ROAD SAFETY VISION KERALA - A SUMMARY

Among Indian states, Kerala had recorded higher road accident rate for the past five decades. Kerala had registered 1528 road accidents in 1960 which nearly doubled to 2871 in 1965. Further it almost doubled to 5639 accidents in 1975. This increasing trend continued till 1995 when it reached a staggering figure of 36,086 accidents. The State had recorded an all-time high of 41,678 accidents and 51,225 injuries in 2005. However, the fatalities remained at a lower figure of 3200 persons in 2005.

Until 2005, the number of accidents per thousand vehicles in the State remained as one of the highest compared to the National average. Government of Kerala was deeply concerned over this increasing trend of accidents and the casualties. The formation of Kerala Road Safety Authority (KRSA) in 2007 was an important step in this direction. Since then, the State Government took several initiatives in the areas of road development, black spot improvement, traffic education and road safety awareness programmes. The Authority has been taking several actions to arrest the increasing trend of road accident in the state. The concerted efforts of Police and Motor Vehicle Department in terms of sustained enforcement of helmet and seat belt use, speed regulations, traffic surveillance system, observance of lane discipline, check on drunken driving, over-speeding etc. have yielded desired results.

The state experienced a decline in the absolute number of accidents since 2007. The number of accidents declined from 41,645 in 2006 to 35,013 in the year 2010. It implies that a reduction of 17 percent of accidents during the period between 2005 and 2010. The number of accidents and injuries were 35,028 and 39,999 respectively in 2013 which remained more or less the same as that of previous year. However the Government is deeply concerned about the increasing number of fatalities and casualties especially to the vulnerable road users consisting of pedestrians, two wheeler users, senior citizens and people with varying disabilities.

The Government also recognizes that road safety need to be improved upon to the level of developed nations by undertaking all tangible actions. The Government considers road safety as a major public health and economic issue which adversely affects the cross section of the society and vulnerable road users. The Government of Kerala further recognizes that road safety has to be addressed in a holistic manner by providing safer roads, proper training of drivers, effective vehicle management and sustained traffic enforcement.

Keeping in mind the Government's priority on the Road Safety and UN General Assembly Resolution proclaiming 2011-20 as a Decade of Road Safety, the Government of Kerala has come out with this Road Safety Vision Document.

ROAD SAFETY VISION

To Facilitate Safe Mobility to the Society

MISSION

Formulation of an Action Plan for Reduction of Traffic Accidents in Kerala and its implementation in a coordinated way.

TARGETS TO BE ACHIEVED

- To reduce traffic accidents to 50% of the current level by 2020 and to maintain zero growth level further.
- To ensure zero accidents at railway level crossings in the state by manning all unmanned level crossings and upgrade them to manned level crossings and rail over bridges by 2015.
- To reduce the severity of road accidents by enforcing the seat belt and helmet use, and strict compliance of speed governors by heavy vehicles.
- To minimise loss of lives due to delay in evacuation and transfer of accident victims to first-aid/ trauma care centres and ensure quality medical attention within the minimum response time, say 60 minutes.

- To educate road users through various means about the basic road rules.
- To impart training to drivers the importance of defensive driving, courtesy and respect to fellow drivers/ road users.
- To strengthen the identified Research Institutions in the state for R & D support on Road Safety Action Plan involving Four E's namely: Engineering, Education, Enforcement, Emergency Response System suitable to Kerala conditions and also prepare accident analysis reports, data base management, investigation of causative factors and accident reconstruction methods.

REALISATION OF TARGET

The following are the tasks identified to realise the above targets:

- Establishment of necessary infrastructure to carry out routine accident investigations and conduct safety audit of highways, identify stretches having defective road geometrics, lack of road-side appurtenances and safety devices
- Strict enforcement against all traffic violations using intelligent transport system such as radar speed check devices, surveillance cameras, GPS/GIS enabled accident management system.
- Compulsory Inspection & Certification of transport vehicles every year including safety and emission norms and link registration/insurance of vehicles with Inspection & Certification.
- Establishing post-accident trauma care facilities desirably at 10 km. radius on National and State Highways and ensuring medical care to accident victims within minimum response time (say 20 to 30 minutes).
- Encouraging private sector participation in rescue, evacuation and trauma care of accident victims for effective delivery of emergency relief services.

- Encouraging NGOs and other expert agencies in spreading road safety messages and conduct road safety awareness campaigns to educate public on defensive driving and safe journey.
- Setting standards for safe design of roads by providing speed reduction devices, traffic sign boards, signals, pedestrian facilities and adequate parking supply.
- Improve sight distances at curves and junctions by removing all obstructions such as structures, trees, compound walls etc. and by enacting necessary land use control legislation
- Introduction of activity based traffic education in school curriculum.
- Soft policing on first time traffic violators and educating them the type of violation and its impact of other road users.
- Hard policing and strict enforcement on habitual traffic violators with the help of ITS technologies such as surveillance cameras, interceptors and other advanced automated traffic control devices. Strategies should be evolved for sustained enforcement on overspeed, rash driving, non-wearing of seat belt and helmet, using mobile phone while driving, drunken driving and other traffic rule violations.
- Improve the quality of accident data-base for R & D purposes and decision support system.
- Equip the Motor Vehicle Department as an expert agency for dealing with all matters of motor vehicles, evaluation of their fitness, issuing/renewal of driving licences and other permits on most scientific and efficient way, comparable to world standards.
- Strengthening of Kerala Road Safety Authority with adequate technical man-power, capacity building and research functions to provide an institutional framework for a coordinated approach to prevent road accidents.

POLICY VISION FOR ZERO TOLERANCE

The World Health Organisation slogan, "Road Safety is No Accident" actually means zero tolerance of all causes/factors of accidents. Such an approach of zero tolerance is based on the following principles:

i) Priority **-** Human life and health are paramount, and safety consideration should take priority over mobility.

ii) Human Errors - Human beings are prone to make errors due to their physical, mental and driving limitations. Therefore, transportation system should be designed to such a level of safety so that the scope for human errors is minimized and the harm is reduced when they occur.

iii) Public Concern - Safety of all segments of road uses must be the main concern of any road safety policy. Providers, enforcers and health authority must guarantee the best safety standards for all citizens, be they motorist, pedestrians, school children, elderly people, disabled persons, females or any other group.

Further under zero tolerance, accident control measures would involve following four steps:

i) *Reduce the exposure to traffic* - efficient transportation, speed lanes and lane discipline and controlled land use are the important step to reduce risks from exposure to traffic.

ii) *Reduce the chances of accidents* - it would require the three E's, viz., Traffic Engineering, Traffic Enforcement and Traffic Education.

iii) *Reduce the post-accidents harm* - it would require efficient and effective emergency medical response system i.e. quick treatment of accident victims. The present practice of avoidance or referring of victims on various pretexts by private hospitals need to be effectively dealt with.

iv) *Reduce the harm done when accident occur* - it would require better safety standards of vehicles and use of safety equipments by occupants/drivers of vehicles, such as seat belts, helmets airbags, etc.

In this background, the State would attempt to reduce the annual frequency of accidents to about 18000 from the present level of 35,000 by 2020 and to maintain zero growth further on in accordance to the UN Resolution. Further, road safety issues would be taken in a holistic manner by covering accident abatement measures, accident insurance and compensation, early settlement of accident cases, and rehabilitation programmes for accident victims. Special consideration would be given to the disadvantageous section of the society and vulnerable road users.

CAUSE OF ACCIDENT AND MITIGATIVE MEASURES

Reasons for accidents and Causative factors

Accidents occur due to combination of the following causative factors:

DUVERT

1. Driver related
2. User related
3. Vehicle related
4. Environment related
5. Road related
6. Traffic related

Driver related prominent causes

1. Lack of driving skills
2. Lack of knowledge or non adherence of traffic rules
3. Drink driving and addiction to drugs
4. Fatigue and sleepless driving
5. Visual acuity of drivers
6. Not dimming the lights at night.
7. Over speeding and wrong overtaking manoeuvres at curves

Pedestrian/road user related causes

1. Non adherence to traffic rules
2. Careless walking on the carriageway
3. Crossing the road abruptly
4. Playing on the road by children
5. Careless boarding and alighting and sudden opening of doors of vehicles
6. Stretching the hands outside the vehicle
7. Carrying hazardous materials and over dimensional cargo in vehicles

8. Mental aberration and social tensions
9. Unmindful of fellow passengers
10. Use of intoxicants while walking/riding
11. Visual acuity problems
12. Not showing signals while turning, stopping and crossing the road
13. Lack of road discipline
14. Non obedience of traffic signal

Vehicle related causes

1. Lack of timely inspection and maintenance of vehicle
2. Usage of older vehicles on road
3. Poor vehicle lighting
4. Carrying hazardous material and oversized goods
5. Lack of in vehicle safety measure

Road related causes

1. Narrow road, weak culvert/bridge
2. Encroachments on road side
3. Distresses on the pavement
4. Level difference between carriageway edge and shoulders
5. Improper lane marking
6. Absence of proper signage system
7. Absence of adequate shoulders or service lanes
8. Absence of pedestrian facilities
9. Poor road geometrics
10. Slippery road surface
11. Improper design of super elevation
12. Poor street lighting facilities
13. Digging road for public utilities
14. Improper road side appurtenances

15. Lack of vertical clearance at bridges
16. Bill boards/road side advertisement
17. Lack of traffic control devices
18. Ribbon type land use development
19. Lack of safety barriers and traffic channelisers.
20. Elements of surprise like check barriers, speed breakers etc.
21. Unorganised on-street parking
22. Poor drainage
23. Lack of segregated bus bays
24. Parking of vehicles at the bell mouth of junctions

Traffic related causes

1. Dynamic and unpredictable nature of traffic
2. Traffic congestion and traffic conflicts at junctions
3. Heterogeneous traffic
4. Intermixing of through traffic with local traffic

ROAD INFRASTRUCTURE PLAN

Augmentation of Road Capacity

The road network system in the state should be modernized comprising of Expressways, Modern National Highways, State Highways and District Roads with 8 lanes, 6 lanes, 4 lanes and 2 lanes carriageways respectively. They should be developed in an integrated manner with smooth interchanges. More attention needs to be given to options of elevated carriage ways.

Pending road development projects including NH bypasses, construction of ring roads, fly over's, ROBs etc. to bypass the congested towns and junctions should be taken up on priority basis. Steps may be taken for construction of North – South Expressway, on elevated corridors if sufficient land is not available. The Expressway will have six/eight lane carriage way with controlled access to local traffic by constructing fly over/under passes, clover leaf interchanges, bypasses and elevated lanes at locations passing through cities and towns.

Bypasses and Ring Roads

All cities should be connected with efficient Ring Road System as well as bye pass system. This helps to avoid the bypassable traffic from entering into the heart of the city. Likewise all major junctions catering heavy traffic should have fly overs or underpasses for providing unhindered movement of traffic.

