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Q #01

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various modes of Transport are:

- "1" Rail Transport.
- "2" Road Transport.
- "3" Water Transport.
- (4) Air Transport.
- "5" pipeline.

=> Rail Transport:

- => It is a means of transport, on vehicles which run on tracks (rails or rail roads)
- => It is one of the most important, commonly used and very cost effective modes of commuting and goods carriage over long as well as short distances.
- => Since this system runs on metal (usually steel) rails and wheel, it has inherent benefit of lesser frictional resistance which help attached more load in terms of wagons or carriage
- => Train are powered by an engine locomotive running on electricity or on diesel.

=> Advantages:

- => Economical for long distances: The train are economical for long distance. They are also convenient for long distance. They journey for passengers is also comfortable. This is because there is no jerk or bumps as compared to Road transport.

⇒ Full protection to goods:

The train operate full protection to goods from sun, rain, wind, dust, etc

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⇒ Road transport:

⇒ Road transport means transportation of goods and personnel from one place to the other on roads.

⇒ Road is a route between two destinations, which has been either paved or worked on to enable transportation by way of motorised and non motorised carriages.

⇒ Advantages:

⇒ Street transport required a great deal's less capital investment when contrasted with different methods of transport.

For Example:

rail roads and Air transport

⇒ Fast speed:

one of the off chance that the products are to be sent instantly or rapidly, road transport is more suited than the rail roads or water transport.

⇒ Water transport:

⇒ water transport is the process of transport a watercraft, such as a barge, boat, ship or sail boat, over a body of water, such as a sea, ocean, lake, channel or river.

=> Ship transport is primarily used for the carriage of people and non perishable goods, generally referred to as cargo.

Advantages:

=> Large capacity: it can carry much larger quantities of heavy and bulky goods such as coal, and timber etc.

=> Safety: The rates of accidents breakdowns in this form of transport, are minimum as compared to any other form of transport.

=> Air Transport:
 => The mobility of men and material by air is called air transport
 => it is the fastest means transport. it is very useful for long distance and save time.

Advantages:

High speed: It is the fast speed means of transport. passenger and goods can be transported easily from one place to the other.

=> Easy transport of costly and light goods:
 it is quite convenient to send costly, light and perishable goods through air transport.

=> pipeline:-

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- => pipeline transport is the mode of transportation of goods or material through a pipe
- => liquids and gases are transported in pipeline and any chemically stable substances can be sent through a pipeline
- => Even solids can also be transported through pipeline after converting them into slurry.

Highway

- 1) it is the smooth and more width mode of transportation
- 2) It is for normal distance
- 3) It is less time consuming
- 4) It is less load transformation
- 5) Highway are made for the cars, truck, motorcycle, van etc.
- 6) more economic and more busy
- 7) 24 hour use

Rail Roads

- 1) It is also the smooth but less width mode of transportation.
- 2) It is long travelling
- 3) It is more time wasting
- 4) It is more load transformation mode.
- 5) It is made for rail only
- 6) It is also economic but not busy as compared to roads
- 7) less time use as compared to road

Q #02

Ans:

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Phases of Highway location process:

- (1) Office study of existing information
- (2) Reconnaissance survey
- (3) preliminary location survey.
- (4) Final location survey.

=> Data Examination (office study)

The first phase in highway location study is the examination of all available data of the area in which the roads is to be constructed

=> for this phase photographic investigation.

Data source:

=> Existing Engineering report

=> maps

=> Aerial photographic

=> charts

=> National / provincial department, Transportation, Agriculture, geology, hydrology, mining.

=> preliminary location survey:

=> During this phase of the study the position of the feasible routes are set as closely as possible by

(1) Establishing all the control points.

(2) Determining preliminary vertical and horizontal alignments for each.

⇒ Economic Evaluation:

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Economic evaluation of each alternative routes is carried out to determine the future effect of investing the resource necessary to construct the highway.

Factor consider or extract:

- ⇒ Road user costs.
- ⇒ Construction costs.
- ⇒ maintenance costs.
- ⇒ Road user costs.
- ⇒ Road user disbenefits adverse effect due to dislocation of families, business and so for that.

Results of economic evaluation:

- ⇒ provide information of the economic resource that will be gained or lost if a particular location is selected.

Environmental Evaluation:

- ⇒ highway construction at any location significant impact on surrounding.
- ⇒ A highway an integral part of the local environment
- ⇒ Environment includes plant, animal and human communities and encompasses social, physical, material and man made variables.
- ⇒ These variable are ~~inter~~ interrelated in a manner that maintain equilibrium and sustains the life style of the different communities.
- ⇒ Essential to evaluate Environmental impact of alignment selected.

⇒ This may lead to a reduction of the quality of life of the animals and human communities. page #07

⇒ In case environment impact study (EIS) is required it is conducted at this to determine the environmental impact of each alternative route.

⇒ EIS will determine the negative and/or positive effects the highway facility will have on the environment.

⇒ Example

⇒ At grade freeway construction urban area may result in unacceptable noise level for residents

⇒ Highway facilities may be located so that it provides ~~an aspect on better access~~ or better access to jobs and ~~and~~ recreation centres.

⇒ Best alternative, based on all the factors considered is then selected as the preliminary alignment of the highway.

Final location survey:

⇒ The final location survey is a detailed layout of the selected route.

⇒ The horizontal and vertical alignment are determined and the position of structure and drainage channels are located.

