

Important Sight Distances of Highway Formulas PDF

Formulas
Examples
with Units



List of 30 Important Sight Distances of Highway Formulas

1) Coefficient of Friction Formulas

1.1) Coefficient of Friction given Stopping Sight Distance Formula

Formula

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

Evaluate Formula

Example with Units

$$0.0476 = \frac{11.11 \text{ m/s}^2}{2 \cdot 9.8066 \text{ m/s}^2 \cdot (160 \text{ m} - (11.11 \text{ m/s} \cdot 2.5 \text{ s}))}$$

1.2) Coefficient of Longitudinal Friction given Breaking Distance Formula

Formula

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

Example with Units

$$0.1573 = \frac{11.11 \text{ m/s}^2}{2 \cdot 9.8066 \text{ m/s}^2 \cdot 40 \text{ m}}$$

Evaluate Formula

2) OSD Formulas

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

Formula

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

Example with Units

$$0.9007 \text{ m/s}^2 = \frac{4 \cdot 13.7 \text{ m}}{7.8 \text{ s}^2}$$

Evaluate Formula

2.2) Minimum Overtaking Distance Formula

Formula

$$D = 3 \cdot OSD$$

Example with Units

$$834 \text{ m} = 3 \cdot 278 \text{ m}$$

Evaluate Formula

2.3) Minimum Spacing between Vehicles during Overtaking Formula

Formula

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

Example with Units

$$13.777 \text{ m} = (0.7 \cdot 11.11 \text{ m/s} + 6)$$

Evaluate Formula



2.4) Overtaking Sight Distance Formula ↻

Formula

$$OSD = V_b \cdot t_r + V_b \cdot T + 2 \cdot (0.7 \cdot V_b + l) + V \cdot T$$

Evaluate Formula ↻

Example with Units

$$276.832 \text{ m} = 11.11 \text{ m/s} \cdot 2 \text{ s} + 11.11 \text{ m/s} \cdot 7.8 \text{ s} + 2 \cdot (0.7 \cdot 11.11 \text{ m/s} + 6 \text{ m}) + 18 \text{ m/s} \cdot 7.8 \text{ s}$$

2.5) Overtaking Sight Distance given Minimum Overtaking Distance Formula ↻

Formula

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

Example with Units

$$278 \text{ m} = \frac{834 \text{ m}}{3}$$

Evaluate Formula ↻

2.6) Reaction Time of Driver using OSD Formula ↻

Formula

$$t_r = \frac{OSD - V_b \cdot T - 1.4 \cdot V_b \cdot l - V \cdot T}{V_b}$$

Evaluate Formula ↻

Example with Units

$$2.1051 \text{ s} = \frac{278 \text{ m} - 11.11 \text{ m/s} \cdot 7.8 \text{ s} - 1.4 \cdot 11.11 \text{ m/s} \cdot 2 \cdot 6 \text{ m} - 18 \text{ m/s} \cdot 7.8 \text{ s}}{11.11 \text{ m/s}}$$

2.7) Spacing between Vehicles given Total Time of Travel in Overtaking Sight distance Formula ↻

Formula

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

Example with Units

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

Evaluate Formula ↻

2.8) Speed of Slow Vehicle using OSD Formula ↻

Formula

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

Example with Units

$$11.2143 \text{ m/s} = \frac{278 \text{ m} - 18 \text{ m/s} \cdot 7.8 \text{ s} - 2 \cdot 6 \text{ m}}{2 \text{ s} + 7.8 \text{ s} + 1.4}$$

Evaluate Formula ↻

2.9) Total Time of Travel in Overtaking Sight distance Formula ↻

Formula

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

Example with Units

$$7.8031 \text{ s} = \sqrt{4 \cdot \frac{13.7 \text{ m}}{0.9 \text{ m/s}^2}}$$

Evaluate Formula ↻



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

Formula

Formula

$$V = V_b + 4.5$$

Example with Units

$$15.61\text{m/s} = 11.11\text{m/s} + 4.5$$

Evaluate Formula 

3) SSD Formulas

3.1) Intermediate Sight Distance Formula

Formula

$$\text{ISD} = 2 \cdot \text{SSD}$$

Example with Units

$$320\text{m} = 2 \cdot 160\text{m}$$

Evaluate Formula 

3.2) Stopping Sight Distance Formula

Formula

$$\text{SSD} = \text{BD} + \text{LD}$$

Example with Units

$$67.7\text{m} = 40\text{m} + 27.7\text{m}$$

Evaluate Formula 

3.3) Stopping Sight Distance for Velocity in meter per second Formula

Formula

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

Example with Units

$$69.7302\text{m} = 11.11\text{m/s} \cdot 2.5\text{s} + \frac{11.11\text{m/s}^2}{2 \cdot 9.8066\text{m/s}^2 \cdot 0.15}$$