New Road Construction

Advance action is required to finalize the alignment of the new road development and ensure the Right of Way freed from encroachments in advance. Necessary legal enactments for advance position of ROW of the identified alignment are required. Well defined policies are needed for making the land acquisition procedures in pace. Re-settlement and rehabilitation policies are to be developed in a friendly manner in which provisions are clearly specified to compute the land cost in a judicious manner and hand over the amount to the land owner whose land is acquired at the time of acquisition itself.

Road Construction Quality

Modernization in design as well as construction procedures is required to attain an eco-friendly and fast construction of the Road project. The use of modern imported machineries for construction of the pavement increases the life span as well as quality of the construction. Policies are to be adopted in such a way to provide strict quality control on each and every construction as per the design norms and technical specifications and the contracting agency is fully responsible for the construction quality over the service period.

Road Maintenance

A rupee spent on maintenance saves two to three rupees in vehicle operating cost besides providing a very cost effective option to improving traffic flow and safety. If timely maintenance is not carried out, the asset will deteriorate over the period and render service less. The Government will have to give top priority to maintain the precious road assets.

Controlled Land Use

No high rise apartments as well as mega malls are to be permitted very close to major road corridors. No construction of permanent structures or ribbon development should be allowed with in the right of way to be reserved for widening the road according to projected traffic demand for next 50 years. Green zones should be maintained on both sides of the major arterial and sub-arterial road corridors.

The building line set in National Building Rule for road side developments is generally a fixed setback width from the edge of road irrespective of road geometry. For ensuring safety at curves and junctions sufficient setback distance should be maintained with respect to the curve radius. No structures, trees, compound walls etc. should be allowed at curves and junctions obstructing sight distance. Necessary changes/amendments should be required in National Building Rule and Master Plans prepared by Town Planning Department.

Pedestrian safety

Pedestrians are 'Vulnerable Road Users' and therefore they must be regarded as a 'traffic unit' in planning and designing the traffic facilities. The development plan should be prepared on a human scale and must accord adequate priority to the safety of pedestrians, while formulating the scheme. It is required to provide of adequate sidewalks and maintain them in proper usable condition to promote better usage and safety of pedestrians. Zebra crossing and guard railing should be introduced wherever required. Adequate provision like flashing beacons should be provided at these locations to compel the attention of the motorist and to facilitate them to give right of way to the pedestrians. At locations where the demand for the pedestrians crossing a busy road is significant, it is desirable to construct grade- separated pedestrians crossing like footbridge or subway.

Parking

Due to the absence of parking lots and road side parking facilities, people used to park vehicles on carriageways and even foot paths. These causes traffic congestion and accidents. Policies are to be formulated to analyze the traffic demand and provide enough parking facilities on all roads considering the future traffic demand also.

Rigid Pavement for Flood Prone Areas

Government will have to take initiatives to encourage construction of rigid pavement on areas prone to flood and high traffic intensity so as to minimize recurring maintenance cost and obstruction to traffic movement while repairs.

Drainage

Lack of adequate drainage facility has been one of the major reasons for pavement failure and this causes frequent road accidents. Inorder to solve this problem built-up drain should be provided at least in urban areas.

Street Lighting

Most of the roads are not having proper street lights and this makes driving cumbersome during night time. The black topped surfaced pavements are very poor in visibility and the absence of lighting adds up difficulty. Mandatory checkups are to be formulated to maintain proper lighting on all road corridors in the state.

Road Furniture

Standardized Traffic signalling and proper road markings and signs should be made mandatory on all roads and junctions. The advancements in traffic signal systems on leading countries should be utilized for creating highly efficient and capable vehicle actuated type signal systems. Modern reflective markings are found very useful. Retro reflective paintings, Stickers and cat's eye type markings are to be provided and well maintained on every main highways and roads catering huge traffic loads. Modern types of efficient safety barriers systems shall to be installed at every hazardous location on roads.

Roadside Arboriculture

Policies are necessary to make any infrastructural development in an eco-friendly way. Planting trees should be done on the road side as well as at medians as a part of promoting greenery, reducing night glare of opposing vehicles and reducing pollution level. But whenever such a policy is initiated, care has to be given in the choice selection of the plant and its planting position since trees with spreading nature, spreads on top of road surface results in fast deterioration of the pavement due to stripping of aggregates during rainfall.

Control of vehicle Overloading

It is very important to restrict and control the over loading practice of goods operators as it causes pavement damage as well as accidents. In no case, heavy vehicles are to be patrolled on shoulders/carriageway edge etc. as it increases the risk factors. Instead patrolling can be done only on locations where sufficient ROW is available so that the trucks can be parked away from

Highway shoulder. This could be made mandate with strict policy implementations.

Road Signage

Unscientific implementation of traffic control devices and installation of sign boards by various agencies in different ways, should be controlled in confirmation with standards. Too much sign boards of different kind and different types at close intervals do not serve any purpose rather than confusion and accident proneness. Application of cones, barriers etc. on carriageways results in heavy breaking or sudden drifting of vehicles and increases accident proneness. This should always be done as per the guidance of expertise Transport/Highway engineers or research professionals in this sector. Policies are to be made to engage competent agencies like NATPAC or CRRI to design and implement traffic control measures, installation of traffic sign boards or markings on roads.

Road Side Advertisement

A lot of advertisement boards can be seen on almost all major roads in Kerala. These boards distract the eye sight and concentration of most of the drivers from road. So an advertisement policy should be developed for the state for controlling the road side advertisement.

Intelligent transportation system

Lot of advancement has come in the sector of intelligent transportation system. These advancements should be utilised in various road stretches as well as in vehicles to ease hazardous traffic flow.

Road Safety Research & training

Road Safety aspects for all modes of transport need to be given due priority. The following aspects of road safety should get governmental attention:

a) Creation of accurate Accident Data Base along with site inspection report by independent and competent authority.

b) Accident Investigation, analysis and corrective measures if any to the geometry, pavement surface or proper road safety training.

c) Periodic training awareness and campaign programs to educate people to develop a safe road safety culture.

Implementation of Road Safety Action Plan

- Strengthening and extension of Accident Victim Rehabilitation schemes.
- Safe environment should be provided in urban areas, to encourage walking & cycling habits. This will also reduce motor vehicular traffic.
- Mandate implementation of Road safety education from child level onwards.

Licensing system

- Licensing system should be amended to international standards. Each learner should have to be tested for their knowledge related to basic vehicular design, traffic rules and regulations, road markings, traffic signalling and the mandatory rules, safety culture to follow on roads during day as well as night driving and various types of parking.

Trauma care

- At least one hospital inside a city should have trauma care facilities to handle a minimum of 20 – 25 trauma patients at a time in case of severe accidents or any natural calamity or explosion. Government has to undertake necessary actions to improve the trauma care facilities in government hospitals and encourage private hospitals to develop trauma care facilities.
- As the road condition and traffic condition is not good in our state, the potential of air ambulance services should be used for critical patient transport.
- Extension of 108 trauma care ambulance services to whole state with more number of ambulances should be required for improving trauma care and safe transfer of patients.

- As per the expert statements, the accident victims are subjected to severe injuries due to mishandling and shifting from the spot to hospital. Most of the spinal injuries are occurring just due to lack of awareness in handling the victim. Awareness campaign programs to educate the people about handling the accident victims and first aid procedures should be conducted at regular intervals.

Public Transport

At present more than 80 percent of transport is handled by personal modes such as cars and two wheelers. Two wheelers are involved in 40 percent of accidents and they are the victims in 25 to 30 percent fatal accidents. It is necessary to increase the share of public transport by enhancing their safety aspects and easy availability at economical cost.

Higher share of public transport patronage

Sixty percent of the vehicles registered and 45 percent of the road accidents in the state are in urban areas. It is expected that about 55 percent of Keralites will live in urban centers by 2025. Due to inadequate public transport services and lack of reliability and connectivity, the personalized transport demand is ever increasing in urban areas. The share of personal vehicles in meeting travel demand should be minimized as far as possible. This can be achieved by imposing progressive taxation on personal vehicles, congestion pricing, and imposing fines for single person use.

Bus transport safety

Bus operation should be kept punctual, reliable and neat for attracting the passengers from personal modes.

A well-defined policy should be developed to fix the utilization period of buses depending upon its operational efficiency. A period of 15 years or with respect to a set kilo meter of service may be taken as the service period of buses. Frequent assessments and trainings to each and every staff of public transport should be made mandatory for safe operation of buses.

Decongestion of bus stands

The construction of shopping complexes in bus stands should be avoided for reducing the traffic attractions towards one point of the city. Heavy traffic in one point will cause to heavy congestion and accidents.

ITS Application

The government will have to take steps to encourage harnessing latest IT and GIS based technology in traffic management, fleet management, trip scheduling, traffic enforcement and road safety.

Over Speeding

Speed influences the impact of accidents and its severity in a crash. Even small reduction vehicle speed results in a marked reduction in the number of road fatalities and serious injuries. Road traffic injuries can be reduced by speed control measures. Over speeding of buses loses many valuable lives. Over speeding of buses should be controlled by strict implementation of speed governors.

Overloading

Due to the lack of adequate fleet planning overloading of buses is seen in all main routes in Kerala. Overloading will affect the overall stability of the vehicle especially at manoeuvring actions as well as at sharp curves. Hence overloading should be controlled by adopting effective fleet planning and proper enforcement.

Seat belts and doors

Most of the private buses especially city buses are operating without having doors. This creates lot of accidents especially in boarding and alighting activities. Door and emergency exit etc. should be ensured in every stage of bus operation. Wearing a seatbelt will be reduced the injuries/fatalities of passengers in the bus which involved in accidents. Seatbelt should be made compulsory in every public transport vehicles for reducing impact of accidents.

Bus bay

Public transport services are considered to be slow traffic. The frequent stops for alighting and boarding passengers slowdown the entire traffic movement in the stream that inturn reduces the capacity of the road. So a separate bus bay for buses should be required for reducing the accidents and increase the capacity of the road.

BRTS, Mono, Metro and Suburban Rail

Modern means of public road transport system such as Bus Rapid Transit system (BRTS), bus priority schemes, mono rail, metro rail etc. should get due consideration in higher level cities. This doesn't seem fruitful with the current road way facilities but once the infrastructure develop into relevant standards, these type of public transport modes can be brought up into efficient utilization.

The state government is thinking alternative options for reducing traffic congestion on the existing roads. One of the options under consideration is development of Suburban rail corridor by utilising the existing rail tracks in the state. Introduction of Suburban rail between the Central Business District and its suburbs, or other locations will attract large number of commuters to railway and release congestion and accidents threats on roads.