⇒ The method used is to set out of the points of intersection of the straight portion of the highway between these.

⇒ Best alignment is obtained using a trial and error process designer opinion considering both engineering and aesthetic factor.

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Ans:Effects of Horizontal Curvature:

It is the outset of the this project or vehicle in highway clearly requirements were to demonstrate (a) whatever the effects of highway geometrical features on vehicle. on vehicles propulsive demand could be measured (b) whatever such effects could be calculated reliable for vehicle without having to ~~test~~ test such vehicle on the road.

Effects of Road Grade:

The total driveline torque was measured in a series of replicate runs on 6.41 m section of private road at speed of 15 to 60 min/hr 84 to 96 km/hr on grade upto +8 percent & linear correction b/w driveline torque and road grade was found that showed a standard deviation of 2.2 percent.

Importance of vehicle performance in highway:

Design: The project culminated in the development of a computer programme that predicts the fuel consumption and air pollutant emissions of vehicle when operated on highway of arbitrary length and geometric design.

=> Influence of Driver Variance on Highway Fuel Economy:

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An experiment was conducted with 10 drivers selected at random from the employee staff and consisted of 5 women and 5 men of various ages, plus a "control" driver who was the experiment conductor. The 10 drivers were not ~~told~~ told that their driving habits were the subjects of the experiment conductor. They understood they were evaluating some prototype road test equipment.

The test road was a rural section of a limited access, divided highway used for this test only during low traffic times. It had a uniform posted speed limit of 55 mi/hr (88 km/hr)

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⇒ Directional Distribution:

- ⇒ Highway must be designed to adequately serve the peak hour traffic volume in the peak direction of flow.
- ⇒ Total hourly traffic in both directions is used to design two lane roads.
- ⇒ In the design of highway with more than two lanes and on two lane. Directional traffic is used for multilane roads and streets.
- ⇒ Typically, one direction contributes by 55-70% in total traffic, although occasionally 80% is observed.

⇒ Directional Distribution - Example:

⇒ For example, consider a rural road with a design volume of 40,000 vehicle per hour (vph) for both directions of travel combined.

⇒ If during the design hour the directional distribution is equally split, or 20,000 vph in one direction may be adequate.

⇒ If 80 percent of the DHV is in one direction, at least three lanes in each direction would be needed for the 32,000 vph.

⇒ Directional Distribution - Directional Design Hourly Volumes DDHV - ADTs are converted to a peak-hour volume in peak direction of flow.

$$DDHV = ADT \times K (\text{peak hr}) \times D (\text{peak dir} - \text{flow})$$

$K =$ proportion of daily traffic occurring during peak hour

$D =$ proportion of peak hour traffic travelling in peak direction of flow.

\Rightarrow For design, the K factor often represent the proportion of ADT occurring during the 50th peak hour of the year.

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Q #05

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Ans:

Surface Distress

Def: surface distress is "any friction of poor or unsatisfactory pavement performance or signs of impending failure"

Classification:Fracture:

This could be in the form of cracking of cracking (in flexible and rigid pavements) or spalling resulting from such things as excessive loading, fatigue, thermal moisture damage, contraction.

Distortion:

This is in the form of deformation.

Example:

(rutting, corrugation, shoving) (creeps, ~~desint~~ densification, consolidation, swelling or frost action.

Disintegration:

This is the form of stripping, ravelling, spalling, which can result from such things as loss of bonding, chemical reactivity, traffic, abrasion, aggregate degradation, poor consolidation/compaction or binder aging.

Q #06

Ans

Alligator Cracking:

Alligator cracking indicative of fatigue failure of pavement due to repeated traffic load.

- ⇒ Alligator cracking may be considered as combination of fatigue and block cracking
- ⇒ It is a series of interconnected cracks of various stages of development.
- ⇒ Alligator cracking develops into a many-sided pattern that resemble chicken wire or alligator skin
- ⇒ Occurs in area subjected to repeated traffic loading.

⇒ Block cracking:

- ⇒ A pattern of cracks that divides the pavements into approximately rectangular pieces, with side generally longer than one foot
- ⇒ Rectangular blocks range in size from approximately 0.1m^2 to 10m^2

possible cause:

Shrinkage of Asphalt

=> Longitudinal Cracking:

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Cracks predominantly parallel to pavements centreline, location with in the lane

Possible cause:

Expansion and contraction of pavements material road bed, settlement, poorly constructed paving joints.

Transverse Cracking:

Cracking occur across the centreline not due to reflection cracking

Possible cause:

Expansion and contraction of pavements material road bed settlement, poorly constructed paving joints.

Causes of Cracks:

- (1) Fatigue stresses
- (2) Thermal stresses
- (3) Settlement
- (4) poor drainage
- (5) Existing discontinuities: Cracks, joints
- (6) Asphalt mix design issues: bitumen content, etc.

Causes of Transverse Cracking:

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- (1) \Rightarrow slab longer than required
- (2) \Rightarrow Excessive thermal stresses

Causes:

Causes:

- (1) \Rightarrow Cracks sealing
- (2) \Rightarrow Full depth original repair
- (3) \Rightarrow Dowel bar retrofit.

\Rightarrow Causes of longitudinal cracking:

\rightarrow Subsoil settlement.

Causes:

- (1) \Rightarrow Joint sealing
- (2) \Rightarrow Full depth replacement
- (3) Sub surface stabilization.