Fig. 3

3. Causes of Accidents

There are four basic elements in a traffic accident:

(1) The road users

(2) The vehicles

(3) The road and its condition

(4) Environmental factors like traffic weather etc.

The road users responsible for the accident may be the driver of one or more vehicles involved, pedestrians or the passengers. Vehicles involved in the accident may also be defective. The condition of the road surface or other existing geometric features or any of the environmental conditions of the road may not be upto the expectation causing an accident. In nutshell, we can say that an accident may be caused due to a combination of several reasons and seldom due to one particular reason. Following can be the causes of accidents:

(i) **Distracted Driving:** Distracted drivers are the top cause of accidents. A distracted driver is a motorist that diverts his or her attention from the road, usually to talk on a cell phone, send a text message or eat food.

(ii) **Speeding:** Travelling above the speed limit is an easy way to cause an accident. The faster you drive, the slower your reaction time will be if you need to prevent an auto accident.

(iii) Drunk Driving: When you drink, you lose the ability to focus and function properly and very dangerous when operating a vehicle. Driving under the influence of alcohol causes accidents every day, even when they are one of the top causes that can be avoided.

(iv) Reckless Driving: If you don't drive carefully, and you may end up in a needless accident. That's what often happens to reckless drivers who speed, change lanes too quickly or tailgate before causing a car accident.

(v) Rain: If the weather gets bad so do the roads. Car accidents happen very often in the rain because water creates slick and dangerous surfaces for cars, trucks, and motorcycles and often causes automobiles to spin out of control or skid while braking. To avoid a car accident, drive extra careful when it rains.

(vi) Running Red Lights: It is a common sight at road intersections that vehicles cross without caring for the light. The main motive behind Red light jumping is saving time. The common conception is that stopping at red signal is wastage of time and fuel.

(vii) Running Stop Signs: Stop signs should never be ignored, but when they are, serious accidents are often the result. Each year, thousands of car accidents occur because drivers run a stop sign. Many rollover accidents and side-impact car accidents result from drivers that run stop signs.

(viii) Design Defects: Automobiles have hundreds of parts, and any of those defective parts can cause a serious accident.

(ix) Unsafe Lane Changes: There will always come a time where you need to get over to another lane (i.e. exit from a freeway, get in the correct lane to make a turn, etc.). When drivers don't make safe lane changes properly, it often leads to accidents.

(x) Road design: Defective geometric design like inadequate sight distance, inadequate width of shoulders, improper curve design, improper lighting and improper traffic control devices.

(xi) Animals: Stray animals on the road cause accidents.

4. Road Safety Measures

The various measures to decrease the accident rates may be divided into three groups:

(1) Engineering

(2) Enforcement

(3) Education

4.1 ENGINEERING MEASURES

(1) Road Design: The geometric design features of the road such as sight distances, width of pavement, horizontal and vertical alignment design details and the intersection design elements are checked and corrected if necessary. The pavement surface characteristics including the skid resistance values are checked and suitable maintenance steps are taken to bring them upto the design standards.

(2) Preventive Maintenance of Vehicles: The braking system, steering and lighting arrangements of vehicles playing on the roads may be checked at suitable intervals and heavy penalties levied on defective vehicles.

(3) Before and After Studies: The record of accidents and their patterns for different locations are maintained by means of collision and condition diagrams. After making the necessary improvements in design and enforcing regulation, it is again necessary to collect and maintain the record of accidents 'before and after' the introduction of preventive measures to study their efficiency.

(4) Road Lighting: Proper road lighting can decrease the rate of accidents during night, due to poor visibility. Lighting is particularly desirable at intersections, bridge sites and at places where there are restrictions to traffic movements.

4.2 ENFORCEMENT MEASURES

(1) Speed Control: To enable drivers of vehicles to develop correct speed habits tachometers may be fitted so as to give the record of speeds. Surprise checks on speed should also be done time to time.

(2) Traffic Control Device: The Signals may be redesigned or signal system may be introduced if necessary. Similarly proper traffic control device like signs, markings or channelizing islands may be installed wherever necessary.

