Name = Shahkar

ID = 7808

Section = 'A'

Semester = 6th

Subject = Highway and Traffic Engineering

Instructor = Dr. Nadeem Anwar.

ONLine MiD Term Examination

Civil Engineering Department.

Scanned with CamScanner

ID= 7808
Name= Shahkar

Question NO 1

1- keep in view different modes of transportation. compare railways with highways.

Ans:- Comparising between Railways and highways:-

Railways:-

1- Railways transportation is advantagous for moving people and better goods for one place to another using trains.

2- It requires a large amount of investment for its construction.

3- It is safer than road way.

4- Comparitively to road transport, railways transport is much safer due to minimum crash rate.

5- Energy required to drag a unit load through unit distance by the railway is 1/4 to 1/5.

Scanned with CamScanner

=> Highways:-

1. It helps to provide services to any one or to the all.
2- It helps to provide service door to door by the mean of high way transportation.
3- It cheaper compared to other
8 modes of transportation.
4- It donot provide much faster service as compared to railways.
5- It requires small amount of investment for its construction as compared to railways.

Question No 2

You are transportation engineer. you have been tasked to conduct office study as a preliminary step for design of new highway. what refrence material you will study and what data you will extract?

Scanned with CamScanner

Ans:- Premilinary analysis of data:

⇒ ~~Per~~ premilinary data are the data which are generated from small-scale research projects to evaluate the feasibility, prior to conducting full research studies.

The ~~of~~ data to be collected include.

1- Engineering ⇒ Traffic volume
⇒ geology
⇒ climate.

2 ~~Economic~~: Environmental
⇒ historical site
⇒ wild life
⇒ water pollution, noise

3- Economic
⇒ commercial & industrial activities.

4- demographic:- ⇒ Lande use
⇒ zoning patterns.

Scanned with CamScanner

1- Environmental Evaluation:-

Following are the causes that badly effect the presence of living and non-living organism.

- First of all the plants, trees are badly effected.
- Deforestration
- air & water pollution that causes headaches and other problems to the nearby residents.
  It ~~distributes~~ disturbs the equilibrium and leaves significant impact on the environment.

2- Economic Evaluation:

For determining the possible future effects of utilizing the resources during the construction period,

Factor includes.

⇒ Road user dis-benefit.
⇒ construction cost.
⇒ Road user cost
⇒ Maintanance cost

Scanned with CamScanner

Question No 3

Vehicle performance:

The Most critical parameter which are included in determining high way design are

1- acceleration rates value
2- Deceleration rates value.

The performance of road vehicle form the basis of road way design guidelines such as.

1- Maximum grades.
2- Free way ramps.
3- passing sight distance.
4- Effect of Pavement friction
5- Turn out bays for buses

For accomudating different type of vehicles (High traffic and low traffic) on a roadway. vehicle performance in highway design is studied.

Scanned with CamScanner

The main reason we study vehicle performance in high way design is to be able to accomodate a large variety of vehicle types, on roads.

Question NO 4

Directional Distribution:

Usually to measure traffic for two lane highway using the design hourly volume as the total traffic in both directions of travel.

We can define it as the percentage of however volume over the total highway volume.

Knowledge of the hourly traffic load in each direction of travel. In some cases traffic may be split 50-50 as two direction, but during most peak-hour periods

Scanned with CamScanner

it is common to find a large percentage of traffic movement in one direction.

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

ii) Total hourly traffic in both direction is used to design two lane roads.

The directional design hour volume (DDHV) is one way volume in the predominant direction of travel in the design hour, expressed as a percentage of the two way DHV. For rural and suburban roads, the directional distribution factor ranges from 55 to 80 %.

Example: if traffic is directionally split 60/40, what is directional distribution of traffic for previous example Design hourly volume = 420 veh/hr?

Scanned with CamScanner

Directional design hourly volume =

(DDHV) = 0.6 x 420 = 252 veh/hr

Note!!! we use 0.6 not 0.4!

Question NO 5

Classification of Pavement Distress:-

Fracture: occurs in the form of:-

→ be cracking
→ fatigue issues
→ due to more loading.
→ thermal changes.

Distortion. Distortion is due to in the form of deformation.

It also occurs due to the reasons involving.
→ excessive load.

Scanned with CamScanner

Disintegration:

The breakup of a pavement into small pieces is called Disintegration. It occurs in the form of stripping or removal of paving materials such as aggregate etc.

It is also in the form of stripping or revealing or removal of loving internal which can result from such things as loss of bending chemical readively traffic absorssion.

Scanned with CamScanner

Q No 6 Define the following terms:

1- Alligator Cracking:-

In the asphalt industry, alligator cracking refers to a surface damaged in such a way that the cracks from a pattern that looks like reptile scales. most notably those on an alligator or crocodiles back.

⇒ The pattern usually begins with longitudinal cracks.

⇒ which are then connected by transverse cracks.

⇒ These create geometric shapes that are normally interconnected and which can spread over a wide in a relatively brief period.

⇒ Alligator cracking is one of the most serious issues that can affect an asphalt surface in Austin. it is one of the most costly problems to repair - but it is also preventable in most cases.

Assuming that the initial installation was corrected performed. alligator cracking is almost always

Scanned with CamScanner

the severity and extent of the block Cracking.

1- Low Severity Cracks (≤ 1/2 inch Wide):-
Crack Seal to prevent (1) entry of moisture into the subgrade through the Cracks and (2) further raveling of the Crack edges.
HMA can provide years of satisfactory Service after developing Small Cracking if they are kept sealed.

2- High Severity Cracks (> 1/2 inch Wide and Cracks with raveled edges:-
Remove and replace the cracked pavement layer with an overlay.

Scanned with CamScanner

Block cracking:

Interconnected cracks that divide the pavement up into rectangular pieces. Block range in size from approximately 0.1 m^2 ($1 ft^2$) to 9 m^2 ($100 ft^2$). Large blocks are generally classified as longitudinal and transverse cracking. Block cracking normally occurs over a large portion of pavement area but sometimes will occur only in non-traffic areas.

Problem:-

Allow moisture infiltration, roughness

Possible causes:- HMA shrinkage and daily temprature cycling. Typically caused by an inability of asphalt binder to expand and contract with temprature cycles because of:

1- Asphalt binder aging.
2- Poor choice of asphalt binder in the mix design.

Repair:-

Strategies depend upon

Scanned with CamScanner

Longitudinal Cracking:-

⇒ This type of cracking occurs parallel to centerline of asphalt pavement.
⇒ The reason of longitudinal cracking are poorly constructed joints.
⇒ Inproper paver operation.
⇒ Expansion and contraction of pavement material.

These cracks are not Load-related.

Longitudinal Cracking in Roads:-

Longitudinal Cracking is Cracking in the surface of road that runs longitudinal along the pavement. It can consist of a single crack or as a series of parallel cracks.

Quantification:-

As with other sealed road failure moodes there are two main attributes taken into account when measuring longitudinal Cracking; extent and severity.

⇒ Cracking extent is the percentage of the road surface subject to cracking.
⇒ Cracking Severity is related to the width of cracks and is typically recorded as a numbe.

Scanned with CamScanner

the result of neglecting to make needed repairs and protect the surface with a sealant.

Traverse cracking:-

The type of following of cracking occurs perpendicular to the center line of asphalt pavement.

The reasons of traverse cracking.

→ poorly constructed joints.
→ poorly roadbed settlements.
→ They are not load related.
→ We can fix the cracks by replacing the cracked pavements layer with an overlay.

Scanned with CamScanner