Intech Associates
CONSULTING ENGINEERS

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DFID Department for International Development

Department for International Development
in cooperation with World Bank
and Asian Development Bank

SEACAP PROGRAMME

Managed by
Crown Agents & Halcrow Group

SEACAP 2
CAMBODIA Transport
MAINSTREAMING PARTNERSHIP

WORKING PAPER 3
Improving Road Safety
(Component 9)

July 2005

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Our Ref: 0421/VA4a
Your Ref: CTMP – SEACAP 2

21 July 2005

Attention Excellency Suos Kong
Secretary of State
Ministry of Rural Development
Chairman, Interim SEACAP Steering Committee

Dear Excellency Suos Kong,

RE: SEACAP 2 Improving Road Safety Report

Please find attached a copy of the Improving Road Safety Report (Component 9) for the Cambodia Transport Mainstreaming Partnership (SEACAP 2).

The report has been prepared by Chris Baguley, the Consultant's Road Safety adviser, with the support of the Intech-TRL team in Cambodia.

We would welcome any comments on follow up or further contributions from the Interim Steering Committee on the report and any aspect of the CTMP initiative.

Yours sincerely

Robert Petts
Project Manager

cc H.E. Lim Sidenine, MPW&T, Vice Chairman SEACAP Interim Steering Committee
Dr. Um Romany, ITC, Member SEACAP Interim Steering Committee
Dr. Simon Lucas, DFID, Hanoi
Le Minh Nguyet, Crown Agents, Vietnam
Pham Hai Bang, Halcrow, Vietnam
Dr Colin Jones, TRL, UK.
Heng Kackada, Intech Cambodia

TABLE OF CONTENTS

This document is an output from projects funded by the UK Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of the DFID.

ABBREVIATIONS & ACRONYMS

ADB	Asian Development Bank
AIP	Accident Investigation and Prevention process
ASEAN	Association of South East Asian Nations
ATM	ASEAN Transport Ministers
AusAID	Australian Agency for International Development
DFID	Department for International Development, UK
EngKaR	DFID's Engineering Knowledge and Research project
IUD	Infrastructure and Urban Development
HGV	Heavy Goods Vehicle
HI	Handicap International
ITC	Institute of technology of Cambodia
JICA	Japanese International Cooperation Agency
MAAP	Microcomputer Accident Analysis Package
MOT	Ministry of Tourism (Cambodia)
MOH	Ministry of Health (Cambodia)
MOI	Ministry of Interior
MOEYS	Ministry of Education, Youth and Sports (Cambodia)
MPTC	Ministry of Posts and Telecommunications (Cambodia)
MPWT	Ministry of Public Works and Transport (Cambodia)
MRD	Ministry of Rural Development (Cambodia)
NRTSC	National Road Traffic Safety Committee (Cambodia)
PSV	Public Service Vehicle
NGOs	Non-Governmental Organisations
NRTSC	National Road Traffic Safety Committee (Cambodia)
RTAVIS	Road Traffic Accident and Victim Information System
SEACAP	South East Asia Community Access Programme
TA	Technical Assistance project
TKP	Global Transport Knowledge Partnership
TMP	Transport Mainstreaming Partnership (Cambodia)
ToR	Terms of Reference
TRL	Transport Research Laboratory (TRL Limited)
UK	United Kingdom
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
UPM	Universiti Putra Malaysia
USA	United States of America
USD or US$	United States Dollar
WHO	World Health Organisation

EXECUTIVE SUMMARY

Introduction

A substantial programme of DFID, World Bank and ADB co-funded transport knowledge generation and dissemination projects is now underway in Cambodia, Laos and Vietnam under the South East Asia Community Access Programme (SEACAP). The overall objective of the Programme is that '*Livelihoods of poor and vulnerable people in SE Asia are improved sustainably*'

SEACAP builds upon the successful collaborative research projects already completed in Cambodia and Vietnam in identifying ways to improve sustainable access to rural communities to facilitate benefits from health, education, trade, social facilities and services, thereby creating opportunity for pro-poor growth and escape from poverty.

The SEACAP programme currently comprises 21 different projects. Of these the SEACAP 2 programme has provision for the establishment of a Cambodia Transport Mainstreaming Partnership (TMP) which in turn is sub-divided into 9 components. The ninth component is to 'Improve Road Safety' in the country.

The problem of road accident casualties is particularly acute in the countries of the Asia – Pacific region as this region currently contributes 44% of global road deaths despite it having only around 16% of the worlds motorised vehicle fleet (Jacobs et al, 2000). Indeed more recently, in June 2005, the ADB has stated that "the increase in the number of road crash deaths and injuries is having a substantial impact on the economic and social development of the Region. If no major road safety measures are implemented there will be more than 385,000 road deaths and 24 million injuries over the next 5 years in the ASEAN countries, incurring more than US$88billion in economic losses."

Unfortunately Cambodia has the worst road accident fatality rate in the ASEAN Region when related to vehicles using the road network (currently 21.5 fatalities per 10,000 registered vehicles). The road safety situation in Cambodia is inevitably likely to be adversely affected by the rapidly increasing vehicle fleet of the country, with which there is likely to come a much higher risk of road accidents. However, such an increase in deaths and injuries should not be accepted as the inevitable price for increased mobility. Indeed, it can be regarded as one of the responsibilities of government to help to maintain as safe a road environment as possible for its population of road users.

Over the past six years, not only have recorded accidents increased overall but the severity of injury of accident victims appears to have been increasing at an even greater rate. Fatalities increased by 32.7 per cent in 2003, and a massive **46.8 per cent in 2004 alone**, a trend that is obviously causing great concern. The situation with regard to people seriously injured in crashes is also likely to be deteriorating sharply but there are indications of a high level of under-reporting of such accidents.

Handicap International and the Cambodian Red Cross have realised this under-reporting problem and have made a very valuable contribution by organising the production of a more accurate accident and casualty database combining police information with that gathered from a number of hospitals, initially in Phnom Penh but soon to be extended to the whole country. Some key facts that they have already shown from this new database are that:-

- The system records about **five times more** casualties than the Police system alone.

- There is currently an average of **17 fatalities per month** in Phnom Penh (about half dying at the scene).

- Casualties aged between 15 and 24 years old account for **48 per cent** of all casualties (though this age group represents only 24 per cent of the population). This proportion is almost twice that of the average found in South East Asia and much higher than the worldwide average.

- Males account for **71 per cent** of all casualties (although only 48 per cent of the population)

- Motorcyclists account for the majority of casualties at **76 per cent** and almost **80 per cent** of casualties suffering from head injuries are motorcycle users. (Only 4.4 percent of these wore a crash helmet).

- The second most common casualty group is pedestrians at **9 per cent** of the total.

- **39 per cent** of casualties occur during the hours of darkness.

- The three most common causes of accidents recorded are :
  - **Excessive speed (36 percent),**
  - **Not respecting the give way rule (28 per cent), and**
  - **Alcohol or drug involved (15 per cent)**

The government of Cambodia has already recognised the serious and deteriorating road safety situation that the country faces and has signed up to an ADB-ASEAN road safety project. This was led by ADB to assist the 10 ASEAN countries to strengthen their institutional capacity and to address road safety issues more effectively. The project focused on developing national Priority Action Plans and a regional Action Plan through a series of in-country workshops and a regional workshop.

At a meeting of ASEAN Transport Ministers in Phnom Penh in November 2004, the Government of Cambodia agreed the following key actions:-

1. Adopt the ASEAN Road Safety Strategy and Action Plan 2005-2010;

2. Establish in a multi-sector body to coordinate and manage the implementation of the National Road Safety Action Plan;

3. Establish an ASEAN Multi-Sector Road Safety Working Group to coordinate and oversee the implementation of the ASEAN Road Safety Strategy and Action Plan 2005-2010;

4. Institute a system for the effective monitoring of implementation of the national road safety plans and the ASEAN regional road safety action plan;

One of the first important actions, (item 2 above) is the setting up of a National Road Traffic Safety Committee (NRTSC) to manage the implementation of the national Road safety Strategy and Action Plan. This proposal was approved by the Prime Minister on 20th May 2005, and thus the Committee has now been formed. One of the NRTSC's first and important actions was to finalise the adopted National Road Safety Action Plan, and to form Municipal and Provincial level Road Safety Committees.

This Action Plan was thus made the focus of this current component of SEACAP 2 with a view to determining progress in implementation and any further problems and needs.

The National Road Safety Action Plan: Target Setting

The target fatal accident rates that have currently been agreed between the ASEAN countries for Cambodia are:-

- By 2010 – not more than 7 fatalities per 10,000 registered vehicles
- By 2015 – not more than 2 fatalities per 10,000 registered vehicles.

With the current rate of 21.5 fatalities per 10,000 vehicles (for 2004), it is considered that these present extremely challenging targets that are not achievable even with a considerable dedicated effort by the many stakeholders capable of contributing to safety, and backed by adequate financial investment. The current economic activity and growth of the country is likely to mean that the vehicle fleet of the country is also likely to be growing at such a rate that more realistic targets would be: -

- **By 2010 – not more than 17 fatalities per 10,000 registered vehicles**
- **By 2015 – not more than 8.5 fatalities per 10,000 registered vehicles.**

The contents of the current draft Action Plan are generally sound and relatively comprehensive covering a total of 15 different sectors or subject areas, each having its own series of Actions. These summary tables of Actions are reproduced in the main body of this report and the sectors' weaknesses and strengths are each discussed. Thus, only the additional recommendations of this study (in brief) for each of the 15 sector Action Plans are included in the following sections of this Executive Summary.

Action Plan 1: Establishing a NRTSC for Coordination and Management of Road Safety

1.1 The NRTSC should revise the draft Action Plan after carefully deciding on a more accurate budget allocation based on a detailed costing of actions required over the next 5 years.

1.2 Many stated dates in the Plan have already passed without the particular action having been completed. All actions need to be thoroughly investigated and a new timetable set, otherwise it is likely that confidence and momentum will be lost.

1.3 Agree a timetable for regular meetings of the NRTSC (for example, quarterly) to ensure members are kept up-to-date with progress around the country on road safety and to serve as an incentive to report back actions taken.

1.4 The NRTSC should disaggregate the target casualty reductions proportionately to the Municipality and Provincial Regions on an annual basis in terms of actual number to be achieved.

1.5 The NRTSC should produce and require Municipal and Provincial Committees to issue detailed plans on an annual basis, stating exactly how their budgets will be spent to achieve their individual targets.

1.6 It is important that the strategy is monitored at various stages throughout its implementation to help keep it on course, and ultimately a full evaluation of its effectiveness should be carried out.

Action Plan 2: Road Accident Data System

2.1 Incorporate additional fields on the new accident report forms, as detailed in Appendix A.

2.2 Consider introduction of an easy-to-use computer accident database and analysis system (such as TRL's MAAP). The package should require minimal training yet provide reliable cross tabulations and other analyses, including GIS mapping analyses. It should help to ensure more widespread utilisation of the database across the country.

2.3 Greater funding will be required for the system, hardware and comprehensive training for the accident database than is currently given in the National Action Plan. Indeed the Plan for the accident database should be more detailed showing planned phases of extension to other hospitals around the country by set dates, to assist gradual national coverage.

Action Plan 3: Road Safety Funding

3.1 All items in the National Road Safety Plan should be carefully costed in the submission for ministerial approval.

3.2 Consider setting up a road fund, for example, from a fuel levy and/or special tax from the vehicle insurance industry.

3.3 Consider making 3rd party vehicle insurance compulsory, with appropriate controls set on the insurance companies to maintain realistic, affordable maximum premiums.

Action Plan 4: Road Safety Audit – Hazardous Locations

4.1 The persons carrying out road safety audits or AIP work need to possess considerable experience in recognising potential safety problems. Thus initially there will be a need to commission audit experts to help decide on the necessary types of audit, conduct audits and provide long-term training. This is essential in order to build up the very necessary knowledge and perceptual skills required by the relevant local engineers. .

4.2 Define current blackspot levels including highway units. This is important in order to make legitimate comparisons and to set priorities for treatment.

4.3 Ensure that highway engineers monitor and carry out evaluations of effectiveness of implemented safety schemes, and record the results in their annual plan.

4.4 In the current draft of the Action Plan, a considerable increase in the budget specified for treatments will probably be required to meet casualty reduction targets.

Action Plan 5: Roads Environment and Road Design

5.1 The roads standards, particularly with regard to safety features, need to be followed much more consistently and good records kept centrally of justifications for any departures from standards.

5.2 There needs to be clear unambiguous priority indicated at each intersection (signs and stop lines), so that traffic on the higher status road is always given precedence over that from the less important road.

5.3 It is essential that land-use planners understand the traffic and safety implications of their proposals before schemes are finalised. This should be done by circulating the plans for comment to fellow professionals responsible for traffic and road safety (part of the safety audit process).

5.4 Carry out research into the possibility of using local (waste or by-product) materials as dust inhibiting agents to spray/spread on rural roads in the dry season.

Action Plan 6: Road Safety Education for Children

6.1 The cost of the road safety training materials should be included in the MOEYS's current 5-year action plan (currently in draft).

6.2 The MPWT need to inform MOEYS when they install new road features with which road users may not be familiar (eg. the diagonal line-marked pedestrian crossing, and the concrete median dividers), so that children can be informed at school, and the course material changed as necessary.

6.3 The budget currently stated in the NRTSC Action Plan for printed material will only provide, on average, about US$20 per school. It is suggested therefore that this be increased significantly.

6.4 It is suggested that separate practical lessons in the playground on safe cycling would also provide very worthwhile training.

Action Plan 7: Traffic Law and Regulations

7.1 The new draft Traffic Law needs to be finalised and introduced as soon as possible.

7.2 All the suggestions made by Handicap International on this draft should be incorporated (Appendix B), with the minor exception to Article 17 which it is recommended should that there should be no differentiation in maximum speed limit for different vehicles in both urban and rural areas. However, for heavy vehicles greater than 3.5 tons, it is felt that there should be a limit of 70km/h on rural highways.

7.3 A number of further minor amendments to the HI comments are listed in Appendix B of this report. These include the following:-

i) That the section on law infringement penalty details for each offence, i.e. fines, licence bans and prison sentences, should be moved to a separate set of Regulations or sub-decree in order to make them more easily updated without another full set of Land Traffic Laws having to be approved.

ii) The rule pertaining to wearing of helmets should also have a note about proper wearing of the chinstrap.

ii) The need for child seats and restraints in cars.

iii) Consideration of effectively banning remorques by limiting by law the number of passengers they may carry.

iv) Bicycles or tricycles should show a white light to the front and red light to the rear if ridden during the hours of darkness.

Action Plan 8: Law Enforcement

8.1 An expert police advisor is recommended to review operations and draw up a policing plan, including equipment and training needs. The Traffic Police strongly support this recommendation.

8.2 There appears to be a clear need and justification for acquiring appropriate equipment for enforcing speed limits and drunk driving.

8.3 Improve safety of pedestrians by helping to enforce give way rules at zebra crossings and keeping footways clear.

8.4 Reducing the number of unregistered vehicles by increased vigilance and eventual use of vehicle registration database to subsequently follow up vehicle owners that have committed traffic infringements.

Action Plan 9: Technical Inspection (of vehicles)

9.1 Consideration should be given to making it a requirement to show a valid inspection certificate when road tax is renewed.

9.2 Assign realistic estimates for the opening of more test centres in the provinces as noted in the Action Plan.

9.3 Encourage proper completion of the visual part of the vehicle inspection procedure carried out manually, as specified.

Action Plan No. 10: Driver training (and testing)

10.1 Provision should be made now to be able to cope with the expected high demand for motorcycle tests when the new Traffic Law comes into force.

10.2 It is suggested that examiner's increase the standard required to pass the driving test, e.g. the pass rate should be reduced from 80% to about 50%, in common with many other countries.

10.3 Increase enforcement of the need to produce a medical certificate assuring of fitness to drive before taking the test, and also include a simple eyesight test (eg. reading a registration plate at a set distance).

10.4 The candidate's ability to stop the vehicle in a controlled manner in an emergency should be tested. Again this can be done simply by the examiner sitting in the car, instructing the candidate to imagine a child has run into the road when he taps the dashboard.

10.5 Consideration should be given to including a second part of the test after successful completion of the test track, when the examiner accompanies the candidate on a given route along public roads.

Action Plan 11: Emergency Assistance to Traffic Accident Victims

11.1 Given the very high cost of procuring ambulances in Cambodia, the current amounts stated in the Safety Plan will be grossly inadequate to meet the stated demand, and should therefore be revised.

11.2 A more detailed needs assessment should be carried out that gives greater attention to where ambulances are needed in relation to the response times that can be assumed for all locations in the country. This plan should also include costs of running the ambulances (ie. crew, spares, fuel etc) and purchase of the right sort of vehicles (e.g. adapted 4-wheel drive vehicles will be needed in most rural areas).

11.3 The equipment carried on board ambulances is rather limited and a review of this together with extraction equipment for fire tenders should be made and separate budget allocation made in the Plan.

Action Plan 12: Road Safety Publicity Campaigns

12.1 Design publicity campaigns drawing on the theme of personal responsibility. This has been the mark of effective campaigns in many countries.

12.2 Safety publicity activities in Cambodia have made good progress towards the general goal of raising the level of safety consciousness. The objectives now must be:

- to ensure continuity in publicity activities
- to improve the techniques employed
- to move towards a more focused and integrated approach
- to introduce structured evaluation of safety activities.

12.3 When the new Law on Land Traffic is given ministerial approval the radio and television services should be utilised fully to convey the important changes in the laws to all road users. Preparation of these bulletins should begin well in advance of the law ratification.

12.4 Campaigns on speeding and drinking and driving should be planned, perhaps also focussing on the young males.

Action Plan 13: Partnerships with Private and NGO's

13.1 As a means of boosting the funds that central government will need to achieve the casualty reduction targets, the NRTSC should seek discussions with the oil industry, tyre companies, insurance companies, motor suppliers etc. to see if they are prepared to

contribute resources for either campaigns, other road safety publications or even road infrastructure improvements.

Action Plan 14: Road Accident Costing

14,1 Use the accident costings currently available from the ADB study, but conduct a full in-depth study every 5 years, applying multipliers for national annual inflation in the intervening years.

14.2 Ensure that these figures are used effectively throughout the country to justify expenditure on accident remedial work and also used in the eventual evaluation.

Action Plan 15: Road Safety Research Institution

15.1 Conduct a series of roadside surveys to determine the incidence of drink and drug usage by drivers. Continuing surveys would allow for effective evaluation of the measures that are taken to combat the problem, and ensure that future efforts are properly directed.

15.2 A series of vehicle speed surveys should be conducted to determine the level of speed limit infringement.

15.3 Cooperate with UPM of Malaysia in joint studies to research effective ways of coping with safety problems associated with high volumes of motorcycle traffic.

The way forward

The improvement in road environment and driver and other road user behaviour in Cambodia will necessarily take a long period of time to bring about. However, the do-nothing' option will result in extremely high numbers of deaths and seriously injured people on the nation's roads by 2015.

If the Road Safety Action Plan together with further recommendations made in this report are followed then the targets set for the next 5 and 10 years should be achievable. If they are achieved, then over the 10-year period to 2015 this will results in a total of 8500 lives having been saved. Using the latest approximate costing produced for Cambodia, a total of about US$174million will be saved over this 10-year period in fatality accidents alone. This would justify a doubling in the current estimated budget for the Plan which would still result in a saving of US$20million to the nation. It should be noted that this is also a conservative figure because with the remedial work that will have been put in place to achieve this saving in fatalities, it is certain that many other serious injury accidents will be saved, thereby wasting less of the nation's resources and saving a great deal of human suffering.

1 INTRODUCTION

1.1 South East Asia Community Access Programme (SEACAP)

A substantial programme of DFID, World Bank and ADB co-funded transport knowledge generation and dissemination projects is now underway in Cambodia, Laos and Vietnam under the South East Asia Community Access Programme (SEACAP). These research and dissemination initiatives follow on from the previous DFID Infrastructure and Urban Development (IUD) Engineering Knowledge and Research (EngKaR) programme. The SEACAP programme is currently expanding from 17 to 21 projects. SEACAP builds upon the successful collaborative research projects already completed in Cambodia and Vietnam on identifying ways to improve sustainable access to rural communities to facilitate benefits from health, education, trade, social facilities and services, thereby creating opportunity for pro-poor growth and escape from poverty.

The overall objective of the Programme is:-

'Livelihoods of poor and vulnerable people in SE Asia improved sustainably'

and includes empowering local ownership of their access. This includes initiatives that allow rural roads to be constructed and maintained in a sustainable way by local people using local materials, local labour and skills, local enterprises, and simple, low cost equipment. More affordable in capital and recurrent costs, these rural road solutions are becoming the spine of local governments' policies and this programme is designed to expand the successes of the initial research work.

The SEACAP initiatives will contribute to poverty reduction by scaling-up and using knowledge from various transport sector initiatives in support of the aims and policies of the Governments of Cambodia, Laos and Vietnam which will improve access for the rural poor, lower transport costs and create local employment and enterprise opportunities.

The adoption and use of appropriate, sustainable local resource based techniques and involvement of the communes to rehabilitate the major part of the network will provide all-weather access to the poor communities. It will also help to establish an affordable maintenance regime to safeguard the past and future major transport sector investments. The current and currently planned projects are shown in Table 1

1.2 SEACAP 2 – Cambodia Transport Mainstreaming Partnership

The second component of the South East Asia Community Access Programme (SEACAP 2 - see DFID, 2005) is designed to support the transport sector activities of the MPWT and MRD, through a Cambodia Transport Mainstreaming Partnership (TMP). The TMP is aimed at resolving a number of outstanding issues in the transport sector relating to consolidation of past research outputs and to the setting up of a unified information system. One component of the SEACAP 2 programme is to facilitate the dissemination of information widely within Cambodia; including, but not limited to the information gathered during the earlier SEACAP work on rural road surfacing technologies and gravel road surface deterioration.

Another component is to review the road safety situation of the country with a view to formulating a comprehensive policy and strategy review of activities, practices and procedures across all sectors that can affect safety.

Table 1 - LIST OF SEACAP PROJECTS

Project No.	Description	Country
1	Rural Road Surfacing Research, for Ministry of Transport Vietnam: Dissemination and Mainstreaming of Research	Viet Nam
2	Cambodia Transport Mainstreaming Partnership	Cambodia
3	Appropriate Road Technology in Mountainous areas of VN	Viet Nam
4	Assessment of existing rural road surfaces in VN	Viet Nam
	i) Scoping	
	ii) Full Survey	
5	Impact of rural road access on poverty reduction and growth Phase II	Viet Nam
6	Infrastructure Constraints to growth and poverty reduction in Cambodia	Cambodia
7	Sustainable Mechanism for ownership on local stakeholders	Viet Nam
8	Low-cost surfacing Phase II	Cambodia
9	Full data collection in 2 provinces	Viet Nam
10	Commune Handbook Training to Non-RT2 Provinces	Viet Nam
11	Second Year Programme	Viet Nam
12	Road Map Field Verification and Roll Out for Non-RT 2 Provinces	Viet Nam
13	Provincial Hand Book Training	Viet Nam
14	Role of the Private Sector in Rural Transport	Viet Nam
15	Community participation in the Rural Transport Sector	Viet Nam
16	Institutional, incentive and capacity analysis of the Rural Transport sector	Viet Nam
17	Local Resource Solutions to problematic rural road access in Laos	Laos
18	Capacity Development for Sustainable Commune Infrastructure	Cambodia
19	Development of local resource based standards	Cambodia
20	Development of locally made, low cost equipment for the road sector	Cambodia
21	Rural Infrastructure advisory services and research management	

Note: 1-17: Projects approved
18-21: Intended Projects

1.3 SEACAP 2 – Components

SEACAP 2 includes the following components:-

Output 1 – Operational TMP
Output 2 – Knowledge Products
Output 3 – Practical Demonstration
Output 4 – Website
Output 5 - Policy Standards and Procedures
Output 6 – Improve Road Maintenance
Output 7 – Training Courses
Output 8 – Training Needs Assessment and Delivery (Human Resources Development Strategy)
Output 9 – Improve Road Safety

This Working Paper deals with component 9 above.

2 BACKGROUND

The number of road accident casualties occurring each year tends to be a problem for most countries around the world, but is often particularly acute in developing countries like Cambodia, where it is increasing at an alarming rate. The WHO now estimate that about 1.2 million deaths and over 50 million injuries occur per year on the world's road networks (WHO, 2004), and it has long been recognised that around 85% of these deaths occur in developing countries. The problem is particularly acute in the countries of the Asia – Pacific region as this region currently contributes 44% of global road deaths despite it having only around 16% of the worlds motorised vehicle fleet (Jacobs et al, 2000). More recently, in June 2005, the ADB has stated that "the increase in the number of road crash deaths and injuries is having a substantial impact on the economic and social development of the Region. If no major road safety measures are implemented there will be more than 385,000 road deaths and 24 million injuries over the next 5 years in the ASEAN countries, incurring more than US$88billion in economic losses."