(3) Training and Supervision: The transport authorities should be strict in testing and issuing license to drivers especially drivers of public service vehicles or taxis.

(4) Medical Check: The drivers should be tested for vision and reaction periodically.

(5) Observance of Law and Regulation: Traffic laws and regulations must be followed by each and every person who is driving any kind of vehicle.

4.3 EDUCATIONAL MEASURES

(1) Education to Road Users: It is most important to educate the road users for the various precautionary measures to use the road way facilities with safety.

(2) Safety Drive: Imposing traffic safety week when the road users are properly directed by the help of traffic police and transport staff is a common means of training. Road users should be taught about the do's and don'ts by means of films and documentaries.

Campus: ..... Course: ..... Class/Section: ..... Date: .....
Name of Faculty: ..... Name of Subject: ..... Code: .....

TRANSPORTATION ENGINEERING

Transportation engg. is a branch of civil engineering that is involved in the planning, design, operation, and maintenance of safe and efficient transportation systems. These system includes roadways, railways, waterways, airways.

ROLE OF TRANSPORTATION

Transportation contributes to the economic, industrial, social and cultural development of any country. Transportation is vital for the ecomonic development of any region since every commodity produced whether it is food, clothing, industrial products or medicine needs transport at all stages from production to distribution. In the production stage, transportation is required for carrying raw materials like seeds, manure, coal, steel etc. In the distribution stage, transportation is required from the production centres viz: farms & factories to the marketing centres and later to the retailers and consumers for distribution.

The inadequate transportation facilities retard the process of socio-economic development of the country.

SCOPE OF HIGHWAY ENGINEERING

Highway Engg: The science and technology dealing with road construction is generally termed as highway engineering.

The road construction involves pavement design, drainage design, traffic design etc.

Highway engg. deals with diff. phases like:

1. Development
2. Planning
3. Alignment
4. Highway material
5. Traffic control
6. Pavement design
7. Highway geometric design
8. Construction & maintenance
9. Economic considerations & Administration considerations.

Development, Planning and Location:

Historic background, basis for planning, master plan, engg. surveys and highway alignment.

Highway Design, Geometrics & structure

Road geometrics and their design, rigid & flexible pavement, design factors & thickness design, overlay design, design of drainage system.

Traffic performance and its control

Traffic studies analysis, need for new road links, traffic regulation and control, intersection design & their controls with sign signals & markings.

Materials, construction and Maintenance

Highway material and mix design, highway construction, earthwork, construction of diff types of pavements, WBM, pavement failure, pavement evaluation, maintenance of pavements

Economic and Administration

Road user cost and economic analysis of highway projects, pavement types and maintenance measures highway finance.

MODES OF TRANSPORTATION

These basic modes of transportation are Land, water and air. Apart from these pipe lines, elevators, conveyor belts, cable cars, aerial ropeways and monorails, these are also modes used for moving goods & passengers.

MAJOR MODES OF TRANSPORTATION

(1) Roadways / Higways
(2) Railways
(3) Waterways
(4) Airways

(1) Roadways / Highways

Transportation by road is the only mode which could give max. service from above modes It has max. flexibility for travel for travel with reference to route, dirⁿ, time, speed of travel etc.

The road network is therefore needed not only to serve as feeder system for other modes of transportation and to supplement them but also to provide independent facility for road travel by a well planned networks of roads throughout the country.

(2) Railways

The transp. by railway track can be advantageous by railways b/w stations for goods & passengers. specially for long distance. The energy need for it is a very less as compared to other modes so it can be advantageous for bulk transport of goods along land.

(3) Waterways

Transp. by water is the slowest among other modes. This mode needs min. energy.

(4) Airways

It is the fastest among other modes. Air travel also provides more comfort apart from saving in transportation for passengers & goods.