KEY ACTION AREAS

The protective efforts of the Government would be pursued vigorously in order to realize zero growth of accident by 2030. For this purpose following 18 key action areas have been identified:

1. Coordination and Management,
2. Quality of Road infrastructure,
3. safety at Level crossings,
4. Crash Data Collection and Management System,
5. Sensitization of stakeholders and Raising Awareness about Road Safety Issues,
6. Road Safety Publicity and Campaigns,
7. Road Safety Education and Training,
8. Ensuring Safer Road Infrastructure,
9. Traffic Legislations and Enforcement of Traffic Laws,
10. Emergency Medical Assistance to Crash Victims,
11. Upgrading of Vehicle Safety Standards and Testing Procedure,
12. Strengthening of Traffic Police, MVD and Improving Law Enforcement,
13. Ensuring Safer Drivers and Setting up of Driver Training, Testing and Licensing Centers,
14. Undertaking Road Safety Research and HRD,
15. Ensuring safety of Vulnerable Road Users,
16. Road safety auditing and improvement of vulnerable road stretches,
17. Strengthening Institutional and Financial Resources for Road Safety works, and
18. Implementation Strategy.

Following sections provide a brief action plan for the above key areas.

Coordination and Management

A number of agencies including PWD, Transport, Police, Health, Development Authorities etc. are involved in road safety related activities. Kerala Road Safety Authority (KRSA) has been entrusted with the task of coordination and management of road safety activities in the State. In this direction, suitable steps would be taken to further enhance the inter-departmental coordination at State, district, Taluk and Panchayat levels. District road safety committees would be strengthened and a group of volunteers would be created at "Community levels" to assist accident victims. Safe community programmes at Panchayat levels would be initiated.

Quality of Road infrastructure

Maintenance of a good and safer road network involves a variety of operations from planning, programming and scheduling to actual implementation in the field and monitoring. Whatever be the approach or system adopted, the essential objectives should be to keep the road surface and appurtenances in good order and to extent the life of the road assets to the maximum extent possible. Inorder to achieve a safe and good road network road the following actions are required.

- Upkeep of road pavements and side pavements and side shoulders
- Upkeep of roadside drain and cover them with concrete slab
- Upkeep of culverts and bridges, and earth retaining structure and parapets;
- Keeping the sign boards, kilometre stones and other road furniture in good shape and condition;
- Maintenance of roadside arboriculture and greening of median and traffic islands.
- Formation of delineators and guard rails reflectors
- Street lighting

The public work department should ensure the quality of road works and maintained a good and safe road network with the help of various expert agencies which are pioneer in roads related works/researches.

Safety at Level Crossings

Lot of manned and unmanned level crossings are present in our state. Most of them are present in the curves where sufficient visibility is absent. The level crossings are always considered as unsafe due to small human errors become a very big tragedy. Unmanned level crosses are very hazardous location while considering the impact of accidents. The road conditions in the manned level crosses are always pathetic due to presence of unscientific humps and distresses due to acceleration and decelerations activities. So an utmost priority should be taken in eliminating level crosses to flyovers. The railway authority and public work department should work hand in hand for upgrading the unsafe situations in level crossings.

Crash Data Collection and Management System

The Government has implemented Geo KAMS software for accident reporting and data analysis in selected Police Stations. The application of this software would be expanded and traffic police and MVD officials would be imparted training in its use.

Accident data from insurance companies, Motor Accident Claims Tribunal (MACT), Hospitals/Trauma care centers and other sources would be collected and compiled. Special need based surveys would be conducted to supplement this database. Academic and research institutions like NATPAC, engineering collages should be strengthened for pursuing research and analysis Crash Data**.**

Sensitization of stakeholders and Raising Awareness about Road Safety Issues

The Government may take necessary steps to raise awareness about the various issues of road safety including social, economical and human suffering

implications of road accidents. It would sensitize all he stakeholders about what needs to be done to curb the menace of road accidents. This should result in effective involvement of different stakeholders so that they can play meaningful role in promoting road safety.

Road Safety Publicity and Campaigns

The Government has identified key unsafe behavioural elements of road safety such as not using helmet/ seatbelt, dangerous overtaking, over speeding, not observing central yellow marking etc. Public Safety Campaign would be launched for mass education on these issues. Publicity campaigns would be scientifically designed and investigative studies would be conducted to evaluate the impact of such campaigns.

Road Safety Education and Training

Road Safety Education would be made a part of the curriculum for enhancing road safety awareness at an early stage. The Department of Public Instruction, NATPAC, KSTP, Department of Transportation and other agencies would be involved in developing school based road safety education progammes for school children. Production of education material for school children, teacher's guide and teacher training programmes are also to be undertaken. The provision of pedestrian subways/over bridge near schools would be made as per the need.

Road safety publicity campaigns will be used to propagate good road safety practices among the community. The Government would encourage all professionals associated with road design, road maintenance, traffic management, traffic enforcement etc. to attain adequate knowledge of road safety issues.

Road safety community programs at Panchayath, school neighbourhood area, work centers, etc. would be formulated and implemented.

Ensuring Safer Road Infrastructure

PWD, with the help of NATPAC and KHRI would review safety issues with respect to road planning and design and maintenance of roads. A Manual for the State on “Safety-conscious Highway Design Standards” would be adopted and specific sections on “Safety at road Works” would be incorporated. Road Safety Auditing of existing roads and new roads would be carried out in a phased manner. The provision of cycle tracks would be made in areas having high use of cycles such as Chavara, Mavelikkara etc.

Accident prone Locations would be identified and improved in phased manner for all important roads in the State. PWD, NATPAC, and other agencies would carry out “Before and After” studies for all remedial works and evaluate the effectiveness of Safety Schemes. Speed breakers, zebra lines, reflectors etc would be used wherever found necessary.

Application of Intelligent Transport System (ITS) to establish a safe and efficient transport system would be encouraged. Enforcement Authorities would be provided modern/automated traffic management equipments for smoother and safer flow of traffic.

Traffic Legislations and Enforcement of Traffic Laws

The Police and MVD engaged in traffic law enforcement are to enhance their operational efficiency with in the current legislation and identify additional legislations amendments needed. Introduction of graduated licensing system and hazard perception test for driving license candidates will be explored and adopted.

Emergency Medical Assistance to Crash Victims

A sizeable number of deaths and injuries can be reduced if immediate medical care is given to accident victims. The Government would strive to ensure that all persons involved in road accidents benefit from speedy and effective trauma care and management. The current practice in emergency medical assistance is

to be reviewed. Thereafter a plan would be developed to strengthen the emergency medical services including communication, transportation, on the spot medical aid, new trauma care centers, rehabilitation centers etc. Hospitals, both under public and private sectors, alongside the major roads would be adequately equipped to provide for trauma care and rehabilitation.

Up gradation of Vehicle Safety Standards and Testing Procedure

A review of current vehicle testing system, standards and practice would be conducted. Training programmes need to be conducted for police and staff of Motor Vehicle Department on road side vehicle inspection. A long term plan to implement an effective, professional and well resourced vehicle testing centre and issuance of fitness certificate would be undertaken. Suitable legal provisions would be made for proper and safer use of different types of vehicles including school buses, heavy vehicles and vehicles carrying hazardous materials.

Strengthening of Traffic Police and MVD and Improving Law Enforcement

The Government would take steps to improve quality of enforcement to ensure effective and uniform implementation of safety laws. The steps would be undertaken to establish and strengthen highway patrolling on major roads.

Training programmes for traffic police in effective law enforcement, use of modern equipments, and dealing with traffic law offenders need to be undertaken. Task force headed by a Circle Inspector would be formed in areas having high accident rate. Task force members would be given training at PTC, Drivers training Institute etc. Modern equipment to control and regulate traffic would be made available to traffic police.

Ensuring Safer Drivers and Setting up of Driver Training, Testing and Licensing Centers

The Government would strengthen the system of driver licensing and training to improve the competence and capability of drivers. In each district driver training and testing centers would be planned and developed in a phased manner.

Undertaking Road Safety Research and HRD

In developed countries comprehensive database on road condition accident details are available and continuous updation of the same is being done for monitoring. NATPAC, engineering colleges, KHRI, Institute of Driver Training and Research and design wing of PWD would be encouraged to undertake road safety research. Funding for research projects would be provided by the KRSA, in accordance to the needs of KRSA and availability of funds.

The Government would establish centers of excellence in road safety research in regional and academic institutions. Steps would be undertaken to disseminate the results of research and examples of good practices through publication, training, conferences/workshops, and websites.

Ensuring Safety of Vulnerable Road Users

The design and construction of all road infrastructure and supporting facilities will take into account the needs of non-motorized transport, pedestrians, vulnerable and physically challenged in an appropriate manner. Steps would be taken to disseminate “best practices” in this regard to town planners, highway/traffic engineers, architects and others.

Road safety auditing and improvement of vulnerable road stretches

Road Safety Auditing (RSA) is a formal procedure for assessing accident potential and safety performance in the provision of new road schemes, or upgrading the existing roads. It should form an integral part of planning, design, construction and maintenance of roads, and it requires an objective approach to

the assessment of accident risk. The principal method of ensuring this objectively is through an independent assessment of schemes by persons who are independent of the original design team. A road safety auditing should be required in every stage of highway planning, design, construction and maintenance activities. Agencies like Public Work Department, NATPAC etc. will take care of road safety auditing of all the existing and new roads in the state and public work department should reconstruct the identified vulnerable road stretches in a safer manner.

Strengthening Institutional and Financial Resources for Road Safety Works

The Government would take suitable steps to ensure that, the required institutional and financial environments for road safety works are further strengthened. The reforms in these areas would provide for the active and the extensive participation of the community at large, private sector, academic institutions, NGOs and road safety activities.

Newer sources for generating financial resources for road safety works would be explored. The concerned Department would be encouraged to provide enough financial resources for road safety activities of their Department. KRSA would also properly supplement the Departmental efforts in funding road safety works.

Implementation Strategy

The Government has established Kerala Road Safety Authority to coordinate and oversee the works related to road safety. The authority would take suitable steps to implement the Road Safety Policy and Action Plan. A review of role and activities of KRSA would be undertaken to further strengthen the effectiveness of KRSA and amend the KRSA Act as per the need.

CONCLUSION

Accident situation in the State has improved substantially. The proactive steps such as enforcement of helmet/seatbelt use, control on over speeding, observance of traffic signs/markings, lane discipline, control on drunken driving, improvement of accident prone location, road safety education and better enforcement all have resulted in better safety level on roads. These efforts would be strengthened to maintain this down trend in accidents.

Action as identified under 18 key areas would be taken up on priority basis. Road safety situation would be monitored on regular basis and corrective steps taken to improve safety level for all segments of road users. The current road safety policy would be updated based on the feedback received from various road safety programs as envisaged in 18 key areas of action plan.

WORLD ACCIDENT SCENARIO

Road crashes kill at least 1.5 million people worldwide each year and injure 50 million. 90% of these road casualties are in developing countries. Highest road crashes were reported in United States (24 lakh crashes causing 40000 deaths). Whereas India recorded the highest number of casualties in road accidents. In the year 2012, India registered about 8 lakh road accidents causing 1.42 lakh deaths.

Japan has 10 percent of India's size both in terms of geographical area and population, but, less than 10000 people get killed in road crashes every year.

Road crash injuries and deaths have decreased in most of the developed countries and preliminary data for 2010 suggest that a number of countries have recorded further sharp decrease in road fatalities.