Unfortunately Cambodia has the worst road accident fatality rate in the ASEAN Region (21.5 fatalities per 10,000 registered vehicles, though closely followed by Laos at 20.9). The road safety situation in Cambodia is inevitably likely to be adversely affected by the rapidly increasing vehicle fleet of the country, with which there is likely to come a much higher risk of road accidents, but such an increase in deaths and injuries should not be accepted as the inevitable price for increased mobility. Indeed, It should be stated that strictly the word "accident" refers to an unexpected, unforeseen and unfortunate event. Using this term to describe a road crash implies that the event was not preventable, when in fact, most "accidents" are preventable[1] with forethought, proper training, awareness and measures to make the road network more 'forgiving'. Indeed, it can be regarded as one of the responsibilities of government to help to maintain as safe a road environment as possible for its population of road users.

2.1 Objectives of the road safety component

The original terms of reference listed three distinct phases of this safety component of he overall SEACAP 2 project:

1 *To review the current situation – a comprehensive policy and strategy review of activities, practices and procedures across all sectors of activity.*
2. *To examine the options – examine the strengths and weaknesses in the organisations with safety responsibilities and identify where improvements are required and what priorities should be set.*
3. *Formulate the new comprehensive strategy – prepare a sectoral road safety programme or action plan in consultation with local organisations.*

For this particular component rather than focus only on rural roads, the ToR refers to road safety on the whole of the Cambodia road network

This report represents the output of the first phase above, but as will be described below, much of the groundwork required has recently already been carried out in Cambodia as part

[1] Note that many workers in the field now therefore tend to use only the word "crashes", but as this term also appears incorrect when applied to pedestrian collisions, then with the aforementioned understanding of 'an ability to prevent', the word "accidents" will be used throughout this report.

of an ASEAN initiative, and thus this report is largely concerned with reviewing progress and making additional recommendations where appropriate, thereby providing much of the requirements of phases 2 and 3.

2.2 Introduction to the improvement of road safety

Success in dealing with the road safety problem will require the willingness on behalf of all involved sectors of society and all road users to create an atmosphere of trust, responsibility and partnership. Indeed, experience shows that it needs to be tackled in a comprehensive and co-ordinated manner with input from many agencies in order to achieve success. It has also been shown that different types of intervention are effective at different stages of a country's development of safe road network, and that the problem needs to be addressed within a systematic and strategic plan to maximise benefits.

It is widely accepted that efficient improvement of road safety within a country cannot be achieved by action carried out by a single organisation or sector. Reducing the number of road accidents on the network is far more effective if tackled on a well-researched and scientific basis, using an integrated approach. Well-defined targets are a proven management tool which in this case should form the basis for focused and coordinated activities.

The components of such a plan can be considered as: -

- Road safety management co-ordination and funding.
- An improved data collection and analysis system.
- Road safety planning and engineering activities
- Investigation and treatment of hazardous locations
- Road safety education for school children.
- Driver training and testing for improved driving standards
- Road safety publicity
- Vehicle standards and testing.
- Traffic legislation
- Traffic law enforcement
- Emergency medical services.
- Road safety research and evaluation.

These components or sectors are dealt with as separate sections of Chapter 4, the National Road Safety Action Plan, hitherto referred to as the Plan, which is currently in draft form only (as explained in Sections 2.4 and Chapter 3). In each of these Sectors various weaknesses and strengths are noted in the respective parts of Chapter 4, where these have not already been highlighted in the Plan. Also, some further recommendations in addition to those that have already been included in the Plan are suggested. The summary chart for each sector of the current draft of the Plan, which includes various timings for completing implementation of the tasks, is reproduced for reference.

The following section, 2.3, summarises the road safety situation in Cambodia, highlighting various key features from available published data.

In Chapter 3, the Cambodian National Road Safety Action Plan is introduced together with the important targets for fatal accident rates that have been set by ASEAN. More realistic goals are proposed and discussed.

Appendix A includes the latest version of the Police accident report form as originally designed by Handicap International. Some comments and minor recommendations for changes are also given here, and most of these have already been accepted by HI.

Appendix B gives comments made on the new draft Law on Land Traffic for Cambodia.

Appendix C gives an example automated vehicle testing form currently in use.

Appendix D provides a list of recommended equipment to be carried on board emergency vehicles providing life support for road accident victims.

Appendix E lists the persons met for discussions on various aspects of road safety during the visit.

2.3 Road safety in Cambodia

In the Kingdom of Cambodia, the peace and stability currently existing has promoted a rapid development of infrastructure and a rapid growth in the level of motorisation. This has in turn resulted in a significant worsening of the road safety situation across the country. The rapid growth in traffic levels, absence of good traffic regulation, flouting of the rules, ineffective enforcement, and general lack of road safety education and driver training have all contributed to the occurrence of more and more traffic accidents.

Road crashes have recently been recognised as the second biggest disaster for the country. It is second to HIV/Aids which kills approximately 15,000 (about 0.11% of the 13 million population) per year compared to over 1000 road crash fatalities, (about 0.03% of the population). The number of crashes is, however, increasing dramatically every year damaging life, properties and social harmony.

The improvement of road safety in the Kingdom of Cambodia is a very difficult challenge that the country faces, largely because of the following factors:

- High economic growth (5.5%-10.8% over past 5 years { ADB, 2005)) which will lead to increased fleet growth in the number of motor vehicles (6.7 % to 15.7% over past 5 years);
- Rapid population growth in urban areas and cities;
- Road network improvement is leading to increasing vehicle speed.

Published accident statistics as recorded by the Traffic Police have been available for Phnom Penh since 1994, but have only been compiled nationally since 2000. However, the current worsening road safety problem is clearly illustrated in Figure 1, which presents the accident and casualty figures for the whole country.

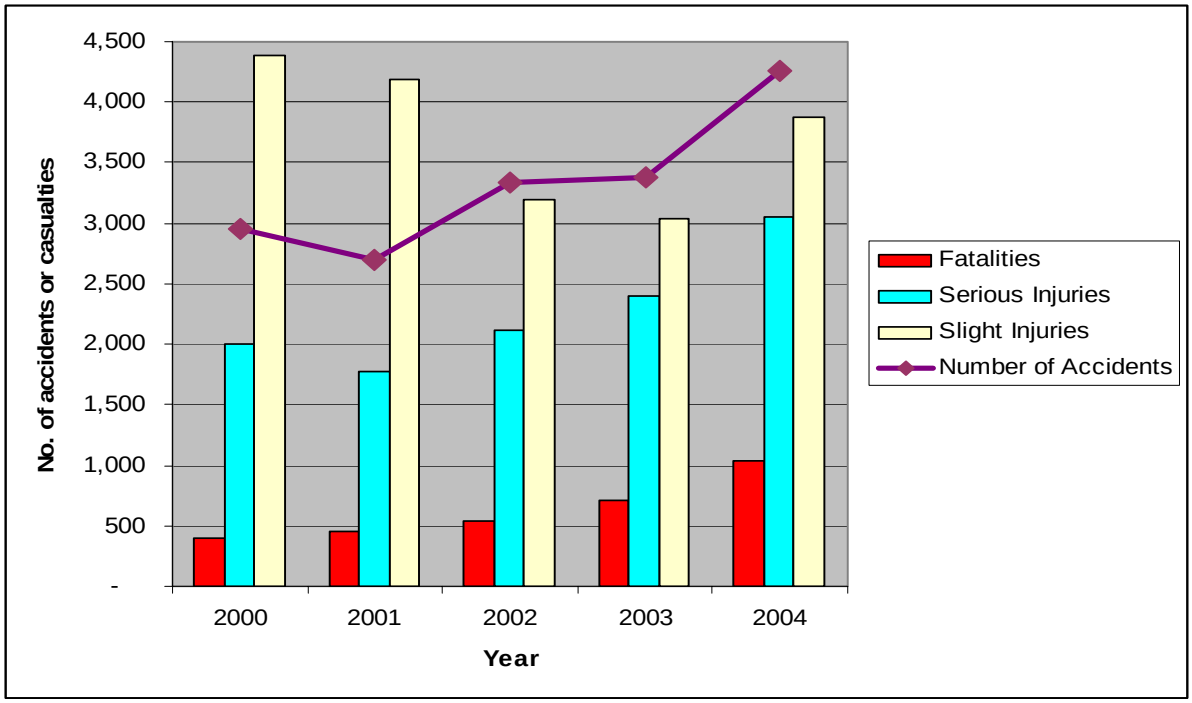

Figure 1 Road accidents and casualties in Cambodia from 2000 to 2004 recorded by the Police

Over the past six years, it can be seen that not only have recorded accidents increased overall but the severity of injury of accident victims appears to have been increasing at an even greater rate. Fatalities increased by 32.7 per cent in 2003, and a massive **46.8 per cent in 2004 alone**, a trend that must surely cause concern.

The fatality rates expressed as a proportion of registered vehicles and also of population of the country are shown in Figure 2.

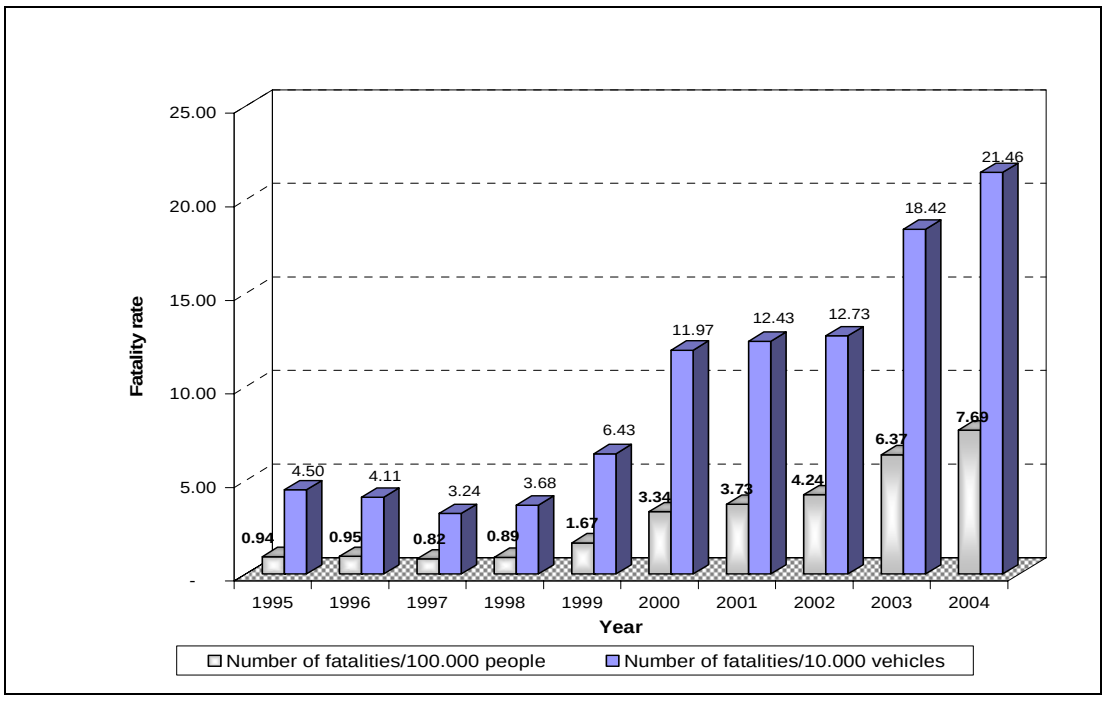

Figure 2. Trends in fatality rates, 1995 to 2004 (source: MPWT)

However, it should be noted that prior to the year 2000, only accidents that occurred in Phnom Penh were actually compiled and published by the Police. Nevertheless the bar chart again clearly demonstrates that no matter how fatality rate is expressed, it is increasing at an alarming rate.

The casualties are relatively evenly distributed around the provinces (see Figure 3) apart from Phnom Penh being excessively high at 1459 casualties in 2004. The two second highest Provinces for casualties are Banteay Mean Chey and Battambang, but these both have only half the number of Phnom Penh, reflecting a much higher density of population, wealth, vehicles and probably higher proportion of young males (the predominant road user group involved in road accidents) in the capital city.

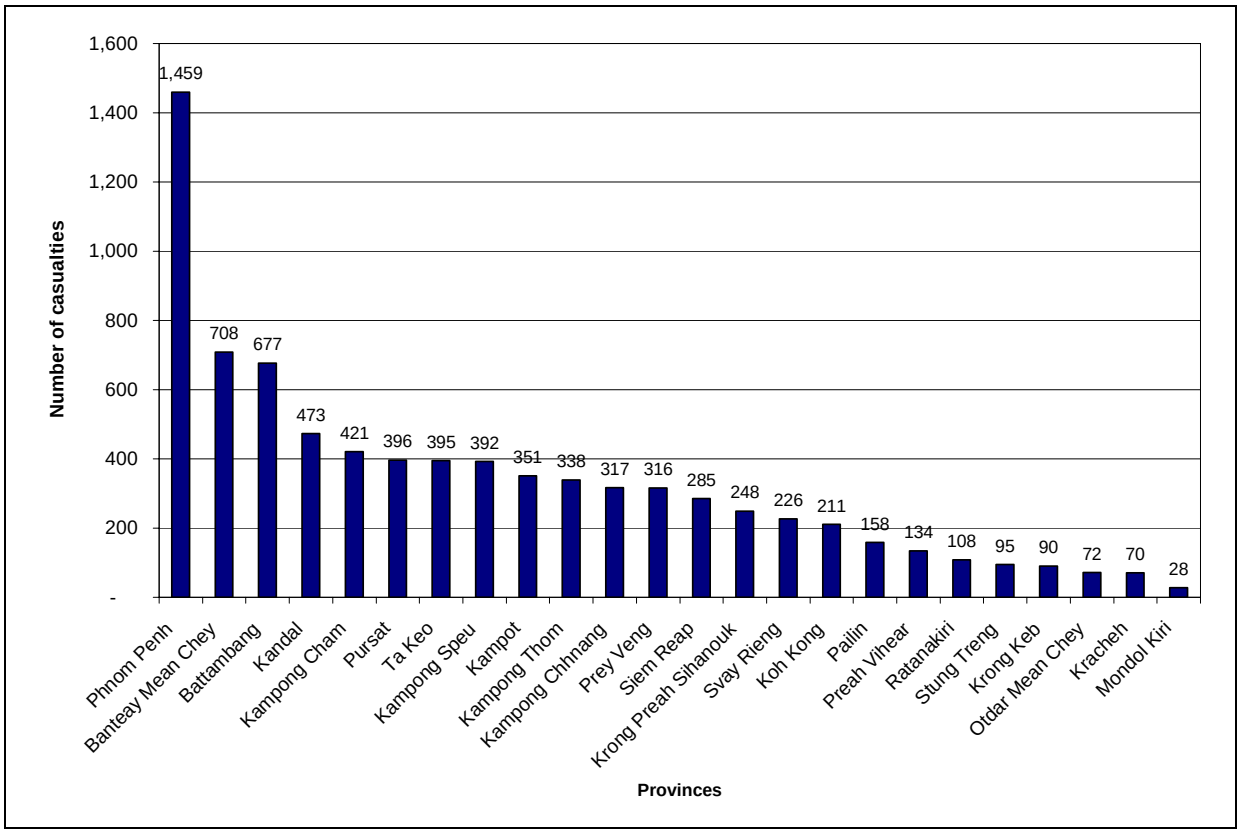

Figure 3. Casualties in 2004 by Province in Cambodia

The distribution of casualty severities of the national accident data is shown in Figure 4. This may be typical of recorded accident data in developing countries but it not what would normally be expected in a nation's road crash occurrence. For example the ratio of fatalities to all injured persons is 1:92.9 in the UK, 1:81.0 in USA and 1:99.5 in Japan. In Cambodia this ratio is 1:6.6 only. This means that, as fatalities tend to be the more accurately recorded accident types, there is probably considerable under-reporting of non-fatal crashes to the Police.

Handicap International and the Cambodian Red Cross have realised this under-reporting problem and have made a very valuable contribution by organising the production of a more accurate accident and casualty database combining police information with that gathered from a number of hospitals, initially in Phnom Penh (see Handicap International and Cambodian Red Cross, 2004). They are intending to extend this to many more hospitals so that eventually it will become the full national accident database. More details are given in section 4.2.

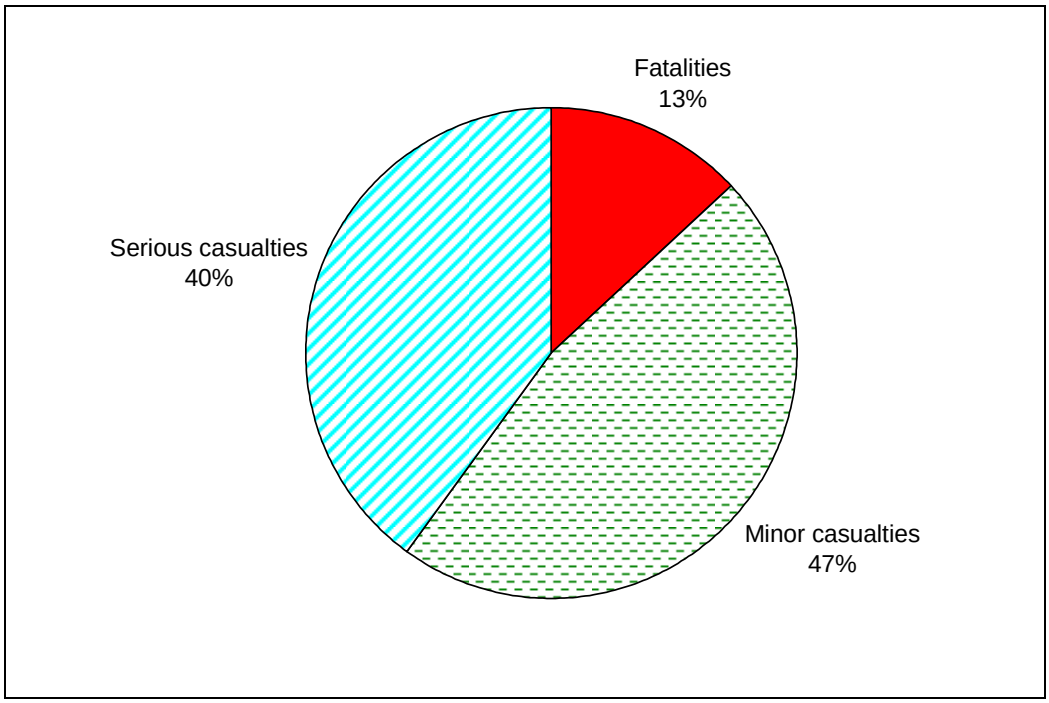

Figure 4 Casualty severities of recorded data from the Police, 2004

Although the HI database currently only applies to Phnom Penh, a number of key facts have been published in the aforementioned report and some key findings are summarised below:-

- The system records about **five times more** casualties than the Police system alone.
- There is currently an average of **17 fatalities per month** in Phnom Penh (about half dying at the scene).
- Casualties aged between 15 and 24 years old account for **48 per cent** of all casualties (though this age group represents only 24 per cent of the population). This proportion is almost twice that of the average found in South East Asia and much higher than the worldwide average.
- Males account for **71 per cent** of all casualties (although only 48 per cent of the population)
- Motorcyclists account for the majority of casualties at **76 per cent** (though motorcycles represent 75 per cent of the vehicles in use in Phnom Penh).
- Almost **80 per cent** of casualties suffering from head injuries are motorcycle users. Only 4.4 percent of these wore a crash helmet. The recent survey of helmet wearing is 9 per cent in Phnom Penh
- The second most common casualty group is pedestrians at **9 per cent** of the total.
- Of all occupation categories, students are the largest group of casualties at **22.5 per cent** of the total {followed by 'workers' at 22 per cent and 'vendors/small business workers' at 18 per cent}.

- Over **52 per cent** of car/truck/bus casualties possessed a valid driving licence.
- **39 per cent** of casualties occur during the hours of darkness.
- The three most common causes of accidents recorded are :
  - **Excessive speed (36 percent),**
  - **Not respecting the give way rule (28 per cent), and**
  - **Alcohol or drug involved (15 per cent)**

2.4 ASEAN Road Safety Action Plan

It has been noted that the Government of Cambodia has welcomed an ADB ASEAN road safety project which built on earlier ADB road safety TAs by assisting the 10 ASEAN countries to strengthen their institutional capacity and to address road safety issues more effectively. The project focused on developing national Priority Action Plans and a regional Action Plan through a series of in-country workshops and a regional workshop.

As part of this ASEAN initiative, a small team of international and local road safety experts researched the situation in Cambodia and drew up a national Road Safety Action Plan (subsequently referred to as 'the Plan') modelled on successful national and local plans in operation in many other countries. It was initially based on the Road Safety Action Plan Guidelines published by the UN, ADB and the World Bank some years ago (Ross Silcock et al, 1997). The plan was, however, specifically tailored to the particular current needs of Cambodia.

The Draft Action Plan was produced in a short time period through intensive workshops involving senior representatives of all the key agencies. It was the intention, however, that this draft plan would stimulate discussion and act as a catalyst in advancing Road Safety in the Country and that it would contribute towards the improvement of road safety in ASEAN and become an important component of an eventual ASEAN-wide Regional Road Safety Plan.

Discussions are underway with the ADB country office to see if some surplus funds can be diverted from existing ADB-funded projects to provide resources to commence implementation of the most urgent areas of the Road Safety Action Plan.

At a meeting of ASEAN Transport Ministers in Phnom Penh, Cambodia on 23rd November 2004 (the Tenth ASEAN Transport Ministers (ATM) Meeting), the Government of Cambodia agreed the following actions:-

1. Adopt the ASEAN Road Safety Strategy and Action Plan 2005-2010;
2. Establish in a multi-sector body to coordinate and manage the implementation of the National Road Safety Action Plan;
3. Establish an ASEAN Multi-Sector Road Safety Working Group to coordinate and oversee the implementation of the ASEAN Road Safety Strategy and Action Plan 2005-2010;
4. Institute a system for the effective monitoring of implementation of the national road safety plans and the ASEAN regional road safety action plan;
5. Seek the international support and technical assistance from the Asian Development Bank, the ASEAN Dialogue Partners, the international donor community and other

related international/regional organizations, global and regional road safety partnership organizations, private and business organizations, and civil society in the development and implementation of regional programs, projects and activities; and

6. Direct its Senior Officials to implement this Declaration, establish an ASEAN Multi-Sector Road Safety Working Group and to report progress on the implementation of the national road safety action plans and the ASEAN road safety action plan, with the assistance of the ASEAN Secretariat. Progress reports of implementation shall be submitted at the annual ASEAN Transport Ministers Meeting (ATM), for further action.

One of the first important actions, (item 2 above) is the setting up of a National Road Traffic Safety Committee (NRTSC). This was approved by the Prime Minister on 20th May 2005, and thus the Committee was officially formed on that day. One of the NRTSC's first and important actions was to finalise the adopted National Road Safety Action Plan, and to form Municipal and Provincial level Road Safety Committees.

This Action Plan was thus made the focus of this current component of SEACAP 2 with a view to determining progress in implementation and any further problems and needs.

3 THE NATIONAL ROAD SAFETY ACTION PLAN: TARGET SETTING

3.1 Plan structure

As stated earlier, the Plan was originally drafted as part of the ADB project in 2004. It has since been considerably modified by the MPWT with a view to simplifying it and generally improving its feasibility for implementation.

The first part presents some overall basic statistics of the trends in accident numbers in Cambodia and registered vehicles and also in the fatality rate expressed as fatalities per 10,000 vehicles. It notes a figure of 18.4 fatalities per 10,000 vehicles, making it "one of the worst safety records in the ASEAN Region".

Part II of the Plan lists five of the key elements that are contributing to the high road accident rate in Cambodia. These are:-

1. Road user errors
2. Road defects
3. Vehicle defects
4. Inefficient and inadequate legislation
5. Weakness of traffic law enforcement

These topics will be discussed under each sector, where applicable, in the following chapter (Chapter 4) of this report.

3.2 Target casualty reductions

Part III states the target fatal accident rates that have been agreed between the ASEAN countries for Cambodia. These are:-

- By 2010 – not more than 7 fatalities per 10,000 registered vehicles
- By 2015 – not more than 2 fatalities per 10,000 registered vehicles.

