
Automatic Signals—
1 [ ] Stop-go signals at intersection
2 [ ] Flashing red and/or amber at intersection
3 [ ] Stop-go ped. sig's not controlling intersect'n
4 [ ] Pedestrian crossing with flashing lights
5 [ ] Railway level crossing with gates, booms or automatic signals
6 [ ] Signals marked above not operating
Other Control—
7 [ ] Police
8 [ ] Stop sign
9 [ ] Give way sign
10 [ ] School crossing with flags
11 [ ] School crossing site but no flags out
12 [ ] No control

PART C: TYPE OF ACCIDENT (Initial Event)

18. Vehicle to Vehicle Collision. (Cross one)
1 [ ] Angle
2 [ ] Rear end
3 [ ] Head-on
4 [ ] Sideswipe—same direction
5 [ ] Sideswipe—opposite direction

Single Vehicle Accidents
6 [ ] Struck Pedestrian
7 [ ] Struck Animal (incl. ridden horse)
8 [ ] Fall from moving vehicle
9 [ ] Overturned on roadway
10 [ ] Ran off roadway and struck fixed object
Specify object..................
11 [ ] Ran off roadway, no object struck
12 [ ] Struck object on roadway
Specify object..................
13 [ ] Other accident

19. Hit/Run Accident
YES 1 [ ] NO 2 [ ]

PART D: PARTICULARS OF UNITS INVOLVED IN INITIAL EVENT

20. Total No. of Vehicles in Accident..................

21. First two Units Involved in Accident. (Cross one for each unit)
A B
1 [ ][ ] Car or Station Wagon
2 [ ][ ] Taxi or Hire Car
3 [ ][ ] Utility or Panel Van
4 [ ][ ] Articulated Vehicle
5 [ ][ ] Truck, other
6 [ ][ ] Bus
7 [ ][ ] Motor Cycle or Motor Scooter
8 [ ][ ] Bicycle
9 [ ][ ] Horse-Drawn Vehicle or ridden horse
10 [ ][ ] Tram
11 [ ][ ] Railway Train, Trolley, etc.
12 [ ][ ] Other, Specify..................

22. Motor Vehicle Details	A	B
Make (e.g., Ford)		
Year of Manufacture		
Reg. No.		
23. Speed Police estimate of speed (km/h)		

24. Vehicle Movements. (Cross one for each vehicle)
A B
1 [ ][ ] Overtaking
2 [ ][ ] Going straight ahead
3 [ ][ ] Turning right at inters. or into driveway
4 [ ][ ] Turning left at inters. or into driveway
5 [ ][ ] "U" turning
6 [ ][ ] Stopped in line of traffic
7 [ ][ ] Stationary after being in an accident
8 [ ][ ] Parked
9 [ ][ ] Parking or Unparking
10 [ ][ ] Backing along roadway
11 [ ][ ] Leaving private driveway

25. (Cross one if applicable)
1 [ ][ ] Skidding on roadway
2 [ ][ ] Skidding on gravel shoulder
3 [ ][ ] Swerving to avoid pedestrian, animal, etc.
4 [ ][ ] Driverless moving vehicle

26. Vehicle Defects Contributing to Accident. (Cross one)
A B
1 [ ][ ] None
2 [ ][ ] Not known
3 [ ][ ] Yes, Specify..................

27. Were Prescribed Lamps Alight? (Cross one)
A B
1 [ ][ ] Not Applicable
2 [ ][ ] No
3 [ ][ ] Yes
4 [ ][ ] Not known

28. Was Vehicle Engaged in Towing? (Cross one)
A B
1 [ ][ ] Not towing
2 [ ][ ] Not known
Towing—
3 [ ][ ] Caravan
4 [ ][ ] Trailer
5 [ ][ ] Other, Specify..................

PART E: PARTICULARS OF DRIVERS (INCL. RIDERS) INVOLVED IN INITIAL EVENT

	Driver of A	Driver of B
29. Sex	Male 1 [ ] Female 2 [ ]	Male 1 [ ] Female 2 [ ]
30. Age.	..........Y'rs	..........Y'rs
31. Time since obtaining first licence?	......Y'rs ......M'ths	......Y'rs ......M'ths
32. Driver's Licence Details.	No.......... State..........	No.......... State..........
(Cross if applicable) Probationary	1 [ ]	1 [ ]
Conditional	2 [ ]	2 [ ]

33. Police Opinion of Sobriety.
(Cross one or more for driver of each vehicle)
A B
Had not been drinking .. .. 1 [ ][ ]
Not known whether drinking .. 2 [ ][ ]
Had been drinking—
Obviously affected .. .. 3 [ ][ ]
Not obviously affected .. .. 4 [ ][ ]
Breath or Blood test taken .. .. 5 [ ][ ]
% alcohol in blood (if known) 6 [ ][ ]

34. Seat Belts. (Cross one or more for each Seating Position whether occupied or not)

FITTING DETAILS:

	No.	Vehicle A Front Dvr.	left	cent.	Rear right	left	cent.	No.	Vehicle B Front Dvr.	left	cent.	Rear right	left	cent.
None fitted	1							1						
Not known if fitted	2							2						
Type of seat belt fitted—														
Lap belt only	3							3						
Diagonal only	4							4						
Lap-sash or full harness	5							5						
Type not known	6							6						
Child restraint	7							7						

Child restraint make: / model: — make: / model:

WEARING DETAILS: COMPLETE ONLY IF SEATING POSITION IS OCCUPIED

Was seat belt being worn?	No.	Vehicle A						No.	Vehicle B					
No	8							8						
Not known	9							9						
Yes	10							10						

14.18

PART F : PARTICULARS OF PERSONS INVOLVED IN VEHICLES A, B AND C **ONLY** AND ALL PEDESTRIANS

35. (Cross one column for each person in all questions)

Person Involved		I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	
Vehicle A. Driver or Rider	1											1
Left-hand front passenger	2											2
Other front passengers	3											3
Right-hand Rear Passenger	4											4
Left-hand rear passenger	5											5
Other rear passengers	6											6
Vehicle B. Driver or Rider	7											7
Left-hand front passenger	8											8
Other front passengers	9											9
Right-hand rear passenger	10											10
Left-hand rear passenger	11											11
Other rear passengers	12											12
Vehicle C. Specify Type....................................												
Driver or Rider												
Left-hand front passenger												
Other front passengers												
Rear passenger												
Pedestrian	13											13
Extent of Injury :												
Killed or Died within 30 days												
Injured, admitted to hospital												
Other injured requiring medical treatment												
Other injured not requiring medical treatment ..												
Not Injured												
Sex Male	1											1
Sex Female	2											2
Age (years)												
		I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	

PART G : SUMMARY OF **ALL** PERSONS INVOLVED

36. Number

- ☐ Killed or Died within 30 Days
- ☐ Injured, Admitted to Hospital
- ☐ Other Injured requiring medical treatment
- ☐ Other Injured not requiring medical treatment
- ☐ Not Injured
- ☐ Total Persons

PART H : PARTICULARS OF **FIRST** PEDESTRIAN TO BE HIT

37. Pedestrian's Movements. (Cross one)

1 ☐ Crossing road
2 ☐ Working on roadway
3 ☐ Playing on roadway
4 ☐ Lying on roadway
5 ☐ Standing on roadway
6 ☐ Walking along roadway—With traffic
7 ☐ Walking along roadway—Against traffic
8 ☐ Pushing or working on vehicle
9 ☐ Walking to, from or boarding tram
10 ☐ Walking to, from (or boarding) other vehicle
Specify veh. (e.g., Bus, Ice Cream Van, etc.)............
11 ☐ Not on roadway

38. If crossing road at Police or lights signal did pedestrian comply with it?

1 ☐ No
2 ☐ Yes (Cross one if applicable)
3 ☐ Not known

39. Did pedestrian emerge from behind parked car?

1 ☐ No
2 ☐ Yes (Cross one)
3 ☐ Not known

40. Was pedestrian on monitored crossing?

1 ☐ No
2 ☐ Yes (Cross one)
3 ☐ Not known

41. Sex 1 ☐ Male 2 ☐ Female

42. Age.............. (Years)

43. Police Opinion of Pedestrian's Sobriety. (Cross one)

1 ☐ Not known whether drinking
2 ☐ Had not been drinking
Had been drinking—
3 ☐ Obviously affected
4 ☐ Not obviously affected

North ↑

INSTRUCTIONS.

(1) Letter each vehicle and show direction of travel by arrow ⟶ [A] [B] ⟵
(2) Number each pedestrian and show by ⟶ ①
(3) Use solid line to show path of vehicle before accident ⟶ [A]
dotted line after accident ----→ [A]
(4) Show railway by —|—|—|—|—|—|—
(5) Show distance and direction to landmarks, identify by name.

SKETCH OF LOCALITY—To be shown hereon in all cases

(Give outline sketch of locality showing road boundaries and movements of ALL vehicles, etc., concerned, and stop/giveway signs)

Describe briefly what happened. Refer to vehicles and pedestrians by the same letters and numbers as in body of form and on sketch

....

....

....

....

....

District.............. Station.............. Rank.............. No.............. Signature.............................. Date..../..../....

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14.19

Cross appropriate squares thus [X] detach from Form No. 513

Revised 1.1.75

Road Safety and Traffic Authority
801 Glenferrie-road, Hawthorn 3122 V.P. Form No. 513A

ROAD TRAFFIC ACCIDENT STATISTICS SHEET

Members of the Force in Charge of Stations are held responsible that these Reports are made out as fully and intelligently as possible before forwarding to the above Authority

FOR OFFICE USE ONLY

Date

1. F 1 PI 2 PD 3

2. Acc. File No.........

3. L.G.A.

4. Location code

5. RUM 6. O.H.

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M

PART A: PARTICULARS OF TIME, DAY, DATE AND LOCATION OF ACCIDENT

7. Time— | | | | hours 8. Day of Week.............. 9. Date....../....../......

10. Location—
Municipality of..............
Occurred on..............
(Give name of street, road or highway)

[ ] At
[ ] Near
Intersection with..............
(Give name of street, road or highway)

If not at Intersection........metres / kilometres {North / South / East / West} of intersection

11. ALSO FOR COUNTRY
In/Between Town/s of..............
And.............. (kilometres) {North / South / East / West} of..............
(Show exact distance)
(Show nearest identifiable feature such as bridge, rail crossing, or mile post)

PART B: PARTICULARS OF LOCALITY

12. Zone Speed Limit. (Cross one)
1 60 km/h
2 75 km/h
3 80 km/h
4 90 km/h
5 100 km/h
6 110 km/h
7 Other, Specify..............

13. Atmospheric Conditions. (Cross those applicable)
1 Clear
2 Raining or Snowing
3 Fog
4 Smoke or Dust in air
5 Strong wind

14. Road Condition. (Cross one)
1 Dry
2 Wet
3 Muddy
4 Snowy or Icy

15. Light Condition. (Cross one)
1 Daylight
2 Dusk or Dawn
3 Dark

16. Road Character. (Cross one)
1 Cross intersection
2 "T" intersection
3 "Y" intersection
4 Multiple intersection
5 Straight
6 Curve

(Cross those applicable)
7 Divided Highway
8 Median Opening
9 Bridge, culvert or causeway
10 Railway level crossing
11 Gravel road or unmade road

17. Traffic Control. (Cross those applicable)
Automatic Signals—
1 Stop-go signals at intersection
2 Flashing red and/or amber at intersection
3 Stop-go ped. sig's not controlling intersect'n
4 Pedestrian crossing with flashing lights
5 Railway level crossing with gates, booms or automatic signals
6 Signals marked above not operating
Other Control—
7 Police
8 Stop sign
9 Give way sign
10 School crossing with flags
11 School crossing site but no flags out
12 No control

PART C: TYPE OF ACCIDENT (Initial Event)

18. Vehicle to Vehicle Collision. (Cross one)
1 Angle
2 Rear end
3 Head-on
4 Sideswipe—same direction
5 Sideswipe—opposite direction

Single Vehicle Accidents
6 Struck Pedestrian
7 Struck Animal (incl. ridden horse)
8 Fall from moving vehicle
9 Overturned on roadway
10 Ran off roadway and struck fixed object
Specify object..............
11 Ran off roadway, no object struck
12 Struck object on roadway
Specify object..............
13 Other accident

19. Hit/Run Accident
YES 1 [ ] NO 2 [ ]

PART D: PARTICULARS OF UNITS INVOLVED IN INITIAL EVENT

20. Total No. of Vehicles in Accident..............

21. First two Units Involved in Accident. (Cross one for each unit)
A B
1 Car or Station Wagon
2 Taxi or Hire Car
3 Utility or Panel Van
4 Articulated Vehicle
5 Truck, other
6 Bus
7 Motor Cycle or Motor Scooter
8 Bicycle
9 Horse-Drawn Vehicle or ridden horse
10 Tram
11 Railway Train, Trolley, etc.
12 Other, Specify..............