The UN resolution reaffirms the critical importance of addressing road safety issues and the need for the further 213 international 92 cooperation, particularly to meet the needs of low-income and middle income countries.

NATIONAL ROAD ACCIDENT SCENARIO

The road accidents in India have been growing at an alarming rate. From **Appendix 1,** it is evident that India recorded about 40,000 accident deaths in 1990 which further increased to 1,25,660 road fatalities in 2009 and 1,42,000 fatalities in 2012.

ACCIDENT SCENARIO IN KERALA

The Kerala State registered 3031 fatalities in 2009 which increased to 4200 fatalities in 2012 which is much higher than a large number of developed countries, including United Kingdom, Australia and Canada. Thus, a lot more needs to be done to address the Road Safety problems in Kerala.

Appendices 2 and 3 present the details of road crashes in Kerala and the ratio of traffic deaths with population and vehicle kms. It is seen that in Kerala an average of 11.2 persons are killed per lakh population, compared to 10.8 at national level.

Kerala was exhibiting relatively a higher accident rate for the past few decades. For example, Kerala registered only 1528 accidents is 1960, which had increased to 2871 in 1965 and further doubled to 5639 accidents in 1975. This trend continued up to 1995 when Kerala recorded 36,086 accidents. Thereafter, Kerala has seen a fluctuating trend and since 2006, there has been a decline in number of accidents. In the year 2012, the number of accidents declined to 35,115 which implied a decline of 17 percent in accidents during the intervening five year period from 2005.

Figure1 shows the fluctuating trend of road accidents Kerala. The declining trend in accidents have been preceeded by sustained efforts by sustained efforts by the Government efforts and positive actions by Departments concerned in controlling the accidents. In the recent past, the Government of Kerala took up a number of initiatives in curtailing the accidents by improving road conditions, sensitising the road safety culture and enforcing traffic rules. The Government's effort in terms of enforcement of helmet and seatbelt use, speed regulations, observance of lane discipline, check on drunken driving etc. have yielded positive results.

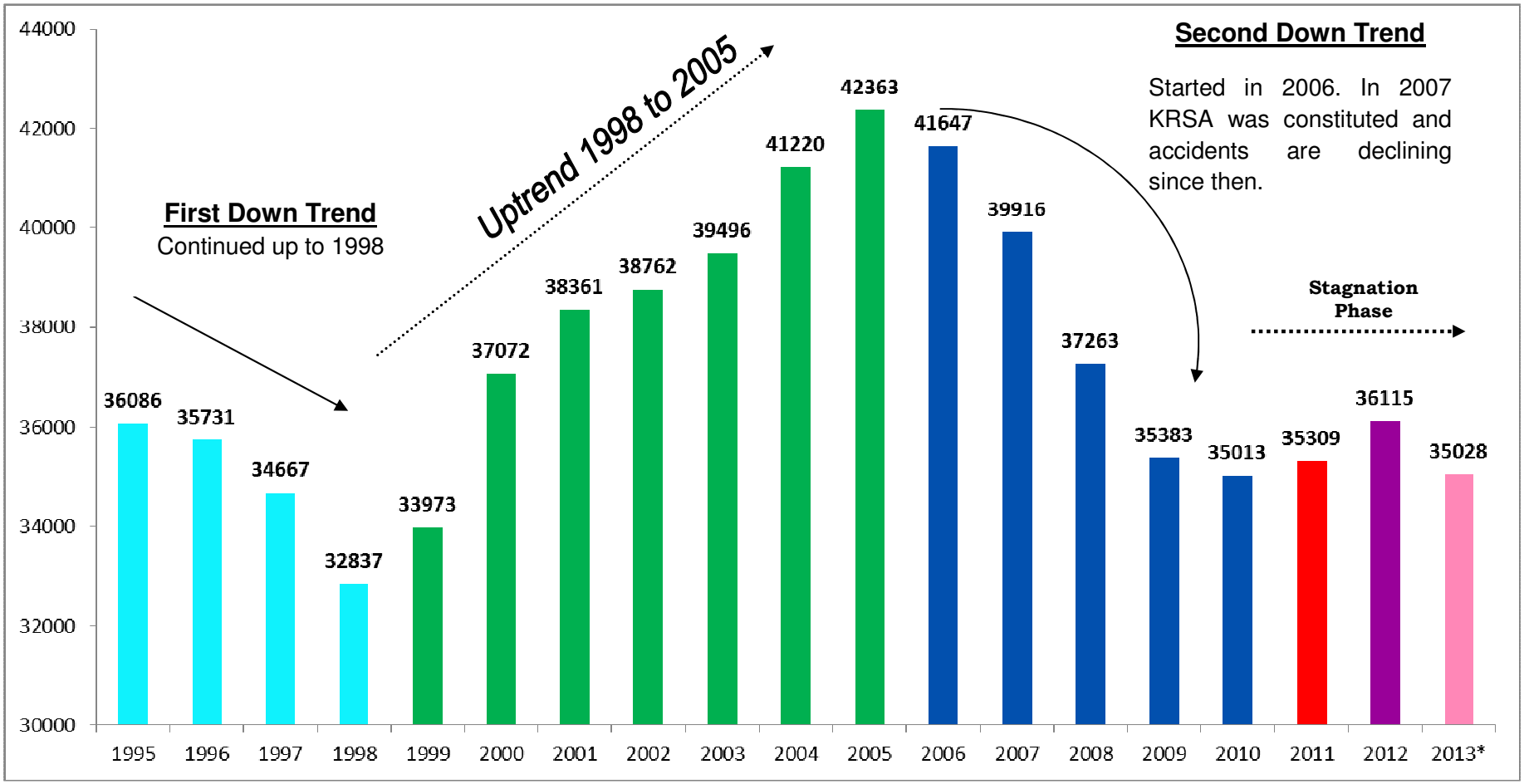
Appendix 1

Trend of road traffic accidents in Kerala (1960 – 2013)

Trend	Year	No. of accidents	Persons injured	Persons killed	No. of vehicles (in lakh)	Accidents per 1000 vehicle
Increasing trend	1960	1528	1663	235	0.24	63.67
	1965	2871	2982	368	0.55	56.34
	1970	4214	4300	500	0.86	49
	1975	5639	7107	842	1.31	44.69
	1980	7064	9913	1184	1.75	40.37
	1985	13756	18455	1489	3.78	37.78
	1990	20447	26996	1793	5.81	35.19
	1995	36086	49950	2519	10.06	35.87
	2000	37072	49399	2710	19.1	19.41
	2005	42363	51124	3203	31.22	13.35
Declining trend	2006	41647	49881	3589	35.60	11.70
	2007	39917	48248	3778	40.25	9.92
	2008	37263	43841	3897	44.42	8.51
	2009	35434	41226	3742	48.80	7.26
	2010	35013	40998	3818	53.98	6.49
Static trend	2011	35309	40709	3990	60.72	5.82
	2012	36115	40675	4107	82.46	4.38
	2013 (Jan-Nov)	32109 (35028)*	36666 (3999)*	3748 (4089)*	86.00	3.73

*Estimated based on Jan-Nav, 2013 data

Figure 1: Trends of Accidents in Kerala



* Projected

- Since the formation of KRSA accidents have declined by about 16%.
- However, fatalities have not shown any declining tendency.

Appendix 2

District wise Details of Accidents in Kerala, 2013(JAN-NOV)

Districts	Total Accidents Reported	Number of Persons Died	Number of Persons Injured
Ernakulam	5090	443	5543
Thiruvananthapuram	4250	492	4788
Thrissur	3467	373	3847
Kollam	2589	383	2951
Alappuzha	2581	346	2748
Malappuram	2444	320	2935
Kozhikode	2422	315	2536
Kottayam	2381	251	2738
Palakkad	1946	303	2219
Kannur	1695	170	2267
Pathanamthitta	1196	121	1349
Idukki	815	89	1117
Kasargode	706	91	890
Waynad	527	51	738
Total	**32109**	**3748**	**36666**

Appendix 3

Incidence and Rate of Deaths due to Road Accidents during 2012

Sl. No.	State/UT	No. of Cases of Road Accidents	Total Registered Motor Vehicles as on 2011 (In lakhs)	No. of deaths due to Road Accidents in 2012	Accidental Deaths per 1000' vehicles (5)/(4)	Rate of Deaths (5)/(3)*100
(1)	(2)	(3)	(4)	(5)	(6)	(7)
STATES:						
1	Andhra Pradesh	42524	10214	14964	1.47	35.2
2	Arunachal Pradesh	251	142	138	0.97	55.0
3	Assam	6535	1561	2291	1.47	35.1
4	Bihar	10320	2695	5056	1.88	49.0
5	Chhattisgarh	13511	2695	3167	1.18	23.44
6	Goa	4312	851	292	0.34	6.8
7	Gujarat	27949	13052	7817	0.60	28.0
8	Haryana	10065	5391	4446	0.82	44.2
9	Himachal Pradesh	2899	567	1109	1.96	38.3
10	Jammu & Kashmir	6709	993	1165	1.17	17.4
11	Jharkhand	5711	3121	2818	0.90	49.3
12	Karnataka	44448	9931	9448	0.95	21.3
13	Kerala	36174	6100	4286	0.70	11.8
14	Madhya Pradesh	51210	7377	8175	1.11	16.0
15	Maharashtra	66316	17450	13333	0.76	20.1
16	Manipur	771	142	158	1.11	20.5
17	Meghalaya	483	142	219	1.54	85.3
18	Mizoram	110	142	77	0.54	70.0
19	Nagaland	42	284	56	0.20	133.3
20	Odisha	9285	3405	3701	1.09	39.8
21	Punjab	6341	5249	4820	0.92	76.0
22	Rajasthan	22969	7944	9528	1.20	41.5
23	Sikkim	158	43	55	1.28	34.8
24	Tamilnadu	67757	15605	16175	1.04	23.9
25	Tripura	888	142	272	1.92	30.6
26	Uttarpradesh	29972	13335	16149	1.21	53.9
27	Uttarakhand	1472	993	844	0.85	57.3
28	West Bengal	12290	3263	5397	1.65	43.9
	Total (states):	**481472**	**132829**	**135956**	**1.02**	**28.2**

Sl. No.	State/UT	No. of Cases of Road Accidents	Total Registered Motor Vehicles as on 2011 (In lakhs)	No. of deaths due to Road Accidents in 2012	Accidental Deaths per 1000' vehicles (5)/(4)	Rate of Deaths (5)/(3)*100
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Union Territories:						
29	A & N Islands	236	71	25	0.35	10.6
30	Chandigarh	419	993	136	0.14	32.5
31	D & N Haveli	85	142	53	0.37	62.4
32	Daman & Diu	50	142	29	0.20	58.0
33	Delhi (UT)	6937	7235	1866	0.26	26.9
34	Lakshadweep	3	14	0	0.00	0.0
35	Puducherry	1181	709	193	0.27	16.3
Total (UTS):		**8911**	**9306**	**2302**	**0.25**	1.60
Total (all India):		**490383**	**142135**	**135956**	**0.96**	32.43

ROAD SAFETY VISION KERALA - A SUMMARY

Among Indian states, Kerala had recorded higher road accident rate for the past five decades. Kerala had registered 1528 road accidents in 1960 which nearly doubled to 2871 in 1965. Further it almost doubled to 5639 accidents in 1975. This increasing trend continued till 1995 when it reached a staggering figure of 36,086 accidents. The State had recorded an all-time high of 41,678 accidents and 51,225 injuries in 2005. However, the fatalities remained at a lower figure of 3200 persons in 2005.

