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Sight Distances of Highway Formulas

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List of 30 Sight Distances of Highway Formulas

Sight Distances of Highway

Coefficient of Friction

1) Coefficient of Friction given Stopping Sight Distance

$$fx \quad f = \frac{V_b^2}{2 \cdot [g] \cdot (SSD - (V_b \cdot t))}$$

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2_img.jpg\)](#)

$$ex \quad 0.047595 = \frac{(11.11\text{m/s})^2}{2 \cdot [g] \cdot (160\text{m} - (11.11\text{m/s} \cdot 2.5\text{s}))}$$

2) Coefficient of Longitudinal Friction given Breaking Distance

$$fx \quad f = \frac{V_b^2}{2 \cdot [g] \cdot BD}$$

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa_img.jpg\)](#)

$$ex \quad 0.157332 = \frac{(11.11\text{m/s})^2}{2 \cdot [g] \cdot 40\text{m}}$$

OSD

3) Acceleration of Vehicle given Total Time of Travel in Overtaking Sight distance

$$fx \quad a = \frac{4 \cdot s}{T^2}$$

[Open Calculator !\[\]\(235bfe13ebf007ce2eea9e689707fac7_img.jpg\)](#)

$$ex \quad 0.900723\text{m/s}^2 = \frac{4 \cdot 13.7\text{m}}{(7.8\text{s})^2}$$




4) Minimum Overtaking Distance 

$$fx \quad D = 3 \cdot OSD$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$ex \quad 834m = 3 \cdot 278m$$

5) Minimum Spacing between Vehicles during Overtaking 

$$fx \quad s = (0.7 \cdot V_b + 6)$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$ex \quad 13.777m = (0.7 \cdot 11.11m/s + 6)$$

6) Overtaking Sight Distance 

$$fx \quad OSD = V_b \cdot t_r + V_b \cdot T + 2 \cdot (0.7 \cdot V_b + 1) + V \cdot T$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$ex \quad 276.832m = 11.11m/s \cdot 2s + 11.11m/s \cdot 7.8s + 2 \cdot (0.7 \cdot 11.11m/s + 6m) + 18m/s \cdot 7.8s$$

7) Overtaking Sight Distance given Minimum Overtaking Distance 

$$fx \quad OSD = \frac{D}{3}$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754_img.jpg\)](#)

$$ex \quad 278m = \frac{834m}{3}$$

8) Reaction Time of Driver using OSD 

$$fx \quad t_r = \frac{OSD - V_b \cdot T - 1.4 \cdot V_b - 2 \cdot 1 - V \cdot T}{V_b}$$

[Open Calculator !\[\]\(aff7c69c44a5e015f18c35867ef3f5c3_img.jpg\)](#)

$$ex \quad 2.105131s = \frac{278m - 11.11m/s \cdot 7.8s - 1.4 \cdot 11.11m/s - 2 \cdot 6m - 18m/s \cdot 7.8s}{11.11m/s}$$



9) Spacing between Vehicles given Total Time of Travel in Overtaking Sight distance 

$$fx \quad s = \frac{(T^2) \cdot a}{4}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)


$$ex \quad 13.689m = \frac{((7.8s)^2) \cdot 0.9m/s^2}{4}$$

10) Speed of Slow Vehicle using OSD 

$$fx \quad V_b = \frac{OSD - V \cdot T - 2 \cdot l}{t_r + T + 1.4}$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

$$ex \quad 11.21429m/s = \frac{278m - 18m/s \cdot 7.8s - 2 \cdot 6m}{2s + 7.8s + 1.4}$$