22. Motor Vehicle Details	A	B
Make (e.g., Ford)		
Year of Manufacture		
Reg. No.		
23. Speed Police estimate of speed (km/h)		

24. Vehicle Movements. (Cross one for each vehicle)
A B
1 Overtaking
2 Going straight ahead
3 Turning right at inters. or into driveway
4 Turning left at inters. or into driveway
5 "U" turning
6 Stopped in line of traffic
7 Stationary after being in an accident
8 Parked
9 Parking or Unparking
10 Backing along roadway
11 Leaving private driveway

25. (Cross one if applicable)
1 Skidding on roadway
2 Skidding on gravel shoulder
3 Swerving to avoid pedestrian, animal, etc.
4 Driverless moving vehicle

26. Vehicle Defects Contributing to Accident. (Cross one)
A B
1 None
2 Not known
3 Yes, Specify..............

27. Were Prescribed Lamps Alight? (Cross one)
A B
1 Not Applicable
2 No
3 Yes
4 Not known

28. Was Vehicle Engaged in Towing? (Cross one)
A B
1 Not towing
2 Not known
Towing—
3 Caravan
4 Trailer
5 Other, Specify..............

PART E: PARTICULARS OF DRIVERS (INCL. RIDERS) INVOLVED IN INITIAL EVENT

	Driver of A	Driver of B
29. Sex	Male 1 / Female 2	Male 1 / Female 2
30. Age.	........Y'rs	........Y'rs
31. Time since obtaining first licence?	......Y'rs ......M'ths	......Y'rs ......M'ths

32. Driver's Licence Details.

	Driver of A	Driver of B
No.		
State		

(Cross if applicable)

	A	B
Probationary	1	1
Conditional	2	2

33. Police Opinion of Sobriety.
(Cross one or more for driver of each vehicle)
A B
Had not been drinking 1
Not known whether drinking .. 2
Had been drinking—
Obviously affected 3
Not obviously affected 4
Breath or Blood test taken 5
% alcohol in blood (if known) 6

34. Seat Belts. (Cross one or more for each Seating Position whether occupied or not)

FITTING DETAILS:

		Vehicle A: Front Dvr.	left	cent.	Rear right	left	cent.		Vehicle B: Front Dvr.	left	cent.	Rear right	left	cent.
None fitted	1							1						
Not known if fitted	2							2						
Type of seat belt fitted—														
Lap belt only	3							3						
Diagonal only	4							4						
Lap-sash or full harness	5							5						
Type not known	6							6						
Child restraint	7							7						

Child restraint make: make:
model: model:

WEARING DETAILS: COMPLETE ONLY IF SEATING POSITION IS OCCUPIED

Was seat belt being worn?		Vehicle A							Vehicle B					
No	8							8						
Not known	9							9						
Yes	10							10						

CONFIDENTIAL AND PRIVILEGED DOCUMENT

14.20

PART F: PARTICULARS OF PERSONS INVOLVED IN VEHICLES A, B AND C **ONLY** AND ALL PEDESTRIANS

35. (Cross one column for each person in all questions)

Person Involved		Person No. I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	
Vehicle A. Driver or Rider	1											1
Left-hand front passenger	2											2
Other front passengers	3											3
Right-hand Rear Passenger	4											4
Left-hand rear passenger	5											5
Other rear passengers	6											6
Vehicle B. Driver or Rider	7											7
Left-hand front passenger	8											8
Other front passengers	9											9
Right-hand rear passenger	10											10
Left-hand rear passenger	11											11
Other rear passengers	12											12
Vehicle C. Specify Type..												
Driver or Rider												
Left-hand front passenger												
Other front passengers												
Rear passenger												
Pedestrian	13											13
Extent of Injury:												
Killed or Died within 30 days												
Injured, admitted to hospital												
Other injured requiring medical treatment												
Other injured not requiring medical treatment ..												
Not injured												
Sex Male	1											1
Sex Female	2											2
Age (years)												
		I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	

PART G: SUMMARY OF **ALL** PERSONS INVOLVED

36. Number

☐ Killed or Died within 30 Days
☐ Injured, Admitted to Hospital
☐ Other Injured requiring medical treatment
☐ Other Injured not requiring medical treatment
☐ Not Injured
☐ Total Persons

PART H: PARTICULARS OF **FIRST** PEDESTRIAN TO BE HIT

37. Pedestrian's Movements. (Cross one)

1 ☐ Crossing road
2 ☐ Working on roadway
3 ☐ Playing on roadway
4 ☐ Lying on roadway
5 ☐ Standing on roadway
6 ☐ Walking along roadway—With traffic
7 ☐ Walking along roadway—Against traffic
8 ☐ Pushing or working on vehicle
9 ☐ Walking to, from or boarding tram
10 ☐ Walking to, from (or boarding) other vehicle
Specify veh. (e.g., Bus, Ice Cream Van, etc.)............
11 ☐ Not on roadway

38. If crossing road at Police or lights signal did pedestrian comply with it?

1 ☐ No
2 ☐ Yes (Cross one if applicable)
3 ☐ Not known

39. Did pedestrian emerge from behind parked car?

1 ☐ No
2 ☐ Yes (Cross one)
3 ☐ Not known

40. Was pedestrian on monitored crossing?

1 ☐ No
2 ☐ Yes (Cross one)
3 ☐ Not known

41. Sex 1 ☐ Male 2 ☐ Female **42. Age**.................. (Years)

43. Police Opinion of Pedestrian's Sobriety. (Cross one)

1 ☐ Not known whether drinking
2 ☐ Had not been drinking
Had been drinking—
3 ☐ Obviously affected
4 ☐ Not obviously affected

North ↑

INSTRUCTIONS.

(1) Letter each vehicle and show direction of travel by arrow ⟶ A ⟩ ⟨ B ⟵
(2) Number each pedestrian and show by ⟶ ①
(3) Use solid line to show path of vehicle before accident ⟶ A
dotted line after accident - - -> A
(4) Show railway by —|—|—|—|—|—
(5) Show distance and direction to landmarks, identify by name.

SKETCH OF LOCALITY—To be shown hereon in all cases

(Give outline sketch of locality showing road boundaries and movements of ALL vehicles, etc., concerned, and stop/giveway signs)

Describe briefly what happened. Refer to vehicles and pedestrians by the same letters and numbers as in body of form and on sketch

....

....

....

....

....

District............ Station............ Rank............ No............ Signature............ Date....../....../......

C. H. Rixon, Government Printer, Melbourne.

14.21

RoSTA USE ONLY

SEVERITY | L.G.A.

LOCATION CODE

RUM | OBJECT HIT

VICTORIA POLICE — FORM 513A–1

TRAFFIC ACCIDENT REPORT

DUPLICATE (4.10.77)

THIS FORM MUST ACCOMPANY FORM 513A–2

FORWARD TO: ROAD SAFETY AND TRAFFIC AUTHORITY
801 GLENFERRIE RD., HAWTHORN, 3122

VEHICLES "A" AND "B" MUST BE THE VEHICLES INVOLVED IN THE FIRST IMPACT

TRAFFIC DEPT. FILE NO.

STATION A/B NO.

COPY TO RoSTA ON / /19

TOTAL NO. OF VEHICLES INVOLVED | TOTAL NO. OF PERSONS INVOLVED

LOCATION

MUNICIPALITY | DATE OF ACCIDENT / /19 | TIME OF ACCIDENT (24HR) | DAY OF WEEK | ZONE SPEED LIMIT (KM/H)

OCCURRED ON: NAME OF STREET, ROAD OR HIGHWAY | DISTANCE FROM INTERSECTION N/S/E/W OF | NAME OF NEAREST INTERSECTING STREET, ROAD OR HIGHWAY

ALSO FOR COUNTRY: DISTANCE FROM NEAREST LANDMARK N/S/E/W OF | IN/BETWEEN TOWN(S) OF

VEHICLE A

DRIVERS NAME | ADDRESS

DATE OF BIRTH / / | LICENCE NO. | STATE | DATE OF EXPIRY / /19 | LICENCE TYPE: 1 LEARNER 2 PROBATIONARY 3 CONDITIONAL 4 PROB.&COND. 5 STANDARD 6 DISQUALIFIED 7 UNLICENCED 9 NOT KNOWN | SEATBELT* | SEX | INJURY*

MAKE OF VEHICLE | YEAR | REGISTRATION NO. | STATE | DATE OF EXPIRY / /19 | VEHICLE CAUGHT FIRE: 1 YES 2 NO 9 NOT KNOWN | TOWED AWAY: 1 YES 2 NO 9 NOT KNOWN

OWNERS NAME (IF SAME AS DRIVER WRITE 'AS ABOVE') | ADDRESS (IF SAME AS DRIVER WRITE 'AS ABOVE') | DAMAGE

VEHICLE B

DRIVERS NAME | ADDRESS

DATE OF BIRTH / / | LICENCE NO. | STATE | DATE OF EXPIRY / /19 | LICENCE TYPE: 1 LEARNER 2 PROBATIONARY 3 CONDITIONAL 4 PROB.&COND. 5 STANDARD 6 DISQUALIFIED 7 UNLICENCED 9 NOT KNOWN | SEATBELT* | SEX | INJURY*

MAKE OF VEHICLE | YEAR | REGISTRATION NO. | STATE | DATE OF EXPIRY / /19 | VEHICLE CAUGHT FIRE: 1 YES 2 NO 9 NOT KNOWN | TOWED AWAY: 1 YES 2 NO 9 NOT KNOWN

OWNERS NAME (IF SAME AS DRIVER WRITE 'AS ABOVE') | ADDRESS (IF SAME AS DRIVER WRITE 'AS ABOVE') | DAMAGE

VEHICLE C

DRIVERS NAME | ADDRESS

DATE OF BIRTH / / | LICENCE NO. | STATE | DATE OF EXPIRY / /19 | LICENCE TYPE: 1 LEARNER 2 PROBATIONARY 3 CONDITIONAL 4 PROB.&COND. 5 STANDARD 6 DISQUALIFIED 7 UNLICENCED 9 NOT KNOWN | SEATBELT* | SEX | INJURY*

MAKE OF VEHICLE | YEAR | REGISTRATION NO. | STATE | DATE OF EXPIRY / /19 | VEHICLE CAUGHT FIRE: 1 YES 2 NO 9 NOT KNOWN | TOWED AWAY: 1 YES 2 NO 9 NOT KNOWN

OWNERS NAME (IF SAME AS DRIVER WRITE 'AS ABOVE') | ADDRESS (IF SAME AS DRIVER WRITE 'AS ABOVE') | DAMAGE

OTHER PERSONS INVOLVED (DO NOT INCLUDE DRIVERS/RIDERS)

NAME	ADDRESS	STATE-MENT*	VEH	POS*	SEAT-BELT*	AGE (YRS)	SEX (M/F)	INJURY*

STATEMENT
1 WRITTEN STATEMENT MADE
2 " " NOT MADE

VEHICLE (VEH)
INSERT A,B,C,ETC., OR P (FOR PEDESTRIAN)

POSITION (POS)

LF	CF	D
LR	CR	RR
	OR	

BLANK – PEDESTRIAN
PL – PILLION PASSENGER
OR – OTHER REAR PASSENGER – INCLUDES: LUGGAGE AREA OF STATION WAGON, REAR OF GOODS CARRYING VEHICLE, BUS, TRAM, ETC
NK – NOT KNOWN

SEATBELT
1 NOT FITTED
2 CHILD RESTRAINT FITTED
3 ADULT
8 NOT APPLICABLE FOR VEHICLE TYPE (e.g. MOTORCYCLE, TRAM, ETC.)
9 NOT KNOWN IF RESTRAINT FITTED (LEAVE BLANK FOR PEDESTRIANS)

INJURY
1 KILLED OR DIED WITHIN 30 DAYS
2 INJURED, ADMITTED TO HOSPITAL
3 OTHER INJURED REQUIRING MEDICAL TREATMENT
4 OTHER INJURED NOT REQUIRING MEDICAL TREATMENT
5 NOT INJURED

*** INSERT APPLICABLE CODE**

TYPE OF ACCIDENT – (INITIAL EVENT)
1 VEHICLE TO VEHICLE COLLISION
SINGLE VEHICLE ACCIDENT –
a. ON CARRIAGEWAY:
2 STRUCK PEDESTRIAN
3 " ANIMAL (NOT RIDDEN) **
4 " OBJECT **
5 OVERTURNED
6 FALL FROM MOVING VEHICLE
b. RAN OFF CARRIAGEWAY AND:
7 STRUCK PEDESTRIAN (ON FOOTPATH, ETC.)
8 " VEHICLE
9 " ANIMAL (NOT RIDDEN) **
10 " FIXED OBJECT **
11 NO OBJECT STRUCK
12 OTHER ACCIDENT
**GIVE DETAILS OF OBJECT OR ANIMAL STRUCK:

INJURED TAKEN TO: (SHOW DESTINATION(S). WHEN THIS IS A HOSPITAL, SPECIFY IF ADMITTED)

WERE FRIENDS/RELATIVES INFORMED?

