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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

Open Calculator

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

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

2) Coefficient of Longitudinal Friction given Breaking Distance

Open Calculator

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

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

OSD

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

Open Calculator

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

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

4) Minimum Overtaking Distance

Open Calculator

fx $D = 3 \cdot OSD$

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

5) Minimum Spacing between Vehicles during Overtaking

Open Calculator

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

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

6) Overtaking Sight Distance

Open Calculator

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

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

7) Overtaking Sight Distance given Minimum Overtaking Distance

Open Calculator

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

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

8) Reaction Time of Driver using OSD

Open Calculator

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

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

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

Open Calculator

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

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

10) Speed of Slow Vehicle using OSD

Open Calculator

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

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

11) Total Time of Travel in Overtaking Sight distance

Open Calculator

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

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

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

Open Calculator

fx $V = V_b + 4.5$

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

SSD

13) Intermediate Sight Distance

Open Calculator

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

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

14) Stopping Sight Distance

Open Calculator

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

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

15) Stopping Sight Distance for Velocity in meter per second

Open Calculator

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

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

16) Stopping Sight Distance given Intermediate Sight Distance

Open Calculator

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

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

17) Stopping Sight Distance on Level Ground with Breaking Efficiency

Open Calculator

$$\text{SSD} = \text{V}_\text{b} \cdot \text{t} + \frac{\text{V}_\text{b}^2}{2 \cdot [\text{g}] \cdot \text{f} \cdot \eta_\text{x}}$$

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

18) Stopping Sight Distance on Upward Inclined Surface

Open Calculator

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

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

19) Total Reaction Time given Stopping Sight Distance

Open Calculator

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

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

Braking Distance

20) Braking Distance on Inclined Surface

Open Calculator

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

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

21) Braking Distance on Inclined Surface with Efficiency

Open Calculator

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

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

22) Braking Distance on Level Ground with Efficiency

Open Calculator

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

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

23) Breaking Distance

Open Calculator

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

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

24) Breaking Distance given Stopping Sight Distance

Open Calculator

$$BD = SSD - LD$$

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

25) Velocity of Vehicle given Breaking Distance

Open Calculator

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

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

26) Velocity of Vehicle in meter per second for Braking Distance

Open Calculator

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

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

Lag Distance

27) Lag Distance or Reaction Distance for Velocity

Open Calculator

$$LD = V_b \cdot t$$

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

28) Lag Distance or Reaction Distance given Stopping Sight Distance

Open Calculator

$$LD = SSD - BD$$

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

29) Reaction Time given Lag Distance or Reaction Distance

Open Calculator

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

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

30) Velocity of Vehicle given Lag Distance or Reaction Distance

Open Calculator

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

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

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**
- **Highway Geometric Design Formulas**
- **Sight Distances of Highway Formulas**

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