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section B

Semester 6th

Technology Civil Engg

Paper Highway and traffic Engineering

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(1) Comparison :-

Keeping in view different modes of transportation, comparison of railways with Highways is as under.

Railways:

⇒ The transportation along the railways track could be advantageous by railway b/w the stations both for the passengers and goods particularly for long distance.

⇒ It depends upon the roads transport i.e road could serve as a feeder system.

⇒ Energy require to drag a unit load through unit distance by the railway is only 1/4 to 1/5 of that required by road.

⇒ safety (minimum crash rate if handled carefully else sever crash can occur.

Highways:

⇒ It gives the maximum service to one and all.

⇒ It gives maximum flexibility for travel will reference to route choice, direction time and travelling speed.

⇒ It provide door to door service.

⇒ Other modes are dependent on it.

⇒ It requires small investment for the government.

⇒ Motor vehicles are cheaper than other Carriers like rail engines.

⇒ It saves the time for short distances.

⇒ High degree of accident due to flexibility of movement.

Q#2 Study for design of new highway

The first phase in any highway design and location study is the examination of all available data of the area in which the road is to be constructed.

⇒ This phase is usually carried out prior to any field or photogramatic investigation.

Reference Materials :-

(National/Provincial departments - transportation agriculture, geology, hydrology and mining.

⇒ Existing engineering projects. reports.

⇒ Maps

⇒ Aerial photographs.

⇒ Charts.

⇒ The amount and type of data collected and examined depend on the type of highway being considered.

Data Extracted :-

⇒ Engineering, including topography, geology, climate and traffic volumes.

⇒ Social and demographic, including land use and zoning pattern.

⇒ Environmental, including types of wild life, Location of recreational, historic and archeological sites, and the possible affects of air, noise, and water pollution.

⇒ Economic, including unit costs for construction and (road) the trend of agricultural, commercial, and industrial activities.

Analysis of data

⇒ will indicate whether any of the specific sites should be excluded from further consideration because of one or more of the above characteristics.

Example:- If it is found that a site of historic and archeological importance is located within an area being considered for possible route location, it may be immediately decided that any route that traverses that site should be excluded from further consideration.

⇒ At the completion of this phase of the study, the engineer will be able to select general areas through which the highway can traverse.

⇒ Feasible routes are identified by a stereoscopic examination of the aerial photographs, taking into considerations factors such as,

⇒ Terrain and soil conditions,

⇒ Serviceability of route to industrial and population areas.

⇒ Crossing of other transportation facilities, such as rivers, railroads and highways.

⇒ Directness of route.

⇒ The feasible routes identified are then plotted on photographic base maps.

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3) Importance of vehicle Performance:-

⇒ Acceleration and deceleration rates of vehicles are often critical parameters in determining highway design.

⇒ These rates often govern the dimension of such design features.

① Freeway ramps
② climbing or passing lanes
③ Turnout bays for buses
④ Acceleration and deceleration lanes.
⑤ Highway alignment (adequate passing and stopping sight distance)
⑥ Determine the need for truck climbing lanes (steep grade).

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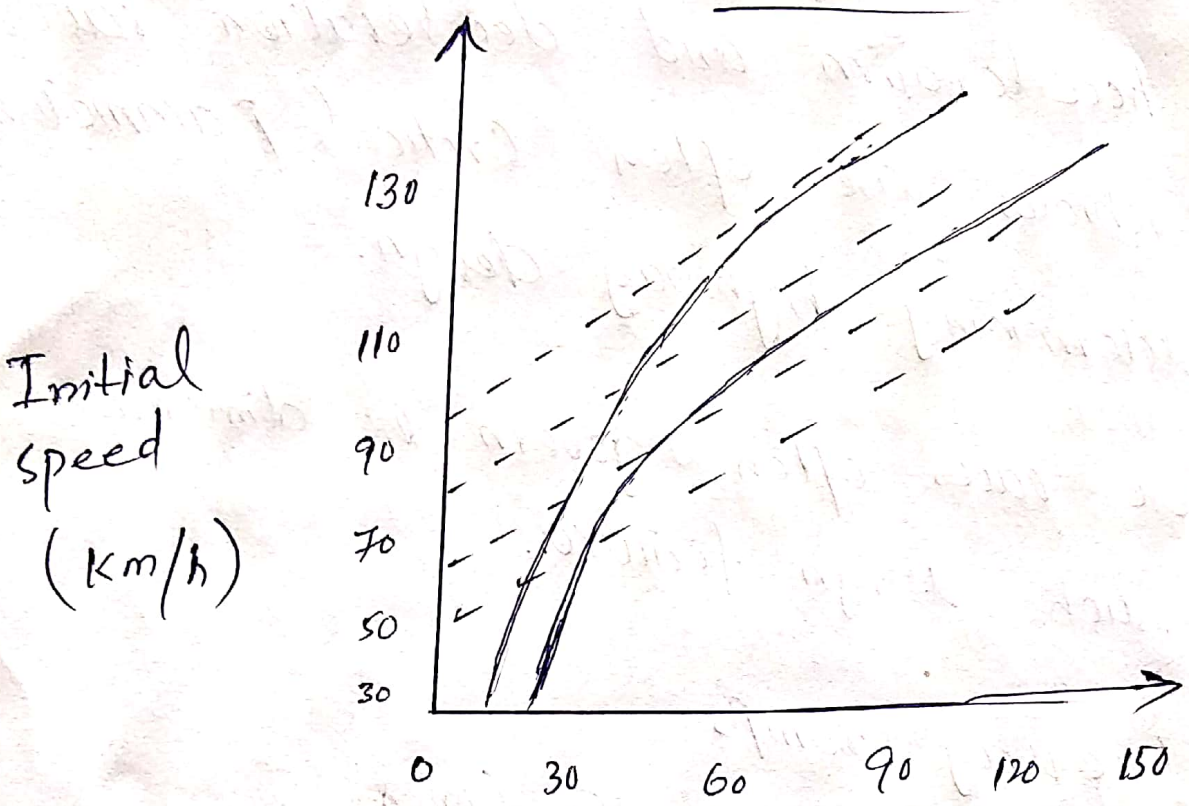

