Sight Distance on a Horizontal Curve (Middle Ordinate)

Clearance needed to an obstruction for a required sight distance on a horizontal curve, and the sight distance that a given clearance provides.

Method: Middle ordinate of the sight line; AASHTO; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Radius to the centre of the inside lane	300.00	m
Required sight distance (along the lane)	160.00	m
Available clearance to the obstruction	8.0000	m

Calculated results

Parameter	Value	Unit
Clearance needed for S	10.604	m
Sight distance with the available clearance	138.87	m
Clearance margin	-2.6036	m

Notes for this case

• When the sight distance S is shorter than the curve, the line of sight is a chord whose arc along the lane is S; its middle ordinate is M = R[1 − cos(S/2R)] (S/2R in radians). Inverting gives the sight distance a clearance allows: S = 2R·acos(1 − M/R). Required stopping or passing sight distances come from the design speed; when S exceeds the curve length the line of sight extends onto the tangents and this formula is conservative.

Formula and method

$$M = R\left[1 - \cos\frac{S}{2R}\right], \quad S = 2R\cos^{-1}\left(1 - \frac{M}{R}\right)$$

Variables

R	Radius to the centre of the inside lane	m
S	Required sight distance (along the lane)	m
M_{av}	Available clearance to the obstruction	m
M	Clearance needed for S	m
S_{av}	Sight distance with the available clearance	m
$M_{av} - M$	Clearance margin	m

Method and standards

Curve sight distance.

Assumptions and limits

- Sight distance shorter than the curve; flat road (no vertical effect).

References

Middle ordinate of the sight line, AASHTO, A Policy on Geometric Design of Highways and Streets (method of the middle ordinate)

Report details

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Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/civil/surveying/horizontal-curve-sight-distance

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.