calculatoratoz.com

unitsconverters.com

Flow Velocity in Straight Sewers 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 33 Flow Velocity in Straight Sewers Formulas

Flow Velocity in Straight Sewers

1) Area given Water Flow Equation

Open Calculator

fx $$A_{cs} = \frac{Q_w}{V_f}$$

ex $$13.04464\text{m}^2 = \frac{14.61\text{m}^3/\text{s}}{1.12\text{m/s}}$$

2) Conversion Factor given Flow Velocity

Open Calculator

fx $$C = \left(\frac{V_f \cdot n_c}{\left(S^{\frac{1}{2}}\right) \cdot r_H^{\frac{2}{3}}} \right)$$

ex $$0.028193 = \left(\frac{1.12\text{m/s} \cdot 0.017}{\left((2\text{J})^{\frac{1}{2}}\right) \cdot (0.33\text{m})^{\frac{2}{3}}} \right)$$

3) Energy Loss given Flow Velocity

Open Calculator

$$S = \left(\frac{V_f \cdot n_c}{C \cdot r_H^{\frac{2}{3}}} \right)^2$$

$$2.027679\text{J} = \left(\frac{1.12\text{m/s} \cdot 0.017}{0.028 \cdot (0.33\text{m})^{\frac{2}{3}}} \right)^2$$

4) Flow Velocity using Manning's formula

Open Calculator

$$V_f = \frac{C \cdot r_H^{\frac{2}{3}} \cdot S^{\frac{1}{2}}}{n_c}$$

$$1.112329\text{m/s} = \frac{0.028 \cdot (0.33\text{m})^{\frac{2}{3}} \cdot (2\text{J})^{\frac{1}{2}}}{0.017}$$

5) Hydraulic Radius given Flow Velocity

Open Calculator

$$r_H = \left(\frac{V_f \cdot n_c}{C \cdot S^{\frac{1}{2}}} \right)^{\frac{3}{2}}$$

$$0.333419\text{m} = \left(\frac{1.12\text{m/s} \cdot 0.017}{0.028 \cdot (2\text{J})^{\frac{1}{2}}} \right)^{\frac{3}{2}}$$

6) Roughness Coefficient using Flow Velocity

Open Calculator

fx $$n_c = \frac{C \cdot r_H^{\frac{2}{3}} \cdot S^{\frac{1}{2}}}{V_f}$$

ex $$0.016884 = \frac{0.028 \cdot (0.33\text{m})^{\frac{2}{3}} \cdot (2\text{J})^{\frac{1}{2}}}{1.12\text{m/s}}$$

7) Velocity using Water Flow Equation

Open Calculator

fx $$V_f = \frac{Q_w}{A_{cs}}$$

ex $$1.123846\text{m/s} = \frac{14.61\text{m}^3\text{/s}}{13\text{m}^2}$$

8) Water Flow Equation

Open Calculator

fx $$Q_w = A_{cs} \cdot V_f$$

ex $$14.56\text{m}^3\text{/s} = 13\text{m}^2 \cdot 1.12\text{m/s}$$

Controlling Sewer Water Flow

9) Area for Siphon Throat

Open Calculator

$$A_{siphon} = \frac{Q}{C_d \cdot (2 \cdot g \cdot H)^{\frac{1}{2}}}$$

$$0.093066\text{m}^2 = \frac{1.5\text{m}^3/\text{s}}{0.94 \cdot (2 \cdot 9.8\text{m}/\text{s}^2 \cdot 15\text{m})^{\frac{1}{2}}}$$

10) Coefficient of Discharge given Area for Siphon Throat

Open Calculator

$$C_{d'} = \frac{Q}{A_s \cdot (2 \cdot g \cdot H)^{\frac{1}{2}}}$$

$$0.729015 = \frac{1.5\text{m}^3/\text{s}}{0.12\text{m}^2 \cdot (2 \cdot 9.8\text{m}/\text{s}^2 \cdot 15\text{m})^{\frac{1}{2}}}$$

11) Depth of Flow over Weir given Flow Diversion

Open Calculator

$$h = \left(\frac{Q}{3.32 \cdot (L_{weir})^{0.83}} \right)^{\frac{1}{1.67}}$$

$$0.801024\text{m} = \left(\frac{1.5\text{m}^3/\text{s}}{3.32 \cdot (0.60\text{m})^{0.83}} \right)^{\frac{1}{1.67}}$$

12) Discharge given Area for Siphon Throat

Open Calculator

$$Q = A_s \cdot C_d \cdot (2 \cdot g \cdot H)^{\frac{1}{2}}$$

$$1.934117\text{m}^3/\text{s} = 0.12\text{m}^2 \cdot 0.94 \cdot (2 \cdot 9.8\text{m/s}^2 \cdot 15\text{m})^{\frac{1}{2}}$$

13) Flow Diversion for Side Weir

Open Calculator

$$Q = 3.32 \cdot L_{weir}^{0.83} \cdot h^{1.67}$$

$$1.4968\text{m}^3/\text{s} = 3.32 \cdot (0.60\text{m})^{0.83} \cdot (0.80\text{m})^{1.67}$$

14) Head given Area for Siphon Throat

Open Calculator

$$H = \left(\frac{Q}{A_s \cdot C_d}\right)^2 \cdot \left(\frac{1}{2 \cdot g}\right)$$

$$9.022113\text{m} = \left(\frac{1.5\text{m}^3/\text{s}}{0.12\text{m}^2 \cdot 0.94}\right)^2 \cdot \left(\frac{1}{2 \cdot 9.8\text{m/s}^2}\right)$$