Deceleration Distances for Passenger Vehicles Approaching Intersections.

(4) Directional Distribution in design of Highways :-

⇒ Highways must be designed to adequately serve the peak-hour traffic volume in a peak direction of flow.

⇒ Total hourly traffic in both directions is used to design two-lane roads.

⇒ In the design of highways with more than two lanes and on two-lanes roads where important intercections are encountered or where additional lanes are to be provided later, knowledge of hourly traffic volume for each direction of travel is essential- Directional traffic is used for multilane roads and streets.

⇒ Typically, one direction contributes by 55-70% in total traffic, although occassionally 80% is observed.

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⇒ Directional distribution — Directional Design hourly volumes DDHV — ADTs are converted to a peak-hour volume in a peak direction of flow.

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

K = proportion of daily traffic during P-hr

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

For design, the K factor often represents the proportion of ADT occuring during the 30th peak hour of the year.

(5) Classification of suiface distreds modes:-

Surface distress modes can be broadly classified into the following three groups.

- **i) Fracture:** This could be in the form of cracking or breaking, generally due to excessive loading, fatigue, Thermal changes.

ii) Distortion:

This is in the form of deformation, which can result from such things as accessive loading, densification, Consolidation or subgrade issues.

iii) Disintegration:-

This is in the form of Stripping or reveling or removal of Paving maierials, which can result from such things as loss of bonding, chemical reactivity, traffic abrasion, aggregate degradation, or binder aging.

Q-6 Alligator Cracking

⇒ Alligator Cracking may be considered a 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 resembles chicken wire or alligator skin.

⇒ Occurs in areas subjected to repeated traffic loadings.

Block Cracking

⇒ A pattern of cracks that divides the pavement into approximately rectangular pieces, with sides generally longer than one foot.

⇒ Rectangular blocks range in size from approximately 0.1 m^2 to 10 m^2.

⇒ Possible Cause : is the shrinkage of asphalt.

longitudinal Cracking:

Cracks permanantly parallel to pavement Centelline. Location within the lane (wheel path versus non - wheel path) is significant.

Possible Cauees:

Expansion and contraction of pavement material, roadbed settlement, poorly Constructed paving joints.

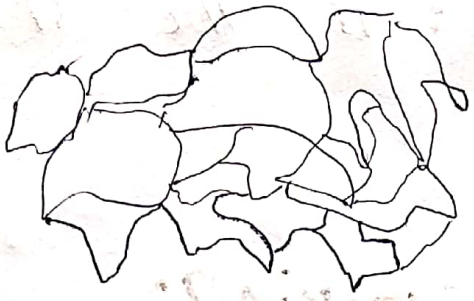
Transverse Cracking

⇒ Cracking : across the centerline, not due to deflection cracking.

Possible Causes.

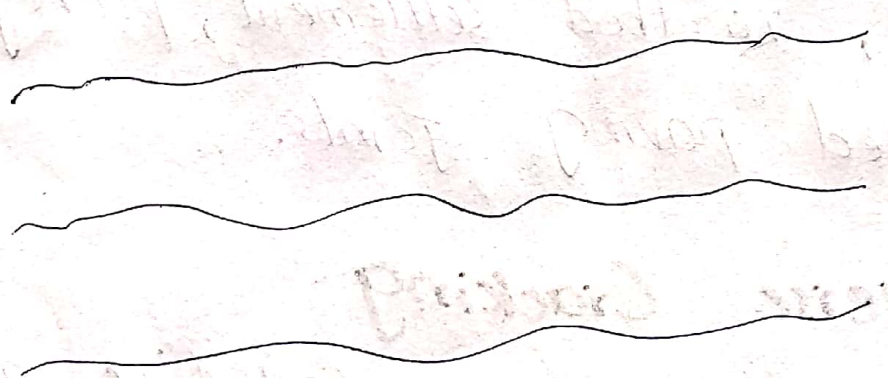
⇒ Expansion and contraction of pavement material.
⇒ Roadbed settlement
⇒ Poorly Constructed Paving Joints.

Alligator Cracking diagram:



Block Cracks:

longitudinal Cracks



Transverse Cracking: