NAME : SHAHROSE KHAN

ID # : 7836

SUBJECT: HIGHWAY & TRAFFIC ENGINEERING

SECTION: B

SUBMITTED TO: DR. NADEEM

MODULE : 6th

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Q1 Keeping in view different modes of Transportation compare railways with Highways.

Ans:

RAILWAYS	HIGHWAYS
• Good for long distance as it can carry more load and people at same time.	• Highest flexibility due to extensive routes and provides door to door service.
• It is dependent on road transport.	• Road transport acts as a feeder system to railway.
• Frequency of accidents is less.	• Frequency of accidents is more.
• Higher maintaince cost due to huge engine and rail track.	• Comparetivly low maintaince costs.
• Energy required to drag unit load is 1/4 to 1/5 of that road.	• It saves time for short distances.
• Requires enormous amount of capital for government to invest	• Generally requires nominal capital comparativly.

Q2 You are a 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?

Ans: Being a transportation engineer I will consider the following steps for office study of highway:

DATA EXAMINATION:

- It is the first step in which we examine all available data in which the road is to be constructed.
- There is no use of any photogrammetric investigation in this phase.

DATA SOURCES:

- The data sources are majorly available with National and Provincial departments.
- Mostly the data is collected in form of:
  - → Maps
  - → Aerial Photographs
  - → Charts
  - → CAD visuals
  - → Existing engineering projects e.g dams.
- The type of data to be collected is dependent on the highway type.

TOPOGRAPHY OF DATA COLLECTION:

1- Engineering includes geology, climate & traffic volumes.

2- Environmental includes types of wildlife, location of recreational and historical sites, effects of air, noise & water pollution.

3- Social & Demographic includes land use and zoning pattern.

4- Economic including unit costs for construction and the trend of agricultural, commercial and industrial activities.

PRELIMINARY ANALYSIS OF DATA:

- It will indicate if any specific sites should be excluded from considerations.
- In the presence of any historical, archaeological sites the routes that traverses it is excluded from further considerations.
- At the completion of this phase, the engineer will be able to select general areas through which highway can traverse.

Q3 What is the importance of vehicles performance in highway design?

Ans: The vehicle's performance in highway design is very important because of following points:

1- Adequate passing and stopping sight distance.
2- Acceleration and deceleration lanes.
3- Maximum grades.
4- Setting speed limits.
5- Timing of signalized intersections.
6- Braking characteristics also effects vehicle performance.
7- Freeway ramps.
8- Climbing or passing lane.

Q4 Write short note on Directional distribution in design of highways?

Ans: In the design of highways with more than two lanes and on two lane roads where important intersections 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 multilane roads and streets. Typically, one direction contributes by 55-70% in total traffic.

Example:

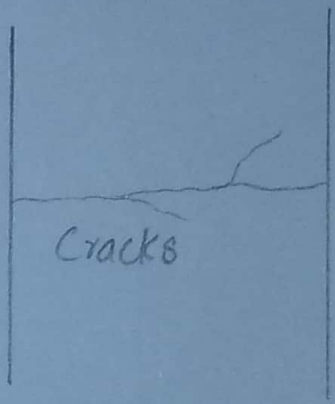
Consider a rural road with a design volume of 4000 vph for both directions of a travel combined. If the traffic is equally split then two lanes may be adequate. Thus if 80% of the DHV is one direction, at least three lanes in each direction would be needed for the 3200 vph.

Qs: Explain broad classification of surface distress modes?

Ans: Following are the broad classification of surface distress mode:

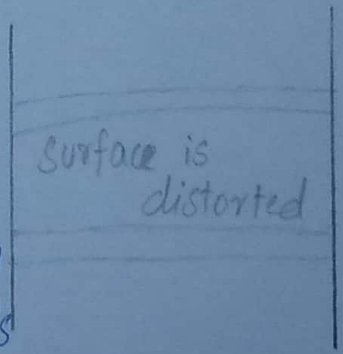
1- FRACTURE:

This takes place due to excess of load, fatigue or thermal cracking. It could be in the form of cracking or breaking.



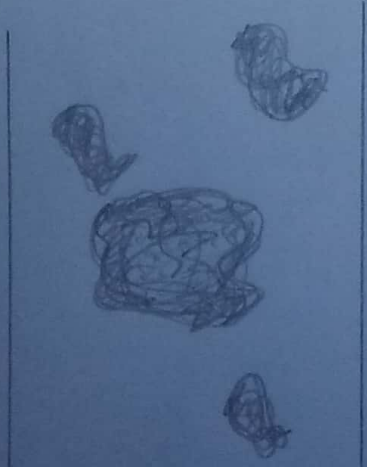
2- DISTORTION:

It is in the form of deformation, which may result from such things as excessive loading, densification, consolidation.



