



calculatoratoz.com



unitsconverters.com

Cable System, Sag and Drainage on Bridges Formulas

Calculators!

Examples!

Conversions!

Bookmark calculatoratoz.com, unitsconverters.com

Widest Coverage of Calculators and Growing - **30,000+ Calculators!**
Calculate With a Different Unit for Each Variable - **In built Unit Conversion!**
Widest Collection of Measurements and Units - **250+ Measurements!**

Feel free to SHARE this document with your friends!

[Please leave your feedback here...](#)



List of 17 Cable System, Sag and Drainage on Bridges Formulas

Cable System, Sag and Drainage on Bridges

Cable Systems

1) Cable Tension using Natural Frequency of Each Cable

$$fx \quad T = \left(\left(\omega_n \cdot \frac{L_{span}}{n} \cdot \pi \right)^2 \right) \cdot \frac{q}{[g]}$$

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

$$ex \quad 600.9406kN = \left(\left(5.1Hz \cdot \frac{15m}{9.9} \cdot \pi \right)^2 \right) \cdot \frac{10.0kN/m}{[g]}$$

2) Fundamental Vibration Mode given Natural Frequency of Each Cable

$$fx \quad n = \frac{\omega_n \cdot \pi \cdot L_{span}}{\sqrt{T}} \cdot \sqrt{\frac{q}{[g]}}$$

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

$$ex \quad 9.907757 = \frac{5.1Hz \cdot \pi \cdot 15m}{\sqrt{600kN}} \cdot \sqrt{\frac{10.0kN/m}{[g]}}$$



3) Natural Frequency of Each Cable

[Open Calculator !\[\]\(4729e517bc6a7cd81c8025b9646574fb_img.jpg\)](#)

$$fx \quad \omega_n = \left(\frac{n}{\pi \cdot L_{span}} \right) \cdot \sqrt{T \cdot \frac{[g]}{q}}$$

$$ex \quad 5.096007Hz = \left(\frac{9.9}{\pi \cdot 15m} \right) \cdot \sqrt{600kN \cdot \frac{[g]}{10.0kN/m}}$$

4) Span of Cable given Natural Frequency of Each Cable

[Open Calculator !\[\]\(e474458956c9a37fbf9586ddb60a7fa1_img.jpg\)](#)

$$fx \quad L_{span} = \left(\frac{n}{\pi \cdot \omega_n} \right) \cdot \sqrt{T \cdot \left(\frac{[g]}{q} \right)}$$

$$ex \quad 14.98826m = \left(\frac{9.9}{\pi \cdot 5.1Hz} \right) \cdot \sqrt{600kN \cdot \left(\frac{[g]}{10.0kN/m} \right)}$$

Catenary Cable Sag and Distance between Supports

5) Catenary Parameter for UDL on Catenary Parabolic Cable

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

$$fx \quad c = \left(\frac{T_s}{q} \right) - d$$

$$ex \quad 19.56m = \left(\frac{210kN}{10.0kN/m} \right) - 1.44m$$



6) Maximum Sag given Catenary Parameter for UDL on Catenary Parabolic Cable

$$fx \quad d = (-c) + \left(\frac{T_s}{q} \right)$$

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

$$ex \quad 1.44m = (-19.56m) + \left(\frac{210kN}{10.0kN/m} \right)$$

7) Span of Cable given Catenary Parameter for UDL on Catenary Parabolic Cable

$$fx \quad L_{span} = 2 \cdot c$$

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

$$ex \quad 39.12m = 2 \cdot 19.56m$$

8) Tension at Supports given Catenary Parameter for UDL on Catenary Parabolic Cable

$$fx \quad T_s = (d + c) \cdot q$$

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

$$ex \quad 210kN = (1.44m + 19.56m) \cdot 10.0kN/m$$

9) Total Sag given Catenary Parameter for UDL on Catenary Parabolic Cable

$$fx \quad f_{cable} = d + c$$

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

$$ex \quad 21m = 1.44m + 19.56m$$



10) UDL given Catenary Parameter for UDL on Catenary Parabolic Cable

$$fx \quad q = \frac{T_s}{d + c}$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

$$ex \quad 10\text{kN/m} = \frac{210\text{kN}}{1.44\text{m} + 19.56\text{m}}$$

Rainwater Accumulation and Drainage on Bridges

11) Average Rainfall Intensity given Runoff Rate of Rainwater from Bridge during Rainstorm

$$fx \quad I = \frac{q_p}{1.00083 \cdot C_r \cdot A_{\text{catchment}}}$$

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

$$ex \quad 16.00032\text{mm/min} = \frac{1.256\text{m}^3/\text{s}}{1.00083 \cdot 0.5 \cdot 9412\text{m}^2}$$

