Class – VII Semester / IV Year

Subject –Transportation Engineering (7CE4-01)

Unit –3 Sight Distance & Horizontal Alignment

Presented by – Jitesh Kumar Jain (Assistant Professor)

Department of Civil Engineering,

Jaipur Engineering College and Research Centre

Jaipur

VISION

- To become a role model in the field of Civil Engineering for the sustainable development of the society

MISSION

1) To provide outcome base education.
2) To create a learning environment conducive for achieving academic excellence.
3) To prepare civil engineers for the society with high ethical values.

PROGRAMME OUTCOMES (PO)

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

COURSE OUTCOMES

Name of Subject – TRANSPORTATION ENGINEERING

Semester- VII **Code – 7CE4-01**

CO1:-Introduction,modes,development,classification,planning & alignment of highway in India.

CO2:-Design of highway & desirable properties, testing of material as per IRC code.

CO 3:-Method of highway construction, Equipment & design of flexible & rigid pavements as per IRC.

CO4:-Introduction of Railway,Waterways,Airways,Engineering

SIGHT DISTANCE

- Sight distance available from a point is the actual distance along the road surface, which a driver from a specified height above the carriageway has visibility of stationary or moving objects.

OR

- It is the length of road visible ahead to the driver at any instance.

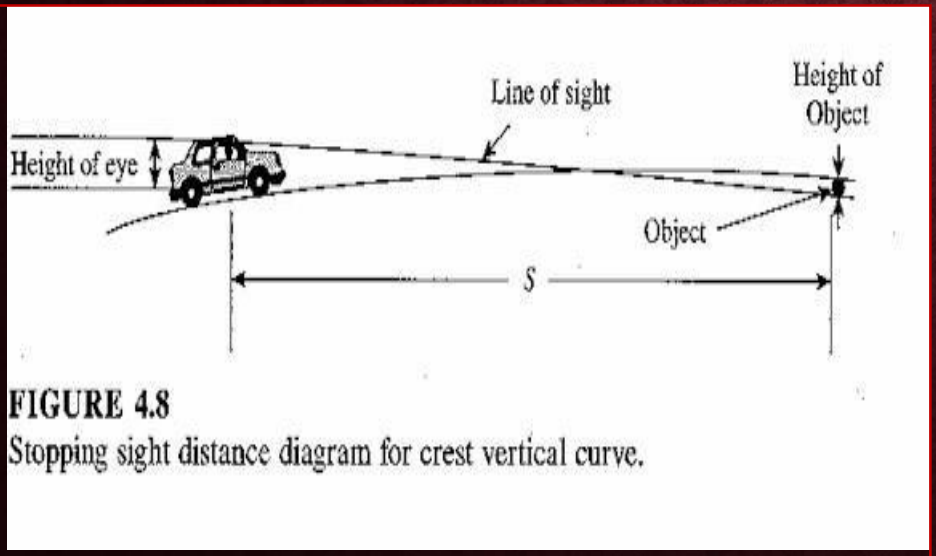
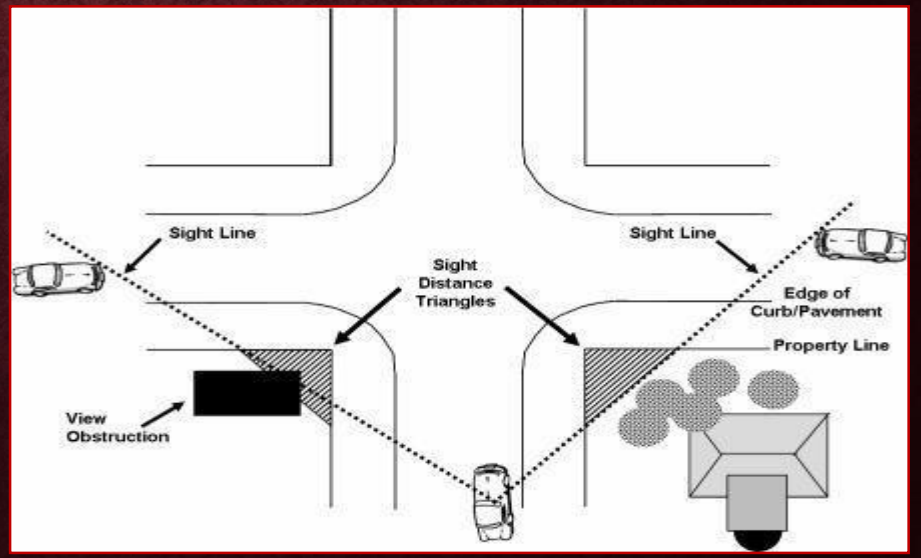