Until 2005, the number of accidents per thousand vehicles in the State remained as one of the highest compared to the National average. Government of Kerala was deeply concerned over this increasing trend of accidents and the casualties. The formation of Kerala Road Safety Authority (KRSA) in 2007 was an important step in this direction. Since then, the State Government took several initiatives in the areas of road development, black spot improvement, traffic education and road safety awareness programmes. The Authority has been taking several actions to arrest the increasing trend of road accident in the state. The concerted efforts of Police and Motor Vehicle Department in terms of sustained enforcement of helmet and seat belt use, speed regulations, traffic surveillance system, observance of lane discipline, check on drunken driving, over-speeding etc. have yielded desired results.

The state experienced a decline in the absolute number of accidents since 2007. The number of accidents declined from 41,645 in 2006 to 35,013 in the year 2010. It implies that a reduction of 17 percent of accidents during the period between 2005 and 2010. The number of accidents and injuries were 35,028 and 39,999 respectively in 2013 which remained more or less the same as that of previous year. However the Government is deeply concerned about the increasing number of fatalities and casualties especially to the vulnerable road users consisting of pedestrians, two wheeler users, senior citizens and people with varying disabilities.

The Government also recognizes that road safety need to be improved upon to the level of developed nations by undertaking all tangible actions. The Government considers road safety as a major public health and economic issue which adversely affects the cross section of the society and vulnerable road users. The Government of Kerala further recognizes that road safety has to be addressed in a holistic manner by providing safer roads, proper training of drivers, effective vehicle management and sustained traffic enforcement.

Keeping in mind the Government's priority on the Road Safety and UN General Assembly Resolution proclaiming 2011-20 as a Decade of Road Safety, the Government of Kerala has come out with this Road Safety Vision Document.

ROAD SAFETY VISION

To Facilitate Safe Mobility to the Society

MISSION

Formulation of an Action Plan for Reduction of Traffic Accidents in Kerala and its implementation in a coordinated way.

TARGETS TO BE ACHIEVED

- To reduce traffic accidents to 50% of the current level by 2020 and to maintain zero growth level further.
- To ensure zero accidents at railway level crossings in the state by manning all unmanned level crossings and upgrade them to manned level crossings and rail over bridges by 2015.
- To reduce the severity of road accidents by enforcing the seat belt and helmet use, and strict compliance of speed governors by heavy vehicles.
- To minimise loss of lives due to delay in evacuation and transfer of accident victims to first-aid/ trauma care centres and ensure quality medical attention within the minimum response time, say 60 minutes.

- To educate road users through various means about the basic road rules.
- To impart training to drivers the importance of defensive driving, courtesy and respect to fellow drivers/ road users.
- To strengthen the identified Research Institutions in the state for R & D support on Road Safety Action Plan involving Four E's namely: Engineering, Education, Enforcement, Emergency Response System suitable to Kerala conditions and also prepare accident analysis reports, data base management, investigation of causative factors and accident reconstruction methods.

REALISATION OF TARGET

The following are the tasks identified to realise the above targets:

- Establishment of necessary infrastructure to carry out routine accident investigations and conduct safety audit of highways, identify stretches having defective road geometrics, lack of road-side appurtenances and safety devices
- Strict enforcement against all traffic violations using intelligent transport system such as radar speed check devices, surveillance cameras, GPS/GIS enabled accident management system.
- Compulsory Inspection & Certification of transport vehicles every year including safety and emission norms and link registration/insurance of vehicles with Inspection & Certification.
- Establishing post-accident trauma care facilities desirably at 10 km. radius on National and State Highways and ensuring medical care to accident victims within minimum response time (say 20 to 30 minutes).
- Encouraging private sector participation in rescue, evacuation and trauma care of accident victims for effective delivery of emergency relief services.

- Encouraging NGOs and other expert agencies in spreading road safety messages and conduct road safety awareness campaigns to educate public on defensive driving and safe journey.
- Setting standards for safe design of roads by providing speed reduction devices, traffic sign boards, signals, pedestrian facilities and adequate parking supply.
- Improve sight distances at curves and junctions by removing all obstructions such as structures, trees, compound walls etc. and by enacting necessary land use control legislation
- Introduction of activity based traffic education in school curriculum.
- Soft policing on first time traffic violators and educating them the type of violation and its impact of other road users.
- Hard policing and strict enforcement on habitual traffic violators with the help of ITS technologies such as surveillance cameras, interceptors and other advanced automated traffic control devices. Strategies should be evolved for sustained enforcement on overspeed, rash driving, non-wearing of seat belt and helmet, using mobile phone while driving, drunken driving and other traffic rule violations.
- Improve the quality of accident data-base for R & D purposes and decision support system.
- Equip the Motor Vehicle Department as an expert agency for dealing with all matters of motor vehicles, evaluation of their fitness, issuing/renewal of driving licences and other permits on most scientific and efficient way, comparable to world standards.
- Strengthening of Kerala Road Safety Authority with adequate technical man-power, capacity building and research functions to provide an institutional framework for a coordinated approach to prevent road accidents.

POLICY VISION FOR ZERO TOLERANCE

The World Health Organisation slogan, "Road Safety is No Accident" actually means zero tolerance of all causes/factors of accidents. Such an approach of zero tolerance is based on the following principles:

i) Priority **-** Human life and health are paramount, and safety consideration should take priority over mobility.

ii) Human Errors - Human beings are prone to make errors due to their physical, mental and driving limitations. Therefore, transportation system should be designed to such a level of safety so that the scope for human errors is minimized and the harm is reduced when they occur.

iii) Public Concern - Safety of all segments of road uses must be the main concern of any road safety policy. Providers, enforcers and health authority must guarantee the best safety standards for all citizens, be they motorist, pedestrians, school children, elderly people, disabled persons, females or any other group.

Further under zero tolerance, accident control measures would involve following four steps:

i) *Reduce the exposure to traffic* - efficient transportation, speed lanes and lane discipline and controlled land use are the important step to reduce risks from exposure to traffic.

ii) *Reduce the chances of accidents* - it would require the three E's, viz., Traffic Engineering, Traffic Enforcement and Traffic Education.

iii) *Reduce the post-accidents harm* - it would require efficient and effective emergency medical response system i.e. quick treatment of accident victims. The present practice of avoidance or referring of victims on various pretexts by private hospitals need to be effectively dealt with.

iv) *Reduce the harm done when accident occur* - it would require better safety standards of vehicles and use of safety equipments by occupants/drivers of vehicles, such as seat belts, helmets airbags, etc.

In this background, the State would attempt to reduce the annual frequency of accidents to about 18000 from the present level of 35,000 by 2020 and to maintain zero growth further on in accordance to the UN Resolution. Further, road safety issues would be taken in a holistic manner by covering accident abatement measures, accident insurance and compensation, early settlement of accident cases, and rehabilitation programmes for accident victims. Special consideration would be given to the disadvantageous section of the society and vulnerable road users.

CAUSE OF ACCIDENT AND MITIGATIVE MEASURES

Reasons for accidents and Causative factors

Accidents occur due to combination of the following causative factors:

DUVERT

1. Driver related
2. User related
3. Vehicle related
4. Environment related
5. Road related
6. Traffic related

Driver related prominent causes

1. Lack of driving skills
2. Lack of knowledge or non adherence of traffic rules
3. Drink driving and addiction to drugs
4. Fatigue and sleepless driving
5. Visual acuity of drivers
6. Not dimming the lights at night.
7. Over speeding and wrong overtaking manoeuvres at curves

Pedestrian/road user related causes

1. Non adherence to traffic rules
2. Careless walking on the carriageway
3. Crossing the road abruptly
4. Playing on the road by children
5. Careless boarding and alighting and sudden opening of doors of vehicles
6. Stretching the hands outside the vehicle
7. Carrying hazardous materials and over dimensional cargo in vehicles

8. Mental aberration and social tensions
9. Unmindful of fellow passengers
10. Use of intoxicants while walking/riding
11. Visual acuity problems
12. Not showing signals while turning, stopping and crossing the road
13. Lack of road discipline
14. Non obedience of traffic signal

Vehicle related causes

1. Lack of timely inspection and maintenance of vehicle
2. Usage of older vehicles on road
3. Poor vehicle lighting
4. Carrying hazardous material and oversized goods
5. Lack of in vehicle safety measure

Road related causes

1. Narrow road, weak culvert/bridge
2. Encroachments on road side
3. Distresses on the pavement
4. Level difference between carriageway edge and shoulders
5. Improper lane marking
6. Absence of proper signage system
7. Absence of adequate shoulders or service lanes
8. Absence of pedestrian facilities
9. Poor road geometrics
10. Slippery road surface
11. Improper design of super elevation
12. Poor street lighting facilities
13. Digging road for public utilities
14. Improper road side appurtenances

15. Lack of vertical clearance at bridges
16. Bill boards/road side advertisement
17. Lack of traffic control devices
18. Ribbon type land use development
19. Lack of safety barriers and traffic channelisers.
20. Elements of surprise like check barriers, speed breakers etc.
21. Unorganised on-street parking
22. Poor drainage
23. Lack of segregated bus bays
24. Parking of vehicles at the bell mouth of junctions

Traffic related causes

1. Dynamic and unpredictable nature of traffic
2. Traffic congestion and traffic conflicts at junctions
3. Heterogeneous traffic
4. Intermixing of through traffic with local traffic

ROAD INFRASTRUCTURE PLAN

Augmentation of Road Capacity

The road network system in the state should be modernized comprising of Expressways, Modern National Highways, State Highways and District Roads with 8 lanes, 6 lanes, 4 lanes and 2 lanes carriageways respectively. They should be developed in an integrated manner with smooth interchanges. More attention needs to be given to options of elevated carriage ways.

Pending road development projects including NH bypasses, construction of ring roads, fly over's, ROBs etc. to bypass the congested towns and junctions should be taken up on priority basis. Steps may be taken for construction of North – South Expressway, on elevated corridors if sufficient land is not available. The Expressway will have six/eight lane carriage way with controlled access to local traffic by constructing fly over/under passes, clover leaf interchanges, bypasses and elevated lanes at locations passing through cities and towns.

Bypasses and Ring Roads

All cities should be connected with efficient Ring Road System as well as bye pass system. This helps to avoid the bypassable traffic from entering into the heart of the city. Likewise all major junctions catering heavy traffic should have fly overs or underpasses for providing unhindered movement of traffic.