PERSONAL EFFECTS: (HOW WERE THESE DISPOSED OF WHEN PERSONS WERE UNCONCIOUS?)

TRAFFIC CONTROL (SELECT ONE OR MORE)
1 INTERSECTION SIGNALS OPERATING STOP-GO
2 " " " FLASHING
3 " " MALFUNCTIONING
4 PUSH-BUTTON PED SIG'S NOT CONTROLLING INTERSECTION
5 PEDESTRIAN CROSSING
6 RAIL X-ING – GATES OR BOOMS
7 " " – FL. LIGHTS/BELLS ONLY
8 " " – NO AUTOMATIC SIGNALS
9 POLICE
10 STOP SIGN
11 GIVE WAY SIGN
12 GIVE WAY TO RIGHT SIGN
13 SCHOOL CROSSING WITH FLAGS
14 " " WITHOUT FLAGS
15 NO CONTROL
ALSO CROSS IF CONTROL WAS OUT OF ORDER OR DAMAGED PRIOR TO ACCIDENT

ROAD CHARACTER
1 CROSS INTERSECTION
2 'T' "
3 'Y' "
4 MULTIPLE INTERSECTION
5 NOT AT INTERSECTION

(SELECT ONE OR MORE)
1 STRAIGHT
2 CURVE
3 DIVIDED ROAD
4 MEDIAN OPENING (NOT AT INTERSECTION)
5 BRIDGE, CULVERT OR CAUSEWAY
6 ROUNDABOUT
7 ROAD CLOSURE
8 ROADWORKS
9 RAILWAY LEVEL CROSSING

ROAD SURFACE CONDITION
1 DRY
2 WET
3 MUDDY
4 SNOWY OR ICY

1 PAVED
2 UNPAVED OR GRAVEL

ATMOSPHERIC CONDITION (SELECT ONE OR MORE)
1 CLEAR
2 RAINING OR SNOWING
3 FOG
4 SMOKE OR DUST IN THE AIR
5 STRONG WIND

LIGHT CONDITION
1 DAYLIGHT
2 DUSK OR DAWN
3 DARK – STREET LIGHTS ON
4 " – STREET LIGHTS OFF
5 " – NO STREET LIGHTS
6 " – STREET LIGHT DETAILS NOT KNOWN

VEHICLE TYPE (VEH A, VEH B, VEH C)
1 CAR OR STATION WAGON
2 TAXI OR HIRE CAR
3 UTILITY OR PANEL VAN
4 ARTICULATED VEHICLE (SEMI)
5 TRUCK (EXCLUDING SEMI)
6 BUS
7 MOTOR CYCLE OR MOTOR SCOOTER
8 BICYCLE
9 HORSE-DRAWN/RIDDEN HORSE
10 TRAM
11 RAILWAY TRAIN, TROLLEY, ETC.
12 EMERGENCY VEHICLE**
13 OTHER VEHICLE **
99 NOT KNOWN
**SPECIFY TYPE:

VEHICLE MOVEMENTS (VEH A, VEH B)
1 OVERTAKING
2 GOING STRAIGHT AHEAD
3 TURNING RIGHT AT INTERSECTION OR INTO DRIVEWAY
4 TURNING LEFT AT INTERSECTION OR INTO DRIVEWAY
5 'U' TURNING
6 LEAVING PRIVATE DRIVEWAY
7 PARKING OR UNPARKING
8 REVERSING ON CARRIAGEWAY
9 PARKED – STANDING ALLOWED
10 PARKED – STANDING PROHIBITED
11 STATIONARY AFTER BEING IN AN ACCIDENT OR BROKEN DOWN
12 OTHER STATIONARY ON CARRIAGEWAY
99 NOT KNOWN

(IF APPLICABLE) (VEH A, VEH B)
1 SKIDDING ON CARRIAGEWAY
2 SKIDDING ON GRAVEL SHOULDER
3 SWERVING TO AVOID PEDESTRIAN, ANIMAL, ETC.
4 DRIVERLESS MOVING VEHICLE

CONTINUE REPORT ON 513A-2

10546/77–Z.8

14.22

TRAFFIC DEPT. FILE NO.

VICTORIA POLICE
DUPLICATE

TRAFFIC ACCIDENT REPORT

THIS FORM MUST ACCOMPANY FORM 513A – 1

FORM 513A–2 (4.10.77)

STATION A B No.

WERE PRESCRIBED LAMPS ALIGHT?
1 NOT APPLICABLE
2 NO
3 YES
9 NOT KNOWN
VEH A VEH B

MUNICIPALITY

DATE OF ACCIDENT / /19

TIME OF ACCIDENT (24HR)

WAS VEHICLE ENGAGED IN TOWING?
(DO NOT INCLUDE SEMI)
1 NOT TOWING
2 TOWING – CARAVAN
3 " – TRAILER
4 " – OTHER, SPECIFY:
9 NOT KNOWN IF TOWING
VEH A VEH B

POLICE ESTIMATE OF SPEED
VEH A KM/H
VEH B KM/H

PEDESTRIAN SECTION– THIS SECTION RELATES TO THE FIRST PEDESTRIAN HIT

I PEDESTRIAN MOVEMENTS
1 CROSSING CARRIAGEWAY
2 WORKING, PLAYING, LYING OR STANDING ON CARRIAGEWAY
3 WALKING ON CARRIAGEWAY – WITH TRAFFIC
4 WALKING ON CARRIAGEWAY – AGAINST TRAFFIC
5 PUSHING OR WORKING ON VEHICLE
6 WALKING TO, FROM OR BOARDING TRAM
7 WALKING TO, FROM OR BOARDING OTHER VEHICLE – SPECIFY:
8 NOT ON CARRIAGEWAY (EG. ON FOOTPATH)
9 NOT KNOWN

II DID PED. COMPLY WITH CONTROL? (IF APPLICABLE)
1 NO
2 YES
9 NOT KNOWN

III TYPE OF CROSSING SUPERVISOR (IF APPLICABLE)
1 SUPERVISOR (WHITE UNIFORM)
2 BY-LAWS OFFICER
3 POLICE
4 OTHER –SPECIFY:

IV DID PED. EMERGE FROM BEHIND A STATIONARY VEHICLE?
1 NO
2 YES
9 NOT KNOWN

V OPINION OF SOBRIETY
1 HAD NOT BEEN DRINKING
HAD BEEN DRINKING
2 OBVIOUSLY AFFECTED
3 NOT OBVIOUSLY AFFECTED
9 NOT KNOWN WHETHER DRINKING

SKETCH OF LOCALITY

SHOW NORTH WITH AN ARROW:

INSTRUCTIONS

1 LETTER EACH VEHICLE AND SHOW DIRECTION OF TRAVEL BY AN ARROW – A B

2 NUMBER EACH PEDESTRIAN AND SHOW BY – 1

3 USE SOLID LINE TO SHOW PATH OF VEHICLE BEFORE ACCIDENT – A

AND DOTTED LINE AFTER ACCIDENT – A

4 SHOW RAILWAY BY –

NOTE: – SHOW DISTANCE AND DIRECTION TO ANY LANDMARKS, IDENTIFYING THEM BY NAME
– INDICATE WIDTH OF ROAD AND ANY SKIDMARKS ON THE DIAGRAM
– SHOW ALL TRAFFIC CONTROL DEVICES

DESCRIPTION
(DESCRIBE ACCIDENT BRIEFLY)

(REFER TO VEHICLES AND PEDESTRAINS BY THE SAME LETTERS AND NUMBERS AS ON THE SKETCH)
EXCLUDE ANY VERBAL STATEMENT OR ADMISSION

SECTION 80 MCA COMPLIED WITH 1 YES 2 NO — VEH A VEH B VEH C

REPORTED BY: SIGNATURE | NAME (BLOCK LETTERS) | DATE

DISTRICT | STATION | RANK | NUMBER

1 ACCIDENT WAS WITNESSED BY POLICE
2 POLICE ATTENDED SCENE OF ACCIDENT
3 POLICE DID NOT ATTEND SCENE

105A6/77-Z.0

14.23

14.2 APPENDIX 2

Definitions for Coding Accidents

APPENDIX 2

CODING OF ACCIDENT-TYPES

DEFINITIONS FOR CODING ACCIDENTS (1981)

The headings of the columns must be used as the prime classifier of the accident type, then the cells within the column.

Priority in allocating a cell is from left to right (i.e. the columns and cells on the left of the chart should be examined first).

The origins of the vehicles (and pedestrians) and the intended direction of travel must be ascertained to correctly choose the cell.

The cell chosen should describe as accurately as possible the general movement executed by the vehicle/s having the initial collision. The movement is abstracted to the extent of fitting a fixed set of symbols for representation.

The coding chart does not have all conceivable movements but rather the more frequent and useful divisions. When the actual movement can be classified as belonging to a particular column but does not fit one of the existing cells in that column then it should be given the "Other" code for that column.

Vehicle type (e.g. car, bicycle, truck etc.) will be coded as vehicle A, vehicle B from the accident report form.

In some columns some cells can be viewed as subdivisions of another cell for circumstances where actual or intended movements are clearly known (e.g. "right near" is a class of "cross traffic" when it is known that one vehicle is intending to (or did) turn right and the other proceeding straight ahead). When the intended movement is not known then the prime cell should be used (e.g. "cross traffic" is used for vehicles from adjacent approaches colliding at an intersection when it is known that both vehicles were proceeding straight through or it was not known what the intended movement was). The specific prime cells are detailed within the document.

First step - Basic Location Code prior to Accident Types

Before determining the cell to describe the accident the following must be determined.

1. Did the accident occur on a "ROAD"?
2. Was the accident within a "NODE ZONE"?

If the accident was not on a ROAD then it must be ascertained if the accident occurred in -

- a shopping centre
- a parking area (off-street)
- a camping ground.

These areas must however be "locateable", otherwise the accident is uncodeable.

Codes are then assigned as follows -

- ROAD accident in NODE ZONE - Code according to Node type (below)
- ROAD accident on LINK - L
- Non-ROAD accident at Shopping Complex, etc. - H

Then the sketch and narrative on the accident form will be examined to ascertain the appropriate cell to describe the accident. After that and only after that the other responses on the form should be cross checked for consistency for the cell chosen, changes are then made to the responses on the form where appropriate so that the computer edit programs run OK.

NODE types I - Intersection

R - Rail crossing

D - Driveway access

C - Cul de sac

B - State border

ACCIDENT TYPES

0 Pedestrian (on foot, in toy/pram)

"Vehicle hits" includes ped walking into the side of the vehicle.

01. Pedestrian proceeds from kerb or side of carriageway to cross the road and is bit by vehicle from the right. Sup code - median.

02. As above, but pedestrian comes from in front of a parked or stationary vehicle (not a bicycle). Sup codes - vehicle type parked or stationary (e.g. a bus). - median.