With the current rate of 21.5 fatalities per 10,000 vehicles (for 2004), it is considered that these present extremely challenging targets may not be achievable even with considerable dedicated effort by the many stakeholders capable of contributing to safety, and fully backed by adequate financial investment. This is because the current economic activity and growth of the country is likely to mean that the vehicle fleet is also likely to continue its steep upward trend linearly, as shown Figure 5 (topmost line). Unfortunately, the relationship between traffic and accidents, although not simple, is such that road accidents are also likely to continue to increase sharply. Figure 5 illustrates a prediction for the number of accidents for the five available values provided by the Traffic Police, that will occur from now, 2005, until 2015 without additional intervention (upper curved line – using 'No. of Casualties' axis).

Considering only the most accurately recorded type of accident, namely fatalities, using the five available values provided by the Traffic Police, two simple regression lines have been fitted in Figure 5 (lowest lines)- which might be considered to represent the best and worst scenarios. In 2005 this would yield a fatality rate of between 26.2 and 66.6, and by 2015 this could range from 29.3 to as high as 115.7. With these potentially very high predictions it is suggested that the 'do-nothing' option is wholly unacceptable and attempts must be made immediately to try to arrest this situation by adopting fairly radical, though well-planned and appropriate, actions as quickly as possible.

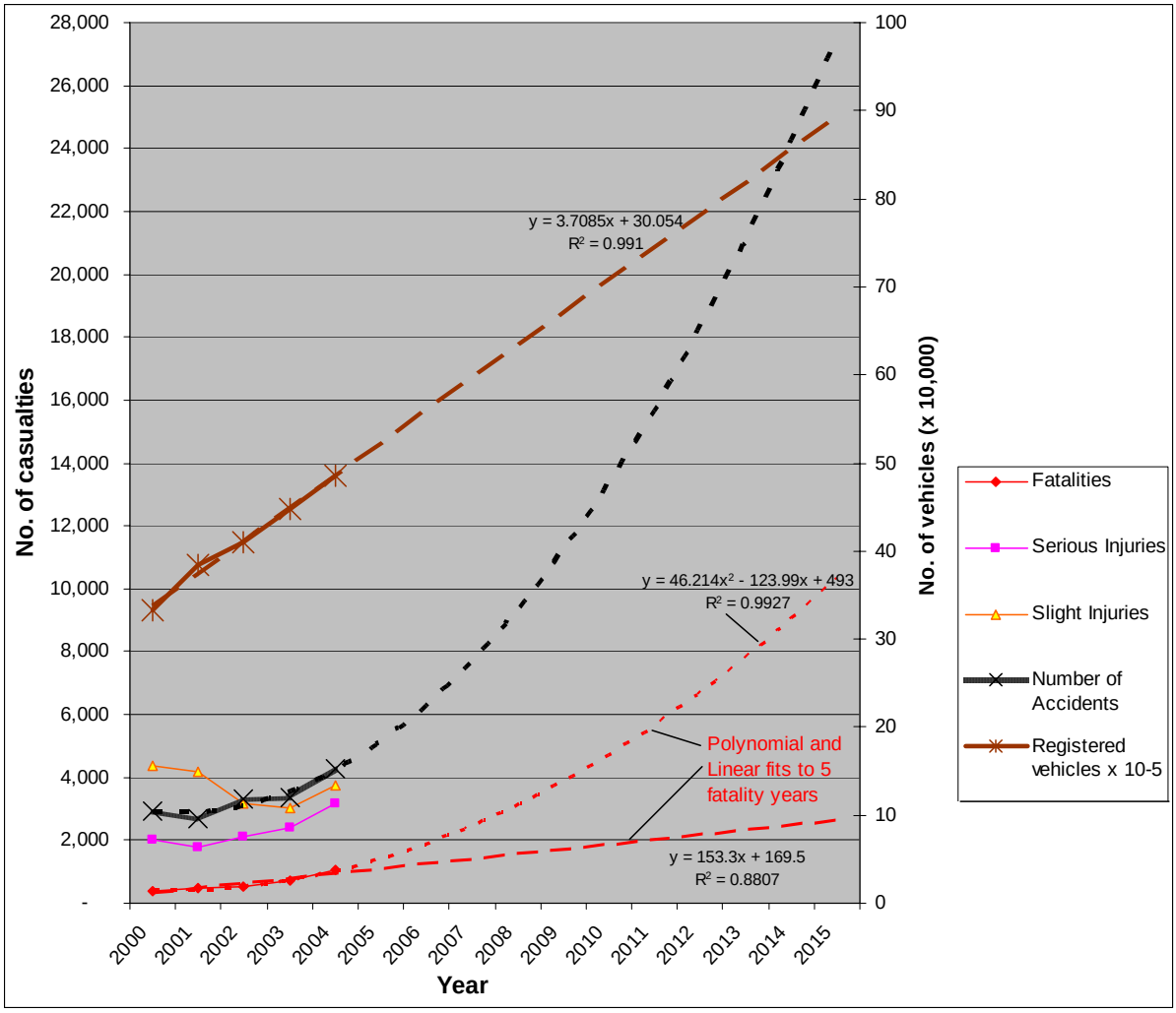

Figure 5 Road accidents, casualties and registered vehicles, and predicted growth

However, it is believed that even by considerable dedicated action, the maximum that could be achieved would be a 30 per cent reduction in fatalities over 10 years, and on the conservative accident growth assumption, this would result in a rate of about 8.4 fatalities per 10,000 vehicles (see Table 1 below). This is, of course, considerably greater than the 2 fatalities per 10,000 vehicles prescribed by ASEAN, which unfortunately may not be achievable. It would nevertheless be a very substantial and worthwhile reduction.

To provide an indication of the magnitude of the potential monetary saving: because accidents saved by a particular accident countermeasure in the year after introduction should also not occur in subsequent years, then over the 10-year period to 2015 this will results in a total of about 8500 lives having been saved (Table 1). If we assume the cost of a fatality to be US$20,488, as suggested in the latest approximate costing produced by Mithonarath et al (2004), then a total of about US$174million will be saved over the 10-year period in fatality accidents alone. It should be noted that this is also a conservative figure because, with the remedial work that will have been put in place to achieve this saving in fatalities, it is certain that many other serious injury accidents will not have occurred, thereby saving an even greater sum.

Table 1 PROJECTED FATALITIES (CONSERVATIVE ESTIMATE) AND TARGET REDUCTIONS.

Year	No. of fatalities.- best fit (linear regression line)	Predicted registered vehs. (linear fit) (x 10k)	Fatality rate: (deaths /10k vehicles)	Target saving: 1/30th saving in first year increasing by 1/30th per year to 1/3rd by 2015	Fatality rate with target achieved: (deaths /10k vehicles)
2006	1,243	56.014		37	
2007	1,396	59.722		119	
2008	1,549	63.431		248	
2009	1,703	67.139		422	
2010	1,856	70.848	26.2	637	17.2
2011	2,009	74.556		884	
2012	2,162	78.265		1,153	
2013	2,316	81.973		1,432	
2014	2,469	85.682		1,712	
2015	2,622	89.390	20.3	1,869	8.4
Accumulated total fatality saving by 2010				1,463	
Accumulated total fatality saving by 2015				8,512	
Value of accident saving by 2010				US$29,208,384	
Value of accident saving by 2015				US$174,398,295	

The current version of the Plan itemises a total budget spend for the next five years of US$38.366million. Although from the above Table 1, this is unlikely to be recouped by 2010, it can be seen that if the programme is still maintained, then considerable savings would be achieved by 2015. Indeed, it could be argued that the budget to be spent on implementing the Road Safety Action Plan should be increased to, say, US$60million over the next 5 years and US$94million from 2010 to 1015. This would still mean a net saving of US$20million that would otherwise be lost to the nation in terms of people killed in road accidents.

Part IV and the remainder of the Plan describes a total of 15 sectors or subject areas, each having its own series of Actions and these are dealt with in turn in the following chapter of this report.

4 THE NATIONAL ROAD SAFETY ACTION PLAN: PROGRESS & OBSERVATIONS

4.1 Action Plan No. 1: Establishing a National Road Safety Council for Coordination and Management of Road Safety

Road safety improvement must have adequate funding but, as stated in Section 2.2 above, it also needs to be carried out in an integrated manner. To coordinate all activities effectively and efficiently, it is necessary to have a single organisation which accepts responsibility and devotes itself entirely to managing the reduction of road accidents.

Owing to greater awareness and alarm over the rapidly increasing level of traffic accidents, the Ministry of Public Works and Transport took the initiative last year to prepare and submit a draft sub-decree for the creation of a National Road Safety Management Committee to the Council of Ministers for their deliberation and urgent adoption. This was also to satisfy one of the ASEAN declarations that each ASEAN Member Country has a multi-sector body to coordinate and manage the implementation of the National Road Safety Action Plan.

The National Road Safety Management Committee will be the sole institution to ensure the Government's implementation policies and programs on road safety.

The National Committee will be composed of the following:

1 Deputy Prime Minister, Co-minister of the Ministry of Interior.	Director
2. Minister of Public Works & Transport	1st Dep. Director
3. Minister of Health	2nd Dep. Director
4. Minster of Education	Member
5. Minister of Defence	Member
6. Minister of Economics & Finance	Member
7. Minister of Justice	Member
8. Minister of Information	Member
9. Minister of Environment	Member
10. National Police Commissioner General of the Ministry of Interior	Member
11. Royal Armed Force Commander – nationwide coverage	Member
12. Secretary General of the Cambodian Rd Cross	Member
13. Representative of the national Association of Insurance Cos.	Member
14. Representative of the national Transport	Member
15. Director General of the Transport Directorate of MPWT	Permanent Member and Coordinator

There is also a Sub-National Committee reporting to the above and this comprises:

1 Municipal and provincial Governor	Director
2. Director of Public Works & Transport	1st Dep. Director
3. Municipal and Provincial Police Commissioner	2nd Dep. Director
4. Municipal and Provincial Commander of Royal Armed Force	Member
5. Municipal and Provincial department of Education	Member
6. Chief of Municipal and provincial Dept of Health	Member
7. Chief of Municipal and Provincial department of Environment	Member
8. Chief of Municipal and Provincial department of Information	Member
9. Chief of Municipal and Provincial department of Economics and Finance	Member
10. Branch Supervisor of the Cambodian red Cross	Member
11. Deputy Chief of the MPWT	Permanent Member

This sub-decree was approved by Prime Minister Hun Sen on 20th May 2005 and thus the NRTSC was officially formed on that date.

One of the first tasks that the Committee must perform is nominate a Steering Committee, Working Committee and secretariat at national and local levels. This is stated in Table 2, which is Plan 1 reproduced from the National Road Safety Action Plan. The Municipal and Provincial level Committees will in turn create Road Safety Working Groups in their districts, communes, and/or villages to (not least) "ensure a mechanism to facilitate easy dissemination of reports and works from national to field level and from field level to national level".

Weaknesses

- There has been no formal coordination mechanism to date to enable effective management and implementation of road safety activity, coordinating such activities between different ministries, agencies and the private sector. There has also been neither ring-fenced budget nor central institution with responsibility to arrange a program of accident remedial work.

- Although agendas and minutes of meetings are mentioned in the sub-decree, there does not appear to be an obligation for the NRTSC to meet on a regular basis for progress and problem-solving discussions.

- Within the current National Action Plan several of the implementing dates have passed without the action having been taken, and the specified budgets remain still as a coarse first-attempt draft.

- There appears to be some key ministries missing from the Committee such as Ministry of Rural Development – as 85 per cent of the population live in rural areas and this ministry is responsible for over 28,000kms. of Cambodia's roads {7720kms being national or provincial roads}, Ministry of Urban Planning and Construction, and Ministry of Land Management (but see below).

Strengths

- There appears to be much greater awareness in government and throughout the country in the very serious situation that road accidents have become.

- The new initiative of setting up an NRTSC to perform such a function is an excellent first step.

- The National Action Plan produced tackles all the required sectors that can affect road safety.

- It is understood that, since the above ministry omissions were notified to MPWT, representatives from these ministries have now been invited to join the NRTSC.

Table 2. Action Plan No. 1: Establishment pf National Road Traffic Safety Committee for Coordination and Management of Road Safety

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)								0	0	0
1 – Draft of Governmental Decree on the establishment of national Road Traffic safety Committee is being considered at inter-ministerial level.	8					1000	1000	0	0	0
2 –Draft of NRTSC deliberated by the Council of Ministers.	9					1000	1000	0	0	0
3 – The prime Minister signs the sub-decree on NRTSC	10					1000	1000	0	0	0
4 – Nomination of Steering Committee, Working Committee and Secretariat at national and local levels.	11					1000	1000	0	0	0
Medium Term(2-3 years)										
NRTSC starts working with its earmarked budget to: 1 – Make its internal regulations and set up the procedure to allocate budget	12					0	10,000	10,000	10,000	10,000
2 – Set up procedure for the campaigns on Traffic Laws to all strata of the people by all means possible.. .	12					0	10,000	10,000	10,000	10,000
3 – Start campaigns on traffic laws and regulations according to the Road Safety Action Plan	-	01				0	10,000	10,000	10,000	10,000
Long Term (4-5 years)										
NRTSC reviews the accomplished works and assesses the efficiency of its works.	-	01				0	5,000	5,000	5,000	5,000
Building and equipping the Secretariat with necessary y material in order to fulfil its duty.	-					0	0	0	0	100,000
Total Budget :	148,000 USD (One hundred and forty eight thousand USD)									

Implementing Ministries:- Ministry of Public Works and Transport
Participating Ministries: - Ministry of interior
Ministry of health
Private Sector
NGOs

Recommendations	***Cost****
1.1 The NRTSC should revise the draft Action Plan after carefully deciding on a more accurate budget allocation based on a detailed costing of actions required over the next 5 years. This is urgently required if government is to approve and acquire the appropriate funding for the Plan to be implemented to the specified timetable.	**L**
1.2 Many stated dates in the Plan have already passed without the particular action having having been completed. Thus the timing of all Actions of the Plan needs to be thoroughly investigated and a new timetable set, otherwise it is likely that confidence and momentum will be lost in carrying the Plan forward.	**L**
1.3 Agree a timetable for regular meetings of the NRTSC (for example, quarterly) to ensure members are kept up-to-date with progress around the country on road safety and to serve as an incentive to report back actions taken.	**L**
1.4 The NRTSC should disaggregate the target casualty reductions proportionately to the Municipality and Provincial Regions on an annual basis in terms of actual numbers to be achieved.	**L**
1.5 As part of complying with its laid-down obligations, the NRTSC should produce and require Municipal and Provincial Committees to issue detailed plans on an annual basis, stating exactly how their budgets will be spent to achieve the overall target (e.g. the highway authorities should detail the sites to be treated against expected casualty savings, and in subsequent years should report on the schemes previously implemented and actual accident and casualty numbers occurring at previous years' treated sites, i.e. provide a simple evaluation).	**M**
1.6 It is important that the strategy is monitored at various stages throughout its implementation to help keep it on course. Also, an eventual full evaluation of its effectiveness should be carried out, not only to help establish whether value for money has been achieved, but to highlight areas or measures that have failed to produce the expected safety improvement as well as those that have that have proved particularly successful. This will provide valuable knowledge for further applications in the continuous process of safety management.	**M**

***** H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

4.2 Action Plan No. 2: Road Accident Data System

The road accident database is a crucial element of road safety improvement work since the record of accidents is the fundamental measure of safety. Without such a database the scale and nature of safety problems will be uncertain as investigation of the database should reveal where the main safety problems lie (not only geographically but in road user groups, types of road, road vehicle, times of day etc) so that action can be focused where the need is greatest. This should help to ensure the best return on the investment and effort made. Indeed, the database can be used in future years to evaluate the effectiveness of the various remedial actions implemented. Without proving that remedial work has been effective in reducing accidents or demonstrating that certain trial countermeasures do not work well, it is likely that money and resources will ***not*** be spent to maximum benefit and even, in some cases, wasted.

There are three levels at which analyses of road accident data are required:

- ***National***, usually through an annual road accident statistics report which enables country-wide strategies to be set (e.g. drink-drive policy);
- ***Regional***, where particular regional problems such as accidents involving remorques in Phnom Penh may need analysis;
- ***Local***, where problems on individual streets, sections of road or junctions will be investigated.

The accident investigation process also distinguishes between Accident Prevention, which is concerned with preventing accidents in the future largely through setting standards in highway design, planning, vehicle and driver testing, education, etc; and Accident Reduction, in which existing problems on the road network are identified and tackled. These two strands operate at a National level.

It is evident that only a computerised system can begin to satisfy all the demands for analysis required by the various agencies concerned with road safety; and that such a system will be the engine of the country's road safety strategy. It is considered that the computerised accident information system is also at the heart of local accident blackspot analysis.

At this stage, it is also important to distinguish between:

1) Accident Investigation as carried out by the police, in which the primary purpose is to identify the persons at fault in a single accident so that any charges might be brought against them; and

2) Accident Investigation as carried out by engineers and other specialist investigators, where clusters of accidents are investigated to find common factors that may have led to the cluster. These clusters may be in location (e.g. a particular bend), time (e.g. Friday nights) or personal road user characteristic (e.g. a particular child age group).

Weaknesses

- There is currently no computerised road accident database within the Traffic Police or MPWT used regularly to tackle road safety problems

- The level of under-reporting of accidents to the police is obviously high as Handicap International (see Strengths below) have reported recording from hospital records 5 times the number of casualties than are recorded by the Police.

- Not all hospitals (and particularly private clinics) are yet included in data collection for the accident database. It currently only comprises data from 11 hospital and private clinics participating in Phnom Penh.

- Owing to the requirement for hospital staff to spend time finding out details of crashes in order to complete required fields on their version of the form, Handicap International are currently paying a nominal sum to hospital staff for completion of each form. Some concern is expressed on the sustainability of this process, once donor funding ceases.

- Data is currently stored by the HI system in a Microsoft ACCESS database which, whilst key staff at HI are able to program it and produce outputs to specified requirements, specialised knowledge and experience of using ACCESS is needed.

Strengths

- Since March 2004 a commendable effort has been made by Handicap International to work towards the production of a more reliable and useful national accident database. This has been called RTAVIS (Road Traffic Accident and Victim Information System – see HI and Cambodian Red Cross, 2004) and requires both the Police and hospitals to complete accident report forms and then combines the data to produce the more comprehensive database.

- There are other hospitals that are scheduled to join the scheme with the intention to make it a full national database

- The system will shortly be handed over to MPWT for them to manage which, as long as adequate resources are made available, will place the responsibility for the database in the government ministry that is leading the NRTSC. It should therefore benefit greatly from its use and it will also be in its own interests to ensure reliability of data.

- New forms have recently been designed in consultation with MPWH and the Traffic Police. A small number of additional recommendations for changes are given in Appendix A. This list was given to HI, who has quickly incorporated most of them in the form, but the changes are not yet approved by MPWT and the Police.

- A seminar will be held in early June 2005 to present the new forms and gain agreement from all stakeholders for their immediate use.

Table 3. Action Plan N° 2: Road Accident Data Systems

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. Organizing a seminar for discussion and review of the Data Collection Work and assessing its state.	8	-	-	-	-	4,000	4,000	4,000	4,000	4,000
2. Training Data Collection officers in the whole country aiming at getting reliable and accurate data	10	-	-	-	-	10,000	10,000	10,000	10,000	10,000
Medium Tem (2-3 years)										
1. NRSC Secretariat and the Committees of local level start communicate through Computer Network	-	05	-	-	-	0	10,000	10,000	10,000	10,000
2. Establishing a Data Storage / retrieval System for the whole country	-	07	-	-	-	0	10,000	10,000	10,000	10,000
Long Term (4-5 years)										
Using ASEAN Network System to facilitate discussion on Road Safety with all ASEAN Countries aiming to share good information and good experiences	-	-	-	-	01	0	0	0	10,000	10,000
Total Budget:	170,000 USD (One hundred and seventy thousand USD)									

Implementing Ministry: - Ministry of Public Work and Transport
Participating Ministries: - Ministry of Interior
- Ministry of Health
- HANDICAP

Recommendations		***Cost****
2.1	Incorporate additional fields on the new accident report forms, as detailed in Appendix A.	**L**
2.2	Consider introduction of an easy-to-use computer accident database and analysis system (such as TRL's MAAP - whose original development was funded by DFID). This package requires minimal training yet provides reliable cross tabulations and other analyses, and even has the facility to carry out powerful mapping analyses when the country decides it is ready to introduce a GIS system to accident data, i.e. when crash locations are recorded by grid coordinates. This new system would be able to take data entry directly from the new report forms and can import the data already held by RTAVIS. However, it would have the potential for easier access and analysis by a larger group of users, thereby ensuring more widespread utilisation of the database across the country.	**H**
2.3	If such a system is acquired then adequate training on management of the system and the types of analysis available should also be purchased as part of the installation process.	**M**
2.4	Greater funding will be required for the system and hardware than is currently given in the National Action Plan for the accident database (shown as Table 3). A 'needs' study should be carried out followed by approaches to donors such as DFID, the World Bank or ADB who have given support for this type of investment in other countries.	**M**
2.5	The National Action Plan for the accident database should be more detailed showing planned phases of extending to other hospitals around the country by set dates, to assist gradual national coverage.	**L**

***** H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

4.3 Action Plan No. 3: Road Safety Funding

Obviously the improvement of road safety requires considerable funding but the amount of money that Cambodia is losing each year as a direct result of road accidents has been been estimated for 2002 to be as high as USD116million (Mithonarath et al, 2004). Although road accident casualties will obviously never be completely eradicated, estimates have been given in Section 3.2 as to the potential savings that the country could feasibly make. Thus there should be a strong case for spending a considerable proportion of this potential saving in order to bring about the savings.

Weaknesses

- No separate funding is made available on an annual basis from central government to spend on actions that will improve road safety. For example, all highway safety features tend to have been included only when a road project is implemented (either new or upgraded roads), as there appears little evidence of a regular budget even for routine road maintenance, particularly for the rural road network.

- It is thought that only about 50% of car drivers have at least the minimum level of car insurance (3rd party) but very few motorcyclists indeed (say, 10%) take out insurance cover. Consequently there is often little or no financial help for victims of road crashes.

Strengths

- Handicap International and the Cambodian Red Cross have through direct donations funded a programme of safety campaigns as well as other projects, like the production of a road safety school curriculum (Van Wetter et al, 2004).

Recommendations		***Cost****
3.1	As in 1.1, that all items in the National Road Safety Plan should be carefully costed in the submission for ministerial approval.	**L**
3.2	Consider setting up a road fund, for example, from a fuel levy and/or special tax from the vehicle insurance industry.	**M**
3.3	Consider making 3rd-party vehicle insurance compulsory, with appropriate controls set on the insurance companies to maintain realistic, affordable maximum premiums.	**M**

***** H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

Table 4. Action Plan N^{o} 3: Road Safety Funding

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. NRSC and relevant ministries make proposition to Government for earmark fund of Road Safety	11	-	-	-	-	1,000	1,000	1,000	1,000	1,000
2. National Assembly study and hopefully approve the request made on earmark fund for Road Safety	-	05	-	-	-	0	0	0	0	0
3. NRSC allocates budgets to its Departments/Units	-	07	-	-	-	0	5,000,000	5,000,000	5,000,000	5,000,000
Medium Term (2-3 years)										
1. NRSC organizes a workshop inviting other organizations and private sectors to participate and support Road Safety Action Plans	-	10	-	-	-	0	5,000	5,000	5,000	5,000
2. NRSC establishes mechanism for auditing and reporting on the expenses in Road Safety Action Plans	-	-	01	-	-	0	5,000	5,000	5,000	5,000
Long Term (4-5 years)										
1. Sustainable Road Safety Funding by the Government. private sectors	-	-	-	01	-	0	0	0	0	0
Total Budget:	20,045,000 USD (Twenty million and forty five thousand USD)									

Implementing Ministry: - Ministry of Public Work and Transport
Participating Ministries: - Ministry of Economics and Finance
- Ministry of Planning
- Ministry of Interior

4.4 Action Plan No. 4: Road Safety Audit – Hazardous Locations

Highway engineers in most developed countries have accepted the fact that accidents tend to cluster on the road network and often the main reason for this is due to some poorly-designed engineering factor. Engineers have thus often actually led the national efforts in reducing the carnage on the roads. They have done this by adopting a systematic and scientific approach to investigation of problems or potential problems and designing appropriate remedial action.

It is generally accepted that there are two main approaches to improving safety within the highway engineering field. These are by:

a) ***Accident Prevention,*** and
b) ***Accident Reduction***

Both approaches are concerned with ways of preventing accidents happening in the future but the term accident Prevention in this context is taken to be procedures that should not allow unsafe designs to be introduced (even today) when a road is initially built or upgraded. This means ensuring that safe design practices are present in the highway design standards and that these are adhered to by the designers. This is further helped by the introducing the safety audit process for all new and upgraded road schemes.