CHARACTERISTICS OF ROAD TRANSPORTATION

(1) Roads are used by various types of road vehicles like passengers cars, buses, trucks, two & three wheeled automobiles, pedal cycles and animal drawn vehicles. But railway tracks are used only by rail locomotives & wagons, waterways are used by only ships & boats

(2) Road transp. requires a relatively small investment for the govn. Motor vehicles are cheaper than rail locomotives, air carriers, construction and maintenance is also cheapear

(3) Road transp. offers a complete freedom for vehicle to move freely from one lane to another

(4) Provide flexibility of change in location, direction speed and timing of travel.

(5) For short distances travel, road transp. saves times.

(6) Road trapsportation is subjected to high probability of accidents due to flexibility of movement.

(7) Road transportation is the only means of transp. that offers itself to whole community alike.

DIFFERENT TYPES OF TRAFFIC SIGN

Traffic engg. is that branch of engg. which deals with the improvement of traffic performance of roads networks and terminals. This is achieved by systematic traffic studies.

Traffic engineering is that phase of engineering which deals with planning and geometric design of streets, highways with traffic operations for making it safe, convenient & economic for transportation.

Traffic signs:

The traffic signs should be backed by law in order to make them useful and effective. Acc. to Indian Motor Vehicle act.

(i) Regulatory (ii) Warning (iii) Informatory

→ Signs should be placed such that they could be seen by the road users easily & in time.

→ Location of sign should be such that edge of sign adjacent to road is not less than 0.6 m away from edge of kerb.

→ Sign should be mounted on sign painted alternately with black & white bands.

→ Reverse side of all the sign plates should be painted gray.

(1) REGULATORY SIGNS

- To inform the road users of certain laws, regulations and prohibitions.

(i) stop and Give-way signs
(ii) Prohibitory signs.
(iii) No parking & No stopping signs
(iv) Speed Limit & vehicle control sign
(v) Restriction ends sign
(vi) Compulsory dirⁿ control & other signs

(2) Warning sign

Warning signs are used to warn the roads users of certain hazardous conditions that exist on or adjacent to the roadway.

(3) Infoormatory signs

Is are used to guide the road users along routes, inform them of destination & distance and provide with information to make travel easies, safe and pleasant.

(i) Dirⁿ & place identification sign
(ii) Facility info
(iii) Usefull info
(iv) Pasking sign
(v) Flood gauge.

TRAFFIC SIGNS

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Mandatory Signs

STOP

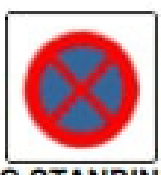

GIVE WAY


NO ENTRY


PEDESTRIAN PROHIBITED


HORN PROHIBITED


NO PARKING


NO STANDING OR PARKING

SPEED LIMIT


RIGHT-HAND CURVE


LEFT-HAND CURVE


RIGHT HAIR PIN BEND


LEFT HAIR PIN BEND


NARROW ROAD AHEAD


NARROW BRIDGE


PEDESTRIAN CROSSING


SCHOOL AHEAD


ROUND ABOUT


DANGEROUS DIP


HUMP OR ROUGH ROAD


BARRIER AHEAD

Caution Signs


RIGHT-HAND CURVE


LEFT-HAND CURVE


STEEP DESCENT


RIGHT HAIR PIN BEND


LEFT HAIR PIN BEND


RIGHT HAIR PIN BEND


LEFT HAIR PIN BEND


RIGHT REVERSE BEND


LEFT REVERSE BEND


HARMFUL


NARROW ROAD AHEAD


GAP IN MEDIAN


MAJOR ROAD AHEAD


AXLE LOAD LIMIT


OVERHEAD CHANNEL


FERRY


CROSS ROAD


LENGTH LIMIT

LOAD LIMIT


HARMFUL

Informatory Signs

HOSPITAL

FIRST AID

LIGHT REFRESHMENT

MOVE ON

PETROL PUMP

COMPULSORY TURN LEFT

COMPULSORY AHEAD ONLY

COMPULSORY TURN RIGHT AHEAD

COMPULSORY SOUND HORN

PUBLIC TELEPHONE

PARKING SIGN