Overtaking Sight Distance on Two-Way Roads

Overtaking sight distance from design speed, overtaken vehicle speed, reaction time and acceleration: reaction, overtaking and opposing vehicle distances.

Method: Three-stage overtaking manoeuvre

Input parameters

Unit system: SI

Parameter	Value	Unit
Design speed (overtaking vehicle)	80.000	km/h
Overtaken vehicle speed	64.000	km/h
Reaction time	2.0000	s
Acceleration while overtaking	0.72000	m/s²
Spacing per unit speed	0.72000	s
Minimum spacing	6.0000	m
Road type	Two-way (opposing vehicle)	

Calculated results

Parameter	Value	Unit
Spacing between vehicles	18.800	m
Overtaking time	10.220	s
Reaction distance	35.556	m
Overtaking distance	219.29	m
Opposing vehicle distance	227.11	m
Overtaking sight distance	481.95	m

Notes for this case

• d_1 = V_b·t_r while the driver decides; overtaking covers 2s relative to the slower vehicle, T = √(4s/a), d_2 = V_bT + 2s; the opposing car travels d_3 = VT. Spacing s = k_sV_b + s_0 (0.2V + 6 m with V in km/h is common). Where V_b is not known, it is often taken about 16 km/h below the design speed.

Formula and method

$$OSD = V_b t_r + (V_b T + 2s) + VT, \quad T = \sqrt{\frac{4s}{a}}, \quad s = k_s V_b + s_0$$

Variables

V	Design speed (overtaking vehicle)	m/s
V_b	Overtaken vehicle speed	m/s
t_r	Reaction time	s
a	Acceleration while overtaking	m/s²
k_s	Spacing per unit speed	s
s_0	Minimum spacing	m
road	Road type	-
s	Spacing between vehicles	m
T	Overtaking time	s
d_1	Reaction distance	m

d_2	Overtaking distance	m
d_3	Opposing vehicle distance	m
OSD	Overtaking sight distance	m

Method and standards

Overtaking distance.

Assumptions and limits

- Level road; constant acceleration; one overtaken vehicle.

References

Three-stage overtaking manoeuvre

Report details

Report reference	FCC-3GDN-01Y4 (the same inputs always give the same reference)
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

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

This calculator online

https://calc.firecad.com/civil/roads/overtaking-sight-distance

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.