New Road Construction

Advance action is required to finalize the alignment of the new road development and ensure the Right of Way freed from encroachments in advance. Necessary legal enactments for advance position of ROW of the identified alignment are required. Well defined policies are needed for making the land acquisition procedures in pace. Re-settlement and rehabilitation policies are to be developed in a friendly manner in which provisions are clearly specified to compute the land cost in a judicious manner and hand over the amount to the land owner whose land is acquired at the time of acquisition itself.

Road Construction Quality

Modernization in design as well as construction procedures is required to attain an eco-friendly and fast construction of the Road project. The use of modern imported machineries for construction of the pavement increases the life span as well as quality of the construction. Policies are to be adopted in such a way to provide strict quality control on each and every construction as per the design norms and technical specifications and the contracting agency is fully responsible for the construction quality over the service period.

Road Maintenance

A rupee spent on maintenance saves two to three rupees in vehicle operating cost besides providing a very cost effective option to improving traffic flow and safety. If timely maintenance is not carried out, the asset will deteriorate over the period and render service less. The Government will have to give top priority to maintain the precious road assets.

Controlled Land Use

No high rise apartments as well as mega malls are to be permitted very close to major road corridors. No construction of permanent structures or ribbon development should be allowed with in the right of way to be reserved for widening the road according to projected traffic demand for next 50 years. Green zones should be maintained on both sides of the major arterial and sub-arterial road corridors.

The building line set in National Building Rule for road side developments is generally a fixed setback width from the edge of road irrespective of road geometry. For ensuring safety at curves and junctions sufficient setback distance should be maintained with respect to the curve radius. No structures, trees, compound walls etc. should be allowed at curves and junctions obstructing sight distance. Necessary changes/amendments should be required in National Building Rule and Master Plans prepared by Town Planning Department.

Pedestrian safety

Pedestrians are 'Vulnerable Road Users' and therefore they must be regarded as a 'traffic unit' in planning and designing the traffic facilities. The development plan should be prepared on a human scale and must accord adequate priority to the safety of pedestrians, while formulating the scheme. It is required to provide of adequate sidewalks and maintain them in proper usable condition to promote better usage and safety of pedestrians. Zebra crossing and guard railing should be introduced wherever required. Adequate provision like flashing beacons should be provided at these locations to compel the attention of the motorist and to facilitate them to give right of way to the pedestrians. At locations where the demand for the pedestrians crossing a busy road is significant, it is desirable to construct grade- separated pedestrians crossing like footbridge or subway.

Parking

Due to the absence of parking lots and road side parking facilities, people used to park vehicles on carriageways and even foot paths. These causes traffic congestion and accidents. Policies are to be formulated to analyze the traffic demand and provide enough parking facilities on all roads considering the future traffic demand also.

Rigid Pavement for Flood Prone Areas

Government will have to take initiatives to encourage construction of rigid pavement on areas prone to flood and high traffic intensity so as to minimize recurring maintenance cost and obstruction to traffic movement while repairs.

Drainage

Lack of adequate drainage facility has been one of the major reasons for pavement failure and this causes frequent road accidents. Inorder to solve this problem built-up drain should be provided at least in urban areas.

Street Lighting

Most of the roads are not having proper street lights and this makes driving cumbersome during night time. The black topped surfaced pavements are very poor in visibility and the absence of lighting adds up difficulty. Mandatory checkups are to be formulated to maintain proper lighting on all road corridors in the state.

Road Furniture

Standardized Traffic signalling and proper road markings and signs should be made mandatory on all roads and junctions. The advancements in traffic signal systems on leading countries should be utilized for creating highly efficient and capable vehicle actuated type signal systems. Modern reflective markings are found very useful. Retro reflective paintings, Stickers and cat's eye type markings are to be provided and well maintained on every main highways and roads catering huge traffic loads. Modern types of efficient safety barriers systems shall to be installed at every hazardous location on roads.

Roadside Arboriculture

Policies are necessary to make any infrastructural development in an eco-friendly way. Planting trees should be done on the road side as well as at medians as a part of promoting greenery, reducing night glare of opposing vehicles and reducing pollution level. But whenever such a policy is initiated, care has to be given in the choice selection of the plant and its planting position since trees with spreading nature, spreads on top of road surface results in fast deterioration of the pavement due to stripping of aggregates during rainfall.

Control of vehicle Overloading

It is very important to restrict and control the over loading practice of goods operators as it causes pavement damage as well as accidents. In no case, heavy vehicles are to be patrolled on shoulders/carriageway edge etc. as it increases the risk factors. Instead patrolling can be done only on locations where sufficient ROW is available so that the trucks can be parked away from

Highway shoulder. This could be made mandate with strict policy implementations.

Road Signage

Unscientific implementation of traffic control devices and installation of sign boards by various agencies in different ways, should be controlled in confirmation with standards. Too much sign boards of different kind and different types at close intervals do not serve any purpose rather than confusion and accident proneness. Application of cones, barriers etc. on carriageways results in heavy breaking or sudden drifting of vehicles and increases accident proneness. This should always be done as per the guidance of expertise Transport/Highway engineers or research professionals in this sector. Policies are to be made to engage competent agencies like NATPAC or CRRI to design and implement traffic control measures, installation of traffic sign boards or markings on roads.

Road Side Advertisement

A lot of advertisement boards can be seen on almost all major roads in Kerala. These boards distract the eye sight and concentration of most of the drivers from road. So an advertisement policy should be developed for the state for controlling the road side advertisement.

Intelligent transportation system

Lot of advancement has come in the sector of intelligent transportation system. These advancements should be utilised in various road stretches as well as in vehicles to ease hazardous traffic flow.

Road Safety Research & training

Road Safety aspects for all modes of transport need to be given due priority. The following aspects of road safety should get governmental attention:

a) Creation of accurate Accident Data Base along with site inspection report by independent and competent authority.

b) Accident Investigation, analysis and corrective measures if any to the geometry, pavement surface or proper road safety training.

c) Periodic training awareness and campaign programs to educate people to develop a safe road safety culture.

Implementation of Road Safety Action Plan

- Strengthening and extension of Accident Victim Rehabilitation schemes.
- Safe environment should be provided in urban areas, to encourage walking & cycling habits. This will also reduce motor vehicular traffic.
- Mandate implementation of Road safety education from child level onwards.

Licensing system

- Licensing system should be amended to international standards. Each learner should have to be tested for their knowledge related to basic vehicular design, traffic rules and regulations, road markings, traffic signalling and the mandatory rules, safety culture to follow on roads during day as well as night driving and various types of parking.

Trauma care

- At least one hospital inside a city should have trauma care facilities to handle a minimum of 20 – 25 trauma patients at a time in case of severe accidents or any natural calamity or explosion. Government has to undertake necessary actions to improve the trauma care facilities in government hospitals and encourage private hospitals to develop trauma care facilities.
- As the road condition and traffic condition is not good in our state, the potential of air ambulance services should be used for critical patient transport.
- Extension of 108 trauma care ambulance services to whole state with more number of ambulances should be required for improving trauma care and safe transfer of patients.

- As per the expert statements, the accident victims are subjected to severe injuries due to mishandling and shifting from the spot to hospital. Most of the spinal injuries are occurring just due to lack of awareness in handling the victim. Awareness campaign programs to educate the people about handling the accident victims and first aid procedures should be conducted at regular intervals.

Public Transport

At present more than 80 percent of transport is handled by personal modes such as cars and two wheelers. Two wheelers are involved in 40 percent of accidents and they are the victims in 25 to 30 percent fatal accidents. It is necessary to increase the share of public transport by enhancing their safety aspects and easy availability at economical cost.

Higher share of public transport patronage

Sixty percent of the vehicles registered and 45 percent of the road accidents in the state are in urban areas. It is expected that about 55 percent of Keralites will live in urban centers by 2025. Due to inadequate public transport services and lack of reliability and connectivity, the personalized transport demand is ever increasing in urban areas. The share of personal vehicles in meeting travel demand should be minimized as far as possible. This can be achieved by imposing progressive taxation on personal vehicles, congestion pricing, and imposing fines for single person use.

Bus transport safety

Bus operation should be kept punctual, reliable and neat for attracting the passengers from personal modes.

A well-defined policy should be developed to fix the utilization period of buses depending upon its operational efficiency. A period of 15 years or with respect to a set kilo meter of service may be taken as the service period of buses. Frequent assessments and trainings to each and every staff of public transport should be made mandatory for safe operation of buses.

Decongestion of bus stands

The construction of shopping complexes in bus stands should be avoided for reducing the traffic attractions towards one point of the city. Heavy traffic in one point will cause to heavy congestion and accidents.

ITS Application

The government will have to take steps to encourage harnessing latest IT and GIS based technology in traffic management, fleet management, trip scheduling, traffic enforcement and road safety.

Over Speeding

Speed influences the impact of accidents and its severity in a crash. Even small reduction vehicle speed results in a marked reduction in the number of road fatalities and serious injuries. Road traffic injuries can be reduced by speed control measures. Over speeding of buses loses many valuable lives. Over speeding of buses should be controlled by strict implementation of speed governors.

Overloading

Due to the lack of adequate fleet planning overloading of buses is seen in all main routes in Kerala. Overloading will affect the overall stability of the vehicle especially at manoeuvring actions as well as at sharp curves. Hence overloading should be controlled by adopting effective fleet planning and proper enforcement.

Seat belts and doors

Most of the private buses especially city buses are operating without having doors. This creates lot of accidents especially in boarding and alighting activities. Door and emergency exit etc. should be ensured in every stage of bus operation. Wearing a seatbelt will be reduced the injuries/fatalities of passengers in the bus which involved in accidents. Seatbelt should be made compulsory in every public transport vehicles for reducing impact of accidents.

Bus bay

Public transport services are considered to be slow traffic. The frequent stops for alighting and boarding passengers slowdown the entire traffic movement in the stream that inturn reduces the capacity of the road. So a separate bus bay for buses should be required for reducing the accidents and increase the capacity of the road.

BRTS, Mono, Metro and Suburban Rail

Modern means of public road transport system such as Bus Rapid Transit system (BRTS), bus priority schemes, mono rail, metro rail etc. should get due consideration in higher level cities. This doesn't seem fruitful with the current road way facilities but once the infrastructure develop into relevant standards, these type of public transport modes can be brought up into efficient utilization.

The state government is thinking alternative options for reducing traffic congestion on the existing roads. One of the options under consideration is development of Suburban rail corridor by utilising the existing rail tracks in the state. Introduction of Suburban rail between the Central Business District and its suburbs, or other locations will attract large number of commuters to railway and release congestion and accidents threats on roads.