03. Pedestrian proceeds from kerb or side of carriageway to cross the road and is hit by a vehicle from the left. Includes any emerging of pedestrian from vicinity of parked or stationary vehicles. Sup codes - for emerging, - median.

04. Pedestrian playing, working, lying, standing, etc. on carriageway is used for person actually working on the road or for persons whose direction of approach onto the carriageway is unknown. Sup code - for each activity.

05. Pedestrian is walking on the carriageway, respectively with or facing

06. the traffic and is hit by a vehicle. Sup code - presence of paved footpath.

07. Pedestrian crosses carriageway on one leg of an intersection, vehicle turning R or L from the parallel carriageway. (Pedestrian walking on prolongation of footpath). Sup code - marked crosswalk. Sup code - R or L.

08. Vehicle runs off carriageway and hits pedestrian on footpath (or verge). Includes accidents between vehicle and pedestrian on the footpath (bicycle hits pedestrian; vehicle from driveway hits pedestrian). Sup codes - to distinguish vehicle leaving carriageway and vehicle moving on footpath - type of driveway.

09. Person walking to/from or boarding a tram. Sup code - safety zone, code TO/FROM, boarding/alighting.

00 Any road accident involving a pedestrian not classified above. Person might be hit by the vehicle he intends to board or has left (with Sup code for vehicle type) but see 01-03.

Prime cell - 01, sub 02
Vehicle reversing with get Sup code.

Note: (a) If pedestrian is crossing road relating to boarding/alighting from vehicle other than a tram, give Sup code to vehicle type for cells 01, 02, 03. Code Bus, Taxi, other.

(b) For train/ped accidents code train as vehicle type.

(c) 01-09 Sup code if pedestrian has stepped from median.

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1. <u>Vehicles from adjacent approaches of intersection</u>

These cells are used for all intersection types viz cross, tee, Y or multi-leg approaches.

This column is for use at intersections only.

11. Vehicles approach from two adjacent approaches, both intending to proceed straight through. Vehicles on right is straight-thru.

12. One vehicle is straight-thru, the other right turning vehicle on the right is right-turning.

13. One vehicle is straight-thru, the other left-turning. Vehicle on the right is left-turning.

14. One vehicle is making or intending a right turn, the other is straight-thru. Vehicle on the right is straight-thru.

15. One vehicle is making right turn, the other is right turning. Vehicle on right is right turning.

16. One vehicle is making a right turn, the other is left-turning. The vehicle on the right is left turning.

17. One vehicle is making or intending a left turn, the other is straight-thru. The vehicle on the right is straight-thru.

18. One vehicle is a left turn, the other is right turning. The vehicle on the right is right turning.

19. One vehicle is making a left turn, the other is left-turning. The vehicle on the right is left turning.

10. Other collisions involving adjacent approaches, e.g. Three vehicles from three approaches in mutual collision; vehicle reversing.

Prime cell - 11, sub 12-19
Intersection type is coded on Accident form, no Sup code needed.

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2. Vehicles from opposing approaches (all locations)

These cells can be used for accidents at all locations e.g. intersections, driveways, median openings, links, etc.

21. Vehicles from opposing directions collide. Includes side-swipes. If a vehicle crosses a median or other separator and hits vehicle travelling in opposite direction still code as this cell

Sup code - median/separator.

Sup code - for straing road or curve.

Sup code - rail crossing.

Note - one or both of the vehicles in collision might be out of control.

22. One vehicle proceeding straight through, the other turning right from the opposing direction.

Sup codes - driveway, median opening.

Sup code - type of driveway.

23. One vehicle turning left, one vehicle turning right from opposing direction.

Sup codes - driveway, median opening

- type of driveway.

24. Both vehicles turning right from opposing directions.

Sup codes - driveway, median opening.

- type of driveway.

20. Other accidents involving vehicles from opposing directions (but see 41 for U turn).

Note: Node or Link is recorded as a separate code.

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3. Vehicles from one approach, same direction

REAR END - vehicles in same lane.

(These can be used at intersections or at driveways on links.)

31. Front vehicle - straight ahead, vehicles must be both going straight ahead in same lane.

32. Front vehicle - left turning or intending to turn. Sup codes as for 22.

33. Front vehicle - right turning or intending to turn. Sup codes as for 22.

In the case of these cells the rear vehicle might itself be turning or intending to turn right or left (e.g. two vehicles in a right turn lane).

Contact with the rear of the front vehicle by the rear vehicle is the criterion regardless of the angle of impact, but vehicles must be in the same lane or partly in the same lane [see also 'LANE' and 'OVERTAKING'].

Prime cell - 31, sub 32, 33.

LANE - vehicles in parallel lanes

(These can be used at Intersections but only when vehicles originate from same approach.)

35. Two vehicles are travelling in same direction straight ahead and one side-swipes the other.

36. Vehicle diverges to the right and hits or is hit by the vehicle in the next lane. If the reason for the lane change is a parked vehicle then use the Sup code, do not code as Overtaking.

37. Vehicle diverges to the left and hits or is hit by the vehicle in the next lane. If the reason for the land change is a parked vehicle then use the Sup code, do not code as Overtaking.
Sup code - parked vehicle.
Prime cell 35, sub 36, 37.

38. Two vehicles are in parallel lanes (marked or unmarked) and vehicle on the left makes (or attempts to) a right turn and hits vehicle in the right lane. The turn should be associated with a driveway, median opening, intersection, etc.
Sup code - driveway, median opening - as for 22
- driveway type. - as for 22.

39. Two vehicles are in parallel lanes (marked or unmarked) and vehicle on the right makes (or attempts to) a left turn and hits vehicle in the left lane. The turn should be associated with a driveway, median opening, intersection etc.
Sup code - driveway, median opening - as for 22
- type of driveway - as for 22.

Notes: - lanes refers to parallel traffic streams, lane marking as such need not exist. There must however be width enough for two lanes, even if unmarked.

30. Other.

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4. Manoeuvring (these can occur at nodes or links)

41. Vehicle makes a U turn; can be struck by vehicle from either direction or strikes a vehicle (including parked vehicles). Includes U turns through a median via a constructed opening (but not U turns across a median at places without a constructed opening). Sup code - median opening, hit opposite dir., same dir., parked vehicle.

42.)

43.) Includes parallel parking and angle parking. One vehicle must be moving in or out of the parking space and the other vehicle in the traffic stream.

Sup code - kerb or centre-of-road parking

Sup code - angle or parallel parking.

44. Vehicle manoeuvring within a parking space (marked or unmarked) and hits vehicle to front or rear. Vehicles to front or rear might also be manoeuvring at the time (do not confuse with RUM 42, 43).

Sup code - as above.

45. Vehicle reverses in traffic stream. Do not use for vehicle reversing from parking space or driveway (see RUM 42, 43, 44, 47).

46. Vehicle reverses (see note at end) into a fixed object on or off carriageway. Fixed object hit is recorded.

47. Vehicle emerges from driveway onto carriageway (vehicle may be travelling forward or reversing).

Sup codes - as for 22.

For vehicles entering driveway use 22, 23, 24, 32, 33, 38, 39.

For pededstrian hit by emerging vehicle use 08.

48. Vehicle emerges from loading bay (forward or reverse). see comments from 47.

Sup code - as for type of driveway.

40. Other

Note: 'Reversing' means driver drives backwards, does not include 'rolling'.

5. OVERTAKING (the vehicle to be overtaken must be a moving vehicle).

Overtaking (for a two lane road) involves a vehicle pulling out into portion of road reserved for opposing traffic, overtaking the lead vehicle and pulling back into the original lane. Both vehicles are in the same lane to start with, overtaking vehicle goes onto the "wrong" side of the road. Cell 53 can apply to a road with two or more lanes available for one direction of travel.

51. Vehicle pulls out to overtake and collides with vehicle from opposite direction. The collision can take place at any time from just pulled-out until the time the vehicle returns to the correct side of the road. The head-on-class includes side-swipes by vehicle travelling in opposite directions.

52. Vehicle pulls out to overtake and loses control. Vehicle might subsequently leave road (if hit by vehicle travelling in opposite direction code as 51).

53. Vehicle pulls out to overtake a moving vehicle in the same lane and is hit by vehicle coming from behind which itself is in the overtaking process. [The vehicle furthest back could itself be in the process of overtaking in the case of a two-lane road or could be travelling in the adjacent lane in the case of a road with two or more lanes available for the direction involved. This latter case requires a Sup code.]

54. Vehicle, at the end of its overtaking manoeuvre, cuts in on the overtaken vehicle.
Sup code - presence of opposing direction vehicle.

55. Vehicle is pulling out to overtake but hits/clips the vehicle in front.

50. Other overtaking.

Note: see 36, 37 for diverging accidents due to avoidance of parked vehicle.

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6. ON PATH

61. Vehicle collides with rear or side of vehicle parked on left side of road (parallel or angle parking)

- If street is one-way then collisions with vehicles parked on the right side of road are included. Centre-of-road parked vehicles are included.
- If the collision is with an opened door of the parked vehicle then 64 is used.
- The vehicle hit must be actually parked, for vehicles moving in or out of parking space see 42 & 43.

Sup code - angle or parallel parking, as for 42.
Vehicle type of parked vehicle should be recorded.

62. Same points as above. The vehicle hit must be actually double parked (see note at bottom). Sup codes as above.

63. Includes hitting the disabled vehicle and/or any police car, tow truck, ambulance, etc. attending the disabled vehicle.

64. Vehicle hits open door of stationary or parked vehicle.

65. Striking bridge, bridge abutment, tree, fixed object etc. where they are actually on the carriageway and cause a reduction in usable carriageway. Where reduction in carriageway does not occur, accident is classified in column 7 or column 8. Object hit is recorded.

66. The initial event must be a vehicle hitting temporary roadworks e.g. pile of dirt, excavation, signs and barriers. Roadworks must be on carriageway.

67. Vehicle hits object on carriageway, which is a non-fixed object (e.g. fallen rocks, crates, fallen trees, etc.). Object hit is recorded.

60. Other.

Note: A vehicle is double parked if the driver is absent otherwise the vehicle is 'standing'.

7. OFF PATH, on straight

These accidents can occur at nodes or links.

Notes: If a 'road' is divided by presence of traffic island, safety zone, median or separator then on each side of that device is a carriageway. Hence vehicles leaving the carriageway may mount the traffic island, median, etc. When the vehicle hits an object on the device cells 72, 74 are used and the object hit off carriageway is recorded. Sup codes are given for each device.

When the vehicle mounts the device and then proceeds onto the other carriageway a Sup code will be used.

For cases when a vehicle crosses a median and hits a vehicle travelling in the opposite direction see cell 21.

71. Vehicle loses control and runs off road to the left. Note similar cell for curves in column 8.
See notes at top.

72. As for 71, but vehicle hits object after leaving carriageway. Object hit is recorded.

73. Vehicle loses control and runs off road to the right.

74. As for 73, but vehicle hits object after leaving carriageway. Object hit is recorded.

75. Vehicle loses control but does not leave the carriageway (e.g. rolls over). Note - see cell 85 for similar accident on curve. Sup code for "kerb hit" on left or right (each coded). If the kerb is associated with traffic island, safety zone, median or separator then give further Sup code.

70. Other off path on straight (e.g. vehicle goes straight ahead from stem of tee at Tee junction or off end of cul-de-sac).
Sup codes 71-75
- device hit/mounted
- object hit
- left or right kerb
- if vehicle proceeds onto second carriageway.

This group can be used at roundabouts.

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8. <u>OFF-PATH on curve</u>

These accidents can occur at a bend/curve or if associated with a bend. They can also be at nodes or links.

<u>Notes:</u> If a 'road' is divided by presence of traffic island, safety zone, median or separator then on each side of that device is a carriageway. Hence vehicles leaving the carriageway may mount the traffic island, median, etc. When the vehicle hits an object on the device cells 82, 84 are used and the object hit off carriageway is recorded. Sup codes are given for each device.

When the vehicle mounts the device and then proceeds onto the other carriageway a Sup code will be used.

For cases when a vehicle crosses a median and hits a vehicle travelling in the opposite direction see cell 21.

81. A vehicle negotiating a RIGHT HAND bend loses control and runs off the carriageway to either the left or the right.
Sup codes for right and left.
Sup code if median, traffic island etc. mounted.