Accident Reduction means regularly monitoring safety on the present road network and applying the Accident Investigation and Prevention (AIP) process to initially study locations where accidents have clustered (i.e. blackspots) and to design and implement a programme of appropriate countermeasure treatments.

4.4.1 Road Safety Audit

Initiated in Great Britain, with research supported by TRL in the 1980's, the road safety audit process has proven to be highly effective in identifying and reducing the ***potential*** for accidents.

Road safety audit is a formal procedure for assessing accident potential and safety performance in the provision of new road schemes and the improvement, rehabilitation and maintenance of existing roads. An audit should form an integral part of highway planning, design, construction and maintenance and it requires an objective approach to the assessment of accident risk. The principal method of ensuring this objectivity is through the independent assessment of schemes by persons unconnected with the original design.

The main aim is to ensure that all new highway schemes operate as safely as possible. This means that safety should be considered throughout the whole preparation as well as construction of any road project.

Figure 6 Sharp 90^{o} bend after long straight section, initially unmarked – should have been noticed in an audit. Good warning devices (signs, jiggle bars, chevrons) subsequently installed.

The basis for road safety audits is the systematic application of safety principles. Specific aims are:

- to minimise the risk and severity of accidents occurring on the scheme;
- to minimise the risk of accidents occurring on adjacent roads, i.e. to avoid creating accidents elsewhere on the network;
- to recognise the importance of safety in highway design to meet the needs and perceptions of all types of road user; and to achieve a balance between needs where they may be in conflict;
- to reduce the long term costs of a scheme, bearing in mind that unsafe designs may be expensive or even impossible to correct at a later stage; and
- to improve the awareness of safe design practices by all involved in the planning, design, construction and maintenance of roads.

Strict adherence to design standards (see next Section) does not always avoid safety problems. Adverse features may unwittingly be introduced from a combination of design elements. Safety needs may conflict with capacity and environmental requirements; necessary relaxations of standards (perhaps due to terrain) may give rise to safety problems. Furthermore, design standards tend to lag behind the application of the latest international and national research findings. In view of such issues, a structured safety audit can usefully identify potential problems and make practical recommendations for alleviating them.

4.4.2 Accident Investigation and Prevention at Hazardous Locations

As stated earlier, on any road network, accidents are rarely completely randomly distributed but tend to cluster at certain locations, i.e. hazardous locations or blackspots. By studying these sites it is often found that there are common patterns of driver error, say, to which a particular engineering feature may have contributed. A suitable road improvement or

package of measures should help prevent or ameliorate similar occurrences in the future. This is commonly referred to as AIP: the Accident Investigation and Prevention process. Thus treating blackspot locations first should logically yield the best return on investment made in terms of accidents saved.

Figure 7 Blackspot identified by Traffic Police in Phnom Penh outside Calmette Hospital. Wide road with relatively fast-flowing traffic, difficult for pedestrians (perhaps preoccupied with visit they are making to a patient) to cross.

Almost a prerequisite for engineers to be able to carry out this AIP work efficiently in Cambodia is access to a reliable computerised database so that they can easily monitor where accidents cluster and then investigate recorded details to determine common patterns for which they can identify appropriate treatment.

In the definition of “blackspot” it is important to use the same time period (usually injury accidents per year or per 3 years), and type of highway unit. There may be a need to have a number of different blackspot groups (e.g. per 100m or 1km road length, specified measured area, or within 150 feet of a junction) to be consistent in identifying the worst accident clustering within the road group type. In the future when most blackspots have been treated successfully, it may be appropriate to move onto route schemes or area-wide schemes.

Listings under the separate blackspot types should be drawn up and ranked in order of importance - for further investigation. To assist in this it may be desirable to assign a points system, say, in relation to accident severity classification (e.g. 6 points for fatal, 3 points for serious and 1 for minor injury).

Figure 8 Blackspot identified by Traffic Police on toll road in Phnom Penh: a sharp right bend after long straight section with no signs or marking. Driver sightline is down avenue of trees straight ahead – probably a greater hazard at night-time.

Safety problems in Cambodia have hitherto been treated in a relatively ad-hoc manner, usually with aid-funded projects (e.g. JICA) and by foreign engineers.

There are many references describing the accident analysis process (e.g. TRL, 1994; RoSPA, 1992; NAASRA, 1988; Ogden, 1997) but most include the following stages:-

- Preliminary accident analysis to understand accident types and conditions. Accident factor grids or 'stick' diagrams are useful here.
- Site investigation where road user behaviour and other traffic/road data is monitored - to help define the problems.
- Detailed analysis (including simple statistical tests to ensure that the accident numbers are not due to random fluctuation) to classify causal factors.
- Design appropriate remedial measures and cost, and carry out estimated cost benefit by applying figures produced from the accident costing survey (see Section 4.14).
- A simple cost benefit analysis system should be adopted to prioritise a program of remedial measures based on best rate of return for the cost of the proposed remedial scheme.
- Draw up a prioritised list for implementation for the road network that yields the best 'value for money'.

Weaknesses

- No road safety audits have been carried out locally and no audit system is currently in place. Consequently hazardous engineering features are still being built today.

- It is unlikely that any local engineers have adequate experience to carry out valid audits or properly organised AIP work.

- Currently there is no annual ring-fenced budget for implementing a programme of blackspot treatments.

- The road standards that exist for Cambodia may not be appropriate for all road safety audits (see next Section).

Strengths

- Safety audits may only have been carried out relatively recently by foreign consultants working on new road projects funded via the aid agencies. However, relatively recent road construction work such as that illustrated in Figure 6, where remedial work had to be implemented more than 18 months after works had finished due to the occurrence of many serious accidents, suggest that audits are not always carried out.

Figure 9 Chevron sign: a very helpful and cost-effective warning device on bends, though much better if (diamond-grade) reflective material used.

- There are some good safety measures that have been installed (e.g. chevron signs as in Figure 9, road humps, raised crossings etc).

- Generally the set of aims stated in the Actions of the National Road Safety Plan (shown in Table 5) is a good one; however, annual funds for treatments are likely to be too limited to cover remedial work over the whole country.

Recommendations		***Cost** *
4.1	The persons carrying out audits or AIP work need to possess considerable experience in recognising potential safety problems normally built up over many years work in the field and in the design of remedial measures. Thus it is recommended that initially audit experts are commissioned to help decide on the necessary types of audit, and for them to provide long-term training. This is essential in order to build up the very necessary knowledge and perceptual skills required by those local engineers who will eventually be carrying out this important work.	**H**
4.2	Define current blackspot levels including highway units as described in 4.4.2. This is important in order to make legitimate comparisons and to set priorities for treatment.	**L**
4.3	Ensure that highway engineers monitor and carry out evaluations of effectiveness of implemented safety schemes, and record the results in their annual plan.	**L**
4.4	In the current draft of the Action Plan (Table 5), a considerable increase in the budget specified for treatments will probably be required to meet casualty reduction targets.	**M**

***** H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

Table 5. Action Plan N° 4: Road Safety Audit- Hazardous places

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. To nominate a group of engineers for being trained on road safety Audit skills	07	-	-	-	-	10,000	10,000	10,000	10,000	10,000
2. Establish a legislative procedure on road safety audit to be applicable in the whole country	08	-	-	-	-	1,000	1,000	1,000	0	0
3. Group of auditors collect data on the hazardous locations- black spots and all other places such as harshly curving roads, roads next to schools etc; and make the inventory and proposals to the upper level for improving.	08	-	-	-	-	10,000	10,000	10,000	10,000	10,000
Medium Term (2-3 years)										
1. The Ministry of Public Works and Transport starts to rebuild, improve the hazardous locations- black spots in the whole country	10	-	-	-	-	0	200,000	200,000	200,000	200,000
2. All roads building must be subject to the Road safety auditors in all stages	-	01	-	-	-	0	1,000	1,000	1,000	1,000
Long Term (4-5 years)										
1. Preparation of project for special lanes of roads for pedestrians, bicyclists and motorcyclists in cities/provinces and along national road.	-	12	-	-	-	0	100.000	100.000	100.000	100.000
2. Promoting the road safety audit field for higher efficiency	-	-	-	-	-	0	0	0	0	0
Total Budget:	1,308,000 USD (One million three hundred and eight thousand USD)									

Implementing Ministry: Ministry of Public Work and Transport

4.5 Action Plan No. 5: Roads Environment and Road Design

On-the-spot road traffic accident investigations carried out many years ago in the UK, USA, and Australia demonstrated that, although some element of human error is involved in most accidents that occur (95 per cent), the road environment is a major contributory factor in about 28 per cent of all accidents. Thus if the road environment can be improved or made more forgiving and this causation factor effectively removed, then there is the potential to prevent or reduce the severity of a significant proportion of the collisions that currently occur.

The road network in Cambodia is obviously still being expanded and/or rehabilitated, and thus many opportunities exist to incorporate good safety practices at marginal cost during the planning and design stages.

It is unclear whether the road network in Cambodia has ever been fully and officially classified into roads used primarily for through-movements and those used for access to housing, commercial buildings or other amenities, where lower speeds are required.

In terms of land use, the primary aim with regard to safety should be to ensure that the conflict between vehicles and pedestrians or other vulnerable road users is minimised.

4.5.1 Road Design Standards

The latest Road Design Standards were produced in 2003 (MPWT, 2003) by an Australian consulting firm funded by AusAID. Whilst these standards are well written and comprehensive, and have some safety features (e.g. in part 3, Drainage, there is a note on avoiding exposed culvert ends), they appear to have had very little adaptation from Australia's own standards.

For example:

i) in determining vehicle capacity, conversion factors for motorcycles to PCU's (Passenger Car Units) are quoted as 1.0 and 0.75 for rural and urban environments respectively, but it is suggested that these may be inappropriate for Cambodia given the high density of motorcycles and their use of the road space.

ii) The section on signs, although describing mountings and material etc well, does not contain drawings of all types of signs used in Cambodia.

iii) Devices such as rumble strips or jiggle bars and road humps are not specified such that they are of standardised shape and marking, so that the driver's experience of such a device will be the same throughout the country. This is important in, for example, the case of humps so that drivers will know from previous experience wherever they encounter humps what is the optimum safe and comfortable speed at which to drive over them. (see Figure 10).

Figure 10 Owing to complaints from drivers through village, the original flat-topped humps with steep sided ramps were extended to long humps as shown above, which can be driven over comfortably at 60km/h. Preferred standard would be 3.7m long, 100 to 120mm height and segment of a circle in cross section. This shape is still suitable for raised zebra crossings.

Weaknesses

- There are many intersections where road markings and signs are badly worn or absent so that the priority is not clear nor even the line behind which drivers should stop, leaving uncertainly and danger to those unfamiliar with the location.

- There appears to be wide discrepancies between safety features on different parts of the network (e.g. no posted lower speed limit as roads pass through a village and on the same highway sections with good signs, (though perhaps misplaced signing as shown in Figure 11). It is assumed that this will be addressed by item 1 of Action Plan 5 (see Table 6).

- Where a low speed limit has been introduced to 40 or 50 km/h for a village or crossing place, there are several locations where this has often been done over an unrealistically short distance (see Figure 11, where 50 limit is applicable to an 80m length of road). This extremely short distance does not allow the driver adequate time to adjust his speed smoothly down to the required level so that he is travelling at that lower safer speed through the potential hazard (the zebra crossing), nor could it be practically enforced.

- Many items of street furniture have been constructed of sold concrete (see Figure 12) which can provide a considerable hazard as they are non energy absorbing. Indeed, there is considerable controversy over the concrete median barriers installed as a trial on some major highways in Phnom Penh, because collisions with the solid ends of barriers have resulted in a number of seriously injured casualties.

- Attention is generally not paid to the edge of the road where steep sideslopes or drainage ditches can cause errant vehicles drifting off the carriageway to turn over (see Figure 13).

Figure 11 Lower 50m speed limit for zebra crossing – applied over only 80m length of road.

Figure 12 Solid concrete structures present considerable hazards to errant vehicles. The start of the concrete median barrier should be chamfered up gradually from road level, despite the consequential need to replace the 'keep right' arrow sign more frequently. Right hand photo shows road narrowing due to culvert protected by concrete pipe sections: a hazard particularly at night.

- On rural roads which are mainly gravel or earth, maintenance is obviously a continual problem as the wet season can cause very rapid deterioration of the road surface: gravel is washed away and deep potholes form. However, the dry season may present a greater safety problem due to dust clouds created by vehicles. Figure 14 Illustrates how overtaking vehicles might be obscured from vision.

Figure 13 Deep irregularities in sideslope can cause vehicles to roll over if they veer off the carriageway.

Figure 14 Dust clouds created by vehicle passage in dry season can adversely affect visibility: driver would not have a clear view of any overtaking vehicle.

Strengths

- Several relatively new sections of rehabilitated principal roads have good safety features installed, such as cycle/pedestrian ways marked by a line at the sides of the road (e.g. see Figure 15), junction warning signs, lower speed limits for villages, marked pedestrian crossings or raised crossings, etc.

Figure 15 Section on NH6 with separate marked cycle/pedestrian lane, and good warning for sharp bend: including rumble strips, edge delineator posts (though more 'forgiving', collapsible posts would be preferable) and chevron boards.

Recommendations		***Cost ****
5.1	The roads standards, particularly with regard to safety features, need to be followed much more consistently and good records (kept centrally) of justifications for any agreed departures from standards.	**L**
5.2	There needs to be clear unambiguous priority indicated at each intersection (signs and stop lines), so that traffic on the higher status road is always given precedence over that from the less important road.	**H**
5.3	It is essential that land-use planners understand the traffic and safety implications of their proposals before schemes are finalised. This should be done by circulating the plans for comment to fellow professionals responsible for traffic and road safety (part of the safety audit process). Indeed, many potential hazards such as those illustrated above could be avoided by a properly conducted safety audit.	**M**
5.4	Carry out research into the possibility of using local (waste or by-product) materials as dust inhibiting agents to spray or spread on rural roads in the dry season.	**M**

***** H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

Table 6. Action plan N° 5: ROADS ENVIRONMENT AND ROAD DESIGN

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. Road signs and signals, road marking, street lighting, reflective devices must be in places along main national roads and roads in cities/provinces, especially Phnom Penh, Kampong Som, Siemreap and other tourist cities.	11	-	-	-	-	500,000	500,000	500,000	500,000	500,000
2. In Phnom Penh, Siemreap and Kampong Som, Projects on Off Street Parking must be in place and bus parking lots be sufficient.	-	-	-	-	-	100,000	100,000	100,000	100,000	100,000
Medium Term(2-3 years)										
1. Establish special lanes for motorcyclists and pathways for pedestrians, dividing strip or road island.	01	-	-	-	-	0	100,000	100,000	100,000	100,000
2. Pedestrians Bridges must be build in Phnom Penh at very crowded places	-	-	01	-	-	0	0	100,000	100,000	100,000
3. Building Off-Street Parking in the important cities such as Phnom Penh, Siemreap and Kampong Som and establishing regulations for on-Street parking in the cities and provinces with payment.	-	-	-	01	-	0	100,000	100,000	100,000	100,000
4. The sidewalk in the main cities should be reserved for pedestrians	-	-	-	05	-	0	0	100,000	100,000	100,000
5. Designating more one way streets in Phnom Penh	-	-	-	-	-	0	0	1,000	1,000	1,000
Long Term (4-5 years)										
1. Enlarging main boulevard at least to three lanes in one traffic direction and building new roads to at least 4 lanes in one traffic directions in Phnom Penh, Siemreap and Kampong Som.	-	-	-	12	-	0	0	1,000,000	1,000,000	1,000000
2. Making rest areas for drivers, restrooms and kiosks along the national roads.	-	-	-	-	-	0	0	0	0	0
3. Removing all existing markets alongside the roads to the safe places out off the roads.	-	-	-	-	01	0	0	100,000	100,000	100,000
4. Sufficient parking lots in all commercial centres	-	-	-	-	05	0	0	0	0	0
5. Designating bus lanes and stations in Phnom Penh, Siemreap and Kampong Som.	-	-	-	-	10	0	0	100,000	100,000	100,000
6. Putting Road signs and signals, road markings and street lighting and traffic light in all cities/provinces and along all national roads	-	-	-	-	12	0	0	100,000	100,000	100,000
Total Budget :	8,303,000 USD (Eight millions three hundred and three thousand USD)									

Implementing Ministry: Ministry of Public Work and Transport

4.6 Action Plan No. 6: Road Safety Education for Children

The term 'safety education' covers those activities that aim to provide the information, through instruction and training, and instil the attitudes and beliefs needed to bring about safe behaviour on the roads. It is therefore not a short-term activity, but one that is essential to the establishment and maintenance of a culture of safety within any society.

Road safety education should be seen as a long-term investment, since encouraging safety consciousness among the child pedestrians and cyclists of today should help to improve the standards of tomorrow's users of motorised vehicles. It must also be seen as an ongoing process, not something that occurs once or twice a year. Experience in many countries has shown that this can best be achieved if it is incorporated into the school curriculum, and there are numerous well-documented ways in which this can be done.

Road safety has appeared as an item in the school curriculum for many years in Cambodia; however, this has tended to be simply to teach the Traffic Law which probably did not appeal to children as it concentrated on learning all the road signs, though it did include how to cross the road.

To be effective, road safety education depends on good materials and good delivery. The materials currently in use have been substantially improved last year by HI. A new 'syllabus' has been produced as a Teacher's Manual on Road Safety Education (Van Wetter et al, 2004), and this appears to be much more comprehensive. It details road safety lessons for Grades 1 to 6 (i.e. from 7 years old to 12), and work books have also been produced. These lessons occupy a total of about 10 hours per grade per year.

The syllabus has only currently been applied as a pilot experiment in selected schools in Phnom Penh. The MOEYS in conjunction with HI have been improving the material over the past 12 months, and the Ministry has now decided to begin this year training 4500 teachers on this road safety syllabus. There are more than 5000 schools in the country, and so they will have to select certain schools owing to the limited resources available. HI are paying for production of the material and even for teachers pay for attending this extra training. However, the MOEYS require more resources to cover the cost of large RS posters for display boards at schools and for further printed material for both teachers and pupils.

One procedure that has been found to be very effective in many developing countries is to have one teacher in each school who is nominated as being responsible for safety matters, often referred to as the 'safety champion'. It has also been shown that providing training for teachers in the delivery of road safety can have considerable benefits in the longer term.

The Ministry is currently preparing a 5-year action plan, which covers requirements in terms of schools and teachers and teaching materials.

Weaknesses

- The old method of teaching children to learn all the traffic signs and other Traffic Law in the classroom was not appropriate for teaching the skills that they need for coping with today's traffic..

- Even with the new syllabus there does not appear to be any practical for children to learn the essential skills in a real road and traffic environment. It is known that young children have much more difficulty than adults in judging vehicle speed and recognising safe gaps in the traffic.

- The new Road Safety Teacher's Manual requires some lessons to be meetings with a policeman and later a hospital worker. Whilst the police have in the past visited schools, it is understood that hospital workers have not. Visits such as these are indeed probably worthwhile, but there are likely to be practical difficulties in arranging such visits with these other professionals on the dates needed and to all schools in the country.

Strengths

- The new syllabus contained in the Teacher's Manual is a very major improvement in the way road safety is taught over the whole primary school.

Figure 16 Preparation for school training session at Handicap International.

Recommendations

		Cost *
6.1	The cost of the road safety training materials should be included in the MOEYS's current 5-year action plan (currently in draft).	**M**
6.2	The MPWT need to inform MOEYS when they install new road features with which road users may not be familiar (eg. the diagonal line marked-crossing (see Figure 7), and the concrete median dividers), so that children can be informed at school, and the course material changed if necessary.	**L**
6.3	The budget currently stated in the NRTSC Action Plan for printed material will only provide, on average, about US$20 per school. It is suggested, therefore, that this be increased significantly.	**M**
6.4	Consideration should be given to introducing separate practical lessons in the playground on safe cycling as this would also provide very worthwhile early training.	**L**
6.5	Consideration should also be given to nominating one teacher per school as 'safety champion'.	

* H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

Table 7. Action Plan N° 6: ROAD SAFETY EDUCATION FOR CHILDREN

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. Cooperation of the Ministry of Public Works and Transport with the Ministry of Education for setting a program education traffic law and revising old education program.	09	-	-	-	-	1,000	1,000	1,000	1,000	1,000
2. Establishing and publishing documents or books for pupils in the whole country	11	-	-	-	-	10,000	10,000	10,000	10,000	10,000
3. Introduce road safety program in kindergarten	-	01	-	-	-	1,000	1,000	1,000	1,000	1,000
Medium Term (2-3 years)										
1. Training teachers for their abilities of teaching traffic laws and regulations	12	-	-	-	-	10,000	10,000	10,000	10,000	10,000
2. Distributing documents or study materials to pupils in all schools	-	01	-	-	-	10,000	10,000	10,000	10,000	10,000
Long Term (4-5 years)										
1. Sending senior officials to study abroad seeking good experiences on road safety, esp. to the ASEAN countries	-	05	-	-	-	0	6,000	6,000	6,000	6,000
2. Revising and improving educational program and assessing its effectiveness and quality of pupils	-	-	07	-	-	0	1,000	1,000	1,000	1,000
Total Budget:	638,000 USD (Six hundred and thirty eight thousand USD)									

Implementing Ministry: Ministry of Education
Participating Ministries: Ministry of Public Work and Transport
Ministry of Interior

4.7 Action Plan No. 7: Traffic Law and Regulations

A set of rules for driving and use of the shared public highway is obviously an essential pre-requisite for collision avoidance and a general safe, smooth operation of the road network. The existing traffic laws in Cambodia came into force in August 1991, but unfortunately they have many deficiencies which both the Traffic Police and other organisations have criticised. Thus a new set of laws is currently in draft form and hopefully will be approved this year. The latter represents a major improvement as it introduces many new significant rules that will affect most road users in some way.

For example, all car drivers and passengers (front seat only in current draft) will need to wear seat belts, all motorcyclists must wear helmets and wearing rates are currently at an extremely low level. There are new speed limits stated for different vehicle types for in town and on rural roads. Also, as the law since 1991 has stated that motorcyclists did not require a driving licence for motorcycles with under 50cc engine size, very few do possess one. With the new law virtually all motorcyclists will now need a licence (for engine cylinder size more than 49cc).

There are, however, a number of inadequacies or improvements that could be made to this draft and Handicap International have already submitted an extensive list of comments (Appendix B) with suggested amendments, and have provided a full explanation for all of these. This list is supported with only one exception, and Appendix B gives a list of further amendments that are recommended.

Weaknesses

- The existing traffic law had many shortcomings, notably in the inclusion of adequate safety features, like the wearing of seatbelts and helmets for motorcyclists, drink-driving legal limit specification, minimum age limits for vehicle licences.

- No driving licence was required for motorcycles up to 100cc engine size. As the smaller 50 to 90cc motorcycles have proliferated in Cambodia, virtually no riders have licences or have received any formal training on motorcycle handling on the public road.

- The fines that are actually written into the law at present are too low, having not been updated since 1991, and now have little deterrent effect on poor driver behaviour, particularly for car drivers.

- The new law includes a requirement for all motorcyclists to wear a helmet. However, since wearing rates are currently at an extremely low level, it is uncertain whether the supply of helmets could meet demand when the law is approved, assuming it is actively enforced by the Police.

- There does not appear to be a restriction within even the new law on the number of passengers that can ride on a motorcycle. It is recognised that as the practice of carrying more than one passenger has become so common, and indeed many rely on this way of being transported, then any restrictions will prove unpopular. Nevertheless it is currently unsafe practice affecting riders control of the motorcycle and leading to greater numbers of people injured or killed when these vehicles crash. A similar argument applies to the use of remorques and pickup trucks as passenger-carrying transport.

Figure 17 Common practice of motorcycle use for complete family transport and pickups often excessively over-laden with passengers - both adversely affecting driver's ability to control the vehicle in an emergency.

Figure 18 Remorques often carry more than the 15 child passengers shown here.

Strengths

- It has been recognised that the law needs strengthening and a new Draft Law on Land Traffic has been drawn up and is awaiting National Assembly approval. It is hoped that this will come into effect later this year, though progress has hitherto been extremely slow (viz: it is understood that this draft was initially produced in 2002).