KEY ACTION AREAS

The protective efforts of the Government would be pursued vigorously in order to realize zero growth of accident by 2030. For this purpose following 18 key action areas have been identified:

1. Coordination and Management,
2. Quality of Road infrastructure,
3. safety at Level crossings,
4. Crash Data Collection and Management System,
5. Sensitization of stakeholders and Raising Awareness about Road Safety Issues,
6. Road Safety Publicity and Campaigns,
7. Road Safety Education and Training,
8. Ensuring Safer Road Infrastructure,
9. Traffic Legislations and Enforcement of Traffic Laws,
10. Emergency Medical Assistance to Crash Victims,
11. Upgrading of Vehicle Safety Standards and Testing Procedure,
12. Strengthening of Traffic Police, MVD and Improving Law Enforcement,
13. Ensuring Safer Drivers and Setting up of Driver Training, Testing and Licensing Centers,
14. Undertaking Road Safety Research and HRD,
15. Ensuring safety of Vulnerable Road Users,
16. Road safety auditing and improvement of vulnerable road stretches,
17. Strengthening Institutional and Financial Resources for Road Safety works, and
18. Implementation Strategy.

Following sections provide a brief action plan for the above key areas.

Coordination and Management

A number of agencies including PWD, Transport, Police, Health, Development Authorities etc. are involved in road safety related activities. Kerala Road Safety Authority (KRSA) has been entrusted with the task of coordination and management of road safety activities in the State. In this direction, suitable steps would be taken to further enhance the inter-departmental coordination at State, district, Taluk and Panchayat levels. District road safety committees would be strengthened and a group of volunteers would be created at "Community levels" to assist accident victims. Safe community programmes at Panchayat levels would be initiated.

Quality of Road infrastructure

Maintenance of a good and safer road network involves a variety of operations from planning, programming and scheduling to actual implementation in the field and monitoring. Whatever be the approach or system adopted, the essential objectives should be to keep the road surface and appurtenances in good order and to extent the life of the road assets to the maximum extent possible. Inorder to achieve a safe and good road network road the following actions are required.

- Upkeep of road pavements and side pavements and side shoulders
- Upkeep of roadside drain and cover them with concrete slab
- Upkeep of culverts and bridges, and earth retaining structure and parapets;
- Keeping the sign boards, kilometre stones and other road furniture in good shape and condition;
- Maintenance of roadside arboriculture and greening of median and traffic islands.
- Formation of delineators and guard rails reflectors
- Street lighting

The public work department should ensure the quality of road works and maintained a good and safe road network with the help of various expert agencies which are pioneer in roads related works/researches.

Safety at Level Crossings

Lot of manned and unmanned level crossings are present in our state. Most of them are present in the curves where sufficient visibility is absent. The level crossings are always considered as unsafe due to small human errors become a very big tragedy. Unmanned level crosses are very hazardous location while considering the impact of accidents. The road conditions in the manned level crosses are always pathetic due to presence of unscientific humps and distresses due to acceleration and decelerations activities. So an utmost priority should be taken in eliminating level crosses to flyovers. The railway authority and public work department should work hand in hand for upgrading the unsafe situations in level crossings.

Crash Data Collection and Management System

The Government has implemented Geo KAMS software for accident reporting and data analysis in selected Police Stations. The application of this software would be expanded and traffic police and MVD officials would be imparted training in its use.

Accident data from insurance companies, Motor Accident Claims Tribunal (MACT), Hospitals/Trauma care centers and other sources would be collected and compiled. Special need based surveys would be conducted to supplement this database. Academic and research institutions like NATPAC, engineering collages should be strengthened for pursuing research and analysis Crash Data**.**

Sensitization of stakeholders and Raising Awareness about Road Safety Issues

The Government may take necessary steps to raise awareness about the various issues of road safety including social, economical and human suffering

implications of road accidents. It would sensitize all he stakeholders about what needs to be done to curb the menace of road accidents. This should result in effective involvement of different stakeholders so that they can play meaningful role in promoting road safety.

Road Safety Publicity and Campaigns

The Government has identified key unsafe behavioural elements of road safety such as not using helmet/ seatbelt, dangerous overtaking, over speeding, not observing central yellow marking etc. Public Safety Campaign would be launched for mass education on these issues. Publicity campaigns would be scientifically designed and investigative studies would be conducted to evaluate the impact of such campaigns.

Road Safety Education and Training

Road Safety Education would be made a part of the curriculum for enhancing road safety awareness at an early stage. The Department of Public Instruction, NATPAC, KSTP, Department of Transportation and other agencies would be involved in developing school based road safety education progammes for school children. Production of education material for school children, teacher's guide and teacher training programmes are also to be undertaken. The provision of pedestrian subways/over bridge near schools would be made as per the need.

Road safety publicity campaigns will be used to propagate good road safety practices among the community. The Government would encourage all professionals associated with road design, road maintenance, traffic management, traffic enforcement etc. to attain adequate knowledge of road safety issues.

Road safety community programs at Panchayath, school neighbourhood area, work centers, etc. would be formulated and implemented.

Ensuring Safer Road Infrastructure

PWD, with the help of NATPAC and KHRI would review safety issues with respect to road planning and design and maintenance of roads. A Manual for the State on “Safety-conscious Highway Design Standards” would be adopted and specific sections on “Safety at road Works” would be incorporated. Road Safety Auditing of existing roads and new roads would be carried out in a phased manner. The provision of cycle tracks would be made in areas having high use of cycles such as Chavara, Mavelikkara etc.

Accident prone Locations would be identified and improved in phased manner for all important roads in the State. PWD, NATPAC, and other agencies would carry out “Before and After” studies for all remedial works and evaluate the effectiveness of Safety Schemes. Speed breakers, zebra lines, reflectors etc would be used wherever found necessary.

Application of Intelligent Transport System (ITS) to establish a safe and efficient transport system would be encouraged. Enforcement Authorities would be provided modern/automated traffic management equipments for smoother and safer flow of traffic.

Traffic Legislations and Enforcement of Traffic Laws

The Police and MVD engaged in traffic law enforcement are to enhance their operational efficiency with in the current legislation and identify additional legislations amendments needed. Introduction of graduated licensing system and hazard perception test for driving license candidates will be explored and adopted.

Emergency Medical Assistance to Crash Victims

A sizeable number of deaths and injuries can be reduced if immediate medical care is given to accident victims. The Government would strive to ensure that all persons involved in road accidents benefit from speedy and effective trauma care and management. The current practice in emergency medical assistance is

to be reviewed. Thereafter a plan would be developed to strengthen the emergency medical services including communication, transportation, on the spot medical aid, new trauma care centers, rehabilitation centers etc. Hospitals, both under public and private sectors, alongside the major roads would be adequately equipped to provide for trauma care and rehabilitation.

Up gradation of Vehicle Safety Standards and Testing Procedure

A review of current vehicle testing system, standards and practice would be conducted. Training programmes need to be conducted for police and staff of Motor Vehicle Department on road side vehicle inspection. A long term plan to implement an effective, professional and well resourced vehicle testing centre and issuance of fitness certificate would be undertaken. Suitable legal provisions would be made for proper and safer use of different types of vehicles including school buses, heavy vehicles and vehicles carrying hazardous materials.

Strengthening of Traffic Police and MVD and Improving Law Enforcement

The Government would take steps to improve quality of enforcement to ensure effective and uniform implementation of safety laws. The steps would be undertaken to establish and strengthen highway patrolling on major roads.

Training programmes for traffic police in effective law enforcement, use of modern equipments, and dealing with traffic law offenders need to be undertaken. Task force headed by a Circle Inspector would be formed in areas having high accident rate. Task force members would be given training at PTC, Drivers training Institute etc. Modern equipment to control and regulate traffic would be made available to traffic police.

Ensuring Safer Drivers and Setting up of Driver Training, Testing and Licensing Centers

The Government would strengthen the system of driver licensing and training to improve the competence and capability of drivers. In each district driver training and testing centers would be planned and developed in a phased manner.

Undertaking Road Safety Research and HRD

In developed countries comprehensive database on road condition accident details are available and continuous updation of the same is being done for monitoring. NATPAC, engineering colleges, KHRI, Institute of Driver Training and Research and design wing of PWD would be encouraged to undertake road safety research. Funding for research projects would be provided by the KRSA, in accordance to the needs of KRSA and availability of funds.

The Government would establish centers of excellence in road safety research in regional and academic institutions. Steps would be undertaken to disseminate the results of research and examples of good practices through publication, training, conferences/workshops, and websites.

Ensuring Safety of Vulnerable Road Users

The design and construction of all road infrastructure and supporting facilities will take into account the needs of non-motorized transport, pedestrians, vulnerable and physically challenged in an appropriate manner. Steps would be taken to disseminate “best practices” in this regard to town planners, highway/traffic engineers, architects and others.

Road safety auditing and improvement of vulnerable road stretches

Road Safety Auditing (RSA) is a formal procedure for assessing accident potential and safety performance in the provision of new road schemes, or upgrading the existing roads. It should form an integral part of planning, design, construction and maintenance of roads, and it requires an objective approach to

the assessment of accident risk. The principal method of ensuring this objectively is through an independent assessment of schemes by persons who are independent of the original design team. A road safety auditing should be required in every stage of highway planning, design, construction and maintenance activities. Agencies like Public Work Department, NATPAC etc. will take care of road safety auditing of all the existing and new roads in the state and public work department should reconstruct the identified vulnerable road stretches in a safer manner.

Strengthening Institutional and Financial Resources for Road Safety Works

The Government would take suitable steps to ensure that, the required institutional and financial environments for road safety works are further strengthened. The reforms in these areas would provide for the active and the extensive participation of the community at large, private sector, academic institutions, NGOs and road safety activities.

Newer sources for generating financial resources for road safety works would be explored. The concerned Department would be encouraged to provide enough financial resources for road safety activities of their Department. KRSA would also properly supplement the Departmental efforts in funding road safety works.

Implementation Strategy

The Government has established Kerala Road Safety Authority to coordinate and oversee the works related to road safety. The authority would take suitable steps to implement the Road Safety Policy and Action Plan. A review of role and activities of KRSA would be undertaken to further strengthen the effectiveness of KRSA and amend the KRSA Act as per the need.

CONCLUSION

Accident situation in the State has improved substantially. The proactive steps such as enforcement of helmet/seatbelt use, control on over speeding, observance of traffic signs/markings, lane discipline, control on drunken driving, improvement of accident prone location, road safety education and better enforcement all have resulted in better safety level on roads. These efforts would be strengthened to maintain this down trend in accidents.

Action as identified under 18 key areas would be taken up on priority basis. Road safety situation would be monitored on regular basis and corrective steps taken to improve safety level for all segments of road users. The current road safety policy would be updated based on the feedback received from various road safety programs as envisaged in 18 key areas of action plan.

WORLD ACCIDENT SCENARIO

Road crashes kill at least 1.5 million people worldwide each year and injure 50 million. 90% of these road casualties are in developing countries. Highest road crashes were reported in United States (24 lakh crashes causing 40000 deaths). Whereas India recorded the highest number of casualties in road accidents. In the year 2012, India registered about 8 lakh road accidents causing 1.42 lakh deaths.

Japan has 10 percent of India's size both in terms of geographical area and population, but, less than 10000 people get killed in road crashes every year.

Road crash injuries and deaths have decreased in most of the developed countries and preliminary data for 2010 suggest that a number of countries have recorded further sharp decrease in road fatalities.