82. As for 81, but object is hit after leaving the carriageway. Object hit is recorded.
Sup code for right and left.
Sup code if median, traffic island etc. mounted.

83. As for 81, but for LEFT HAND bend.
Sup code for right and left.
Sup code for median, traffic island, etc. mounted.

84. As for 83, but hits object after leaving carriageway. Object hit is recorded.
Sup code for right and left.
Sup code if median, traffic island etc. mounted.

85. Vehicle goes out of control on RIGHT or LEFT bend but does not leave carriageway.
Sup code for Right and Left.
Sup code for "kerb hit".
Sup code for traffic island, median etc. if kerb hit is on same.
Sup code for Railway Crossing.

80. Other off-path on curves.
81-85 Sup codes as for 71-75.
This group is not used at roundabouts.

9. PASSENGER & MISCELLANEOUS

91. Passenger falls in or from vehicle. Vehicle can be stationary or moving. Includes passengers on motorcycles, bicycles, animals, buses, trams. Vehicle type is recorded.

92. Load or missile strikes vehicle. Load actually falls from one vehicle onto another vehicle. If load is on the road before vehicle collides with it then it is 68.

93. Vehicle strikes train on a crossing, normally, or if line is actually in the roadway it may collide at other than a crossing.

94. Vehicle hits part of railway crossing furniture, but does not hit the train. Give this code also if barrier arm or boom hits the vehicle.

95. Only riderless animals are involved. Ridden animals and animal-drawn conveyances are classified as vehicles. Sup code - animal, on/off carriageway.

96. Parked vehicle Ran away. Driverless vehicle may be involved in many of the cells already described but due to the lack of a driver all such collisions are given this code. Type of vehicle is recorded.

97. 'Not known' is used when no description is given about the movement of the road users. Forms should be returned to the Police District to obtain further information whenever practicable.

90. Other - when accident does not fit the cells or the 'column other', then give this code.

Acc.-type

01 - 03 If associated with boarding/alighting from other than tram Code Bus Taxi Other (see list at end).

01 - 09 Code M - if ped. stepped off median

02 Cod veh. type, ped. walk from/around (see list at end).

03 Code E for emerging, and veh. type as for 02

04 Code 1 Playing
- 2 Walking
- 3 Lying
- 4 Standing
- 5 not known

05 Code 0 - no paved footpath
- 1 - paved footpath present

06 as for 05

07 Two column code
- (1) M - marked crosswalk
  - 0 - no marked crosswalk
- (2) L - left turning
  - R - right turning

08 Two column code

(1) Veh. moving forward	Veh. moving backward
Code A - under control	D - under control
B - out of control	E - out of control
C - moving along footpath	F - moving along footpath

- (2) Type of driveway
  - H - Hostel, Motel, Hotel
  - P - Private
  - F - Factory
  - C - Commercial (includes school, station)

09 Code S for safety zone
- T/F, To/From
- B/A, Boarding/Alighting

00 Code R if veh. reversing

21 Code M for median

S for separator

T for straight

C for curve

R for railway crossing

22 Two column code

(1) Code D for Driveway

M Median (opening)

L Lane

(2) Type of Driveway

H - Hostel, Hotel, Motel

P - Private

F - Factory

C - Commercial (includes school, station)

23 as for 22

24 " " "

32 as for 22

33 " " "

36 Code - P for presence of parked vehicle (i.e. the reason for the lane change).

37 see 36

38 see 22

39 see 22

41 (1) Code M Median opening

(2) Code O opposite direction

S same direction

P parked vehicle

42 Two column code

(1) Code C - centre of road

K - kerb

(2) A - angle parking

P - parallel parking

47 see 22

48 Code as for type of driveway (see 22)

53 For road with two or more lanes available for direction involved

Code A vehicle behind is in adjacent lane

54 Code O presence of opposing direction vehicle

61 see 42

62 " "

75 Three column code

(1) L - left

R - right

(2) Device

0 - none

1 - traffic island

2 - safety zone

3 - Median

4 - separator

5 - roundabout

(3) Object hit (see list at end)

71-75 Device hit/mounted is coded as in column 2 in 75 above

Code M - if veh mounts the device

X - if veh proceeds across the device into the second carriageway

Code - object hit (see list at end)

81-84 Codes as for 71-75 above

85 Codes 75 above

95 Code animal (see list at end)

Code I/O, on/off carriageway

Basic Location Codes

Nodes + 10m

Code I - intersection

D - driveway, access to Regional Shopping Centre

R - railway crossing

C - cul de sac

B - state border

Link All other locations between two nodes

Code L

Regional Shopping Centres, etc.   Code - H

Vehicle Types   Car, station wagon
- Taxi, hire car
- Utility, panel van
- Articulated veh. (semi)
- Truck (excl. semi)
- Bus
- Motor cycle/scooter
- Bicycle
- Horse drawn, ridden
- Tram
- Rail train, trolley, etc.
- Emergency vehicle
- Other vehicle
- Not known

Object hit   Off carriageway -

1 Poles (telephone, electricity, light)
2 Tree
3 Fences and walls
4 Guide posts
5 Traffic sign (inc. post)
6 Traffic signal (inc. pole)
7 Guard rail/crash rail
8 Fire hydrant
9 Building
10 Bridge
11 Motor Vehicle

13 Other

On carriageway

14 Median

15 Kerb

16 Bridge

17 Traffic island

18 Safety zone

19 Tree

20 Guard rail/crash rail

21 Pole

22 Other

Subsequent objects hit

Code as above

Animals Stock (cows, sheep, horses, etc.)

Wild (kangaroos, wild horses, etc.)

Other

Road Types Arterial

Sub-arterial/distributor

Local, residential

DEFINITIONS FOR CODING ACCIDENTS - FIGURE

PEDESTRIAN on foot in toy / pram	INTERSECTION vehicles from adjacent approaches	VEHICLES FROM OPPOSING APPROACHES	VEHICLES FROM ONE APPROACH same direction	MANOEUVRING	OVERTAKING	ON PATH	OFF PATH ON STRAIGHT	OFF PATH ON CURVE	PASSENGER AND MISCELLANEOUS
NEAR SIDE 01	CROSS TRAFFIC 11	HEAD ON 21	Vehicles in same lane REAR END 31	U TURN 41	HEAD ON 51	PARKED 61	OFF CARRIAGEWAY TO LEFT 71	OFF CARRIAGEWAY RIGHT BEND 81	FELL IN/FROM VEHICLE 91
EMERGING 02	RIGHT FAR 12	RIGHT THRU 22	LEFT REAR 32	LEAVING PARKING 42	OUT OF CONTROL 52	DOUBLE PARKED 62	LEFT OFF CARRIAGEWAY INTO OBJECT 72	OFF RIGHT BEND INTO OBJECT 82	LOAD OR MISSILE STRUCK VEHICLE 92
FAR SIDE 03	LEFT FAR 13	RIGHT LEFT 23	RIGHT REAR 33	PARKING 43	PULLING OUT 53	ACCIDENT OR BROKEN DOWN 63	OFF CARRIAGEWAY TO RIGHT 73	OFF CARRIAGEWAY LEFT BEND 83	STRUCK TRAIN 93
•PLAYING, •WORKING, •LYING, •STANDING, ON CARRIAGEWAY 04	RIGHT NEAR 14	RIGHT RIGHT 24	34	PARKING VEHICLES ONLY 44	CUTTING IN 54	CAR DOOR 64	RIGHT OFF CARRIAGEWAY INTO OBJECT 74	OFF LEFT BEND INTO OBJECT 84	STRUCK RAILWAY CROSSING FURNITURE 94
WALKING WITH TRAFFIC 05	TWO R TURNING 15	25	Vehicles in parallel lanes LANE SIDE SWIPE 35	REVERSING 45	PORE 55	PERMANENT OBSTRUCTION 65	OUT OF CONTROL ON CARRIAGEWAY 75	OUT OF CONTROL ON CARRIAGEWAY 85	ANIMAL 95
FACING TRAFFIC 06	16	26	LANE CHANGE RIGHT 36	REVERSING INTO FIXED OBJECT 46	56	TEMPORARY ROADWORKS 66	76	86	PARKED CAR RUN AWAY 96
L OR R TURNING VEHICLE 07	LEFT NEAR 17	27	LANE CHANGE LEFT 37	DRIVEWAY 47	57	STRUCK OBJECT ON CARRIAGEWAY 67	77	87	VEHICLE MOVEMENTS NOT KNOWN 97
ON FOOTPATH 08	18	28	RIGHT TURN S/S 38	LOADING BAY 48	58	68	78	88	98
STRUCK WHILE BOARDING OR ALIGHTING 09	19	29	LEFT TURN S/S 39	49	59	69	79	89	99
OTHER 00	OTHER 10	OTHER 20	OTHER 30	OTHER 40	OTHER 50	OTHER 60	OTHER 70	OTHER 80	OTHER 90

14.3 APPENDIX 3

Sources of Definitions

The following are a sample of definitions used around the world in connection with road traffic accidents.

1. W.H.O. (1977) has in its Manual of the "International Statistical Classification of Diseases, Injuries and Causes of Death", a section dealing with definitions and examples related to transport accidents. Twenty-one items are defined and the accidents are in the following broad classes -

E800 - E807	Railway Accident
E810 - E819	Motor vehicle traffic Accidents
E820 - E825	Motor vehicle nontraffic accidents
E826 - E829	Other road vehicle accidents
E830 - E838	Water transport accidents
E840 - E848	Aircraft and spacecraft

Some of the items defined are -

The definition of a "transport accident" is any accident involving a device designed primarily for, or being used at the time primarily for, conveying persons or goods from one place to another.

A motor vehicle accident is a transport accident involving a motor vehicle. It is defined as a motor vehicle traffic accident or a motor vehicle nontraffic accident depending if the accident is on a public highway or elsewhere.

A public highway (trafficway) or street is the entire width between property lines (or other boundary lines) of every way or place of which any part is open to the use of the public for the purposes of vehicular traffic as a matter of right or custom.

A roadway is that part of the public highway designed, improved and ordinarily used, for vehicular traffic.

A motor vehicle is a mechanically or electrically powered device, not operated on rails, upon which any person or property may be transported or drawn upon a highway.

An other road vehicle is any device, except a motor vehicle, in, on, or by which any person or property may be transported on a highway. (includes animal drawn vehicle, ridden animal, pedal cycle, a tram.

The types of motor vehicle traffic accidents are-

E810	Collision with train
E811	Re-entrant collision with another motor vehicle (i.e. veh. leaves and re enters same roadway or enters the opposite roadway on a divided highway)
E812	Other collision with another motor vehicle (inc. hits parked veh.)
E813	Collision with other vehicle
E814	Collision with pedestrian
E815	Other collision on highway (e.g. hits object, animal etc. on highway)
E816	Accident without collision on the highway (due to loss of control) [includes-failing to make curve; overturning; colliding with object off the highway.]
E817	Non collision, while boarding or alighting [private & public transport but not trams]

E818	Other non collision (e.g. fire; object falls or thrown;)
E819	Accident of unspecified nature

A fourth digit can be used with the categories above to identify the injured person. The codes are

.0	Driver of motor vehicle, other than motorcycle
.1	Passenger in " " "
.2	Motor cyclist
.3	Passenger on motorcycle
.4	Occupant of tram
.5	Rider of animal, occupant of animal-drawn vehicle
.6	Pedal cyclist
.7	Pedestrian
.8	Other specified person (e.g. occupant of vehicle other than above)
.9	Unspecified person

The types of motor vehicle <u>non traffic</u> accidents are -

E820	Involving motor driven snow vehicle
E821	Involving other <u>off road</u> motor vehicle
E822	Other collision with moving object
E823	Other collision with stationary object
E824	While boarding or alighting
E825	Other and Unspecified nature

The same injured person codes as for the traffic accident can be used.

The types of Other Road vehicle accidents are -

E826 Pedal cycle accident. (includes breakage of cycle; collision with another cycle, pedestrian, non-motor vehicle, objects, etc; fall from)

E827 Animal-drawn vehicle accident. (includes collision with non motor vehicles (except pedal cycle), pedestrians, objects).

