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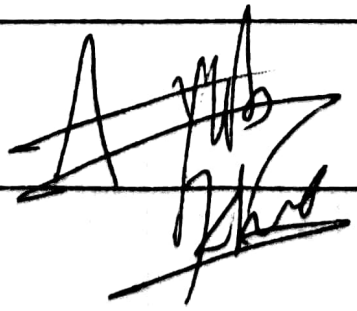
Signature:



Qno1: Keeping in view the different modes of transportation. Compare Rail with Highways:

Ans: On the basis of Comparison b/w Highways and Railways, According to utility, the transportation of people and goods for short distance can be easily done by Highways. On the other hand for long distance, the Railways track are safe and convinient.

Now, let's Compare the Railways to Highways.

Highways	Railways.
(1) In Roadways, the Route are meant for traffic, such as buses, trucks, Scooter and other vehical etc.	(1) in Railways, Routes are meant for movement of train only.
(2) It gives Maximum Service and flexibility for travel with refrence to Route.	(2) Railways given Support For the Carrige of people & & goods, And Roads are used as feeder System.

Highway	Railways.
(3) Highways provide door to door Service and also Other modes are dependent on it.	(3) The Railways does not Provide door to door Service and it is dependent on Highways
(4) The highways width of Right of ways.	(4) The Railway Require less width of Right of way.
(5) The Right of entry is free for all vehical in Highways, because they are not according to any ~~Schedul~~ Schedule.	(5) In Railway, the Right of entry is not free for all train, because their movement are according to a fix Schedule.

Qno 2: You are a transportation engineer, you have been asked to conduct office Study as a preliminary step for design of new highway. What Refrence material you will Study and what data will you Extract.

Ans: If i'm hired as a transportation Engineer for a new highway Construction, I would Look for the following steps.

① **Examination of Data:**

The first Phase in highway location study is the examination of all available data of that area.

My data Sources will be the National or provincial Highway authorities, Agriculture department, geological and Hydrological Reports, are also included in Examination of day.

→ **Area Characteristic Covered:** The area Characteristic include in this Study are:

→ Topography, geology, Climate and traffic volume.

→ Social and demographic, including land use and Zoning part.

→ Type of wild life; location of Recreation, historic places etc.

→ By Historic or recreation, I mean that, if it is found that a Site of Historic importance is located, it may be decided that the route Should be excluded from further Consideration.

So from these reference material, I would extract the data mentioned above and by the help of this data I would be able to Select generall area through which highways can transverse.

Q no 3: What is importance of vehical Performance in Highway design?

Ans: Vehical characteristic that is important in Highway design are;

-> Static
-> Dynamic
-> kinematic.

① Static Characteristic

The weight and Size of vehical is important in determining the Physical Component of highway Such as;

-> Lane width
-> Shoulder width
-> Length and width of Parking bays.
-> Length of verticle Curves.
-> Pavement depth.

4 general Classes of vehical by AASHTO.

① Passenge Car
② Trucks
③ Buses
④ Recreational vehical.

(2) Kinematic Characteristic:

→ Primary element is the accelation capability of vehical.

* Accelaration is important in the operation of passing maneuvers and gap acceptance.

* Dimension of Highway are also determined through accelaration capability.

→ Kinematic Characteristic involves the study, How accelaration rate influence the element of motion, Such as Velocity, distance and Time.

(3) Dynamic Characteristic:

The forces, which can act upon a vehical while it is in motion are;

(1) Air resistant

(2) Grade resistant

(3) Rolling Resistant

(4) Curve Resistant

So the above were importance of vehical Performance, which is to be taken into Consideration while designing a Highway.

Q no 4: Write a short note on Directional ~~Design~~ Distribution: in Highways Design.

Ans: **Directional distribution:**

→ The high way must be designed to adequetly serve the peak hours volume. in peak direction of flow.

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

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

For example: Conside a ~~rural~~ rural Road with a design volume of 4000 vehical per hour for both directions of travel Combined.

→ If during the design hour, the directional distribution is equally split on 2000 v/h in lane, then 2 lane must be adopted in each direction.

Q no 5: Explain broad classification of Surface Distress modes.

Ans: Surface Distress is "Any indication of poor or unfavorable pavement performence or sign of impending failure.

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

① Fracture: This could be in the form of cracking (in flexible and rigid pavement) or spalling resulting from such things as excessive loading, fatigue, thermal changes, moisture damage slippage or contraction.

(2) **Distortion:** This is in the form of deformation such as; Rutting, Corrugation and Shoving), which can Result from Such things as excessive loading, Creep, densification, Consolidation, Swelling or frost action.

(3) **Disintegration:** This is the form of Stripping, raveling or Spalling, which Can result from Such things as loss of bonding, Chemical reactivity, traffic abrasion, aggregate degradation, Poor Consolidation or binder aging.

Thus, Surface distress will be Somewhat related to roughess (The more crack, distortion and disintegration). The rougher the pavement will be, as well as Structural integrity (Surface Can be Sign of impending or Current Structural Problem.

Q 6: Explain Alligator Cracking, block Cracking, Longnitudinal Cracks and transuerse Cracking.

Ans: **Alligator Cracking:** It is the Common type of distress in asphalt Pavement. The Cracking in asphalt layer is resembling the hide of an Alligator.

The Cell Size Can vary upto 11.80 inches but are typically less then 5.90 inches.

Alligator Cracking is generally a loading failure, but numerous factor Can Contribute to it. It is often a Sign of Sub-base failure, Poor drainage or repeated over loading.

Causes: It is a Pavement Failure Cause by failure of Surface due to traffic loading. However, the Alligator Cracking Can be influenced by eviormental and other effect while traffic loading remains the direct Cause.

Prevention and Repair:

Preventing fatigue or Alligator Cracking, Can be as Simple as Possible, Such as Preventing the Common Cause.

for example, reducing the overloading on Asphalt Pavement or improving the drainage.

A good way to Prevent this, is to increase the depth of Asphalt layer.

Block Cracking:

Block Cracking is the Series of interConnecting Cracks, that form in a roughly rectengular patteren.
It Can occure in both Concrete and flexible Pavement.

Causes :

In Rigid Pavement, block Cracking may occur because of insufficient Slab thickness, loss of Sub-base Support or Subgrade Settlement.

In flexible pavement, it may be Caused by reflection of Cracks in an underlying Concrete Pavement, Asphalt Shrinkage etc.

Longnidudnial crack:

These Cracks occure Parralled to the Center line of the Pavement. They Can be Caused by a Poorly Constructed joints, Shrinkaged of Asphalt layer, Cracks reflecting up from an Underlying and longnitudinal Segregation due to improper Paver Operation.

Causes:

1. internal Pressure, in the Case of Rising main.
2. load due to Soil Cover or external loading Such as heavy vehicular loads.

Transverse Cracking:

These Cracks occur roughly perpendicalar to the Centerline of Pavement. the Can be Caused by Shrinkage of the asphalt layer. They are not load related.

Causes:

→ Shrinkage of the HMA Surface due to low tempreture of asphalt binder hardening.