3- DISINTEGRATION:

This is in the form of stripping or ravelling of paving materials which can result from such things such as loss of bonding chemical reactivity, traffic abrasion and binder aging.



Disintegration

Q6: Explain Alligator cracking, block cracking, longitudinal cracking and Transverse cracking?

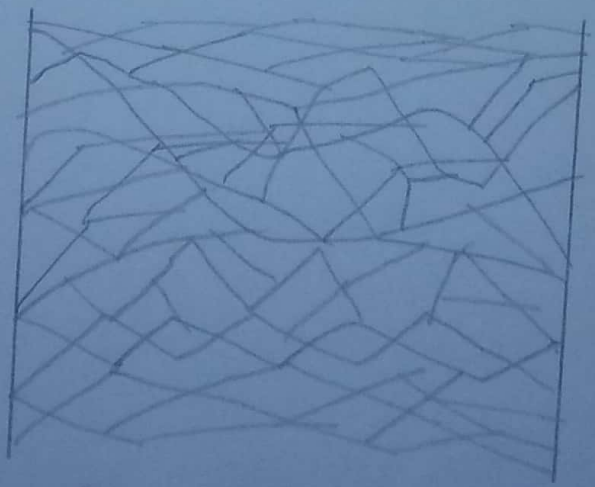
Ans: ALLIGATOR CRACKING:

. It appears as alligator thus named after it, It occurs due to the forces applied by turning or braking motion of vehicles.

. In asphalt pavements the alligator cracking happens when the pavement is carrying burdens that the supporting layers can't resist back.

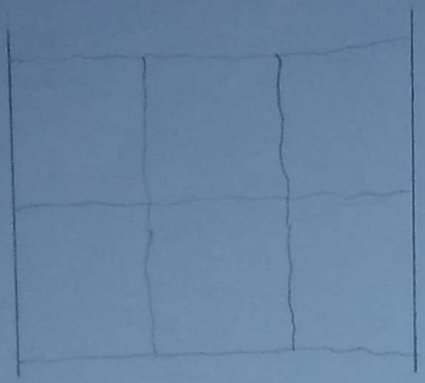
. It is the series of interconnecting cracks caused by fatigue failure under repeated traffic loading.

. The cracks initiate from the bottom of asphalt surface where tensile stress and strain is highest under a wheel load.



ALLIGATOR CRACKING

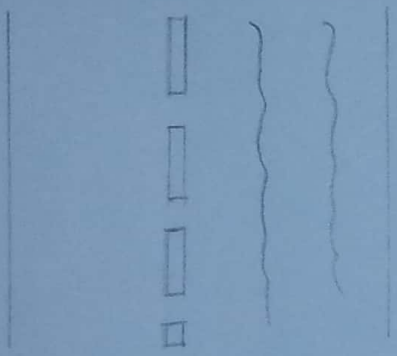
BLOCK CRACKING:



Block-like pattern

It is the series of large rectangular cracks on an asphalt pavement surface. This type of cracking typically covers large areas and may occur in areas where there is no traffic. It is caused by shrinkage due to temperature cycles.

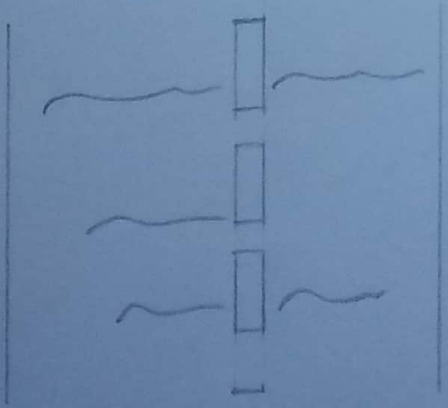
LONGITUDNAL CRACKING:



Parallel cracks

It occurs parallel to the center line of pavement. They can be caused by a poorly constructed joint, shrinkage of asphalt layer. These cracks are not load-related.

TRANSVERSE CRACKING:



Perpendicular cracks.

Transverse cracks occur roughly perpendicular to the centerline of the pavement. They can be caused by shrinkage of the asphalt layer or reflection from an existing crack. They are also not load-related.