11) Total Time of Travel in Overtaking Sight distance 

$$fx \quad T = \sqrt{4 \cdot \frac{s}{a}}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

$$ex \quad 7.803133s = \sqrt{4 \cdot \frac{13.7m}{0.9m/s^2}}$$

12) Velocity of Overtaking Vehicle for Forward Moving Vehicle Velocity in meter per second 

$$fx \quad V = V_b + 4.5$$

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b_img.jpg\)](#)

$$ex \quad 15.61m/s = 11.11m/s + 4.5$$



SSD 13) Intermediate Sight Distance 

$$fx \quad ISD = 2 \cdot SSD$$

[Open Calculator !\[\]\(74d4806277d7e73349d8e8c0897931e9_img.jpg\)](#)


$$ex \quad 320m = 2 \cdot 160m$$

14) Stopping Sight Distance 

$$fx \quad SSD = BD + LD$$

[Open Calculator !\[\]\(8bba887393ca45b761e5cb49e755e762_img.jpg\)](#)


$$ex \quad 67.7m = 40m + 27.7m$$

15) Stopping Sight Distance for Velocity in meter per second 

$$fx \quad SSD = V_b \cdot t + \frac{V_b^2}{2 \cdot [g] \cdot f}$$

[Open Calculator !\[\]\(0fb13ad0bfa3d86868cdd3883e5665b3_img.jpg\)](#)


$$ex \quad 69.73024m = 11.11m/s \cdot 2.5s + \frac{(11.11m/s)^2}{2 \cdot [g] \cdot 0.15}$$

16) Stopping Sight Distance given Intermediate Sight Distance 

$$fx \quad SSD = \frac{ISD}{2}$$

[Open Calculator !\[\]\(e50091943b385fe16d3277389202856f_img.jpg\)](#)

$$ex \quad 160m = \frac{320m}{2}$$


17) Stopping Sight Distance on Level Ground with Breaking Efficiency 

$$fx \quad SSD = V_b \cdot t + \frac{V_b^2}{2 \cdot [g] \cdot f \cdot \eta_x}$$

[Open Calculator !\[\]\(e119fc79c8f448683d20ba4c873025a2_img.jpg\)](#)


$$ex \quad 80.21905m = 11.11m/s \cdot 2.5s + \frac{(11.11m/s)^2}{2 \cdot [g] \cdot 0.15 \cdot 0.8}$$



18) Stopping Sight Distance on Upward Inclined Surface [Open Calculator](#) 


$$fx \quad SSD = V_b \cdot t + \frac{V_b^2}{2 \cdot [g] \cdot f + \Delta H}$$

$$ex \quad 34.65451m = 11.11m/s \cdot 2.5s + \frac{(11.11m/s)^2}{2 \cdot [g] \cdot 0.15 + 15m}$$

19) Total Reaction Time given Stopping Sight Distance [Open Calculator](#) 

$$fx \quad t = \frac{SSD - \frac{V_b^2}{2 \cdot [g] \cdot f}}{V_b}$$

$$ex \quad 10.62509s = \frac{160m - \frac{(11.11m/s)^2}{2 \cdot [g] \cdot 0.15}}{11.11m/s}$$

Braking Distance 20) Braking Distance on Inclined Surface [Open Calculator](#) 

$$fx \quad BD = \frac{V_b^2}{2 \cdot [g] \cdot f + 0.01 \cdot \Delta H}$$

$$ex \quad 39.91989m = \frac{(11.11m/s)^2}{2 \cdot [g] \cdot 0.15 + 0.01 \cdot 15m}$$

21) Braking Distance on Inclined Surface with Efficiency [Open Calculator](#) 

$$fx \quad BD = \frac{V_b^2}{2 \cdot [g] \cdot f \cdot \eta_x + 0.01 \cdot \Delta H}$$

$$ex \quad 49.30192m = \frac{(11.11m/s)^2}{2 \cdot [g] \cdot 0.15 \cdot 0.8 + 0.01 \cdot 15m}$$