The UN resolution reaffirms the critical importance of addressing road safety issues and the need for the further 213 international 92 cooperation, particularly to meet the needs of low-income and middle income countries.

NATIONAL ROAD ACCIDENT SCENARIO

The road accidents in India have been growing at an alarming rate. From **Appendix 1,** it is evident that India recorded about 40,000 accident deaths in 1990 which further increased to 1,25,660 road fatalities in 2009 and 1,42,000 fatalities in 2012.

ACCIDENT SCENARIO IN KERALA

The Kerala State registered 3031 fatalities in 2009 which increased to 4200 fatalities in 2012 which is much higher than a large number of developed countries, including United Kingdom, Australia and Canada. Thus, a lot more needs to be done to address the Road Safety problems in Kerala.

Appendices 2 and 3 present the details of road crashes in Kerala and the ratio of traffic deaths with population and vehicle kms. It is seen that in Kerala an average of 11.2 persons are killed per lakh population, compared to 10.8 at national level.

Kerala was exhibiting relatively a higher accident rate for the past few decades. For example, Kerala registered only 1528 accidents is 1960, which had increased to 2871 in 1965 and further doubled to 5639 accidents in 1975. This trend continued up to 1995 when Kerala recorded 36,086 accidents. Thereafter, Kerala has seen a fluctuating trend and since 2006, there has been a decline in number of accidents. In the year 2012, the number of accidents declined to 35,115 which implied a decline of 17 percent in accidents during the intervening five year period from 2005.

Figure1 shows the fluctuating trend of road accidents Kerala. The declining trend in accidents have been preceeded by sustained efforts by sustained efforts by the Government efforts and positive actions by Departments concerned in controlling the accidents. In the recent past, the Government of Kerala took up a number of initiatives in curtailing the accidents by improving road conditions, sensitising the road safety culture and enforcing traffic rules. The Government's effort in terms of enforcement of helmet and seatbelt use, speed regulations, observance of lane discipline, check on drunken driving etc. have yielded positive results.

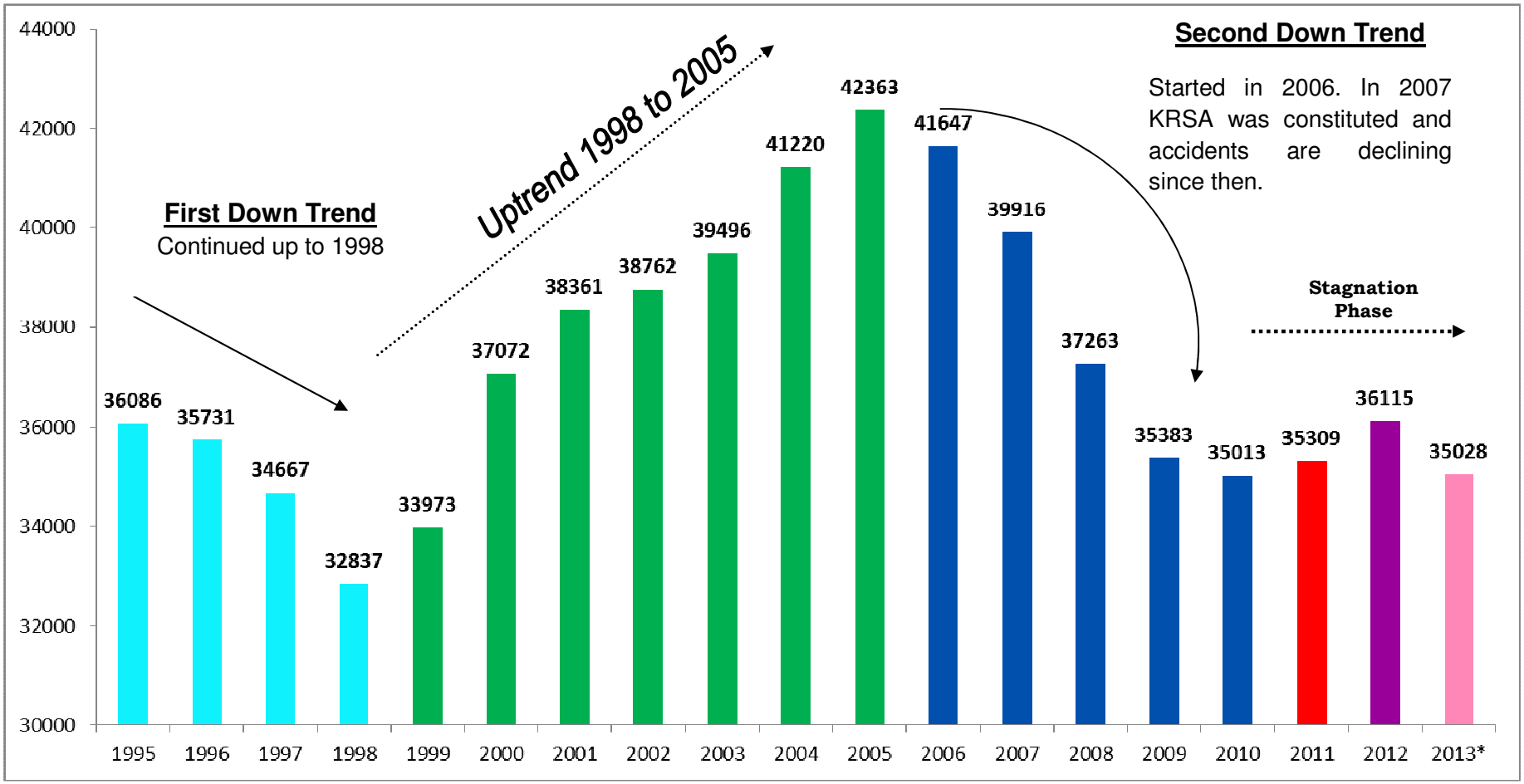
Appendix 1

Trend of road traffic accidents in Kerala (1960 – 2013)

Trend	Year	No. of accidents	Persons injured	Persons killed	No. of vehicles (in lakh)	Accidents per 1000 vehicle
Increasing trend	1960	1528	1663	235	0.24	63.67
	1965	2871	2982	368	0.55	56.34
	1970	4214	4300	500	0.86	49
	1975	5639	7107	842	1.31	44.69
	1980	7064	9913	1184	1.75	40.37
	1985	13756	18455	1489	3.78	37.78
	1990	20447	26996	1793	5.81	35.19
	1995	36086	49950	2519	10.06	35.87
	2000	37072	49399	2710	19.1	19.41
	2005	42363	51124	3203	31.22	13.35
Declining trend	2006	41647	49881	3589	35.60	11.70
	2007	39917	48248	3778	40.25	9.92
	2008	37263	43841	3897	44.42	8.51
	2009	35434	41226	3742	48.80	7.26
	2010	35013	40998	3818	53.98	6.49
Static trend	2011	35309	40709	3990	60.72	5.82
	2012	36115	40675	4107	82.46	4.38
	2013 (Jan-Nov)	32109 (35028)*	36666 (3999)*	3748 (4089)*	86.00	3.73

*Estimated based on Jan-Nav, 2013 data

Figure 1: Trends of Accidents in Kerala



* Projected

- Since the formation of KRSA accidents have declined by about 16%.
- However, fatalities have not shown any declining tendency.

Appendix 2

District wise Details of Accidents in Kerala, 2013(JAN-NOV)

Districts	Total Accidents Reported	Number of Persons Died	Number of Persons Injured
Ernakulam	5090	443	5543
Thiruvananthapuram	4250	492	4788
Thrissur	3467	373	3847
Kollam	2589	383	2951
Alappuzha	2581	346	2748
Malappuram	2444	320	2935
Kozhikode	2422	315	2536
Kottayam	2381	251	2738
Palakkad	1946	303	2219
Kannur	1695	170	2267
Pathanamthitta	1196	121	1349
Idukki	815	89	1117
Kasargode	706	91	890
Waynad	527	51	738
Total	**32109**	**3748**	**36666**

Appendix 3

Incidence and Rate of Deaths due to Road Accidents during 2012

Sl. No.	State/UT	No. of Cases of Road Accidents	Total Registered Motor Vehicles as on 2011 (In lakhs)	No. of deaths due to Road Accidents in 2012	Accidental Deaths per 1000' vehicles (5)/(4)	Rate of Deaths (5)/(3)*100
(1)	(2)	(3)	(4)	(5)	(6)	(7)
STATES:						
1	Andhra Pradesh	42524	10214	14964	1.47	35.2
2	Arunachal Pradesh	251	142	138	0.97	55.0
3	Assam	6535	1561	2291	1.47	35.1
4	Bihar	10320	2695	5056	1.88	49.0
5	Chhattisgarh	13511	2695	3167	1.18	23.44
6	Goa	4312	851	292	0.34	6.8
7	Gujarat	27949	13052	7817	0.60	28.0
8	Haryana	10065	5391	4446	0.82	44.2
9	Himachal Pradesh	2899	567	1109	1.96	38.3
10	Jammu & Kashmir	6709	993	1165	1.17	17.4
11	Jharkhand	5711	3121	2818	0.90	49.3
12	Karnataka	44448	9931	9448	0.95	21.3
13	Kerala	36174	6100	4286	0.70	11.8
14	Madhya Pradesh	51210	7377	8175	1.11	16.0
15	Maharashtra	66316	17450	13333	0.76	20.1
16	Manipur	771	142	158	1.11	20.5
17	Meghalaya	483	142	219	1.54	85.3
18	Mizoram	110	142	77	0.54	70.0
19	Nagaland	42	284	56	0.20	133.3
20	Odisha	9285	3405	3701	1.09	39.8
21	Punjab	6341	5249	4820	0.92	76.0
22	Rajasthan	22969	7944	9528	1.20	41.5
23	Sikkim	158	43	55	1.28	34.8
24	Tamilnadu	67757	15605	16175	1.04	23.9
25	Tripura	888	142	272	1.92	30.6
26	Uttarpradesh	29972	13335	16149	1.21	53.9
27	Uttarakhand	1472	993	844	0.85	57.3
28	West Bengal	12290	3263	5397	1.65	43.9
	Total (states):	**481472**	**132829**	**135956**	**1.02**	**28.2**

Sl. No.	State/UT	No. of Cases of Road Accidents	Total Registered Motor Vehicles as on 2011 (In lakhs)	No. of deaths due to Road Accidents in 2012	Accidental Deaths per 1000' vehicles (5)/(4)	Rate of Deaths (5)/(3)*100
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Union Territories:						
29	A & N Islands	236	71	25	0.35	10.6
30	Chandigarh	419	993	136	0.14	32.5
31	D & N Haveli	85	142	53	0.37	62.4
32	Daman & Diu	50	142	29	0.20	58.0
33	Delhi (UT)	6937	7235	1866	0.26	26.9
34	Lakshadweep	3	14	0	0.00	0.0
35	Puducherry	1181	709	193	0.27	16.3
Total (UTS):		**8911**	**9306**	**2302**	**0.25**	1.60
Total (all India):		**490383**	**142135**	**135956**	**0.96**	32.43