Recommendations	***Cost ****
7.1 The new draft Traffic Law needs to be finalised and introduced as soon as possible.	**L**
7.2 All the suggestions made by Handicap International on this draft should be incorporated, with the minor exception to Article 17 which it is recommended should be as follows:- It is agreed that there should be no differentiation in maximum speed limit for different vehicles in both urban and rural areas, as research in other countries has shown that speed differentials between vehicle types can lead to higher accident rates. However, for heavy vehicles greater than 3.5 tons, it is felt that there should be a limit of 70km/h on rural highways. This is simply because of the momentum that such vehicles have at 90km/h, the damage they could cause, and the difficulty drivers of these vehicles would have in taking evasive action in an emergency.	**L**
7.3 There are also a number of further minor amendments to the HI comments already submitted to Government. These are listed in Appendix B of this report. Whilst most of the important changes have been highlighted in the HI comments, perhaps the more important additional recommendations are as follows:-	**M**
iii) That the section on law infringement penalty details for each offence, i.e. fines, licence bans and prison sentences, should be moved to a separate set of Regulations or sub-decree in order to make them more easily updated without another full set of Land Traffic Laws having to be approved.	
iv) The rule pertaining to wearing of helmets should also have a note about proper wearing of the chinstrap.	
v) The need for child seats and restraints in cars.	
vi) Consideration of effectively banning remorques by limiting the number of passengers they may carry by law. Although these vehicles tend to move relatively slowly, their unmodified motorcycle 'tractors' mean that the driver is not able to stop quickly or take effective evasive action in an emergency and the relatively large number of unprotected passengers they carry (see Figure 18) inevitably results in high numbers of casualties in any collision.	
vii) Bicycles or tricycles should show a white light to the front and red light to the rear if ridden during the hours of darkness.	

* H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

Table 8 Action Plan N° 7: Traffic Law and Regulations

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. Submitting Traffic law to the National Assembly	08	-	-	-	-	3,000	3,000	3,000	3,000	3,000
2. Submitting Traffic law to the Senate	10	-	-	-	-	3,000	3,000	3,000	3,000	3,000
3. Entering into force of traffic Law	12	-	-	-	-	3,000	3,000	3,000	3,000	3,000
Medium Term (2-3 years)										
1. Launching the awareness campaign on Traffic Law and Regulations targeting to all strata of people in the whole country using all means such as radio, TV, newspapers and panels.	-	01	-	-	-	200,000	200,000	200,000	200,000	200,000
2. Monitoring and assessing the results of campaigns and improving methodology of campaigns	-	-	05	-	-	5,000	5,000	5,000	5,000	5,000
Long Term (4-5 years)										
1. Amending or improving Traffic Law and Regulations if there are any aiming to get higher effectiveness as in the developed countries	-	-	-	01	-	1,000	1,000	1,000	1,000	1,000
Total Budget:	638,000 USD (Six hundred and thirty eight thousand USD)									

Implementing Ministry: Ministry of Public Work and Transport
Participating Ministries: Ministry of Interior
Ministry of Education

4.8 Action Plan No. 8: Law Enforcement

The use of the road network would be chaotic and extremely hazardous without a system of rules in the form of good effective road laws and, of course, road users obeying those laws. To ensure the latter, enforcement of the traffic laws is always necessary, and is ideally provided by a separate traffic police force. Cambodia has a reasonably large traffic police unit of some 1700 officers with about 700 based in Phnom Penh. However, officers are quite poorly paid, the traffic laws have hitherto been weak and, as a consequence, enforcement of even the existing laws has been poor.

The two main problems the traffic police face in Cambodia are road accidents and traffic jams. The latter tend to be confined to the two cities of Phnom Penh and Siem Reap.

In 2004, of the 4255 recorded accidents, 2247 involved law violations of the types shown in Table 9. All are generally violations committed by drivers, apart from the fourth (road infrastructure) which is, of course, normally the responsibility of the highway authority.

Table 9 Types of recorded offences in road accidents in 2004

Offence	No. of cases
Exceeding speed limit	1024
Alcohol-related	435
Vehicle faults	225
Road infrastructure faults (e.g., missing signs, sharp bend, bridge problem)	176
Other	387
Total	2247

The majority (46%) of offences were speeding, but the second most common offence was that of drinking and driving or even drunk pedestrians, and this was perhaps surprisingly high at 19% of the total. Despite these relatively high numbers of offences, prosecutions of the drivers at fault are very rare.

Figure 19 Illustrating the difficulty of encouraging pedestrians/training children to use zebra crossings when there is a lack of enforcement to make drivers stop and give way.

The Police have stated that, as they are responsible for checking licences, enforcing driving bans etc, they would like to be in charge of driver testing and issuing of licences. They have been in talks with MPWT, but it appears unlikely that this will be agreed.

Weaknesses

- One of the reasons for the few prosecutions is that the police lack resources. They are short of vehicles and radios, and have no modern equipment at all to enforce either speeding or drunken driving, and have no immediate access to computerised driver and vehicle licence databases.
- The police are fairly poorly paid and many may well lack the incentive to enforce the traffic law in an appropriate manner.
- There are no highway patrol units and it is believed that excessive speed and unsafe overtaking behaviour are leading to many accidents on the major highways.
- Although the Police welcome the new Traffic Law there, it is believed that there will be two major new features that will produce a major enforcement problem; namely that of motorcycle licences and helmet wearing.
- Pedestrian footways are often completely encroached by vendors, and with no enforcement to keep them clear, pedestrians are forced to walk in the roadway, often in close proximity to fast moving traffic.

Figure 20 Pedestrian footway completely encroached by vendors. The right-hand photograph illustrates a protected footway, though this has been provided by an adjacent hotel.

Strengths

- There is generally perceived to be a relatively high level of police presence at least on the streets of Phnom Penh. However, active enforcement of the traffic law could obviously be improved.
- It takes between 3 days and a month to trace a vehicle owner from a licence plate via a request to MPWT, which is unacceptable. The Traffic Police are therefore currently planning to have a computer connection to the MPWT driver and vehicle licence databases.

Figure 21 Police surveillance opposite known blackspot junction in Phnom Penh.

Recommendations		***Cost ****
8.1	An expert police advisor is recommended to review operations and draw up a policing plan, including equipment and training needs. Indeed, the Traffic Police strongly support this recommendation.	**M**
8.2	There appears to be a clear need and justification for acquiring appropriate equipment for enforcing speed limits and drunk driving.	**H**
8.3	Improve safety of pedestrians by helping to enforce give way rules at zebra crossings and keeping footways clear.	**M**
8.4	Reducing the number of unregistered vehicles by increased vigilance and eventual use of vehicle registration database to subsequently follow up vehicle owners that have committed traffic infringements.	**L**

***** H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

Figure 22 A large proportion of vehicles using the road network display no plates since they have not been registered, nor regularly inspected for road worthiness by MPWT.

Table 10. **Action Plan N° 8: Law enforcement**

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. Training traffic police officers on the skills of law enforcement and knowledge on traffic laws and regulations and other daily tasks	08	-	-	-	-	5,000	5,000	5,000	5,000	5,000
2. Equipping traffic police with modern materials in order to fulfil its duty such as speedy motorcycles, motor vehicles and means of communications	-	01	-	-	-	100,000	100,000	100,000	100,000	100,000
3. Establishing patrol units on roads in the cities and along national roads	-	05	-	-	-	6,000	6,000	6,000	6,000	6,000
3. 40% of motorcyclists shall wear the helmets	-	06	-	-	-	7,000	7,000	7,000	7,000	7,000
Medium Term (2-3 years)										
1. Compulsory seatbelts for all drivers	-	07	-	-	-	0	0	0	0	0
2. Equipping traffic police with alcohol testing devices, cameras monitoring vehicle speed; Compulsory authorized plate numbers on all motor vehicles.	-	-	04	-	-	0	0	10,000	10,000	10,000
3. Training traffic police officers for the skills of emergency assistance to traffic victims and transporting them to the hospitals	-	-	05	-	-	0	0	6,000	6,000	6,000
4. Establishing Traffic Engineering Centres in Phnom Penh and Siem Reap	-	-	-	01	-	0	0	0	500,000	500,000
Long Term (4-5 years)										
1. 70% of motorcyclists shall wear the helmets	-	-	-	05	-	0	0	0	200,000	200,000
2. Reforming fine's procedures: Paying fine at the responsible Department	-	-	-	-	01	0	0	0	0	0
3. Establishing Traffic Engineering Centres in other cities and provinces	-	-	-	-	02	0	0	0	500,000	500,000
4. Equipping cameras monitoring vehicles speed along all national roads, in cities and provinces	-	-	-	-	05	0	0	0	500,000	500,000
5. Compulsory third party liability insurances for all motor vehicles	-	-	-	-	11	0	0	0	0	0
Total Budget:	4,038,000 USD (Four millions and thirty eight thousand USD)									

Implementing Ministry: Ministry of Interior
Participating Ministries: Ministry of Public Work and Transport
Ministry of Economics and Finance

4.9 Action Plan No. 9: Technical Inspection (of vehicles)

Without vehicle construction regulations governing safety standards for systems such as brakes, lighting, tyres and signalling, there can be little control over the general safety of a country's vehicle fleet. Even in a developed country such as the UK about 8 per cent of injury accidents have a vehicle fault as one of the main contributing factors. In a country like Cambodia this percentage may well be significantly higher.

According to police statistics, the second most common casualty type comes from light trucks (at 24% of the total – see Figure 23), and it is believed that many of these casualties may have been travelling in the open back (see Figure 17). Thus it is obviously important to try to ensure that these vehicle types are in good roadworthy state.

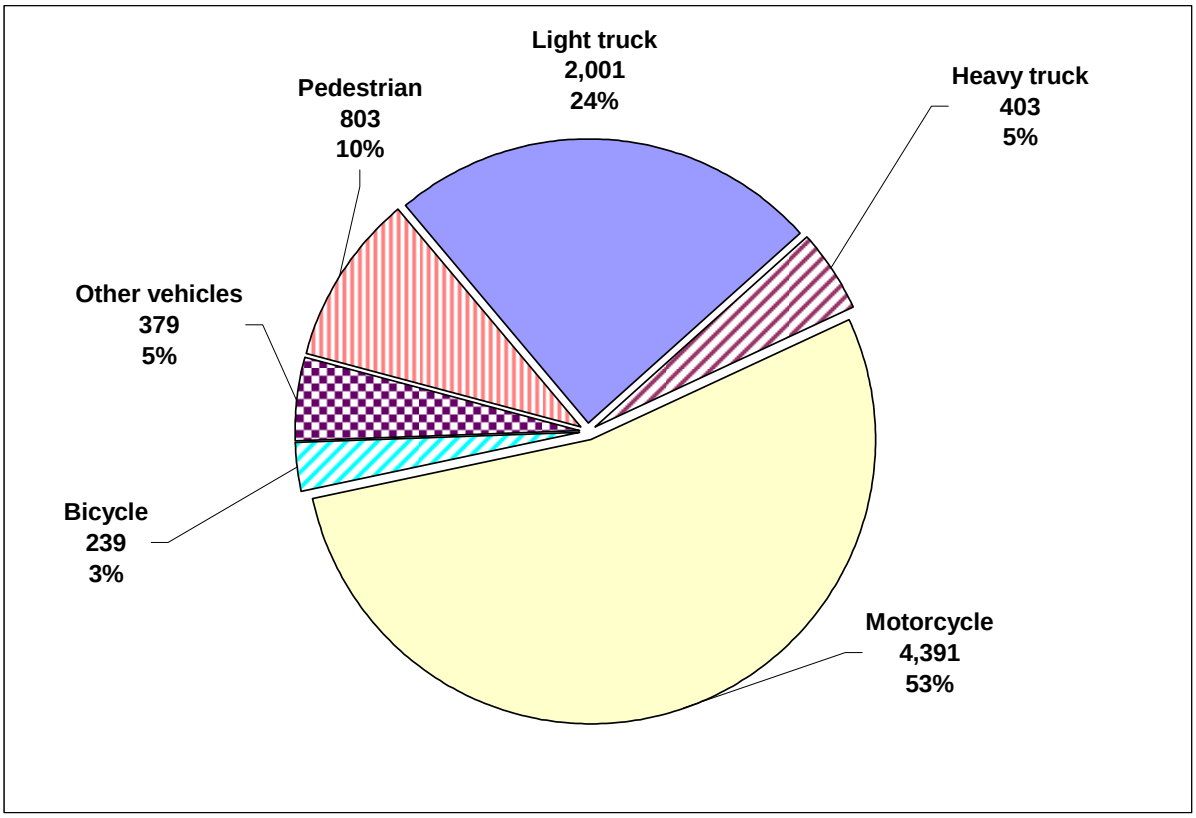

Figure 23 Vehicle types in which casualties occurred in Cambodia (Police 2004 statistics).

Overloading of commercial vehicles can also be a problem as it can lead to excessive wear or damage to road surfaces and bridges, as well as creating situations where drivers are unable to control their vehicles adequately in an emergency. Unofficial modification of goods vehicles by welding reinforcements or extensions can result in a vehicle with a seriously compromised safety performance. These problems should all be controllable by effective regulation of construction standards, regular testing and enforcement spot checks.

Vehicle standards and vehicle testing is carried by the MPWT at one of the two testing stations in the country close to Phnom Penh, one installed by a Chinese contractor and the other by a Korea one. The checks carried out include:-

- Manual inspection of a long list of many items including tyres, lights, steering. At the Phnom Penh centre the following items are measured electronically:-

- Wheel alignment
- Emissions
- Speedo' check (to 40kph {+/- 5km/h})
- Sideslip
- Headlight alignment
- Horn
- Weight
- Brakes

A certificate is issued only if all readings for the above lie within the specified ranges. An example test result is shown in Appendix C. It would appear (from limited observation), however, that often the manual visual inspection is not done, the test being confined to the automated measurements only.

Weaknesses

- Many vehicles being used on the roads of Cambodia were observed to have defects such as broken lights, defective tyres and a general lack of maintenance. A relatively large number of vehicles in use also appear to be right-hand drive (probably imported from Thailand). These tend to be unregistered as right-hand drive vehicles are not permitted.

- Although all commercial vehicles should be inspected every year and private cars every 2 years, it is believed that the majority are not receiving tests (as each of the two test stations only tests on average about 60 to 70 per day (maximum of about 100), and there are about 485,000 vehicles currently registered in Cambodia. This is likely to be because there is little incentive for the owner to take his or her vehicle for re-testing, particularly if they live some distance from Phnom Penh. There is no requirement to show the inspection certificate when, for example, vehicle tax is being renewed, and the on-the-spot fines for not having an up-to-date certificate tend to be low.

- It is suspected that very few motorcycles, those vehicles most commonly involved in collisions, have actually undergone a regular inspection.

- It appears that the majority of tests carried out are for newly imported vehicles in order to get an original registration document.

Strengths

- Although Cambodia tends to rely on the vehicle standards of manufacturing countries because all vehicles are imported into the country, the MPWT has drawn up a comprehensive list of standards for the motor vehicle test. These are referred to in the new draft Law on Land Traffic.

- A separate Standard has fairly recently been issued on the requirements for lorry side under-run guards: a very worthwhile safety device for the protection of other vehicle users in side impacts - in view of the high volume of motorcycle traffic in Cambodia.

- The most advanced vehicle inspection centre is based in Phnom Penh which was open about 4 years ago. It has four test lines (Figure 24), appears to be very well-equipped, working and efficiently run.

Figure 24 Automated vehicle test centre in Phnom Penh

Recommendations		***Cost ****
9.1	Consideration should be given to making it a requirement to show a valid inspection certificate when road tax is renewed.	**L**
9.2	Assign realistic estimates for the opening of more test centres in the provinces as noted in the Action Plan (Table 8).	**L**
9.3	Encourage proper completion of the visual part of the inspection procedure carried out manually, as specified.	**L**

***** H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

Table 11. Table 9. Action Plan N^{o} 9: Technical Inspection

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. Tightening technical inspection by making campaigns raising public awareness on the consequence of not undergoing technical inspection	10	-	-	-	-	4,000	6,000	7,000	7,000	7,000
2. Compulsory technical inspection before registering vehicles, transferring the ownerships or changing vehicle identity card	11	-	-	-	-	0	0	0	0	0
3. Compulsory safety bars (protection devices) for all heavy vehicles preventing the slipping of motorbikes under the vehicles	12	-	-	-	-	0	0	0	0	0
Medium Term (2-3 years)										
1. Compulsory technical inspections for all motorbikes	-	01	-	-	-	0	0	0	0	0
2. Increasing the number of vehicle technical Inspection Centres in the cities and provinces to facilitate vehicle owners	-	10	-	-	-	0	0	0	0	0
Long Term (4-5 years)										
1. Improving the procedure to shortening time for technical inspection	-	-	-	01	-	0	0	0	0	0
2. Privatizing technical inspection for motorbikes	-	-	-	-	01	0	0	0	0	0
Total Budget:	31,000 USD (Thirty one thousand USD)									

Implementing Ministry: Ministry of Public Work and Transport

4.10 Action Plan No. 10: Driver training (and testing)

Driver training is obviously a key element in creating a safety conscious driving population and the driver testing regime has the potential to exert a strong influence on the amount and quality of training that is undertaken by those who wish to obtain a driving licence. The MPWT is responsible for controlling the content and quality of the driving test.

There are 11 driving schools in Cambodia that have been approved and registered. Nine of these have approval to teach the HGV driving, but there is only 1 school that can train learner drivers of articulated trucks. The teachers have to undergo a training course at MPWT and are also examined. The following table lists the recommended hours of tuition:-

Table 12 Hours of tuition recommended by MPWT

Type	Car	HGV/PSV
Driving theory	40	40
Practical Driving test	50	60
Technical	20	10
First Aid	6	6
Extra PSV – stopping , loading	-	2
Extra HGV – loading, coupling etc.	-	2

In practice, the driving schools tend to take 1 month for both car and truck, i.e. about 20 hours training in total which would include about 11 hours practical driving.

The number of people wishing to gain driving licences is increasing steeply as indicated by the figures in Table 13. Indeed, in the first 4 months of 2005, a total of 9,243, including 1,229 HGV licences, have been issued.

Table 13. Number of driving licences issued by MPWT since 2000

Year	Total No. of Licences
2000	15,004
2001	16,232
2002	22,005
2003	22,312
2004	25,298

There does appear to be indications of the driving schools matching demand in respect of the relatively large number of driving school cars, at least in Phnom Penh, as driving school cars which are clearly marked, are quite a common sight.

However, for the most common motor vehicle in the country, the motorcycle, driver training is virtually non-existent. MPWT have only issued a total of about 2000 licences, and have stated that it tends to be foreigners that apply for these. If there is any training at all before new drivers ride a motorcycle on the road for the first time it is simple informal discussion and perhaps practice via friends or relatives. This is a far from desirable state of affairs and may well explain much of the unsafe driving behaviour seen on Cambodia's roads: such as flagrant abuse of red traffic lights, turning manoeuvres at junctions beginning much too early (to cut the corner), failing to give way to pedestrians on zebra crossings etc.

Figure 25 **Drivers failing to give way to circulating traffic from their left on roundabout in Phnom Penh.**

Driver education should be an opportunity to acquire good driving habits at an early stage, through being taught what is safe and appropriate behaviour on the roads. As well as imparting the basic skills, a well-structured programme for driver education should also be able to develop higher level skills such as attentiveness, interaction, and anticipation (reading the road), as well as improving general driving competence. The reality at present, however, is that Cambodia relies almost entirely on an informal system of practice that keeps traffic moving, but has low levels of safety margins which results in many more collisions than should be expected.

The test itself involves an initial theory test (including basic first aid) and, after passing that, normally on a different day, a practical driving test. The test is held on a track and the examiner has a list of 18 items to check (17 for a motorcycle), whilst the candidate stops and starts, reverses, parallel parks the vehicle, drives through the junctions, use s hand signals, stop and start on a hill. Other test cars are apparently used as simulated traffic during the test (e.g. to monitor give way/chosen following distance etc.), though this was not observed during a visit.

Weaknesses

- There do not appear to be any regulations governing motorcycle training before riders use the public road for the first time, and no driving schools or group training schemes exist.

- Driver behaviour and particularly that of motorcyclists is very poor as outlined above: i.e. flagrant abuse of red traffic lights, dangerous corner-cutting on the left-turn manoeuvres at junctions (starting or ending the turn up to 50m from the junction), travelling up the wrong side of the road, failing to give way to pedestrians on zebra crossings, failing to give way to circulating traffic at roundabouts, occasional motorcycles driven too fast with dangerous weaving (generally by young riders), etc.

Figure 26 Yellow van and motorcycle causing problems and potential danger by corner-cutting when making a left turn.

- The test is conducted on a specially constructed test area at MPWT, and whilst more controlled and safer than the public road it does not test the candidates in real traffic situations.

- In the test there is no quick check of eyesight (e.g. reading a registration plate at 20m), nor test of the candidates ability to react quickly and stop the vehicle in a simulated emergency.

Strengths

- MPWT has recently produced, in 2004, a Driving manual (which, it is believed, is based on the French Highway Code). The handbook is printed in Khymer only but it appears to be comprehensive, and contains many useful diagrams, including colour representations of most road signs. It is assumed that most new drivers are purchasing this handbook in order to help pass the driving test.

- The driving test has been standardised: it checks most important driving skills, and appears to be consistently run on a purpose-built test track. The track includes small junctions, a set of traffic signals and a hill.

Recommendations	***Cost ****
10.1 Provision should be made now to be able to cope with the expected high demand for motorcycle tests when the new Traffic Law comes into force.	**H**
10.2 The pass rate is currently about 80 per cent which is much higher than in many other countries (e.g. UK=43%, Ireland=55%, Singapore=41%, Japan=35%), which may be reflected in the quality of driving on Cambodia's roads. It is suggested that examiner's increase the standard required, e.g. so that the pass rate is about 50%.	**L**
10.3 Although driving test candidates are supposed to provide a medical certificate assuring of fitness to drive, it is believed that eyesight is not necessarily checked, which may be an important factor since many people, particularly from rural communities, do not have regular eye tests and may have deficient eyesight. Thus a very simple addition to the driving test before the candidate gets into the car is to test his or her ability to read a registration plate easily at a distance of 20m (N.B. this is the distance for UK driving tests and the appropriate distance for standard Cambodian registration plates needs to be checked with the MOH).	**L**
10.4 The candidate's ability to stop the vehicle in a controlled manner in an emergency should be tested. Again this can be done simply by the examiner sitting in the car, instructing the candidate to imagine a child has run into the road when he taps the dashboard.	**L**
10.5 Consideration should be given to including a second part of the test after successful completion of the test track, when the examiner accompanies the candidate on a given route along public roads.	**M**

***** H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

Table 14. **Action Plan N° 10: Drivers Training**

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. Increasing the number of multi-choice questions from 30 to 45 questions for an examination of light vehicles and 50 questions for heavy vehicles including five questions on Emergency Assistance (First Aide).	07	-	-	-	-	1,000	1,000	1,000	1,000	1,000
2. Training the instructors for all driving schools and providing certificate of competency issued by the Ministry of Public Work and Transport to those who satisfactorily pass the exam.	08	-	-	-	-	1,000	1,000	1,000	1,000	1,000
3. Training officers in the General Department of Transport and in the Provincial/City Departments for Road Safety Campaigns.		-	-	-	-	1,000	1,000	1,000	1,000	1,000
4. Adding Emergency Assistance into the Program of Driving schools	08	-	-	-	-	1,000	1,000	1,000	1,000	1,000
5. Knowledge test should be computerized and driving test should be done in the driving test field already established in Phnom Penh.	10	-	-	-	-	0	0	0	0	0
6. All drivers of heavy vehicles should be subject to retrain on road safety and traffic law.	12	-	-	-	-	2,000	2,000	2,000	2,000	2,000
Medium Term (2-3 years)										
1. Expanding driving test exam locations in 5 zones throughout the country: Zone 1 in Phnom Penh including 6 more provinces, Zone 3 in Battambang including 3 more provinces. Zones 4 in Siem Reap including 3 more provinces and Zone 5 in Kratie including 3 more provinces.	-	05	-	-	-	100,000	100,000	100,000	100,000	100,000
2. Starting to make driving examination for motorbikes from 49CC	-	06	-	-	-	5,000	5,000	5,000	5,000	5,000
Long Term (4-5 years)										
1. Using modern technology in the examination for driving licenses inspiring from experiences of developed countries.	-	-	-	01	-	5,000	5,000	5,000	5,000	5,000
2. Revising exam questions in accordance with international standards	-	-	-	-	01	0	0	0	0	0
Total Budget:	580,000 USD (Five hundred and eighty thousand USD)									

Implementing Ministry: Ministry of Public Work and Transport

4.11 Action Plan No. 11: Emergency Assistance to Traffic Accident Victims

Emergency services and medical care play an important role in improving safety. Prompt arrival of rescue services will minimise the extent and severity of injuries, while the quality of long-term medical care will affect the impact that road traffic accidents have on society as a whole.

The care and rehabilitation of road accident victims falls within the remit of the Ministry of Health and are not considered here, but one of the main issues to which attention is drawn is the response time in reaching the scene of injured crash victims. The time it takes for an ambulance with well-trained first aid personnel to reach a seriously injured victim can be critical in saving his or her life. In fact the first critical period occurs within seconds/minutes of the injury, where only prevention of the accident could avoid death. However, there is another identified period occurring in the second to fourth hours post injury, (described as the 'golden hour') which tend to result in about 35% of deaths from trauma (study in motorised countries with advanced trauma services: Evans and Evans, 1992). Not only are increased survival rates likely to result from early and appropriate medical attention, but the costly treatment offered in Intensive Care Units would also be significantly reduced.