FIGURE 4.8
Stopping sight distance diagram for crest vertical curve.



Types of Sight distance

- Stopping or absolute minimum sight distance(SSD)
- Safe overtaking or passing sight distance (OSD)
- Safe sight distance for entering into uncontrolled intersection.
- Intermediate sight distance
- Head light sight distance

Stopping sight distance:

- The minimum sight distance available on a highway at any spot should be of sufficient length to stop a vehicle traveling at design speed, safely without collision with any other obstruction.

Over taking sight distance:

- The minimum distance open to the vision of the driver of a vehicle intending to overtake slow vehicle ahead with safety against the traffic of opposite direction is known as the minimum overtaking sight distance (OSD) or the safe passing sight distance.

Sight distance at intersection:

- Driver entering an uncontrolled intersection (particularly unsignalised Intersection) has sufficient visibility to enable him to take control of his vehicle and to avoid collision with
- another vehicle

Intermediate sight distance:

This is defined as twice the stopping sight distance. When overtaking sight distance can not be provided, intermediate sight distance is provided to give limited overtaking opportunities to fast vehicles.

Head light sight distance:

This is the distance visible to a driver during night driving under the illumination of the vehicle head lights. This sight distance is critical at up-gradients and at the ascending stretch of the valley curves.

Stopping Sight Distance

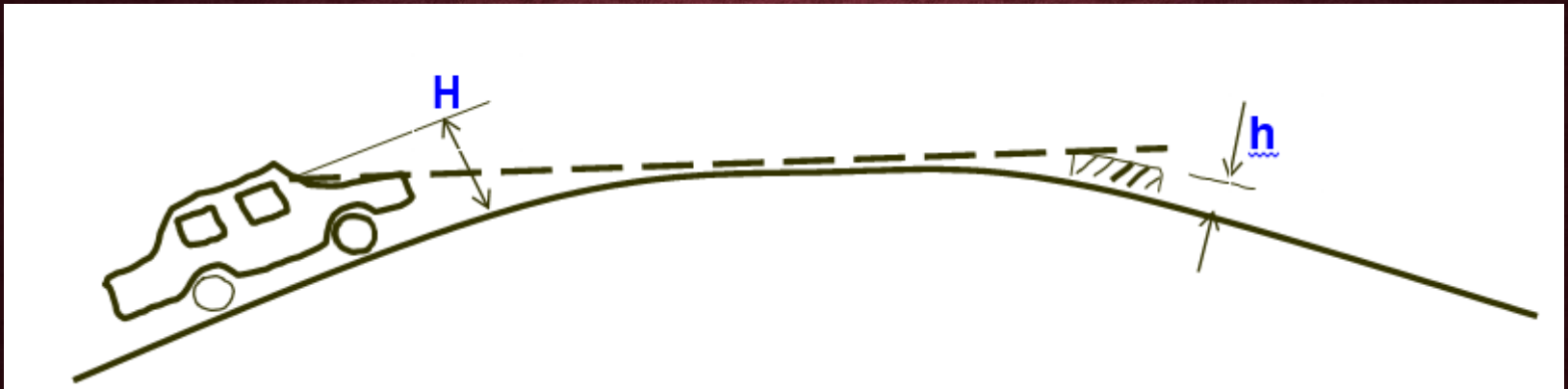
SSD is the minimum sight distance available on a highway at any spot having sufficient length to enable the driver to stop a vehicle traveling at design speed, safely without collision with any other obstruction.