12) Deck Width for Handling Rainwater Runoff to Drain Scuppers

$$fx \quad w = S + \frac{t}{3}$$

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

$$ex \quad 4.5\text{m} = 2.5\text{m} + \frac{6}{3}$$



13) Drainage Area given Runoff Rate of Rainwater from Bridge during Rainstorm

$$\text{fx } A_{\text{catchment}} = \frac{q_p}{1.00083 \cdot C_r \cdot I}$$

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

$$\text{ex } 9412.188\text{m}^2 = \frac{1.256\text{m}^3/\text{s}}{1.00083 \cdot 0.5 \cdot 16\text{mm}/\text{min}}$$

14) Runoff Coefficient given Runoff Rate of Rainwater from Bridge during Rainstorm

$$\text{fx } C_r = \frac{q_p}{1.00083 \cdot I \cdot A_{\text{catchment}}}$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

$$\text{ex } 0.50001 = \frac{1.256\text{m}^3/\text{s}}{1.00083 \cdot 16\text{mm}/\text{min} \cdot 9412\text{m}^2}$$

15) Runoff Rate of Rainwater from Bridge during Rainstorm

$$\text{fx } q_p = 1.00083 \cdot C_r \cdot I \cdot A_{\text{catchment}}$$

[Open Calculator !\[\]\(ab4e2b3fc7e7887b7a72f548aa6f5e60_img.jpg\)](#)

$$\text{ex } 1.255975\text{m}^3/\text{s} = 1.00083 \cdot 0.5 \cdot 16\text{mm}/\text{min} \cdot 9412\text{m}^2$$

16) Shoulder Width for Deck Width of Rainwater Runoff to Drain Scuppers

$$\text{fx } S = w - \left(\frac{t}{3} \right)$$

[Open Calculator !\[\]\(5abce1a84a655b073239ab33e1199487_img.jpg\)](#)

$$\text{ex } 2.5\text{m} = 4.5\text{m} - \left(\frac{6}{3} \right)$$



17) Traffic Lane given Deck Width for Handling Rainwater Runoff to Drain Scuppers

$$\text{fx } t = (w - S) \cdot 3$$

[Open Calculator !\[\]\(9dfdaff1d86ba3c1f8353b4d1b61b8c5_img.jpg\)](#)

$$\text{ex } 6 = (4.5\text{m} - 2.5\text{m}) \cdot 3$$










Variables Used

- **A_{catchment}** Catchment Area for Rainstorm (Square Meter)
- **c** Catenary Parameter (Meter)
- **C_r** Runoff Coefficient
- **d** Maximum Sag (Meter)
- **f_{cable}** Sag of Cable (Meter)
- **I** Intensity of Rainfall (Millimeter per Minute)
- **L_{span}** Cable Span (Meter)
- **n** Fundamental Vibration Mode
- **q** Uniformly Distributed Load (Kilonewton per Meter)
- **q_p** Peak Rate of Runoff (Cubic Meter per Second)
- **S** Shoulder Width (Meter)
- **t** Number of Traffic Lane
- **T** Cable Tension (Kilonewton)
- **T_s** Tension at Supports (Kilonewton)
- **w** Width of Deck (Meter)
- **ω_n** Natural Frequency (Hertz)



Constants, Functions, Measurements used

- **Constant:** **pi**, 3.14159265358979323846264338327950288
Archimedes' constant
- **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:** **Area** in Square Meter (m²)
Area Unit Conversion 
- **Measurement:** **Speed** in Millimeter per Minute (mm/min)
Speed Unit Conversion 
- **Measurement:** **Force** in Kilonewton (kN)
Force Unit Conversion 
- **Measurement:** **Frequency** in Hertz (Hz)
Frequency Unit Conversion 
- **Measurement:** **Volumetric Flow Rate** in Cubic Meter per Second (m³/s)
Volumetric Flow Rate Unit Conversion 
- **Measurement:** **Surface Tension** in Kilonewton per Meter (kN/m)
Surface Tension Unit Conversion 



Check other formula lists

- [Cable System, Sag and Drainage on Bridges Formulas](#) 
- [Parabolic Cable Tension and Length Formulas](#) 
- [General Relation for Suspension Cables Formulas](#) 

Feel free to SHARE this document with your friends!

PDF Available in

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

2/20/2024 | 2:35:02 PM UTC

[Please leave your feedback here...](#)