Transport costs tend to be the third largest part of most district health budgets (after staff and drug costs). However, introducing effective transport management can greatly improve health service delivery. In South Africa, for example, the introduction of an effective transport management system increased the availability of transport for the health sector by nearly 40 per cent, and nearly tripled the amount of vehicle time used for service delivery.

However, the MOH has stated that there is a serious problem with a lack of ambulances in being able to get to the scene of any road accident quickly, not so much in Phnom Penh but certainly in rural areas. There are about 10 hospital ambulances in the city and about 50 in total in the country.

In Phnom Penh the ambulances come under 3 hospital areas (Calmette Hospital for the north, Preah Ang Doung Hospital in the south, and Kossamak Hospital for the west). The Red Cross also used to operate about 3 or 4 ambulances funded by French aid but this has now been terminated and the Red Cross has donated these ambulances to Calmette Hospital.

There has been a problem of many complaints from the public about private ambulances who charge quite highly for their service, and would often be called by the policeman attending the scene of accident as well as the MOH ambulance, which led to a waste of time and fuel for the second crew arriving at the scene. However, this is being overcome by the MOH who no longer issue permits to private ambulances and so strictly, if still operating, they are doing so illegally.

Weaknesses

- In the rural areas there can be a long delay before an ambulance arrives to deal with casualties. This may be an hour, on average, but could be many hours if distances are long or ambulances already on a call. Also there are problems of drivers not always being available and even availability and the cost of fuel for the vehicle.

- Although there are standards with regard to equipment carried on ambulances, which include an aspirator, oxygen and stretcher, this equipment is still inadequate; e.g. they lack laryngoscopes to keep ‘airways’ to the lungs open, IV saline fluids to

maintain fluid balance to counteract blood loss and shock, backboards and cervical collars for spinal cord immobilisation).

- Ambulances tend to be extremely expensive to acquire – at about $120,000. This is highly inflated by the Procurement process (they should cost only about $30,000).

Strengths

- There is only 1 emergency telephone number which is believed to be well known throughout the country: dialling 119 connects to a central switchboard for the 3 emergency services

- The ambulance crews are quite well trained as French Cooperation now provides appropriate training.

- MOH has produced a list of requirements for ambulances and other equipment for each Province of the country. The list highlights the need for a total of 73 ambulances, ranging from 1 to 7 per Province. There is a Working Group being organised by the WHO that will look at the details of this.

- There is an inter-Ministerial Committee is set up to manage disasters. This Committee meets immediately a minister (normally only the Prime Minister) declares a situation to be a disaster emergency. These disaster emergencies tend to be for flood disasters, but there was an aircraft crash in 1997.

- MOH has been in talks with representatives from the Trauma and Critical Care Centre and also JICA's Trauma & Critical Care Centre about the new initiative on road safety.

Recommendations		***Cost ****
11.1	Given the very high cost of procuring ambulances in Cambodia, the current amounts stated in the Safety Plan will be grossly inadequate to meet the stated demand.	**H**
11.2	It is recommended that a more detailed needs assessment is carried out that gives greater attention to where ambulances are needed in relation to the response times that can be assumed for all locations in the country. This plan should also include costs of running the ambulances (ie. crew, spares, fuel etc)., and purchase of the right sort of vehicles (e.g. adapted 4-wheel drive vehicles will be needed in most rural areas).	**L**
11.3	The equipment carried on board ambulances is rather limited. Appendix D gives a recognised minimal list of equipment recommended by the Los Angeles paramedic service, and consideration should be given to following this.	**H**
11.4	The crash victim vehicle extraction equipment carried on fire tenders should also be reviewed and Appendix D also includes a minimal list or recommended equipment.	**H**

***** H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

Table 15. **Action Plan N° 11: Emergency Assistance to Traffic Victims**

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. Establishing an Emergency Assistance Committee composing of the Ministry of Health, the Cambodian Red Cross and other relevant Ministry / organizations to solve the Emergency Assistance problem throughout the country	09	-	-	-	-	0	1,000	1,000	1,000	1,000
2. Furnishing additional ambulance in accordance with the increasing demand in all cities and province	10	-	-	-	-	40,000	40,000	40,000	40,000	40,000
Medium Term (2-3 years)										
1. Putting in place the emergency telephone number along all national roads	-	01	-	-	-	0	0	0	0	0
2. Establishing Emergency Assistance Units along all national roads for emergency intervention by zoning in the whole country	-	05	-	-	-	0	0	0	0	0
Long Term (4-5 years)										
1. Reserving modern ambulances along all national roads for urgent needs.	-	-	01	-	-	0	0	50,000	50,000	50,000
2. Training the emergency assistance technique to all drivers, road users and people living along roads	-	-	-	01	-	0	0	0	50,000	50,000
3. Training additional experts to satisfy demand in the whole country	-	-	-	05	-	0	0	0	7,000	7,000
Total Budget:	536,000 USD (Five hundred and Thirty six thousand USD)									

Implementing Ministry: - Ministry of Health
Participating Ministries: - Ministry of Public Work and Transport
- Ministry of Interior
- HANDICAP

4.12 Action Plan No. 12: Road Safety Publicity Campaigns

The aims of road safety publicity are to make people aware, to increase the levels of safety consciousness, and to bring about direct and targeted changes in behaviour.

Publicity campaigns are used to communicate with the general public to persuade them to behave more responsibly and safely or to inform them about the introduction of new regulations. They can take many forms, from adverts on TV to handing out leaflets or using posters to transmit the message. In addition to this type of campaign it is possible to make use of free methods such as newspaper editorials and stories that can help to increase public awareness and appreciation of particular safety issues.

It has long been established that the effectiveness of publicity (and of safety work in general) is greatly enhanced if an integrated approach is employed, where a variety of safety measures are used at the same time to address a particular safety problem. By way of illustration, the issue of drink-driving could be tackled by combining publicity warning of the consequences of such behaviour, advice on alternative strategies, such as the use of designated drivers, and high profile and well-publicised enforcement by the police. A combination of publicity and enforcement activity has been shown to be particularly effective, but there are other possibilities, for example, changes in legislation, or the introduction of new safety engineering measures.

Safety publicity should be evaluated to not only demonstrate value for the money invested but to also gain knowledge of what does and does not prove effective. General safety publicity should be evaluated in terms of accidents, while more specific campaigns can be assessed in terms of the behaviours at which they are targeted.

Currently there is one radio station in Phnom Penh that appears to broadcast most on the subject of road safety. This is '88 Sweet FM', which was originally formed under the Communist government and is presently a joint government/private venture. They consider it to be one of their main functions to keep the public updated of the state of the road transport system. They have seven roving reporters who work from 06:00 to 19:00 covering 4 sectors of Phnom Penh, and call in (by walkie-talkie) 'live' reports of any road accidents or other traffic problems (major road works, tree-cutting work etc.). The station does also report news of any serious accidents that they are informed about on other parts of the network, and may even send a reporter out to any major incident at night time. Occasionally the Traffic Police give the station prepared text of some public declaration for broadcast, or ask for their help in trying to trace an unknown accident victim. The police have a walkie-talkie link to the radio station.

'88 Sweet FM' has a broadcast range of about 200kms radius, covering about 60% of Cambodia.

Handicap International has also been active in carrying out publicity campaigns. As they have shown that 75 per cent of casualties are motorcycle riders and more than 60 per cent of these suffer head injuries, they have focussed their campaigns on helmet wearing.

These started in April 2004 and included TV, radio and newspaper, initially targeting young parents with children. From December 2004 to March 2005, HI focussed their campaigns on helmet wearing for students. In association with UNICEF and WHO and MOH, they managed to feature the international movie star Jackie Chan. The main message was "Even an action and risk-taking person like Jackie Chan wears a helmet when he rides a motorbike". HI together with the aforementioned partners have also issued/displayed thousands of leaflets, stickers and posters aimed at increasing helmet use.

Figure 27 Example of publicity leaflet produced by Handicap International

Weaknesses

- The radio station broadcasts are unscripted, and more effective campaign messages might be achieved through pre-prepared story-line advertisement style slots and perhaps accident victims telling their individual stories.

- There has hitherto been no specified annual budget provided by central government with which to design and implement properly targeted road safety publicity campaigns.

Strengths

- '88Sweet FM' radio station operates daily two 1½ to 2 hours periods in the morning and evening that focus on road safety, broadcasting a total of about 20 minutes of actual verbal messages per day on safety issues.

- The efforts of HI are to be commended, particularly as they have adopted a scientific approach, targeting one of the main casualty groups and even carrying out an evaluation of their efforts.

- From a series of planned surveys, HI demonstrated that their publicity campaign has apparently increased helmet-wearing from 8% over almost a 1-year period to 13.6% in Phnom Penh and to 16.3% on national roads.

Recommendations		***Cost ****
12.1	Design publicity campaigns drawing on the theme of personal responsibility that has been the mark of effective campaigns in many countries.	**M**
12.2	Safety publicity activities in Cambodia have made good progress towards the general goal of raising the level of safety consciousness. The objectives now must be: • to ensure continuity in publicity activities • to improve the techniques employed • to move towards a more focused and integrated approach • to introduce structured evaluation of safety activities.	**M**
12.3	When the new Law on Land Traffic is given ministerial approval the radio and television services should be utilised fully to convey the important changes in the laws to all road users, and preparation of these bulletins should begin well in advance of the ratification.	**L**
12.4	Campaigns on speeding and drinking and driving, perhaps also focussing on the young males with hard-hitting messages.	**M**
12.5	The Medium Term Action 2 is important but should be moved to Action Plan 5 as this appears to be more a regular road engineering maintenance measure rather than publicity.	**L**

***** H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

Table 16. Action Plan N° 12: Road Safety Public Campaigns

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. NRSC prepares producing images leaflets and other booklets for campaigns	10	-	-	-	-	10,000	10,000	10,000	10,000	10,000
2. NRSC nominates officials going on fields for campaigns	11	-	-	-	-	0	0	0	0	0
3. NRSC allocates budget to relevant campaign units. Most important objects are helmets and seatbelts.	12	-	-	-	-	10,000	10,000	10,000	10,000	10,000
Medium Term (2-3 years)										
1. Starting campaigns aiming at all identified targets. Main targets are pedestrians, bicyclists, motorcyclists who are most vulnerable road users all motorcycles shall display the rear mirrors.	-	01	-	-	-	0	100,000	100,000	100,000	100,000
2. NRSC starts providing budget to cities and provinces to put road signs and signals, street lighting and road marking.	-	07	-	-	-	0	100,000	100,000	100,000	100,000
Long Term (4-5 years)										
1. NRSC starts assessing result after the elapsed campaigns	-	-	-	01	-	0	1,000	1,000	1,000	1,000
2. NRSC continues to launch campaigns targeting at pedestrians, bicyclists and motorcyclists	-	-	-	-	01	0	10,000	10,000	10,000	10,000
Total Budget:	944,000 USD (Nine hundred and forty four thousand USD)									

Implementing Ministry: - Ministry of Public Work and Transport
Participating Ministries: - Ministry of Interior

4.13 Action Plan No. 13: Partnerships with Private and Non Governmental Organisations

It has commonly been recognised around the world that the improvement of safety tends to work more effectively when governments form partnerships with private companies or NGO's and work jointly with civil society towards this common aim. It could be argued that this section really applies to most of the previous sectors discussed.

The Global Road Safety Partnership is an organisation formed by the World Bank in 1999 which recognised the need to involve all sectors of society in actions against the continuous rise in road crashes. It aims is to forge a global partnership between business, civil society and government dedicated to the sustainable reduction of death and injury on the roads in developing and transition countries.

It would seem that the government of Cambodia has also recognised that they cannot work alone in tackling road safety. The business community and civil society also suffer the effects of social and economic problems of death and injury on the road; and it is part of an employer's duty to employees to work for improved road safety. The government is thus trying to form partnerships with such employers and also NGOs to work together to find ways of levering funds for safety improvement.

Weaknesses

- With one notable exception, the involvement of the private sector/NGO's in road safety work has been very limited to date.

Strengths

- The formation of the NRTSC will have already formed partnerships between government Ministries and with some other key industries.
- Handicap International and the Red Cross have for several years been working diligently on road safety improvement projects.
- The action by 2006 of authorising private garages to carry out vehicle inspections on their behalf is very sound in view of the much higher demand if enforcement is increased and the aforementioned proposal on road tax reneal procedure adopted. [The latter is that a valid vehicle inspection certificate needs to be shown when paying the annual road tax].

Recommendations		***Cost ****
13.1	As a means of boosting funds that central government will need to provide for achieving the casualty reduction target, the NRTSC should seek discussions with the oil industry, tyre companies, insurance companies, motor suppliers etc. to see if they are prepared to contribute resources to either campaigns, other road safety publications, or even road infrastructure improvements.	**L**

* H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

Table 17. Action Plan N° 13: Partnerships with Private and Non Government Organizations

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. Meeting between the Ministry of Public Works and Transport, the Ministry of Interior, private and non governmental organizations for discuss on road safety solution at the national level	10	-	-	-	-	4,000	4,000	4,000	4,000	4,000
2. Meeting between cities and provincial governors with private and non governmental organizations for road safety solution at the local level	10	-	-	-	-	4,000	4,000	4,000	4,000	4,000
Medium Term (2-3 years)										
1. Private and non governmental organizations under the guidance of the Government participate in road safety campaigns targeting mainly on pedestrians, bicyclists and motorcyclists.	11	-	-	-	-	0	5,000	5,000	5,000	5,000
Long Term (4-5 years)										
1. Cooperation between the Ministry of Public Works and Transport and the Ministry of Education to determine safe drive zones around schools and in other necessary places with participation of private and non governmental organizations.	-	-	-	01	-	0	6,000	6,000	6,000	6,000
2. Authorization of private to participating in vehicle technical inspection under the control of state	-	-	-	-	01	0	0	0	0	0
Total Budget:	84,000 USD (Eighty four thousand USD)									

Implementing Ministry: - Ministry of Public Work and Transport
Participating Ministries: - Relevant Ministries

4.14 Action Plan No. 14: Road Accident Costing

A strong motivation to improve road safety is the knowledge once accepted by those in power of the economic loss to the country that is consumed by the cost of road accidents. If accidents are properly costed such that decision-makers have confidence in those figures, it is then possible to justify on economic grounds all accident preventive measures as investments.

This has been the approach adopted in many developed and developing countries where the economic value of preventing an accident can be considerable. As consideration of the monetary value of road accidents has become so established worldwide, it is essential that a practical method be adopted to cost road crashes in Cambodia. Only with such a system operating can priorities for road safety be established on a rational basis and the annual investment be determined. A sustainable funding for safety schemes is essential for continuous work towards achieving an overall casualty reduction target.

Section 3.2 earlier used figures produced by Mithonarath et al (2004) to make an estimate of the financial costs of road traffic accidents to the national economy. Although the estimates produced in that study were based on sound principles, they are still relatively coarse, make a number of assumptions, and may benefit from data gathered from more hospitals, garages, etc. Indeed currently they result in relatively low monetary values for individual accidents.

It is therefore recommended that a more in-depth accident costing study is still necessary in Cambodia to calculate true economic benefits that can accrue from employing the various remedial measures employed. In summary, the advantages are:-

- Cost estimations are used in economic analyses to help in selection and comparisons between the alternatives for the improvement of roads.
- They represent a reliable means of determining project priorities.
- They help in assigning the financial share to each improvement project.
- They are used to convince decision makers of the importance of the proposed improvement projects in reducing economic losses

A full accident costing study is a complex procedure and requires specialist input. However, it is recommended that it should be implemented as soon as possible so that road safety will be able to compete on equal (economic) terms for resources from central funds.

It is proposed that, as in Mithonarath et al study, the Gross Output (Human Capital) approach is used to cost accidents. Key elements of this method include:-

- losses in labour wages;
- medical expenditures;
- insurance costs; and
- the cost of damages caused to private and public properties.

Additional sums also need to be added to reflect the ‘pain, grief and suffering’ of those affected.

It should be noted that the valuation of life and crash costs has changed radically in European countries and countries like the UK have adopted a ‘willingness to pay’ approach to estimate the social costs as well as the standard elements which belong to the ‘human capital’ approach.

Weaknesses

- The accident costing study recently published (Mithonarath et al, 2004) has resulted in relatively low values which may make it difficult to justify significant expenditure on safety improvements.

Strengths

- It has obviously been recognised that accident costing is an important element of safety improvement as it has been included in the National Plan as a separate Sector and such a good first estimate has already been made in conjunction with ADB.

Recommendations		***Cost ****
14.1	Use the costings produced by the Mithonarath et al. study at present but conduct a full in-depth study every 5 years, applying multipliers for national annual inflation in the intervening years.	**M**
14.2	Ensure that these figures are used effectively throughout the country to justify expenditure on accident remedial work and also used in the eventual evaluation.	**L**

***** H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

Table 18. Action Plan N^{o} 14: Road Accident Costing

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. Training competent officers of the Ministry of Public Works and Transport on Accident Costing Evaluation	10	-	-	-	-	5,000	5,000	5,000	5,000	5,000
2. Using Gross Output Method Formula according to the ADB instruction	12	-	-	-	-	5,000	5,000	5,000	5,000	5,000
Medium Term (2-3 years)										
1. Seeking other methods to get perfect, reliable and correct evaluation by inspiring experiences from the developed countries	-	01	-	-	-	0	0	0	0	0
2. Training competent officers on Accident Costing Evaluation in all cities and provinces	-	02	-	-	-	0	3,000	3,000	3,000	3,000
Long Term (4-5 years)										
1. Annual publication on the economic losses caused by road accident and Submitting it to the upper level and dispatching to the public	-	-	05	-	-	0	0	10,000	10,000	10,000
Total Budget:	92,000 USD (Ninety two thousand USD)									

Implementing Ministry: - Ministry of Public Work and Transport
Participating Ministries: - Relevant Ministries

4.15 Action Plan No. 15: Road Safety Research Institution

Research can make a valuable contribution to the scientific approach and one that should stem naturally from the operation of an intelligence-led road safety system.

However, it must be recognised that the infrastructure needed for safety research does not exist at present in Cambodia, and the limited amount of research that has been carried out in the past has been organised by visiting international staff. It may still be necessary to continue to look outside the country for research input in the short term, but consideration should be given to forming long term links with academic institutions to work towards the establishment of a research centre within the country and, as stated in the Plan, within MPWT.

While establishing a research capability should be a long term goal, there are certain activities that could be regarded as research, which are of high priority according to reported causes of accidents in Cambodia. These are notably alcohol or drug impaired driving and also excessive speed.

In developing countries in recent years much attention has been devoted to improving compliance with speed limits. This is because excessive speed is seen as one of the most important contributing factors to not only accident occurrence but also to the chances of vehicle occupants or pedestrians surviving a crash or sustaining less severe injuries. It is suggested that as part of the regular traffic census a selection of representative sites are chosen where vehicle speed surveys are carried out. This will provide valuable information on general levels of compliance with speed limits in different road geometry and vehicle types but can also give indications of the effectiveness of publicity and/or enforcement campaigns.

It is suggested that it may also be advantageous for the new MPWT Institute to form alliances with other research institutes in the Region who may have similar safety problems. For example, Malaysia has similar levels of motorcycle traffic and the Universiti Putra Malaysia is probably one of the leading centres in the world for extensive research into improving motorcycle safety.

Weaknesses

- There is currently no road safety research institute based in Cambodia, although Handicap International has now shifted their focus from the problem of land mines to this topic.

Strengths

- Some high quality recent research on road safety such as reviews, blackspot improvement demonstrations, accident costing and evaluation of publicity campaigns have been carried out by various international experts.

- The need for a special research institute has been recognised by MPWT and the setting up of such an institution within this Ministry is proposed within the Plan.

Recommendations		***Cost ****
15.1	One of the first studies recommended for the new institute would be to conduct a series of roadside surveys to determine the incidence of driving whilst under the influence of drink or drugs. From a research point of view, a better understanding of the nature as well as the extent of the problem could provide input to not just enforcement, but a full multi-sector approach to drink-driving and drug-driving as seen from a public health perspective. In addition, continuing surveys would allow for effective evaluation of the measures that are taken to combat the problem, and ensure that future efforts are properly directed.	**M**
15.2	A series of vehicle speed surveys should be conducted to determine the level of speed limit infringement.	**M**
15.3	Cooperate with UPM of Malaysia in joint studies to research effective ways of coping with safety problems associated with high volumes of motorcycle traffic.	**M**

***** H= High Cost (eg. >$100,000) M= Medium Cost (eg. up to $50,000). L= Low Cost (eg. up to $10,000)

Table 19. Action Plan N^{o} 15: Road Safety Research Institution

Actions	Implementing Date (Month)					Budget (in US$)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Short Term (within 12 months)										
1. Making project to establish Road Safety Research Institution within the Ministry of Public works and Transport	10	-	-	-	-	5,000	5,000	5,000	5,000	5,000
2. Training officers on skills of investigating in accident's causes in Cambodia under other organizations' sponsors or sending them abroad for training.	12	-	-	-	-	5,000	5,000	5,000	5,000	5,000
Medium Term (2-3 years)										
1. Seeking financial and technical supports from ADB, JICA HANDICAP etc. for road safety research.	-	01	-	-	-	0	0	0	0	0
2. Determining main targets among road users for the research	-	02	-	-	-	0	3,000	3,000	3,000	3,000
Long Term (4-5 years)										
1. Equipping and preparing competent officials to start researching	-	-	05	-	-	0	0	10,000	10,000	10,000
2. Publishing research results to the whole country	-	-	05	-	-	0	0	10,000	10,000	10,000
Total Budget:	366,000 USD (Three hundred and sixty six thousand USD)									

Implementing Ministry: - Ministry of Public Work and Transport
Participating Ministries: - Ministries of Interior and other relevant Ministries

5 CONCLUSIONS

The aim of this component of SEACAP2 was initially to review the current road safety situation across all sectors of activity; to examine the strengths and weaknesses in these sectors with safety responsibilities; and to identify where improvements are required and what priorities should be set. It was also originally to formulate a comprehensive safety improvement strategy.

Over the past six years, the road safety situation in Cambodia has been gradually deteriorating as more and more traffic has been using the road network and exposure to risk is increased. Recorded accidents have not only increased overall but the severity of injury of accident victims appears to have been increasing at an even greater rate. For example, fatalities increased by 32.7 per cent in 2003, and a massive **46.8 per cent in 2004 alone**, a very worrying trend that is obviously causing the government great concern.

It was soon established that a National Road Safety Action Plan had relatively recently been drafted, originally by a team from the Asian Development Bank, but this had been substantially modified by MPWT. This Ministry had clearly recognised that the efficient improvement of road safety within a country like Cambodia cannot be achieved wholly by actions carried out by a single organisation or sector. The Action Plan has been based on an integrated and coordinated approach across all relevant sectors, with hopefully, subsequent selection of the most practical and cost-effective actions that are appropriate for Cambodia.

5.1 The various Sectors, numbering fifteen in total, have each been assigned a separate action plan by MPWT listing the key actions to be achieved in the short, medium and long terms. These summary action plan tables, which give specific months for the actions to be completed as well as approximate costs, have been reproduced for reference in this document. Appropriate comments have been made on the contents of these tables together with any additional recommended actions listed in a separate box in each sector.

5.2 One important point to note is that the author does not believe that the stated casualty reduction targets agreed at the ASEAN Transport Ministers Meeting in Phnom Penh in November 2004, are achievable. This is largely due to the high growth rate of registered vehicles (and hence traffic), and the unfortunate corresponding rapid increase in casualties that the country has experienced, particularly in the last two years. More realistic target rates would be:

- 17.2 fatalities per 10,000 vehicles by 2010 and
- 8.4 fatalities per 10,000 vehicles by 2015.

These targets need to be related to actual number of injury accidents to be reduced which the NRTSC should disaggregate proportionately as individual targets to the Municipality and Provincial Regions on an annual basis (in terms of actual number to be achieved). As part of this process, the NRTSC should produce and require Municipal and Provincial Committees to issue detailed plans on an annual basis, stating exactly how their budgets will be spent to achieve the overall target and in subsequent years include a simple evaluation.

5.3 The Plan needs a much more accurately costed budget allocation for all actions required over the next 5 years. This is urgently required if government is to approve

and acquire the appropriate funding for the Plan to be implemented to the planned timetable.

5.4 If a country is serious about reducing road accident significantly it will generally require a large investment of resources and the Road Safety Action Plan for Cambodia is no exception. To assist raising adequate funds, consideration should therefore be given to setting up a road fund; for example, from a fuel levy and/or special tax from the vehicle insurance industry.