22) Braking Distance on Level Ground with Efficiency [Open Calculator](#) 

$$fx \quad BD = \frac{V_b^2}{2 \cdot [g] \cdot f}$$

$$ex \quad 41.95524m = \frac{(11.11m/s)^2}{2 \cdot [g] \cdot 0.15}$$

23) Breaking Distance [Open Calculator](#) 


$$fx \quad BD = \frac{V_b^2}{2 \cdot [g] \cdot f}$$

$$ex \quad 41.95524m = \frac{(11.11m/s)^2}{2 \cdot [g] \cdot 0.15}$$

24) Breaking Distance given Stopping Sight Distance [Open Calculator](#) 

$$fx \quad BD = SSD - LD$$

$$ex \quad 132.3m = 160m - 27.7m$$

25) Velocity of Vehicle given Braking Distance [Open Calculator](#) 

$$fx \quad V_b = (BD \cdot (2 \cdot [g] \cdot f))^{0.5}$$


$$ex \quad 10.84803m/s = (40m \cdot (2 \cdot [g] \cdot 0.15))^{0.5}$$

26) Velocity of Vehicle in meter per second for Braking Distance [Open Calculator](#) 

$$fx \quad V_b = \sqrt{BD \cdot (2 \cdot [g] \cdot f)}$$

$$ex \quad 10.84803m/s = \sqrt{40m \cdot (2 \cdot [g] \cdot 0.15)}$$




Lag Distance 27) Lag Distance or Reaction Distance for Velocity 

$$fx \quad LD = V_b \cdot t$$

[Open Calculator !\[\]\(96cc62f861fdd6e50510c0224a756dff_img.jpg\)](#)

$$ex \quad 27.775m = 11.11m/s \cdot 2.5s$$

28) Lag Distance or Reaction Distance given Stopping Sight Distance 

$$fx \quad LD = SSD - BD$$

[Open Calculator !\[\]\(f95dab70c751fda7d824b8b03650f7aa_img.jpg\)](#)

$$ex \quad 120m = 160m - 40m$$

29) Reaction Time given Lag Distance or Reaction Distance 

$$fx \quad t = \frac{LD}{V_b}$$

[Open Calculator !\[\]\(e9474ce1d70442456f8fe9c393ea149c_img.jpg\)](#)

$$ex \quad 2.493249s = \frac{27.7m}{11.11m/s}$$

30) Velocity of Vehicle given Lag Distance or Reaction Distance 

$$fx \quad V_b = \frac{LD}{t}$$

[Open Calculator !\[\]\(9db214d549b9aeebe72aa11d3a5c4b1a_img.jpg\)](#)

$$ex \quad 11.08m/s = \frac{27.7m}{2.5s}$$







Variables Used

- **a** Acceleration (Meter per Square Second)
- **BD** Breaking Distance (Meter)
- **D** Minimum Length of OSD (Meter)
- **f** Design Coefficient of Friction
- **ISD** Intermediate Sight Distance (Meter)
- **l** Length of Wheel Base as per IRC (Meter)
- **LD** Lag Distance (Meter)
- **OSD** Overtaking Sight Distance on road (Meter)
- **s** Minimum Spacing between Vehicles during Overtaking (Meter)
- **SSD** Stopping Sight Distance (Meter)
- **t** Break Reaction Time (Second)
- **T** Time taken for Overtaking Operation (Second)
- **t_r** Reaction Time of Driver (Second)
- **V** Speed of Fast moving Vehicle (Meter per Second)
- **V_b** Speed of Slow moving vehicle (Meter per Second)
- **ΔH** Difference in Elevation (Meter)
- **η_x** Overall Efficiency from Shaft A to X



Constants, Functions, Measurements used

- **Constant:** [g], 9.80665 Meter/Second²
Gravitational acceleration on Earth
- **Function:** sqrt, sqrt(Number)
Square root function
- **Measurement:** **Length** in Meter (m)
Length Unit Conversion 
- **Measurement:** **Time** in Second (s)
Time Unit Conversion 
- **Measurement:** **Speed** in Meter per Second (m/s)
Speed Unit Conversion 
- **Measurement:** **Acceleration** in Meter per Square Second (m/s²)
Acceleration Unit Conversion 



Check other formula lists

- [Highway and Road Formulas](#) 
- [Sight Distances of Highway Formulas](#) 
- [Highway Geometric Design Formulas](#) 

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