

Muhammad Abdullah

ID # 7796

Section "A"

Highway & Transportation

Dr Nadeem Anwar Gureshi

Ans 1:

Highways:

- * Its deliveries are more reliable & timely.
- * Highways makes journey faster & safer.
- * Highways also contribute immensely to social growth.
- * More accidents can occur due to flexibility of movement.
- * They are more flexible than trying to route rail lines everywhere

Railways:

- * It is suitable for long distances travel.
- * Railway provide the cheapest & most convenient mode of passenger
- * Railway help in supplying raw materials and other facilities.
- * It provide a strong medium of

national integration.

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* Railway can accommodate more passengers than other modes of transportation.

Ans 2:

The reference materials that I will study for the design of new highway include:

- 1) Maps
- 2) Aerial photographs
- 3) Charts
- 4) Existing Engineering reports

The data that I will extract from these sources include the following characteristics

- * Engineering (traffic volumes, climate, geology)
- * Social & Demographic (Land use & zoning pattern)
- * Environmental (type of wild life, historic or recreational sites)

* Economic (unit cost for construction).

Ans 3:

Importance of vehicals performance
in highway design:

The most critical parameters which are included in determining highway design are

* Acceleration rates

* Deceleration rates

The performance of road vehicles for the bases for roadway design guideline such as:

* Length of acceleration-deceleration rates

* Maximum grades

* Stopping sight distances

* Setting speed limits

* Passing sight distances

* Timing of signalized intersections

* Turnout bays for buses

* Freeway ramps

The main reason we study vehical performance in highway design is

to be able to accommodate a large variety of vehical types on roads.

Ans 4:

Directional distribution:

→ 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

→ Highways 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-road.

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

Example:

- consider a rural road with a design of 4000 vehicals per hour for both direction of travel combined.
- If during the design hour the directional distribution is equally split or 2000 vph in one direction two lane in each direction may be adequate.

Ans 5:

Classification of surface distress

mode:

surface distress mode can be broadly classified into three main groups

1) Fracture:

This could be in the form of cracking or spalling

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resulting from such things as excessive loading, fatigue, thermal change, slipping, moisture damage or contraction

2) Distortion:

This can be in the form of deformation which can result from such things as excessive loading, creep densification, consolidation, swelling or frost action.

3) Disintegration:

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

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Ans 6:

Alligator Cracking:

Alligator cracking

refers to a surface damaged in such a way that the cracks form a pattern that looks like reptile scales. The pattern usually begins with longitudinal cracks, which are then connected by transverse cracks.

- * Alligator cracking is one of the most serious issues that can affect an asphalt surface in Austin.
- * It is one of the most costly problem to repair

Block Cracking:

It is a series of interconnecting cracks that form in a roughly rectangular pattern.

- * It can occur both in concrete & flexible road pavement.

- * These blocks ranges in size from approximately 1ft^2 to 100ft^2 .
- * Large blocks are generally classified as longitudinal & transverse cracking.
- * This cracking allows moisture infiltration roughness.
- * Typically caused by an inability of asphalt binder to expand & contract with temperature cycle.

Longitudinal Cracking:

These cracks occur parallel to the centerline of pavement.

- * They can be caused by poorly constructed joints, shrinkage of the asphalt year, cracks reflecting up from an underlying layer.
- * They can be a type of fatigue cracking or top-down cracking.

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- * They allow moisture infiltration, roughness & it may indicate the possible onset of alligator cracking & structural failure.

Transverse cracking:

Transverse cracks occurs roughly perpendicular to the centreline of pavement.

- * They can be caused by shrinkage of the asphalt layers or reflecting from an existing crack.
- * They allow moisture infiltration, roughness
- * shrinkage of the surface due to low temperature or asphalt binder.
- * Reflective crack caused by cracks beneath the surface HMA layer
- * Top-down cracking.