5.5 A key action is the improvement of the national road accident database, which is urgently needed for monitoring safety, investigating specific problems and evaluating actions taken. Handicap International is already spearheading such a move to improve the database markedly using hospital as well as police data. However, a recommendation has been made that the data should be stored on a purpose-designed user-friendly accident database and analysis package that can be easily accessed and analyses carried out by the different groups involved in safety improvement. This is a relatively urgent requirement if appropriate action is to be designed and planned effectively.

5.6 The new draft Law on Land Traffic is seen as a major step forward and a great improvement on the existing road law; but a number of important recommended changes have been identified here and separately by Handicap International. It is suggested that one worthwhile amendment would be to move the penalty details to a separate Sub-decree or even a Declaration by the MOI, so that the penalties can be rapidly updated when, for example, a particular offence has become more critical or simply to take account of inflation, without the need to wait for a complete new law to be passed. Indeed, it is noted that the first version of the new draft law dates back to 2002 and, in view of the rapid increase in accidents since that time, its introduction has surely now become more urgent.

5.7 Provision should be made now to be able to cope with the expected high demand for motorcycle tests when the new Traffic Law comes into force. Also the driving test pass rate is currently about 80 per cent which is considered too high and may be contributing to the relatively poor quality of driving on Cambodia's roads. It is suggested that examiner's increase the standard required so that the pass rate is about 50%.

5.8 Road safety audits and the accident investigation and prevention (AIP) process demand considerable experience of the people carrying them out. This skill of recognising potential safety problems has normally been gained over many years working in the field and in designing remedial measures. Thus it is considered advisable that expert help be commissioned initially for these tasks with the primary aim of the expert teaching such skills to appropriate MPWT staff.

5.9 An expert police advisor is also strongly recommended for the Cambodia Traffic police to carry out a review of operations and to draw up a policing plan including equipment and training needs - notably for enforcing speed limits and for drink-driving. Indeed one of the first studies recommended for the proposed MPWT Road Safety Research Institution is to determine the extent of alcohol and drug usage among the driving population.

If the Road Safety Action Plan together with further recommendations made in this report are followed, then the targets set for the next 5 and 10 years should be achievable. If they are

achieved, then over the 10-year period to 2015 this will result in a total of 8500 lives having been saved. If we assume the cost of a fatality to be US$20,488 as suggested in the latest approximate costing produced for Cambodia, then a total of about US$174million will be saved over the 10-year period in fatality accidents alone. This would justify a doubling in the estimated budget for the current Plan and still result in a saving of US$20million to the nation. It should be noted that this is also a conservative figure because with the remedial work that will have been put in place to achieve this saving in fatalities, it is certain that many other serious injury accidents will also be prevented, thereby wasting less of the nation's resources and saving a great deal of human suffering.

The improvement in road environment and driver and other road user behaviour in Cambodia will necessarily be brought about over a long period of time. However, it is hoped that the eventual claim can be made that this evolution was a direct combined result of implementing all the various aspects of this proposed strategy.

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APPENDIX A: NEW ROAD ACCIDENT REPORT FORM FOR TRAFFIC POLICE

COMMENTS ON: NEW DRAFT "TRAFFIC POLICE ROAD TRAFFIC CASUALTY FORM"

Generally this appears to be a good, simple and comprehensive form to fill in, and it is understood that the information required must be kept to a minimum for the persons using the form. However, it is considered that in the following comments where additional fields are suggested, then unless otherwise stated, these are necessary.

PART 1 – Interview Information

1) Check that the Traffic Police Unit is a unique number? A combination of fields that forms a unique reference number is needed for a national database to avoid (and check for) duplication, ie. a record being entered twice at some stage, in error. This could be: Serial Number + Police Unit {unless this number is repeated in different Provinces or Districts} + Date.

PART 2 – Accident Investigation

2. Time of accident

2) At 2. Time of accident. It is recommended that, for clarity, a comment is added: "use 24-hour clock" – to avoid the user forgetting to write a.m. or p.m.

Accident Severity

3) After 2. It is recommended that a separate field with overall accident severity classification (i.e. Fatal, Serious Injury, Slight Injury, 'Damage only –{although it is understood that this is really a Casualty form, the police might also prefer to include the Damage-only category:). This makes it much simpler for tabulating the severity of Accidents (rather than Casualties), and will serve as a check that the worst injury is the same as the accident severity specified.

3. Place of accident

4) It is suggested that the form should also have:
Local street name or landmark…….

5) The Km post has been omitted
- suggest additionally stating that the person completing the form 'should estimate to the nearest 100m as a decimal to km post (e.g. 88.7)'.

6) It is recommended that a separate block of two fields for X-Y map coordinates is included – even though this may not be filled in as yet, it will be necessary for eventual use of GPS-type mapping analysis.

7. Accident circumstance

7) This could actually be shortened as a separate listing of the total number of people involved or the total number of people killed, because their details are in the following Driver/Casualty sections. The system will automatically set up from this appropriate numbers of records for the required number of driver/casualty records and vehicle records). Thus the only fields that are needed are:
How many vehicles were involved in the accidents? ….
How many people were injured (including fatally injured)? ….

However, the above is not a strong recommendation, if the original is preferred.

Collision Type

8) After 7, a separate field for Collision Type is recommended (questions are often asked on the most common types of collision). For example:

Collision type :
1. Head-on
2. Rear end
3. Right- angle
4. Side swipe
5. Overturned vehicle
6. Hit object on road
7. Hit Parked vehicle
8. Hit object off road
9. Hit pedestrian
10. Hit animal
11. Other …..

8. Collided between:

9) It is suggested that the accident investigators/highway engineers will need to understand the vehicle manoeuvres (prior to collision), and so the following additional field is recommended in each Vehicle column:-

Vehicle manoeuvre:
1. Going straight ahead
2. Right turn
3. Left turn
4. U-turn
5. Overtaking (wrong side)
6. Overtaking (correct side)
7. Reversing
8. Sudden start
9. Sudden stop
10. Parking
11. Other …..

10) Again, for precise knowledge about, say, a particular manoeuvre that might be causing safety problems (for which there may be a suitable cost-effective engineering solution), the direction of travel of each vehicle is advisable:

Direction of travel - vehicle travelling from ……. To …….

11) Finally in this section, investigating engineers tend to find a brief description of the accident very useful to match the above details and to help visualise what happened. As, incorporating all the above will push the bottom box (Part 3) onto the next page, this could be at the expense of the 7th casualty box. Thus in its place it is suggested that a free text field box is included at the bottom of this first page where the person filling in the form can describe (in note form only) exactly what happened in the accident. It is suggested that this may be too much to ask of the reporter (and person entering on computer).

e.g.

Brief accident description

Motorbike, veh. 1, from 400 Street turned left but did not see veh 2 – a truck, veh 2 hit front wheel of motorbike - and car, veh 3, ran into back of truck.

PART 3 Casualty Information

12) The heading should be changed as not all drivers would be casualties but the details of these drivers are needed by the police. The headings could be :

DRIVER AND/OR CASUALTY

13) There also needs to be a field to determine in which vehicle the driver or casualty was travelling, i.e.

Person travelling in Vehicle: 1 2 3 4

Developed for

Traffic Police Accident and Casualty Form

Supported by

Serial No. ____

PART 1 - INTERVIEW INFORMATION

Province:.....	Traffic police unit:.....	Interviewer name and signature:	Date:

PART 2 - ACCIDENT INFORMATION

1. Date of accident: | | | | | | | | |

2. Time of accident (use 24-hour clock): .....:.....

3. Severity of accident: ☐ Fatal injury ☐ Serious injury ☐ Slight injury ☐ Damage only

4. Place of accident : Street name:..... Village:..... Commune/Sangkat:..... District:..... Province/Town: .....

Detailed location (intersection or landmark): .....

GPS coordinates (optional): ..... - .....

5. Road type: ☐ Straight road ☐ Roundabout ☐ Curve ☐ Crossroads ☐ T-junction ☐ Bridge ☐ Slope ☐ Other:.....

☐ National road No. ..... ☐ Provincial road No:..... ☐ Km No (use decimal):..... ☐ Major road in city ☐ Minor road in city ☐ Local road/ track ☐ Other: .....

☐ Paved ☐ Unpaved ☐ Construction site ☐ Unknown

6. Did accident happened in an urban area? ☐ Yes ☐ No

7. Cause of accident:

Human error:		Road condition:	Weather condition:	Vehicle defect:
☐ Speed	☐ Wrong use of high beam	☐ Potholes	☐ Rain	☐ Brake failure
☐ Not respect traffic lights	☐ Alcohol abuse	☐ Dirt/Sand/Gravel	☐ Cloudy/mist	☐ Tire blow out
☐ Not respect give way rule	☐ Drug abuse	☐ Dust	☐ Wet road	☐ Steering wheel failure
☐ Not respect right hand drive	☐ Careless driving	☐ Other:.....	☐ Other:.....	☐ Headlight failure
☐ Not respect traffic signs	☐ Health problem / Sleepy while driving			☐ Other:.....
☐ Dangerous overtaking	☐ Other:.....			

8. Collision type: ☐ Head-on ☐ Rear end ☐ Right-angle ☐ Side swipe ☐ Overturned ☐ Fell alone (for two-wheelers)

☐ Hit object on the road ☐ Hit parked vehicle ☐ Hit object off road ☐ Hit pedestrian ☐ Hit animal ☐ Other.....

9. Vehicles involved:	Vehicle 1	Vehicle 2	Vehicle 3	Vehicle 4
	☐ Motorbike ☐ Pick-up	☐ Motorbike ☐ Pick-up	☐ Motorbike ☐ Pick-up	☐ Motorbike ☐ Pick-up
	☐ Bicycle ☐ Minibus	☐ Bicycle ☐ Minibus	☐ Bicycle ☐ Minibus	☐ Bicycle ☐ Minibus
	☐ Motor tricycle ☐ Bus	☐ Motor tricycle ☐ Bus	☐ Motor tricycle ☐ Bus	☐ Motor tricycle ☐ Bus
	☐ Tricycle ☐ Light truck	☐ Tricycle ☐ Light truck	☐ Tricycle ☐ Light truck	☐ Tricycle ☐ Light truck
	☐ Remorque ☐ Heavy truck	☐ Remorque ☐ Heavy truck	☐ Remorque ☐ Heavy truck	☐ Remorque ☐ Heavy truck
	☐ Car (taxi) ☐ Other:.....	☐ Car (taxi) ☐ Other:.....	☐ Car (taxi) ☐ Other:.....	☐ Car (taxi) ☐ Other:.....
	☐ Car (private)	☐ Car (private)	☐ Car (private)	☐ Car (private)
10. Vehicle manoeuvre:				
	☐ Going straight ahead ☐ Reversing	☐ Going straight ahead ☐ Reversing	☐ Going straight ahead ☐ Reversing	☐ Going straight ahead ☐ Reversing
	☐ Right turn ☐ Sudden start	☐ Right turn ☐ Sudden start	☐ Right turn ☐ Sudden start	☐ Right turn ☐ Sudden start
	☐ Left turn ☐ Sudden stop	☐ Left turn ☐ Sudden stop	☐ Left turn ☐ Sudden stop	☐ Left turn ☐ Sudden stop
	☐ U-turn ☐ Parking	☐ U-turn ☐ Parking	☐ U-turn ☐ Parking	☐ U-turn ☐ Parking
	☐ Overtaking ☐ Other	☐ Overtaking ☐ Other	☐ Overtaking ☐ Other	☐ Overtaking ☐ Other
11. Vehicle traveling from:	..... To	..... To	..... To	..... To .....
12. Vehicle characteristics	☐ Left- hand-drive ☐ Righ-hand drive	☐ Left- hand-drive ☐ Righ-hand drive	☐ Left- hand-drive ☐ Righ-hand drive	☐ Left- hand-drive ☐ Righ-hand drive
13. Importance of damage:	☐ Heavy ☐ Slightly	☐ Heavy ☐ Slightly	☐ Heavy ☐ Slightly	☐ Heavy ☐ Slightly
11. Estimation of damage cost (in US$):	.....	.....	.....	.....
12. Are vehicles insured?	☐ Yes ☐ No ☐ Unknown	☐ Yes ☐ No ☐ Unknown	☐ Yes ☐ No ☐ Unknown	☐ Yes ☐ No ☐ Unknown

13. Brief accident description (be as precise as possible):

PLEASE FILL IN THE CASUALTY INFORMATION ON THE BACK OF THIS PAGE

PART 3: ACCIDENT PROVOKER AND/OR CASUALTY INFORMATION

ACCIDENT PROVOKER

1. Name: _____ 2. Gender: ☐ Male ☐ Female 3. Age: _____ 4. Residence: ☐ Province of accident ☐ Other province ☐ Foreigner ☐ Unknown

5. Occupation: ☐ Child ☐ Student ☐ Worker ☐ Vendor/small business ☐ Motor taxi driver ☐ Car taxi driver ☐ House keeping/ Servant ☐ Farmer ☐ Fisherman ☐ Tourist/ Expatriate ☐ Teacher ☐ Police ☐ Soldier ☐ Other government employee ☐ Unemployed ☐ Other:..... ☐ Unknown

6. Type of road user: ☐ Pedestrian ☐ Driver

7. Type of transport: ☐ Vehicle number:..... ☐ Pedestrian

8. Wearing a helmet/seat belt: ☐ Yes ☐ No ☐ N/A ☐ Unknown

9. Having driving license: ☐ Yes ☐ No ☐ N/A ☐ Unknown

10. Substance use: Alcohol: ☐ Yes/Suspected ☐ No ☐ Unknown Drugs: ☐ Yes/Suspected ☐ No ☐ Unknown

11. Severity of injuries: ☐ No apparent injury ☐ Superficial injury (e.g. bruises. Minor cuts) ☐ Moderate (fracture, sutures) ☐ Severe (requires surgery or ICU) ☐ Died on the accident site

12. Was the accident provoker transferred to hospital ? ☐ Yes ☐ No If yes, to which hospital/OD? .....

CASUALTY 1

1. Name: _____ 2. Gender: ☐ Male ☐ Female 3. Age: _____ 4. Residence: ☐ Province of accident ☐ Other province ☐ Foreigner ☐ Unknown

5. Occupation: ☐ Child ☐ Student ☐ Worker ☐ Vendor/small business ☐ Motor taxi driver ☐ Car taxi driver ☐ House keeping/ Servant ☐ Farmer ☐ Fisherman ☐ Tourist/ Expatriate ☐ Teacher ☐ Police ☐ Soldier ☐ Other government employee ☐ Unemployed ☐ Other:..... ☐ Unknown

6. Type of road user: ☐ Pedestrian ☐ Driver ☐ Passenger

7. Type of transport: ☐ Vehicle number:..... ☐ Pedestrian

8. Wearing a helmet/seat belt: ☐ Yes ☐ No ☐ N/A ☐ Unknown

9. Having driving license: ☐ Yes ☐ No ☐ N/A ☐ Unknown

10. Substance use: Alcohol: ☐ Yes/Suspected ☐ No ☐ Unknown Drugs: ☐ Yes/Suspected ☐ No ☐ Unknown

11. Severity of injuries: ☐ No apparent injury ☐ Superficial injury (e.g. bruises. Minor cuts) ☐ Moderate (fracture, sutures) ☐ Severe (requires surgery or ICU) ☐ Died on the accident site

12. Was the casualty transferred to hospital ? ☐ Yes ☐ No If yes, to which hospital/OD? .....

CASUALTY 2

1. Name: _____ 2. Gender: ☐ Male ☐ Female 3. Age: _____ 4. Residence: ☐ Province of accident ☐ Other province ☐ Foreigner ☐ Unknown

5. Occupation: ☐ Child ☐ Student ☐ Worker ☐ Vendor/small business ☐ Motor taxi driver ☐ Car taxi driver ☐ House keeping/ Servant ☐ Farmer ☐ Fisherman ☐ Tourist/ Expatriate ☐ Teacher ☐ Police ☐ Soldier ☐ Other government employee ☐ Unemployed ☐ Other:..... ☐ Unknown

6. Type of road user: ☐ Pedestrian ☐ Driver ☐ Passenger

7. Type of transport: ☐ Vehicle number:..... ☐ Pedestrian

8. Wearing a helmet/seat belt: ☐ Yes ☐ No ☐ N/A ☐ Unknown

9. Having driving license: ☐ Yes ☐ No ☐ N/A ☐ Unknown

10. Substance use: Alcohol: ☐ Yes/Suspected ☐ No ☐ Unknown Drugs: ☐ Yes/Suspected ☐ No ☐ Unknown

11. Severity of injuries: ☐ No apparent injury ☐ Superficial injury (e.g. bruises. Minor cuts) ☐ Moderate (fracture, sutures) ☐ Severe (requires surgery or ICU) ☐ Died on the accident site

12. Was the casualty transferred to hospital ? ☐ Yes ☐ No If yes, to which hospital/OD? .....

CASUALTY 3

1. Name: _____ 2. Gender: ☐ Male ☐ Female 3. Age: _____ 4. Residence: ☐ Province of accident ☐ Other province ☐ Foreigner ☐ Unknown

5. Occupation: ☐ Child ☐ Student ☐ Worker ☐ Vendor/small business ☐ Motor taxi driver ☐ Car taxi driver ☐ House keeping/ Servant ☐ Farmer ☐ Fisherman ☐ Tourist/ Expatriate ☐ Teacher ☐ Police ☐ Soldier ☐ Other government employee ☐ Unemployed ☐ Other:..... ☐ Unknown

6. Type of road user: ☐ Pedestrian ☐ Driver ☐ Passenger

7. Type of transport: ☐ Vehicle number:..... ☐ Pedestrian

8. Wearing a helmet/seat belt: ☐ Yes ☐ No ☐ N/A ☐ Unknown

9. Having driving license: ☐ Yes ☐ No ☐ N/A ☐ Unknown

10. Substance use: Alcohol: ☐ Yes/Suspected ☐ No ☐ Unknown Drugs: ☐ Yes/Suspected ☐ No ☐ Unknown

11. Severity of injuries: ☐ No apparent injury ☐ Superficial injury (e.g. bruises. Minor cuts) ☐ Moderate (fracture, sutures) ☐ Severe (requires surgery or ICU) ☐ Died on the accident site

12. Was the casualty transferred to hospital ? ☐ Yes ☐ No If yes, to which hospital/OD? .....

APPENDIX B: FURTHER COMMENTS AND RECOMMENTIONS ON THE CURRENT DRAFT OF CAMBODIAN LAW ON LAND TRAFFIC.

(NOTE: THESE COMMENTS ARE IN ADDITION TO THOSE PROVIDED BY HANDICAP INTERNATIONAL – ALSO REPRODUCED BELOW)

It must be stressed that the following comments are based on an English translation (which was not wholly comprehensible) of the Khymer version of the draft Law. The comments from Handicap International are included at the end of this Appendix.

Article 6, 1.
Move this Article up to previous Article 5 on definitions – as this is also a definition

Article 9, 4.
It is simply noted that this Article will mean all passengers of remorques (including the many school children that are transported in these vehicles) will also have to wear helmets. This may encourage drivers wishing to avoid this requirement to construct a roof on their trailers, which should not be permitted, as it will mean considerable additional weight and heightening of the centre of gravity for the unmodified motorcycles pulling remorques. Indeed, consideration should be given to either banning or limiting the number of passengers that these vehicles may carry.

In this Article, add to the end:
"…wear safety helmets with the helmet strap tightly fastened under the wearer's chin."

5. It is NOT considered sufficient to have older front seat passengers holding onto young children up to the age of 10 (in a collision they will still be projected forward, often through the windscreen). If travelling in the front seat, children should also wear a seatbelt in either a child seat (for very young children) or a 'booster'' cushion which raises their hips to the level where the belt will work effectively and not cause undue injury in a collision.

Article 12, 1.
Delete "or to go forward". The single yellow light showing is to warn of the red phase, and never the green phase. Suggest the following re-wording:

"When the traffic light is showing yellow, it is the sign to warn of the change to the red phase. Thus drivers would prepare to stop unless they are close to the lights and a sudden stop might risk being hit by the vehicle behind. ……..".

Article 17, 1. and2.
As recommended by Handicap International, there should be no differentiation in maximum speed limit for different vehicles as research in other countries has shown that speed differentials between vehicle types do tend to lead to higher accident rates. However, for heavy vehicles greater than 3.5 tons, it is felt that there should be a limit of 70km/h on rural highways. This is simply because of the momentum that such vehicles have at 90km/h, the damage they could cause, and the difficulty drivers would have in taking evasive action in an emergency. Also, any posted speed (i.e. with signs) would take priority over these general speed limits. Thus this Article should be simplified to:-

"The driving speed of vehicles where there is no over-riding posted speed sign in accordance with the following:

A. In towns and villages:
- All vehicles shall not be driven more than a maximum speed of 40 km/h.

B. Outside towns
- Drivers of all vehicles except heavy vehicles must not exceed a maximum of 90 km/h.
- The maximum driving speed for heavy trucks with net weight of over 3.5 tons is 70km/h. ".

Article 18, 7.
Amend the high ground to:
"7. When approaching the brow of a hill with restricted sightline distance".

Article 20, 1.
Suggest that the following is added:-
"……or preparing to turn left, or are in heavy traffic where their left-hand lane is moving slower than the right -hand lane."

6.
On the subject of overtaking, add to end of list: -'
"Where another vehicle following behind has begun an overtaking manoeuvre'.

Article 21, 10.
It is recommended that the overtaking vehicle ***does*** use high beam for better forward visibility since it is travelling faster and the driver needs to see well ahead. Thus amend to:-
"When passing each other at night outside towns without street lights, the overtaking vehicle should switch on their high beam and the overtaken vehicle should switch to low beam once the overtaking manoeuvre is completed. The overtaken vehicle must switch to low beam immediately the overtaking vehicle has pulled in front".

Article 24, 7
Modify the fourth bullet point to:-

"Within 25m of the pole of traffic lights or traffic signs, or zebra crossings, as this may inhibit road users from seeing these signs or pedestrians using the crossing. "

Article 26, 3
It is recommended that mention is made of signalling here, thus add a bullet point: -
"Drivers who intend to make a U-turn should signal left well before beginning the manoeuvre."

Article 28, 1C
It s recommended that:-
"…. side lights or parking lights should ONLY be use if a vehicle is parked. All moving vehicles should put on dipped beam headlights at dusk and night time or in poor weather conditions when normal visibility is affected".

1D,
Add a bullet point: -

"White reversing light(s) to the rear to indicate that the vehicle is reversing".

2.
Add bullet point:
"Bicycles or tricycles should show a white light to the front and red light to the rear if ridden during hours of darkness."

Article 35,
Suggest adding: -

"After a collision it is an offence to drive away from the scene without stopping and exchanging details with the other road users involved, and in the cases of injury reporting the details to the traffic police."

Article 38
This should refer to the regularity of inspection and the MPWT standards: -

"Defining and controlling the technical check-up of all kinds of vehicles including the period between check-ups are defined in Standards determined by the Ministry Public Works and Transport."

Article 43, 2.
This does not account for the rural speed limit. (NOT just 40 km/hr). Thus suggest:-

"Drive at speeds in excess of the posted speed limit or general speed limit for a particular road location for the type of vehicle driven.

Article 47
This should be moved to Chapter IX, the Penalties section, or preferably to a Regulations document – see below.

Chapter IX.
Articles 54 to 58
It is strongly recommended that these sections be completely removed from this main 'Law on Land Traffic' to simply state that all penalties for traffic violations should be referred to a set of 'Penalties Regulations for Road Law Violations' (or as a sub-decree). All the stated values of fines in Riels, driving bans and prison sentence lengths should be transferred to this Regulations document. This should then enable much quicker ministerial approval of updates of levels of fines or driving bans at a future date – to take account of inflation or stiffer penalties required urgently to combat an upsurge in errant behaviour, without requiring a completely new law to be drafted.

Comments on the Draft Law on Land Traffic by Handicap International

These comments are offered with the caveat that the document from which they have been extracted is a straight translation from Khmer. It has not been interpreted - thus comments may be a factor of misinterpretation from the translation. They have been discussed with a qualified staff member of the Cambodian Defenders Project to ensure appropriate legal advice was followed in the construction. General comments:

1. Include a title for each article - A suggestion is made for each in bold.
2. Where necessary ensure the criminal code is addressed within the articles.

