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SUBJECT : Highway and Transportation Engineering

Module : 6th

SEC : B

Date : 14-4-2020

Q1 Keeping in view different modes of transportation compare railways with highways.

Highways

i) Suitable for any distance

ii) High degree of accident due to flexible movement

iii) Other modes are depend on it

Railway

⇒ Suitable for long distance

⇒ Low degree of accident due to less flexibility of movement

⇒ It depends upon the road transport (i.e) road could serve as feeder

Highway

- iv) Maintenance cost is less
- v) Door to door service is available
- vi) It saves the time for short distance
- vii) It requires small investment

Railway system

- ⇒ Maintenance cost is more
- ⇒ Such service is not possible.
- ⇒ It takes large time for short distance
- ⇒ It requires large investment for the Government.

Q₂ You are an transportation Engineer. You have been tasked to conduct office study as a preliminary step for design of new highway. what reference material you will study and what data you will extract.

Data Examination (office study):-

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

Data Source :

- ⇒ National or Provincial departments transportation agriculture, geology hydrology and mining
- ⇒ Existing engineering reports
- ⇒ Maps
- ⇒ Aerial photograph
- ⇒ charts

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

Area characteristic covered in data collection:

Engineering including topography
including land use and seeing
patterns.

⇒ ~~Engineering~~ Environmental includes
type of wildlife, location of
~~existing~~ recreational, historic and
archeological sites and the
possible effects of air, noise
and water pollution.

Preliminary analysis of the data:

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

For Example: 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.

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Q3 what is the importance of vehicle performance in highway design?

Ans The vehicle performance in highway design is very important because of following parts.

⇒ Adequate passing & stopping sight distance.

⇒ Maximum grades

⇒ setting speed limits

⇒ Timing of signalized intersection

⇒ Free way ramps

⇒ climbing or passing lane

⇒ Braking characteristic also affects vehicle volume performance

⇒ Acceleration and deceleration lanes.

Q4 write short note on directional distribution of in design of highway?

Directional Distribution:

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

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

⇒ In the design of highways with more than lanes road where important intersection are encountered or where additional lanes are to be provided later, knowledge of the hourly traffic volume for each direction of travel is essential. Directional traffic is used for multi lane road and streets.

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

Example:

⇒ Consider a rural road with design volume of 4000 vehicles per hour (vph) for both directions of travel combined.

⇒ If during the design hours the directional distribution is equally split or 2000 vph is one direction, two lanes in each direction may be adequate.

Q No # 05

Explain broad classification of surface distress mode ?.

Ans: Surface distress mode be broadly classified into the following three groups.

1: Fracture:

This could be in the form of cracking or breaking. Generally due to excessive loading, fatigue, thermal change.

2: Distortion:

This is in the form of deformation which can result from such thing or excessive loading, densification, consolidation, or subgrade.

3: Disintegration:

This is in the form of striking or peeling or removal of paving material. which can result from such thing as loss of bonding, chemical reactivity, traffic abrasion, aggregate degradation or binder aging.

QNO# 06

Explain Alligator cracking, block cracking
longitudinal cracking & Transverse cracking?

Ans:

1: Alligator cracking :

Alligator or fatigue cracking is a series of inter-connecting cracks caused by fatigue failure of the asphalt surface under repeated traffic loading. The cracking initiates at the bottom of the asphalt surface where tensile stress and strain is highest under a wheel load.

2: Block cracking :

⇒ Block cracks are interconnected cracks that divide the pavement into approximate rectangular pieces.

⇒ Blocks range in size 1 by 1 feet to 10 by 10 feet.

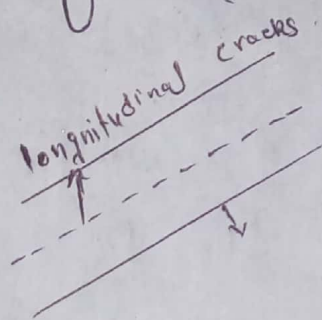
⇒ Caused by shrinkage of the asphalt concrete (AC) & daily temperature.

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3: Longitudinal cracking:

⇒ Longitudinal cracks are parallel to the Pavement center line or lay down direction. Caused by poorly constructed Paving lane Joint.

⇒ Shrinkage of (Ac) surface due to low temperature of the Asphalt (A).



4: Transverse cracking:

⇒ Transverse cracks extend across the Pavement at approximate right angles to the Pavement center line or direction of lay down. These type of cracks are not usually load associated.