E828 Animal being ridden. (includes collision with non motor vehicles [except pedal cycle and animal-drawn vehicles], pedestrian, objects, etc; fall from)

E829 Other road vehicles - includes

boarding or alighting) tram, or
)
derailment) non motor vehicle not
)
fall in, from) classifiable to E826 to
E828

collision between tram (or non motor vehicle), except

as in E826 to E828

and animal

other non motor vehicle [not classifiable E826 to E828]

pedestrian

object

The person injured codes for categories E826 to E829 are -

.0	Pedestrian
.1	Pedal cyclist
.2	Rider of animal
.3	Occupant of animal-drawn vehicle
.4	Occupant of tram
.8	Other specified person
.9	Unspecified person

2. The UN Convention on Road Traffic (1968) includes in its definitions the following -

- Road - means the entire surface of any way or street open to public traffic

- Carriageway - the portion of a road normally used by vehicular traffic; a road may comprise several carriageways.

- Intersection - any level cross-road, junction or fork, including the open areas formed by such cross-roads, junctions or forks.

- Power-driven vehicle - self propelled road vehicle, other than a moped, and other than a rail-borne vehicle

- Motor vehicle - any power driven vehicle which is normally used for carrying persons or goods by road or for drawing, on the road, vehicles used for the carriage of persons or goods.

- Driver - Any person who drives a motor vehicle or other vehicle (including a cycle) or who guides cattle, singly or in herds, or flocks, or draught, pack or saddle animals on a road:

3. The U.N. E.C.E. (1974) in its Bulletin of Road traffic accidents in Europe defines the following -

<u>Accidents</u>

Accidents included (in the Tables) are those -

(a) which occurred or originated on a way or street open to public transport

(b) which resulted in one or more persons being killed or injured (see later definitions) and,

(c) in which at least one moving vehicle was involved

. Killed - killed outright or who died with 30 days as a result of the accident [note not all the countires comply with this definition]

. Injured - Person, who was not killed, but sustained one or more serious or slight injuries as a result of the accident.

. Serious injuries - Fractures, concussion, internal lesions, crushing, severe cuts and laceration, severe general shock requiring medical treatment and other serious lesions entailing detention in hospital

. Slight injuries - Secondary injuries much as sprains or bruises. Persons complaining of shock, but who have not sustained other injuries, should not be considered in the statistics as having been injured unless they show very clear symptons of shock and have received medical treatment or appeared to require medical treatment.

4. U.N. E.C.E. (1979) in its bulletin of Transport Statistics for Europe includes the following definitions

. Road - line of communication open to public traffic primarily for the use of road motor vehicles running on their own wheels

Carriageway - part of the road intended for the movement of road motor vehicles; the parts of the road which form a shoulder for the lower or upper layers are not part of the roadway, ... The width of a carriageway is measured perpendicular to the axis of the road.

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5. "COLLECTION OF ACCIDENT STATISTICS - INTERSTATE"

The following definitions were prepared following a meeting between representatives of COSTCE and CBR at the office of the Victorian Traffic Commision on 11 March 1970.

(1) The following is an initial list of items to be defined:-

- (a) Motor vehicle.
- (b) Non-motor vehicle.
- (c) Pedestrian.
- (d) Parked vehicle.
- (e) Object.
- (f) Road (and/or Carriageway).
- (g) Driver/Rider.
- (h) Passenger.
- (i) Road traffic accident.
- (j) Road traffic death.
- (k) Road traffic fatal accident.
- (l) Road traffic injury.
- (m) Road traffic injury accident.
- (n) Road traffic non-injury.
- (o) Road traffic non-injury.
- (p) Road traffic casualty.
- (q) Road traffic casualty accident.
- (r) Intersection accidents.
- (s) Between-Intersection acidents.

(NOTE: There is no significance in the ordering of the items).

(2) The following are suggested definitions of the above items:-

(a) Motor vehicle:- any vehicle designed to be self-propelled, and includes any vehicle designed to be propelled by electric power obtained from overhead wires but not operated upon rails.

(b) Non-motor vehicles:- includes trams, pedal cycles, animal-drawn vehicles and ridden vehicles.

(NOTE: Non-ridden animals, even if led, are not regarded as vehicles but as animals. Prams, invalid chairs, tricycles, toy vehicles and persons pushing barrows, etc. do not constitute vehicles).

(c) Pedestrian:- means any person on foot, on or in a toy vehicle or in a pram or similar. (Note: A distinction should be made between pedestrians on the roadway (carriageway) and not on the roadway).

(d) Parked vehicle:- Is a stationary road vehicle other than one stopped momentarily in a traffic flow.

(e) Object:- Means any stationary feature, other than a road vehicle, with which a road vehicle collides while it is travelling along a road/carriageway. (Note: A distinction is to be made between the vehicle leaving the road first before hitting the object and the vehicle hitting an object on the road).

(f) Road (and/or carriageway):- any thoroughfare open to the public by right or custom. Excludes off-street parking, access areas and other private property not regarded as a thoroughfare, e.g., railway yards, wharves, sports areas, etc. (Carriageway - portion of a road imporved, designed or ordinarily used for vehicular traffic and includes the shoulders and areas at the sides or centre of the carriageway used for the standing or parking of vehicles, including parking embayments; and if a road has two or more such portions divided by a reservation or reservations, carriageway means each portion separately).

(g) Driver/Rider:- any person driving/riding, or in control of, a vehicle.

(h) Passenger:- any person, other than the driver, who at the time of the accident was in, on, alighting, or falling from a vehicle.

(i) Road traffic accident:- is an accident which follows from the movement of at least one road vehicle on a road, was reported to the police, and resulted in a casualty or a non-injury.

(j) Road traffic death:- recorded when any person is killed at the time of a road traffic accident, or succumbs to injuries received in a road traffic accident up to 30 days after the accident.

(k) Road traffic fatal accident:- recorded when one or more death, as defined in (j) above, occurs as the result of the accident.

(l) Road traffic injury:- is a bodily injury suffered as a result of a road traffic accident.

The injuries to be classed as - (i) when the person is admitted to hospital; (ii) the person receives treatment from a medical practitioner.

(m) Road traffic injury accident:- is an accident in which any person is injured as defined in (l) above. (Note: An accident is classed by the most severe result, i.e., if there is one death and six injuries, the accident is classed as a fatal accident; if there is one person injured, as per definition (l), and six persons unharmed, the accident is classed an injury accident).

(n) Road traffic non-injury:- is recorded for those cases except those defined by (j) and (l) above. (Note: This includes persons with an injury who receive first aid treatment from other than a medical practioner; persons with no injuries at all (these are also referred to as property damage accidents).

(o) Road traffic non-injury accident:- is recorded for accidents except those defined by (k) and (m) above.

(p) Road traffic casualty:- a casualty is a person who either died or was injured as per definitions (j) and (l).

(q) Road traffic casualty accident:- a casualty accident is one in which a person either died or was injured, and is generally the sum of definitions (k) and (m).

(r) Intersection accidents:- intersection type accidents are regarded as having occurred within 30 feet of the intersection.

(s) Between-intersection accidents:- all other accidents except those occurring as defined in (r) above.

(3) Once some agreement has been reached on definitions it would be possible to make interstate comparisions, with caution.

(4) To compare accidents more closely it becomes necessary to look at accident types. At present, various names are used to describe similar or the same type of accident. It appears the easiest solution would be to draw up illustrations of the movements of the vehicles involved in an accident - as is used in a collision diagram. To illustrate this, attached is a copy of the coding of "Road user movements" currently used by the Traffic Commission in its Accident Location System.

(5) One has to define one's use of the accident statistics at this point and the "R.U.M." coding is designed for engineering evaluation whereas some alternative might be required for "publicity" or driver blaming purposes.

6. Watkins (1971) proposed the following Definitions and Accident-Types for use in Australia

A. The item 'Road (and/or Carriageway)' has been divided into the two items 'Road' and 'Carriageway' for consistency with the Australian Standard A16-1965 of the Standards Association of Australia. The definition of intersection used in item 9 is also taken from the same reference.

B. Items one (1) and eleven (11) have been defined using international definitions. The definition of motor vehicle, 1, is that adopted by the 19th World Health Assembly in 1965 (Ref.4), while the 30-day definition of a road traffic death, 11, is in accordance with the definition adopted by the United Nations Economic Commission for Europe Working Party on Road Traffic Safety (previously the Working Party on the Prevention of Road Traffic Accidents) (Ref.5)

C. Following is the list of suggested items requiring definition with proposed definitions

ITEM	DEFINITION
1. Motor vehicle	is any mechanically or electrically powered device not operated on rails, upon which or by which any person or property maybe transported or drawn.

2. Non-motor vehicle — is any vehicle other than a motor vehicle. Includes trams, trains, pedal cycles, animal drawn vehicles, and ridden animals.

Note to 1 and 2: non-ridden animals, even if led, are not regarded as vehicles but as animals. Prams, invalid chairs, tricycles, toy vehicles and persons pushing wheelbarrows, etc., do not constitute vehicles. Any trailer, caravan or other attachment being towed by a vehicle is considered to be part of that vehicle.

3. Pedestrian — means any person on foot, on or in a toy vehicle or in a pram or similar. Includes persons pushing wheelbarrows, etc.

Note to 3: A distinction should be made between pedestrians on the carriageway and not on the carriageway, when describing pedestrian movements.

4. Driver/rider — is any person driving/riding, or in control of a vehicle, or such person falling from a vehicle.

5. Passenger — is any person, other than the driver, who at the time of the accident was in, on, alighting, or falling from a vehicle.

Note to 5: Any person who at the time of the accident was attempting to board a vehicle is a pedestrian not a passenger. A passenger on a motor cycle is termed a pillion rider. A person being illegally carried on a bicycle is a pedal cyclist.

6. Parked vehicle — is a stationary vehicle other than one stopped in traffic.

7. Object — means any feature, other than a vehicle, pedestrian or animal, with which a vehicle collides.

Note to 7: A distinction should be made between the vehicle hitting a fixed (permanent) object on the carriageway including those along the edges of the carriageway and a loose (temporary) object which happens to be on the carriageway. Trailers, caravans and other attchments when not attached to a vehicle are considered to be objects.

8. Road — is any thoroughfare open to the use of the public, including footways or other public places if such exist; i.e., the whole width between abutting property boundaries where the road is in a surveyed road reserve.

Note to 8: Excludes off-street parking, access areas and other private property not regarded as a thoroughfare, e.g., railway yards, wharves, sports areas, off-street shopping centre parking areas, etc.

9. Carriageway — is a portion of a road improved designed or ordinarily used for vehicular traffic and includes the shoulders and areas at the sides or centre of the carriageway used for the standing or parking of vehicles (including parking bays, and, if a road has two or more such portions divided by a median or medians, carriageway means each portion separately).

10. Road traffic accident — is any event that results in injury or property damage attributable directly or indirectly to the movement of a vehicle on a road.

11. Road traffic death	is recorded when a person is killed at the time of a road traffic accident, or whose death within 30 days of the accident is attributable to a road traffic accident.
12. Road traffic injury	is a bodily injury suffered as a result of a road traffic accident, which does not result in death within 30 days.

Note to 12: Persons who are either admitted to hospital or receive medical treatment are recorded as having suffered a road traffic injury.

13. Road traffic casualty	is recorded for persons who either died or were injured as defined in 11 and 12.
14. Road traffic non-casualty	is recorded for persons other than those defined by 13.

Note to 14: Persons receiving only first aid treatment are not recorded as having suffered a road traffic injury.

15. Road traffic fatal accident	is recorded when one (or more) deaths as defined in 11, occurs as a result of an accident.
16 Road traffic injury accident	is a road traffic accident in which any person is injured as defined 12, but no fatality occurred.
17. Road traffic casualty accident	is a road traffic accident in which a person either died or was injured as defined by 11 and 12.
18 Road traffic non-casualty accident (property damage accident)	is recorded for accidents except those defined by 17.

Note to 15, 16 and 18: An accident is classed by the most severe result; i.e., if there is one death and six injuries, the accident is classed as a fatal accident; if there is one person injured, as in 12, and six persons unharmed, the accident is classed as an injury accident.

19. Intersection accident	is an accident regarded as having occurred within 30 (thirty) feet of the intersection.

Note: intersection is the place at which two or more roads cross (see defn. 8).

20. Non-intersection accident	are all other accidents, except those occurring as defined in 19.
21. Type (nature) of accident	Proposed are fourteen types in two groups, single vehicle — initial event involves only one vehicle, and vehicle to vehicle collision — initial event involves two vehicles.

SINGLE VEHICLE ACCIDENT

21.1 Struck pedestrian	Initial event involves vehicle or (see also 21.4)projection of vehicle striking pedestrian.
21.2 Struck animal	Initial event involves vehicle striking animal on carriageway.
21.3 Struck object on road	Initial event involves vehicle striking object, either temporary or permanent, without leaving carriageway.

Note to 21.3: Includes accidents involving vehicles striking overhead bridges.

21.4	Ran off road and struck object	Initial event involves vehicle leaving carriageway, followed by collision with object, pedestrian, animal or vehicle
21.5	Ran off road, no object struck	Initial event involves vehicle leaving carriageway without overturning or striking object.
21.6	Overturned on road	Initial event involves vehicle overturning without striking object on carriageway or leaving carriageway

Note to 21.6: Motor cyclist (or bicyclist) falling off motor cycle (or bicycle) without having a collision with an object or other vehicle constitutes an 'overturned on road'

21.7	Person fell from moving vehicle	Initial event involves a person falling from a moving vehicle without vehicle having a collision with an object or other vehicle
21.8	Other	Single vehicle 'Other' accidents include (a) passenger injured by vehicle making sudden stop with no collision occuring (c) articulated vehicle jack-knifing or its load shifting and injuring driver, with no collision occurring

Vehicle-to-Vehicle Collision

21.9	Rear end collision	Initial event involves vehicles travelling in the same direction in the same road before collision. It can involve a left-turning or right-turning vehicle.
21.10	Sideswipe same direction collision	Initial event involves vehicles travelling in the same direction in the same road before collision. It can involve an overtaking vehicle, a left-turning or a right-turning vehicle but the impact must be along the side of one of the vehicles.

Note to 21.10: A cyclist striking an open car door is a sideswipe same direction collision.

21.11	Head-on collision	Initial event involves vehicles travelling in the same road but in opposite directions.

21.12 Sideswipe opposite direction collision — Initial event involves vehicles travelling in the same road in opposite directions with the impact being along the sides of the vehicles.

Note to 21.11: a vehicle stationary to the left of centre of the carriageway waiting to make a right turn struck by an oncoming vehicle is a head-on or sideswipe opposite direction collision. A turning vehicle swinging wide on a left turn or cutting the corner on a right turn and striking a vehicle going straight ahead on the intersecting road, constitutes a head-on or sideswipe opposite direction collision.
Two turning vehicles colliding at an intersection would be involved in a head-on or sideswipe opposite direction collision.

21.13 Angle collision — Initial event involves vehicles travelling in different roads before collision, or one vehicle leaving private driveway.

Note to 21.13: A vehicle making a right turn across oncoming traffic when struck by an approaching vehicle constitutes an angle collision unless the right turning vehicle is stationary and to the left of centre of the carriageway in which case it would be a head-on or sideswipe opposite direction collision. Collisions involving angle parked vehicles are classed as angle collisions.

Collisions involving U-turning vehicles are classed as angle collisions.
Collisions between a train or railway trolley and a vehicle at a railway crossing are classed as angle collisions.

21.14 Other — Multi-vehicle 'Other' collisions include:

(a) object falling or coming detached from one vehicle and striking another, and
(b) object thrown up from carriageway by passing vehicle and striking another.

7. Definitions/Notes of ABS (1978), Victorian office

The following are to be found in the ABS publication (catalogue No. 9402.2) "Road Traffic Accidents involving Casualties - Victoria" - issued by the Victorian office (1978)

1. The publication contains statistics of road traffic accidents involving casualties as reported to the police, which resulted in:

   (a) The death of any person within a period of 30 days of the accident; or

   (b) bodily injury to any person to an extent requiring surgical or medical treatment.

2. A road traffic accident is, for statistical purposes, defined as follows:

   (a) The accident occurred on any road, street, thoroughfare, etc., open to the public, including railway level crossings; and

   (b) that it involved any road vehicle (e.g. motor car, tram, ridden animal, etc) which at the time of the accident was in motion.

8. Definitions associated with the Victorian 513 Form Folder

On the Folder cover for the 1977 Edition of the 513/513A form the following is found:

INJURY

"Other injured requiring medical treatment" applies to persons receiving treatment from a medical practioner althought not admitted to hospital.

"Other injured not requiring medical treatment" includes persons receiving only first aid at the scene.

9. The Australian National Road Traffic Code (1976) includes in its definitions-

. Road - means any highway, or any road or street open to or used by the public, and includes every carriageway, footway, reservation and traffic island on any highway or on any such road or street.

. Carriageway - portion of road improved, designed or ordinarily used for vehicular traffic, and includes the shoulders and areas at the side or centre of the carriageway used for the standing or parking of vehicles, including parking embayments, and, if a road has two or more of such portions divided by a reservation or reservations, 'carriageway' means each portion separately.

. Intersection - place where two or more roads, intersect or join and includes the area where vehicles travelling on different joining or intersecting roads may collide.

. Vehicle - any conveyance or other device designed to be propelled or drawn by any means, includes an articulated vehicle, a bicycle and a tram-car and where the context permits, includes an animal driven or ridden, but does not include a train.

. Motor vehicle - any vehicle designed to be self-propelled, and includes any vehicle designed to be propelled by electric power obtained from overhead wires but not operated upon rails.

. Pedestrian - any person on foot, or in a toy vehicle, or in a perambulator.

When released in 1964, the Foreword to the Code stated that it was in conformity with the provisions of the 1949 UN Convention on Road Traffic.

10. The U.S.A. Manual on Classification of Motor Vehicle Traffic Accidents (1970) includes the following definitions -

. Trafficway - the entire width between property lines, or other boundary lines, of every way or place, of which any part is open to the public for the purposes of vehicular travel as a matter of right or custom.

. Roadway - that part of a trafficway designed, improved, and ordinarily used for vehicular travel. In the event the trafficway includes two or more separate roadways, the term "roadway" refers to any such roadway separately, but not to all such roadways collectively.

. Road - that part of a trafficway which includes both the roadway and any shoulder alongside the roadway.

. Intersection - the area embraced within the prolongation of the lateral kerb lines or, if none, then the lateral boundary lines of the roadway of two trafficways which join one another within which vehicles travelling upon different trafficways may come into conflict. Where a trafficway includes two roadways thirty feet or more apart, then every crossing of each roadway of such divided trafficway by an intersecting trafficway shall be regarded as a separate intersection. In the event such intersecting trafficway also includes two roadways thirty feet or more apart, then every crossing of two roadways of such trafficways shall be regarded as a separate intersection.

. Driveway Access - a roadway by which motor vehicles may enter or leave a trafficway and limited to that portion that is entirely within the confines of the trafficway.

. Motor vehicle - any mechanically or electrically powered device, not operated on rails, upon which or by which any person or property may be transported or drawn upon a highway.

- Other road vehicle - any device (except a motor vehicle or a pedestrian conveyance) in, upon, or by which any person or property may be transported upon a landway or place, such as a trafficway, (includes tram, ridden animal etc)

- Driver - the operator of any motor vehicle or other road vehicle. Other occupants of devices are passengers.

- Pedestrian - any person not in or upon a motor vehicle or other road vehicle

- In Transport - is the state or condition of a vehicle when it is in use primarily for moving persons or property (including the vehicle itself) from one place to another, and is -

  1. In motion; or
  2. In readiness for motion; or
  3. On a roadway, but not parked in a designated parking area.

- Motor vehicle accident - an accident involving a motor vehicle in transport.

- Motor vehicle traffic accident - any motor vehicle accident that occurs on a trafficway or that occurs after the motor vehicle runs off the roadway but before events are stabilised.

- Other road vehicle accident - an accident involving another road vehicle in transport.

- At-Intersection accident - any motor vehicle traffic accident in which the initial impact occurs within the limits of an intersection.

- Intersection - related Accident - any motor vehicle traffic accident occurs on the approach to or exit from an intersectin which results from an activity, behaviour, or control affecting motor vehicle movement through the intersection which, in turn, affects motor vehicles on the approach to or exit from the intersection.

- Non-junction Accident - a motor vehicle accident that is not an intersection accident, intersection - related accident, or a driveway access accident.

Note - These location oriented accidents are stated in terms of "motor vehicle", the same interpretations are applicable to "other road vehicle" traffic accidents. The same applies to the severity categories.

SEVERITY [all severities, judged at the scene and NOT on medical examination afterward]

• Fatal - any injury that results in death within 12 months of the motor vehicle traffic accident. [This is the only case for altering the initial classification.]

• Incapacitating injury - an injury that prevents the injured person from walking, driving etc. [Determined at the time the person leaves the accident scene, hospitalisation normally would be required for incapacitating injuries, which include - severe lacerations, broken limbs, internal injuries unconcious when taken from the scene, crushed chest etc.]

• Non-incapacitating Evident Injury - any injury which is evident to any observer at the scene (other than the above) [includes - lump on head, abrasions, minor lacerations].

• Possible injury - any injury reported or claimed which is none of the above [injuries claimed or reported, or indicated by behaviour, but not by wounds. Includes limping, nausea, hysteria].

• No injury - No reason to believe that the person received any bodily harm in the accident. [Includes - confusion, anger and internal injuries unknown until after leaving the scene.]

The classification may be abbreviated by combining the three degrees of injury, producing:-

1. Fatal accident
2. Nonfatal injury accident
3. Non-injury (damage-only) accident

11. Definitions found in the "Motor Accidents in New Zealand Statistical Statement, 1978" include -

- Motor Vehicle Accident - any accident that occurs in the public road and results in injury that is attributable directly or indirectly to a motor vehicle or its load. (An accident between a cyclist and a pedestrian is excluded even if one person is killed or injured.)

- Fatal injuries - comprise injuries that result in death within 30 days of the accident.

- Serious injuries - Fractures, concussion, internal injuries, crushings, severe cuts and lacerations, severe general shock necessitating medical treatment and any other injury involving removal to and detention in hospital.

- Minor injuries - injuries of a minor nature such as sprains and bruises.

- Classification of Accidents - classified in two ways in Bulletin.

  A. Movement Classification - This is based on the manner in which the vehicles were moving immediately prior to the accident. Bicycles are treated as vehicles for this purpose. These movements are divided firstly into broad classes. These classes are used in the tables in the Bulletin. They are then further divided into a series of sub classes.

  B. Objects Struck - A classification of accidents by the objects struck, other than moving and stationary vehicles or persons. for the sake of completeness this is extended to include "over bank". An accident will appear more than once in the table if the vehicle/s involved struck more than one object.

- Urban areas - refer to Speed limit areas of 50 km/h and under.

12. Definitions found in "Statistics 1978, of Road Traffic Accidents in Japan." [Int. Assoc. of Traffic & Safety Sciences] include -

Traffic Accident - an accident resulting in death and/or injury, which is caused by the traffic of vehicles or streetcars running on a road.

Killed - Died within 24 hours of an accident
[Note - Data tabled also showed deaths within the year]

Serious Injury - An injury for which a person is detained in hospital for 30 days or more.

Sight Injury - An injury for which a person is detained in hospital for less than 30 days.

Vehicle - means a motor vehicle, moped, light vehicle and trolley bus.

Motor Vehicle - means a vehicle which is operated by means of a motor without depending on rails or cables, excluding a moped.

Types of Accident Used -

Vehicle vs. Pedestrian - walking face to face vehicle
- walking parallel to vehicle
- walking on footpath or verge
- crossing pedestrian crossing
- crossing in vicinity of pedestrian crossing
- crossing in another manner
- playing on road
- other

Vehicle vs. Vehicle - head-on when overtaking
- other head-on
- rear end
- crossing

13. U.K. DEFINITIONS (1960) (Ref. STATS 19)

Fatal - killed as result of the accident, provided death occurs within 30 days.

Serious injury - injury for which person is detained in hospital as an "in-patient", or any of the following injuries whether or not be is detained in hosptial - fractures, concussion, internal injuries, crushings, severe cuts and lacerations, severe general shock requiring medical treatment.

Slight injury - injury of minor character such as sprain or bruise. [Persons who complain of shock but sustain no other injury should NOT be included unless they receive or appear to receive medical treatment.] Persons who appear to be only slightly injured but nevertheless are admitted to hosptial as "in-patients" either immediately or later should be recorded as seriously injured.

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Intersection - "At or within 20 yds (60ft) of Junction"

Accident type - none as such, records "movement before accident"

- one moving vehicle only
- two moving vehicles, same direction
- " " " , opposite direction
- " " " , different roads
- more than two moving vehicles
- no moving vehicle

also records "action of pedestrian casualties"

- crossing road masked by stationary vehicle
- otherwise crossing road
- in road, not crossing
- on footpath or verge
- on refuge or centre strip
- not known

"Actions of P.S.V. Passenger Casualties"

- boarding or alighting from PSV

14. Further U.K. Definitions Dept. of Transport.
(Road Accidents - Great Britain, 1977; HMSO 1978).

Junction - Any place at which two or more highways meet, whatever the angle of the axes of the highways, and parts of such highways lying within 20 yards of that place; it may also include a roundabout.

Accident - accident involving personal injury occurring on the public highway (including footpaths) in which a vehicle is concerned.

Vehicles involved in accidents - vehicles in collision, vehicles whose drivers or passengers are injured, vehicles which contribute to the accident, horses being ridden at the time of the accident. Vehicles which collide after the initial impact causing injury are not included unless they aggravate the degree or amount of injury.

Public Service vehicles - includes trams, trolley buses, coaches and buses.

15. ACCIDENT TYPES USED IN STATISTICS FROM THE "SWEDISH ROAD SAFETY OFFICE, 1972" FOR THE YEAR 1970.

Casualty Accs		
• Single motor vehicle accident		19.0%
• Multi-motor vehicle		
overtaking and lane change	3.8	
rear end	3.7	
oncoming vehicle	9.0	
turning at inters. courses in same directions	3.1	
" " " opposite "	5.0	
crossroad, no turning	9.6	
crossroad, turning	5.3	
		39.4%
• Other types		
cycle/moped - single	2.6	
other vehicle - single	.	
motor vehicle - cycle/moped	18.4	
motor vehicle - other vehicle	.	
motor vehicle - pedestrian	14.7	
trackbound vehicle - motor vehicle	.	
" " - other vehicle	.	
motor vehicle - animal	.	
other motor vehicle accs.	.	
other accidents	.	
(n = 16,636)		41.6%

16. The following definitions used for West Germany Statistics were found in the "Unfallverhutungsbericht Straßenverkehr, 1977.

- - - - - - - - - - - -

Killed - person died instantly or within 30 days as a result of the injuries suffered in the accident.
Serious Injury - person who was immediately taken to hospital and admitted as in-patient.
Slight Injury - person whose injuries did not requrie hospitalisation.

The data used for Federal statistics are only those accidents reported to the Police which involve injury or property damage in excess of 1000DM.

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The "Merkblatt fur die Auswertung von Strassenverhehrs - unfallen, 1974" includes a manual for determining accident-types. It is expressed that the accident-type denotes the traffic event leading to the conflict situation which results in the accident. For the final determination of the accident type only the conflict situation is used, why and how the participants collide is not of significance and the relative blame of the participants (i.e. "accident cause") plays no part in the principle of accident types.

There are seven broad accident-types as follows -

1. run off road
2. making turn
3. turning/crossing
4. conflicts involving pedestrians
5. accidents with stationary traffic
6. traffic lanes
7. other accidents

17. A.C.R.U.P.T.C. (1977)

RECOMMENDED CORE DATA ITEMS

ROAD USER-RELATED VARIABLES

1. Type of Road User
   (a) Driver of - passenger car, utility, panel van or station wagon
   - other motor vehicle (not motorcycle).
   (b) Motor cyclist
   (c) Pedal cyclist
   (d) Passenger in - passenger car, utility, panel van or station wagon
   - other motor vehicle (not motorcycle)
   (e) Motor cycle passenger
   (f) Pedal cycle passenger
   (g) Pedestrian
   (h) Other

2. Age of Road User - in single years

3. Sex of Road User
   (a) Male
   (b) Female

4. Extent of Injury
   (a) Killed or died within 30 days
   (b) Injured, admitted to hospital
   (c) Other injured requiring medical treatment
   (d) Injured, not requiring medical treatment

5. Type of Licence (Drivers and Motor cyclists only)
   (a) full licence
   (b) learner
   (c) probationer
   (d) unlicensed
      - no licence
      - licence not appropriate to class of vehicle driven
      - cancelled, disqualified, etc.

(State/Territory/Country of licence would be useful for studies of interstate drivers. It is recommended, therefore, that measures which provide this data be continued).

NOTE

(i) Data on age, sex and seating position of all occupants, except in the case of pasengers in buses, trams and trains, could be useful if reasonably accurate.

(ii) The number of occupants - whether injured or not - should be recorded, except in the case of passengers in buses, trams and trains.

VEHICLE-RELATED VARIABLES

1. Registration Number

2. Type

(a) Passenger car, utility, panel van or station wagon
(b) Motor cycle
(c) Other motor vehicle
(d) Pedal cycle
(e) Train
(f) Tram
(g) Other

3. Make

4. Year of Manufacture

5. Vehicle Towed/Not Towed from Accident Scene

NOTE (i) The Committee recommended a standardised code to formalise verbal descriptions of damage currently recorded in some States with the ultimate intention of moving towards the suggested damage location code shown in Attachment E. Classificatin of damage as slight/moderate/extensive is also recommended.

(ii) The vehicle registration record could be the source of 'model' data.

(iii) Most States/Territories already include an indication of year of manufacture on their accident report forms. This information could be more accurately obtained through registration records available for interrogation.

Incorporation into vehicle registration records of month and year of manufacutre as recorded on vehicle compliance plates would allow the mandatory Design Rules which a vehicle complies with to be deduced.

ENVIRONMENT-RELATED AND OTHER VARIABLES

1. Features of Roadway (discernible from sketch of location)

(a) At intersection*

- cross
- 'T'
- 'Y'
- multiple
- interchange

(b) Non-intersection features

- crossover, median opening
- railway level crossing
- bridge, causeway or culvert

(c) Road alignment (Non-intersection)
- straight road
- curve on bend

(d) Road type
- divided
- undivided

*On page 14.94 of this paper, the issues concerning the terms 'intersection' and 'intersection accident' are outlined.

2. Location

(a) Local Government Area

(b) Applicable speed limit

NOTE (i) The intention is to produce national tabulations as follows -

- Capital City Statistical Division
  - built-up areas
  - outside built-up areas

- Provincial Cities
  (1971 populations over 40,000)
  - built-up areas
  - outside built-up areas
- Remainder of State
  - built-up areas
  - outside built-up areas : on highways

(ii) "Built-up area/outside built-up area' should be defined by applicable speed limit rather than presence of street lighting - for example, 60 km/h - 75 km/h as built-up area; greater than 75 km/h as outside built-up area (i.e. a differentiation between low speed and high speed areas).

(iii) Ability to differentiate accident occurring on highways and other roads is implicit in the tabulation suggested for 'Remainder of State, outside built-up areas'.

3. Accident Type

(a) Vehicle-to-vehicle collision on carriageway
- vehicles in traffic
- vehicles parked

(b) Single vehicle accidents

(i) On carriageway
- overturning
- struck object
- struck pedestrian
- struck animal
- passenger accident

(ii) Off carriageway
- without colliding
- struck object
- struck vehicle
- struck animal
- struck pedestrian

(c) Other accidents.

4. Day

5. Date

6. Time of Day (hourly intervals on tabulation).

RECOMMENDED DEFINITIONS AND CONCEPTS

Road Vehicle

Two types of road vehicles are recognised:

(i) Road Motor Vehicles are any self-propelled vehicles intended for, or being used for, the transport of persons or goods on roads.

(ii) Other Road Vehicles are any vehicles (other than road motor vehicles) intended for, or being used for, the transport of persons or goods by road - such as trams (when operating within the road as defined) pedal cycles, animal drawn vehicles, ridden animals and wind-powered vehicles, but also includes trains on railway level crossings or when operating within the road as defined.

Road Traffic Accident

Any apparently unpremeditated event reported to the police or other relevant authority and resulting in injury (including death) or property damage attributable directly or indirectly to the movement of a vehicle on a road.

Road

The entire way devoted to public travel, including carriageways, footways, median strips, railway level crossings (for vehicular use) and traffic islands, i.e., the whole width between abutting property boundaries where the road is in a surveyed road reserve. Excludes off-street parking areas, access areas, beaches, etc., and other private property not regarded as a public way, e.g., railway yards, wharves, sporting areas, loading areas, etc.

Carriageway

That part of the road (as defined) especially improved or designed and/or ordinarily used for vehicular traffic. It includes the shoulders, areas including embayments, at the side or centre of the carriageway, used for the standing or parking of vehicles. When a road has two or more of those portions, divided by a median strip, carriageway means each of those portions, separately. The size (width) of the median strip is not relevant. If the accident occurs on the median strip, e.g., by a vehicle mounting it and striking a pedestrian, the accident is deemed to have occurred off the carriageway and would be recorded in statistics as such.

Driver/Rider

\- Any person who supposedly has a vehicle under his physical control from the driving/riding position.

Persons occupying the driving/riding position of stationary or parked vehicles should be classified as 'drivers' as would be a child who releases the handbrake of a parked vehicle from the driving position.

Passenger

Any person other than the driver/rider who at the time of the first event was in, on, or alighting or falling from or entering a vehicle, who was at least partially in or on the vehicle.

Passenger Accident

A single vehicle accident in which only passengers are killed or injured without the vehicle overturning, leaving the carriageway or colliding, e.g., passenger falls or is thrown from or within the vehicle, including pedal cycle and motor cycle.

Pedestrian

Any person other than driver/rider or passenger as defined above. For purposes of clarification the following examples are given of the types of road user who should be included as pedestrians.

Any person on foot whether stationary or in motion, or lying or sitting on the road including those:

(i) boarding, pushing, pulling or otherwise attending to a vehicle
(ii) leading or herding animal(s)
(iii) in, operating, or riding such devices as prams, invalid (wheel) chairs without engines, toy cycles or other toy vehicles, hand or other wheelbarrows, etc.
(iv) formerly classified as bystanders.

Object

Anything with which a vehicle collides other than another vehicle, pedestrian or animal.

Intersection Accidents

Crashes are generally classified as intersection accidents when they occur within a region bounded by lines 10m outside the projection of either property boundaries or the projection of the edge of carriageways.

Use of the property boundary basis can be inappropriate in many cases. This is because in the country, and in some urban locations, the property boundary can not be readily ascertained, or else is so far from the carriageway as to be irrelevant. In such cases the edge of the carriageway is used instead.

In cases where the property boundary is clearly marked, and is reasonably close to the carriageway there are two approaches: one uses the property boundary basis; the other uses the definition used in the country.

It is not clear at present which of these two approaches is the more valuable. It is likely that the great majority of crashes are classified consistently by the two approaches. It is thus unlikely that the difference would have major detrimental effect on inter-state statistics. However, investigations of the comparative effect of the two approaches are contemplated.

ACRUPTC therefore considers that it is not appropriate to attempt a uniform definition of 'intersection' at this stage.

15. PUBLISHED PAPERS, BASED ON/RELATED TO THIS WORK

1. Some considerations and comparisons of city traffic accidents (a three city comparison). International conference on integration of traffic and transportation engineering in Urban Planning (I.T.E.) Tel Aviv, 1978.

2. Toward a better understanding of road accidents, Proc. 2nd REAAA Conf., IVB, pp. 21-22, Manila 1978.

3. With M. Hoque, Accidents on a section of Thailand's Super highway, Proc. 10th ARRB Conf. 10(4) pp. 108-118. Sydney 1980.

4. A tale of four cities, a comparison of accidents. Proc. 10th ARRB Conf. 10(4) pp. 275-292. Sydney 1980.

5. . Standard definitions for road accidents, to be published in 'Aust. Road Research', Sept. 1982,
   . also in Monash University Civil Engineering Working Paper series CEWP 81/21.

6. Long term trends in deaths, population and vehicles, CEWP 81/18.