Reference	Suggestions/comment	Explanation/discussion
Article 5: **definitions**	Add a definition of the different types of vehicles and then use the correct terms where appropriate in the text of the traffic law. This a vehicle can be an enclosed motor vehicle • such as a car, bus, truck, pick up truck and it can also be a motorcycle, and motorcycle with trailer, bicycles, cyclos, motos and taxis. Definitions need to be included for pedestrian cross walks and motorcycle helmets. The descriptors of turning directions is a regulation and needs to come out of this section. It belongs in articles 20/21	There are places in the text of the traffic law where there should be reference to particular vehicle types. A distinction should be possible The escalation of the numbers of motor vehicles with indicator light capacity will gradually introduce this as a mechanism for indicating (if not already the case). It should be formally introduced into the traffic law.
Article 6: 1. 2. 4.	Remove point 1 to definitions Place a prospective date on the changes for disabled people.(and make a separate clause for this as well) Delete the reason for 4 – not required	
Article 7, final dot point	I do not think that the use of whistles *instead* of hand signals is viable in high traffic environments. It should be changed to: ***as well.***	High traffic noise could make the use of whistles difficult and unheard (thus causing some motorists to claim they had not heard the signal). The use of radios, CD's etc internal to vehicles could also render the use of whistles, pointless.
Article 9: Drivers 1. licensing	I think that there should be a whole article on licensing in this law. (unless it is already provided for in some other regulation) Any person driving a motorised vehicle should have a license and that there should be age restrictions (possibly 15 yrs) placed on the provision of the license. The cost of the license does not have to be high, but drivers should be asked to exhibit a level of competence prior to receipt of the license.	Any person driving a motorised vehicle has a responsibility to other road users and themselves to obey the traffic law and to ensure the protection of others. Not all persons in the community have the capacity to obey the law, regardless of intention. In particular this is the case for very young drivers. Thus a licensing system is appropriate, in order to ensure that only those who are capable of following the law and caring for others can drive a motorised vehicle.
3. seat belts	All drivers and passengers (front and back) should wear seat belts *where fitted.*	There is clear evidence in the literature to support a requirement for wearing seat belts in the back seat of vehicles will save lives. Where a seat belt is fitted, there is no good reason for it not to be worn.

4. motor cycle helmets	A standard for the use of motor cycle helmets should be specified. At this stage this is likely to be any standard declared on the helmet (rather than those manufactured to no standard). A date in the future should be set.	Substantial industry preparation will be required before a successful helmet law can be applied. High voluntary wearing rates will boost the success of a requirement prior to its introduction.
5. seating position for children	Specify the vehicle type here. If an enclosed vehicle remove the requirement for children to be accompanied by an adult in the front seat. Require the wearing of seat belts at all times by all passengers in front seats. If the vehicle is a motorcycle there should be restrictions on how the child is carried on the vehicle. Children too small to hold on to an adult should be carried strapped to the body of an adult by a sling or other such restraint. There should be some requirement for seating positions on motorcycles - the current trend for side on seating position is very dangerous. *The whole issue of passengers needs to be assigned its own article - there is confusion between vehicles and passengers.*	Children should be required to wear seatbelts at all times. The presence of an adult in the front seat with a child will not protect the child in the case of a crash. Adults should not carry babies in their arms as passengers on motorcycles. A restraint against the body of the adult is essential - there is now way, in the case of a vehicle crash that a child held in the arms of an adult can be restrained.
7.	Delete this clause	There does not seem to be any point to this clause - how would you measure and administer it?
8. Levels of alcohol	Note reference to this in comment on Article 47. There is a discrepancy between levels of .05 and.08 between this and Article 47.	While at this stage the Cambodian police will have no method of measuring this, never the less its inclusion in the law sets an important precedent for the future and establishes the fact that drugs can affect driving performance in similar ways to alcohol.
11.Passengers	There is no reference to requirements of passengers under the law (other than seat belt wearing). I think that it requires an article of its own and should cover helmet wearing (not motos at this stage) It should also cover the number of passengers allowed to be carried on a motorcycle.	
Article 10: 1.	Perhaps this is best expressed as *"centre of the lane"*	It is likely that this is an interpretive error.
Article 11:Passing and overtaking 3.	Add *in accordance with traffic directions* to the end of 3.	Clarifies where drivers can drive in the case of a traffic jam - not on opposite sides of the road.
Article 12: Traffic Lights 1.	Remove *or to go forward* at the end of the first sentence. Add, *when traffic light is on red countdown, drivers are not permitted to go until countdown is finished.*	The appearance of a yellow light should always indicate the need to stop, not rush through the intersection. Racing yellow to red lights has been the cause of many serious traffic crashes in developed countries.
Article 15: Towing		
Article 17: Speed limits	There should be no differentiation in maximum speed for different vehicles. The speed limit should be the same for all vehicle types.	

Article 19:Following distance	Change sentence 1 to say: "A vehicle moving behind another vehicle must keep an adequate safety distance of *one enclosed vehicle length per every 10km/hr speed being travelled* to avoid crashing with the front vehicle when it slows down or stops unintentionally".	The judgement of road safety experts in more motorised countries is that 1 vehicle length per 10km/hr travelled is a good guide for stopping capacity.
Article 20: Overtaking prohibitions	Add: » *At intersections not controlled by lights ' Where visibility of clear stretch of road is impeded*	Describe more clearly turning/overtaking directions. For motor vehicles (where fitted)-left and right light indicators. For motorcycles (where fitted) left and right light indicators. For motorcycles (where lights are not fitted) hand signals. For motorcycles with trailer, hand signals. For cyclos, hand signals. • Overtaking at uncontrolled intersections can be highly hazardous. • Vehicles should not overtake if the camber and lie of the road prevents vision of sufficient clearance of oncoming traffic to safely pass another vehicle.
Article 22:Junctions 4.	Amend the sentence to specify that the first vehicle on the roundabout has priority to those vehicles subsequently entering the roundabout.	A simple rule qualifying the rights of first vehicle to enter the roundabout has been found to be a successful strategy in motorised countries.
Additional clause	A new clause should be constructed which states that *pedestrians have right of way of they are on a zebra crossing.* All traffic should stop and wait for the pedestrian. This clause would clearly be overridden when pedestrian lights are in use. (not sure if this more rightly belongs in Article 32 or here)	Pedestrians are the most unprotected of all road users. The use of zebra crossings as "protected zones" will become increasingly important as the number of vehicles on the road increases.
Article 28	There is no obvious reference to zebra crossings (or other appropriate name) Remove requirement for flashing light	A flashing light can add to the level of hazard
Article 32:	Move Article 27 to 32 and join them together	
6.	Amend to specifying that children under 6yrs should not walk on the road *unless accompanied by an adult.*	This particular clause is unlikely to receive much attention. Not all children can be accompanied by an adult.
Article 35: Mutual compromise on damage post crash		
In the case of injury or death	Suggest the inclusion of the ambulance emergency number here - that it be a requirement that the EN is called immediately, not waiting until police attendance.	The survival of a road crash victim is significantly enhanced by timely and appropriate first aid response. The matter of management of first response services is critical to this. Most important is that the people who can give the first response be called to the crash scene as soon as possible.
Article 36: Driving licenses	Needed here is a regulation including fee structure, expiry date, license type. Driver of all vehicles, particularly those involved in carrying passengers should be licensed. Suggest that this be phased in over a period of time and that a clause with future time frames be included in this article.	As the level of motorisation increases, the moto transport system will require regulation and management. The care and protection of passengers is an important aspect of this regulation. However, it is recognised that this will not be achieved in the short term. Including a clause to this purpose, with a potential time frame will be important.
Article 37:Vehicle registration	All vehicles, regardless of weight should be registered. This links in with Article 38. A time frame for the introduction of	

	registration for various classes" of vehicles could be introduced.	
Article 40: Responsibility of traffic police	(third point) Police should be required to make a report of traffic accidents as well as offences, (noted in article 35) Police should also be required to call the emergency number to facilitate the attendance by an ambulance, (fourth point) Police should not have the capacity to collect fines for minor offences. There are two options available for the collection of fines: Police impose but not collect fines, or Police should collect fines and receipt.	There is much need of traffic police activity in Cambodia. The need to collect fines takes them away from their urgent duties.
Article 46:	Note comments on Article 40.	
Article 47: A 1.	The assumption is made that in order to assess BAC only 100ml of blood is drawn, making the correct figure .08g alcohol /100ml blood. This clause does no specify how the blood is to be collected and by whom in order for it to be an indictable offence. This should be specified.	The courts /government will need to decide if the use of breath testing will be a suitable method of measuring BAC. (breath testing is cheap and can be done at the roadside - blood testing is expensive, involves doctors' time and is complicated.) No mention is made of the use of mind altering drug whilst driving. At this age the only reliable testing for this offence are psychometric tests, which require significant training of police for roadside documentation. Suggest that reference for this be made in the documented but time framed. Advice should also be sought about the current usage patterns of mind altering drugs in Cambodia to assess the likely involvement of these substances in road crashes,.
Article 48 1. 12.	Note comments on Article 47. Another offence to include is parking within 10 meters of a pedestrian cross walk.	Note: The law appears to give the court no discretion concerning the use of prison and fines. Circumstances occasionally mitigate against always giving maximum penalty.
Article 53:	There should be a clear link between each offence and the specified penalty - link articles 54 and 66.	
Article 54:	There is a need to identify how this links with draft anti corruption law.	
Article 59:	This is not clear – probably needs interpretation	
Article 62. 63,64:	These Articles should reflect where reckless driving, or drink driving or driving under the influence of a mind altering substance is the cause of a vehicle crash. The outcome for the crash victim should not necessarily be the defining factor as the outcome may be caused by inappropriate protection for the victim.	Permanent disability or death may not be a factor of intention or even the events which have occurred (for instance the disability may be a factor of poor first aid management)
Article 71:	Any previous regulations, proclamations etc need to be specified, and them if required add the current text as an addendum	

APPENDIX C EXAMPLE AUTOMATED VEHICLE TESTING FORM

នាយកដ្ឋានដឹកជញ្ជូនផ្លូវគោក
Department of Land Transport
ការិយាល័យត្រួតពិនិត្យសុវត្ថិភាពយានយន្ត
Office of Motor Vehicle Inspection
ក្រុមហ៊ុន Company: CMVI

ព្រះរាជាណាចក្រកម្ពុជា
KINGDOM OF CAMBODIA
ជាតិ សាសនា ព្រះមហាក្សត្រ
NATION RELIGION KING

របាយការណ៍ត្រួតពិនិត្យសុវត្ថិភាពយានយន្ត
Motor Vehicle Inspection Report

ផ្លាកលេខ Plate No.	k4805-PB3	ប្រភេទ Type	TRUCK	លេខរៀង No.	652
លេខម៉ាស៊ីន Engine No.	15503709	ម៉ាក Model	FUSO	ឆ្នាំ ខែ ថ្ងៃ ត្រួតពិនិត្យ Inspection Date	2005.5 .24
លេខសាក់ស៊ី Chassis No.	511621	ទម្ងន់ផ្ទុក/ចំនួនកៅអី Load Capacity/Seats	4T	ពណ៌ Colour	WHITE

ការវាយតំលៃ Evaluation	ទិន្នន័យត្រួតពិនិត្យ Inspection Data						
○	កង់ទាញខាង Side Slip	in :2.1 m/km					
		ទម្ងន់ (kg) Weight	ឆ្វេង (N) Left	ស្តាំ (N) Right	ជលបូក (%) Sum	លំអៀង (%) Diff	ភាពជាប់ហ្វ្រាំង Drag
○	ហ្វ្រាំង Brake						
○	ហ្វ្រាំងភ្លៅមុខ Front axle brake	3285	10840	9250	62.4	4.9	L:1.9 ,R:1.2
○	ហ្វ្រាំងភ្លៅក្រោយ Rear axle brake	3015	8440	8210	56.4	0.8	L:0.8 ,R:1.8
○	ហ្វ្រាំងភ្លៅទី 3 Third axle brake						
	ហ្វ្រាំងភ្លៅទី 4 Fourth axle brake	6300	8170	8170	26.5		60.0
×	ហ្វ្រាំងដៃ Hand brake					សរុប Total:	(%)
	កុងទ័រល្បឿន Speedometer	0.09 km/h					

		ពន្លឺ (cd)	លើ/ក្រោម(cm/10m)	ឆ្វេង/ស្តាំ (cm/10m)	លើ/ក្រោម(cm/10m)	ឆ្វេង/ស្តាំ(cm/10m)
	ភ្លើងហ្វា Head Light	Luminous	Up/Down	Left/Right	Up/Down	Left/Right
×	ឆ្វេង Left	18800	U:16.6	R:13.2		
×	ស្តាំ Right	19100	U:4.8	R:10.2		

	ផ្សែងបញ្ចេញ Exhaust gas	ម៉ាស៊ីនសាំង Petrol Engine	CO	%	HC	ppm			
○		ម៉ាស៊ីនម៉ាស៊ូត Diesel Engine	① 10	%	② 10	%	③ 10	%	មធ្យមភាគavg 10 %
○	ស៊ីរ៉ែន Horn		104.1 dB(A)						
○	ផ្នែកត្រឹមលើ Above Carriage	ចំណុចខ្វះខាត Fail Items							
○	ផ្នែកត្រឹមក្រោម Under Carriage	ចំណុចខ្វះខាត Fail Items							

លរ	ចំណុចត្រួតពិនិត្យផ្នែកត្រឹមលើ Items for inspection (above carriage)			លរ	ចំណុចត្រួតពិនិត្យផ្នែកត្រឹមក្រោម Items for inspection (Under carriage)		
1	ម៉ាស៊ីន/ប្រព័ន្ធអាំប្រ៊ីយ៉ា	15	តារួ-កុងទ័រល្បឿន/ផ្សេងៗ	1	ធុងទឹក/ការលេចជ្រាបប្រេងម៉ាស៊ីន	15	ត្រដាកជំនាសមុខ/កន្ទាស/ចាក
2	ភ្លើងចតខាងមុខ/ភ្លើងចង្កឹមយាន	16	ប្រតិទ្ធហ្វ្រាំង/ហ្វ្រាំងដៃ	2	ការលេចជ្រាបប្រេងប្រអប់លេខ	16	ត្រដាកជំនាសក្រោយ/កន្ទាស/ចាក
3	ភ្លើងហ្វា/ភ្លើងសញ្ញាបង្ហិនខាងមុខ	17	ដៃលង្ហូត/ក្រចាប់បង្ហោលង្ហូត	3	រ៉ូទីលង្ហូត	17	ប៊ូឡុងឡាបចាក្តាស/អេក្រូ
4	កញ្ចក់ចំងៃខ្សល់/កញ្ចក់បង្ហូច	18	កន្ទែងអ្នកបើកបរ/អ្នកដឹណឹរ	4	សន្ទាក់ចង្ហូត/កន្ទែងភ្ជាប់ប្រអប់ពីលើង	18	ការលេចជ្រាបប្រេងប៉ុង
5	ធុងទឹក/ប្រដាប់ចាញ់ទឹកកញ្ចក់	19	សំបកកង់/កង់/ប៊ូឡុងកង់/អេក្រូ	5	ដងជំទួយចង់ចង្ហូត/ឡាបស៊ីកទ័រ	19	តំណភ្ជាប់ឡាបខ្នែង
6	ស៊ីរ៉ែ/ភ្លើងសញ្ញាអាសន្ន	20	ធុងប្រេងឥន្ធនៈ/តំរបធុង	6	ដងលំនឹង/ចាក	20	បំពង់ផ្សែងទឹងសំបុងចង់សំលេង
7	ភ្លើងសញ្ញាឃ្លុំទិសក្រោយ	21	សភាពតូ/ថ្នាំបោប	7	អ័ក្សហ្គុយហ្សូ ទឹងរ៉ូឡឺម៉ង់	21	អាម័រទីស័រ
8	ភ្លើងចតខាងក្រោយ/ភ្លើងចង្កឹមយាន	22	សួរសំលេងម៉ាស៊ីន	8	តំណភ្ជាប់ស៊ុងស្បែងស្បែងមុខ/ចាក	22	សាក់ស៊ីបណ្តោយ
9	ភ្លើងហ្វ្រាំង/ភ្លើងថយក្រោយ	23	កីរឥម៉ូទេរ	9	តំណភ្ជាប់ស៊ុងស្បែងស្បែងក្រោយ/ចាក	23	ចាតទ្រែង
10	ផ្លាកលេខ/ភ្លើងបំភ្លឺផ្លាកលេខ			10	ទុយោហ្វ្រាំងកៅស៊ូ/ទុយោដែក/ស៊ីឡាំង	24	ប្លុបចង្ហូត
11	កញ្ចក់ចាំងពន្លឺ			11	សន្ទាក់ហ្វ្រាំង	25	ខ្សែកាបហ្វ្រាំងដៃ
12	ភ្លើងបំភ្លឺក្នុង/ភ្លើងលើងប្លុល			12	ទុយោកៅស៊ូប្រេងឥន្ធនៈ/ទុយោដែក	26	រចាំងការពារ
13	ខ្សែក្រវាត់សុវត្ថិភាព/ទ្វារ/ត្រចៀកទ្វារ			13	ប៊ូឡុងជំនាសរាង U/អេក្រូ	27	តំរបតក់/រចាំងតក់
14	កញ្ចក់មើលក្រោយខាងក្នុង/សងខាង			14	រ៉ឺស័រ-ជំនាស/ដែកឃ្លាបជំនាស	28	ផ្សេងៗ

ការវាយតំលៃរួម
Overall Evaluation

PASS

APPENDIX D RECOMMENDED EMERGENCY RESPONSE VEHICLE EQUIPMENT

Ambulance Life Support Equipment (from by Department if Health Services, Los Angeles)

PRINCIPLE: Any equipment or supplies carried for use in providing emergency medical care must be maintained in good working order.

MEDICATIONS*
(minimum required amounts)

Albuterol (pre-mixed with NS)	20 **mgs**	Dopamine	**400 mgs**
Activated charcoal (without Sorbital)	2	Epinephrine (1:1,000)	**2 mgs**
Adenosine	24 **mgs**	Epinephrine (1:10,000)	**10 mgs**
Aspirin (chewable 80 mg)	**640 mgs**	Furosemide	**100 mgs**
Atropine sulfate (1 mg/ml or 0.4 mg/ml)	4 **mgs**	Glucagon	**1 mg**
Atropine sulfate (1 mg/10 ml)	6 **mgs**	Lidocaine	**400 mgs**
Calcium chloride	1 **gm**	Morphine sulfate	**30 mgs*** **
Dextrose 50%	**150 mls**	Naloxone	**4 mgs**
Dextrose solution 100 gm (glucose paste may be substituted)	1	Normal saline (for injection)	**2 vials**
Diazepam	20 mgs**	Nitroglycerin spray	**1**
Diphenhydramine	**100 mgs**	Sodium bicarbonate	**50 mls**
Disaster Cache (mandatory for 9-1 -1 responders)			

***All sharps must comply with, Bloodborne Pathogens regulations**
****Diazepam carried on Ambulance Unit is not to exceed 50 mgs.**
*****Morphine sulfate carried on Ambulance Unit is not to exceed 60 mgs.**

INTRAVENOUS FLUIDS
(minimum required amounts)

1000 ml normal saline	8	250 or 500 ml normal saline

SUPPLIES*
(minimum required amounts)

Adhesive dressing (bandaids)	**1 box**	Extrication device or short board	**1**
Airways - Nasopharyngeal Large, medium, small (34-36, 26-28, 20-22)	**1 each**	Flashlight	**1**
		Gauze sponges (sterile)	**12**
Airways - Oropharyngeal Large	**1**	Gauze bandages	**5**
Medium	**1**	Gloves Sterile	**2 Pairs**
Small Adult/Child	**1**	Gloves Unsterile	**1 Box**
Infant	**1**	Glucometer or blood glucose strips/cotton balls	**1 bottle/1 bag**
Neonate	**1**	Hand-held nebulizer pack	**2**
Alcohol swabs	**1 box**	Hemostats, padded	**1**
Backboards	**2**	Intravenous catheters (14G-22G)	**5 each**
Bag-valve device with 02 inlet and reservoir Adult and Pediatric	**1 each**	Intravenous Tubing Microdrip	**6**
Bag-valve mask Large	**1**	Macrodrip	**6**
Medium	**1**	Lancets, automatic retractable	**5**
Small Adult/Child	**1**	Laryngoscope Handle Adult	**1**
Toddler	**1**	Laryngoscope Blades Adult, curved and straight	**1 each**
Infant	**1**	Pediatric, Miller #1 & #2	**1 each**
Neonate	**1**	Magill Forceps Adult and Pediatric	**1 each**
Burn pack or burn sheets	**1**	Normal saline for irrigation	**1 bottle**
Cervical collars (rigid) Adult (various sizes)	**4**	Needle thoracostomy kit or 14 G 2" angiocath	**2**
Pediatric	**2**	OB pack and bulb syringe	**1**
Communication Failure Protocol Quick Field Reference	**1**	Oxygen cannulas	**3**
Contaminated needle container	**1**	Oxygen Masks Adult and Pediatric	**3 each**
Defibrillator with oscilloscope	**1**	Personal Protective Equipment/ Body Substance Isolation Equipment mask, gown, eye protection	
Defibrillator electrodes (including pediatric) or paste	**2**		**2 each**
Double Lumen Esophageal Tracheal Airway (ETC) Small Adult	1	Pediatric Resuscitation Tape	**1**
Adult	**1**	Procedures Prior to Base Contact Field Reference No. 806.1	**1**
ECG Electrodes Adult and Pediatric	**6 each**	Pulse Oximeter	**1**
Endotracheal tubes with stylets Sizes 6.0-8.0	**2 each**	Radio transmitter receiver***	**1**
Endotracheal tube introducer stylet	**2**	Saline locks	**4**
End Tidal CO2 Detector and Aspirator Adult	**1 each**	Splints - (long and short)	**2 each**

SUPPLIES*
(minimum required amounts)

Splints - traction (adult and pediatric)	**1 each**	Scissors	1
Suction Unit (portable)	**4**	Stethoscope	1
Suction Instruments (8Fr.-12Fr. Catheters)	**1 each**	Tape (various types, must include cloth)	1
Tonsilar tip	**1**	Tourniquets	2
Syringes 1 ml - 10 ml	**1**	Vaseline gauze	2
Sphygmomanometer Adult/pediatric/thigh cuff	**1 each**		

* **All sharps must comply with Bloodborne Pathogens Regulations.**

Fire Tender Extrication Equipment

Adequate extrication equipment must be readily available to the emergency medical services responders, but is more often found on heavy rescue vehicles than on the primary responding ambulance.

In general, the devices or tools used for extrication fall into several broad categories: disassembly, spreading, cutting, pulling, protective, and patient-related. The following is necessary equipment that should be available either on the primary response vehicle or on a heavy rescue vehicle.

Disassembly Tools
- Wrenches (adjustable)
- Screwdrivers (flat and Phillips head)
- Pliers
- Bolt cutter
- Tin snips
- Hammer
- Spring-loaded center punch
- Axes (pry, fire)
- Bars (wrecking, crow)
- Ram (4 ton)

Spreading Tools
- Hydraulic jack/spreader combination
- Boss tool with spreading device

Cutting Tools
- Saws (hacksaw, fire, windshield, pruning, reciprocating)
- Air-cutting gun kit

Pulling Tools/Devices
- Ropes/chains
- Come-along
- Hydraulic truck jack
- Air bags

Protective Devices
- Reflectors/flares
- Hard hats
- Safety goggles
- Fireproof blanket
- Leather gloves
- Jackets/coats/boots

Patient-Related Devices
- Swiss seat
- Stokes basket

Miscellaneous
- Shovel
- Lubricating oil
- Wood/wedges
- Generator
- Floodlights

Local extrication needs may necessitate additional equipment, that is, water, aerial, or mountain rescue.

APPENDIX E PERSONS WITH WHOM MEETINGS HELD IN CAMBODIA

Mr Sous Kong	Secretary of State	MRD
Mr Ung Chun Hour	Deputy Director General of Transport	MPWT
Mr Keo Savin	Dep. Director Land Transport Dept	MPWT
Duy Chan Dara	Head of Phnom Penh Centre	Vehicle Inspect. MPWT
Phy Sophorth -	Assis, Director Land Transport	MPWT
Gen. Chan Rithy	Director of Order Department	General Commissariat of National Police, MOI
Col Him Yan	Director of Order Department	National Police, MOI
Maj Mar Samborana	Dep Chief of Office 3	National Police, MOI
Major Kim Yideth	Chief of Traffic Police Office	Phnom Penh Municipal Police
Mr Jean van Wetter	Road Safety Project Coordinator	Handicap International
Mr Kao Vannarin	Injury Surveillance Technical Advisor	Handicap International
Dr Prak Piseth Rainsgey	Director, Preventive Medicine	MOH
Dr Sann Sary	Director of Hospital Services	MOH
Dr Sok Srun	Dep. Director of Hospital Services	MOH
Mrs Ton Sa Im	Director of Pedagogical Research	MOEYS
Mr Ngoun Samphoas	Manager	88Sweet FM Radio Station

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