Evaluate Formula 

3.4) Stopping Sight Distance given Intermediate Sight Distance Formula

Formula

$$\text{SSD} = \frac{\text{ISD}}{2}$$

Example with Units

$$160\text{m} = \frac{320\text{m}}{2}$$

Evaluate Formula 

3.5) Stopping Sight Distance on Level Ground with Breaking Efficiency Formula

Formula

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

Example with Units

$$80.219\text{m} = 11.11\text{m/s} \cdot 2.5\text{s} + \frac{11.11\text{m/s}^2}{2 \cdot 9.8066\text{m/s}^2 \cdot 0.15 \cdot 0.8}$$

Evaluate Formula 

3.6) Stopping Sight Distance on Upward Inclined Surface Formula

Formula

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

Example with Units

$$34.6545\text{m} = 11.11\text{m/s} \cdot 2.5\text{s} + \frac{11.11\text{m/s}^2}{2 \cdot 9.8066\text{m/s}^2 \cdot 0.15 + 15\text{m}}$$

Evaluate Formula 



3.7) Total Reaction Time given Stopping Sight Distance Formula ↻

Formula

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

Example with Units

$$10.6251 \text{ s} = \frac{160 \text{ m} - \frac{11.11 \text{ m/s}^2}{2 \cdot 9.8066 \text{ m/s}^2 \cdot 0.15}}{11.11 \text{ m/s}}$$

Evaluate Formula ↻

3.8) Braking Distance Formulas ↻

3.8.1) Braking Distance on Inclined Surface Formula ↻

Formula

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

Example with Units

$$39.9199 \text{ m} = \frac{11.11 \text{ m/s}^2}{2 \cdot 9.8066 \text{ m/s}^2 \cdot 0.15 + 0.01 \cdot 15 \text{ m}}$$

Evaluate Formula ↻

3.8.2) Braking Distance on Inclined Surface with Efficiency Formula ↻

Formula

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

Example with Units

$$49.3019 \text{ m} = \frac{11.11 \text{ m/s}^2}{2 \cdot 9.8066 \text{ m/s}^2 \cdot 0.15 \cdot 0.8 + 0.01 \cdot 15 \text{ m}}$$

Evaluate Formula ↻

3.8.3) Braking Distance on Level Ground with Efficiency Formula ↻

Formula

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

Example with Units

$$41.9552 \text{ m} = \frac{11.11 \text{ m/s}^2}{2 \cdot 9.8066 \text{ m/s}^2 \cdot 0.15}$$

Evaluate Formula ↻

3.8.4) Breaking Distance Formula ↻

Formula

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

Example with Units

$$41.9552 \text{ m} = \frac{11.11 \text{ m/s}^2}{2 \cdot 9.8066 \text{ m/s}^2 \cdot 0.15}$$

Evaluate Formula ↻

3.8.5) Breaking Distance given Stopping Sight Distance Formula ↻

Formula

$$BD = SSD - LD$$

Example with Units

$$132.3 \text{ m} = 160 \text{ m} - 27.7 \text{ m}$$

Evaluate Formula ↻

3.8.6) Velocity of Vehicle given Breaking Distance Formula ↻

Formula

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

Example with Units

$$10.848 \text{ m/s} = (40 \text{ m} \cdot (2 \cdot 9.8066 \text{ m/s}^2 \cdot 0.15))^{0.5}$$

Evaluate Formula ↻



3.8.7) Velocity of Vehicle in meter per second for Braking Distance Formula

Formula

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

Example with Units

$$10.848 \text{ m/s} = \sqrt{40 \text{ m} \cdot (2 \cdot 9.8066 \text{ m/s}^2 \cdot 0.15)}$$

Evaluate Formula 

3.9) Lag Distance Formulas

3.9.1) Lag Distance or Reaction Distance for Velocity Formula

Formula

$$LD = V_b \cdot t$$

Example with Units

$$27.775 \text{ m} = 11.11 \text{ m/s} \cdot 2.5 \text{ s}$$

Evaluate Formula 

3.9.2) Lag Distance or Reaction Distance given Stopping Sight Distance Formula

Formula

$$LD = SSD - BD$$

Example with Units

$$120 \text{ m} = 160 \text{ m} - 40 \text{ m}$$

Evaluate Formula 

3.9.3) Reaction Time given Lag Distance or Reaction Distance Formula

Formula

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

Example with Units

$$2.4932 \text{ s} = \frac{27.7 \text{ m}}{11.11 \text{ m/s}}$$

Evaluate Formula 

3.9.4) Velocity of Vehicle given Lag Distance or Reaction Distance Formula

Formula

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

Example with Units

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





Evaluate Formula 



Variables used in list of Sight Distances of Highway Formulas above

- **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 in list of Sight Distances of Highway Formulas above

- **constant(s):** [g], 9.80665
Gravitational acceleration on Earth
- **Functions:** sqrt, sqrt(Number)
A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- **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 



Download other Important Highway Engineering PDFs

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

Try our Unique Visual Calculators

-  [Percentage share](#) 
-  [Improper fraction](#) 
-  [HCF of two numbers](#) 

Please SHARE this PDF with someone who needs it!

This PDF can be downloaded in these languages

[English](#) [Spanish](#) [French](#) [German](#) [Russian](#) [Italian](#) [Portuguese](#) [Polish](#) [Dutch](#)

7/9/2024 | 4:17:20 AM UTC