It depends on:

- Feature of road ahead
- Height of driver's eye above the road surface(1.2m)
- Height of the object above the road surface(0.15m)

Criteria for measurement

- Height of driver's eye above road surface (H)
- Height of object above road surface(h)



IRC

- H = 1.2m
- h = 0.15m

Factors affecting the SSD

- Total reaction time of driver
- Speed of vehicle
- Efficiency of brakes
- Frictional resistance between road and tyre
- Gradient of road

Total reaction time of driver:

- It is the time taken from the instant the object is visible to the driver to the instant the brake is effectively applied, it divide into types

1. Perception time
2. Brake reaction time

Perception time:

- it is the time from the instant the object comes on the line of sight of the driver to the instant he realizes that the vehicle needs to be stopped.

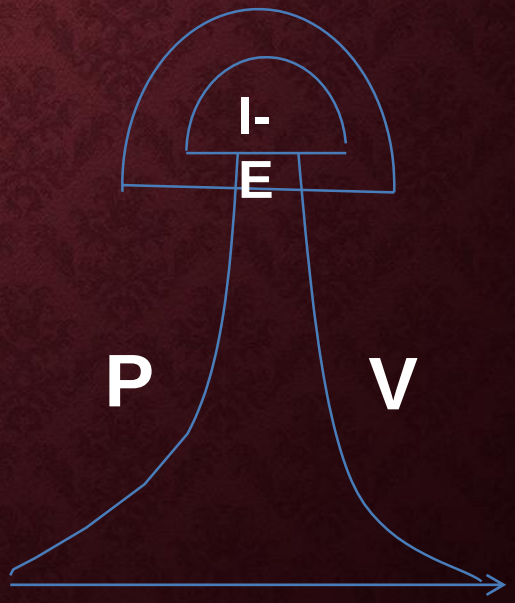
Total reaction time of driver is split into four parts:

Brake reaction time:

- The brake reaction also depends on several factor including the skill of the driver, the type of the problems and various other environment factor.
- Total reaction time of driver can be calculated by "PIEV" theory.

- "PIEV" Theory

P-perception
•I-intellection
•E-Emotion
V-Volition



perception

- It is the time required for the sensation received by the eyes or ears to be transmitted to the brain through the nervous system and spinal chord.

Intellection:

- It is the time required for understanding the situation.

Emotion:

- It is the time elapsed during emotional sensation and disturbance such as fear, anger or any other emotional feeling such as superstition etc, with reference to the situation.

Volition:

- It is the time taken for the final action

Total reaction time of driver may be vary from 0.5 sec to 4 sec

Analysis of SSD

- The stopping sight distance is the sum of lag distance and the braking distance.

Lag distance:

- It is the distance, the vehicle traveled during the reaction time
- If ‘V’ is the design speed in m/sec and ‘t’ is the total reaction time of the driver in seconds,

lag distance = v.t metres.
Where “v” in m/sec t=2.5 sec

Lag distance=0.278 V.t meters
Where “v” in Kmph,
T= time in sec=2.5 sec

Braking distance :

- It is the distance traveled by the vehicle after the application of brake. For a level road this is obtained by equating the work done in stopping the vehicle and the kinetic energy of the vehicle.
- work done against friction force in stopping the vehicle is F x l = f W l, where W is the total weight of the vehicle.
- The kinetic energy at the design speed of v m/sec will be ½ m. v^2

  Braking distance= $v^2/2gf$
- SSD=lag distance + braking distance
- SSD=0.278V.t + $v^2/2gf$

Table 2.6: Coefficient of longitudinal friction					
Speed, kmph	30	40	50	60	>80
Longitudinal coefficient of friction	**0.40**	**0.38**	**0.37**	**0.36**	**0.35**

- Two-way traffic single lane road: SSD=2*SSD
- In one-way traffic with single or more lane or two- way traffic with more than single lane: Minimum SSD= SSD


Thank
you