15) Length of Weir given Flow Diversion

Open Calculator

$$L_{weir} = \left(\frac{Q}{3.32 \cdot h^{1.67}}\right)^{\frac{1}{0.83}}$$

$$0.601546\text{m} = \left(\frac{1.5\text{m}^3/\text{s}}{3.32 \cdot (0.80\text{m})^{1.67}}\right)^{\frac{1}{0.83}}$$

Disposing of Storm Water

16) Area of Opening given Inlet Capacity for Flow Depth more than 1ft 5in

Open Calculator

fx $$A_o = \frac{Q_i}{0.6 \cdot (2 \cdot g \cdot D)^{\frac{1}{2}}}$$

ex $$9.128709\text{m}^2 = \frac{42\text{m}^3/\text{s}}{0.6 \cdot (2 \cdot 9.8\text{m/s}^2 \cdot 3\text{m})^{\frac{1}{2}}}$$

17) Depression in Curb Inlet given Runoff Quantity with Full Gutter flow

Open Calculator

fx $$a = \left(\left(\frac{Q_{ro}}{0.7 \cdot L_o}\right)^{\frac{2}{3}}\right) - y$$

ex $$4.000442\text{ft} = \left(\left(\frac{329\text{ft}^3/\text{s}}{0.7 \cdot 7\text{ft}}\right)^{\frac{2}{3}}\right) - 7.117\text{ft}$$

18) Depth of Flow at Inlet given Inlet Capacity for Flow Depth up to 4.8in

Open Calculator

fx $$y = \left(\frac{Q_w}{3 \cdot P}\right)^{\frac{2}{3}}$$

ex $$7.117831\text{ft} = \left(\frac{14.61\text{m}^3/\text{s}}{3 \cdot 5\text{ft}}\right)^{\frac{2}{3}}$$

19) Depth of Flow at Inlet given Runoff Quantity with Full Gutter Flow

Open Calculator

fx $$y = \left(\left(\frac{Q_{ro}}{0.7 \cdot L_o}\right)^{\frac{2}{3}}\right) - a$$

ex $$7.117442\text{ft} = \left(\left(\frac{329\text{ft}^3/\text{s}}{0.7 \cdot 7\text{ft}}\right)^{\frac{2}{3}}\right) - 4\text{ft}$$

20) Depth of Flow given Inlet Capacity for Flow Depth more than 1ft 5in

Open Calculator

fx $$D = \left(\left(\frac{Q_i}{0.6 \cdot A_o}\right)^2\right) \cdot \left(\frac{1}{2 \cdot g}\right)$$

ex $$3.000466\text{m} = \left(\left(\frac{42\text{m}^3/\text{s}}{0.6 \cdot 9.128\text{m}^2}\right)^2\right) \cdot \left(\frac{1}{2 \cdot 9.8\text{m}/\text{s}^2}\right)$$

21) Inlet Capacity for Flow Depth

Open Calculator

fx $$Q_w = 3 \cdot P \cdot y^{\frac{3}{2}}$$

ex $$14.60744\text{m}^3/\text{s} = 3 \cdot 5\text{ft} \cdot (7.117\text{ft})^{\frac{3}{2}}$$

22) Inlet Capacity for Flow Depth more than 1ft 5in

Open Calculator

fx $$Q_i = 0.6 \cdot A_o \cdot \left((2 \cdot g \cdot D)^{\frac{1}{2}}\right)$$

ex $$41.99674\text{m}^3/\text{s} = 0.6 \cdot 9.128\text{m}^2 \cdot \left((2 \cdot 9.8\text{m}/\text{s}^2 \cdot 3\text{m})^{\frac{1}{2}}\right)$$

23) Length of Opening given Runoff Quantity with Full Gutter Flow

Open Calculator

fx $$L_o = \frac{Q_{ro}}{0.7 \cdot (a + y)^{\frac{3}{2}}}$$

ex $$7.000417\text{ft} = \frac{329\text{ft}^3/\text{s}}{0.7 \cdot (4\text{ft} + 7.117\text{ft})^{\frac{3}{2}}}$$

24) Perimeter when Inlet Capacity for Flow Depth is up to 4.8 inches

Open Calculator

fx $$P = \frac{Q_w}{3 \cdot y^{\frac{3}{2}}}$$

ex $$5.000876\text{ft} = \frac{14.61\text{m}^3/\text{s}}{3 \cdot (7.117\text{ft})^{\frac{3}{2}}}$$

25) Runoff Quantity with Full Gutter Flow

Open Calculator

fx $$Q_{ro} = 0.7 \cdot L_o \cdot (a + y)^{\frac{3}{2}}$$

ex $$328.9804\text{ft}^3/\text{s} = 0.7 \cdot 7\text{ft} \cdot (4\text{ft} + 7.117\text{ft})^{\frac{3}{2}}$$

Required Flow Velocity

26) Coefficient of Roughness given Flow Quantity of Full Flowing Sewer

Open Calculator

$$n_c = \frac{0.463 \cdot S^{\frac{1}{2}} \cdot d_i^{\frac{8}{3}}}{Q_w}$$

$$587.436 = \frac{0.463 \cdot (2\text{J})^{\frac{1}{2}} \cdot (35\text{m})^{\frac{8}{3}}}{14.61\text{m}^3/\text{s}}$$

27) Coefficient of Roughness given Full Flow Velocity in Sewer

Open Calculator

$$n_c = \frac{0.59 \cdot d_i^{\frac{2}{3}} \cdot S^{\frac{1}{2}}}{V_f}$$

$$7.971273 = \frac{0.59 \cdot (35\text{m})^{\frac{2}{3}} \cdot (2\text{J})^{\frac{1}{2}}}{1.12\text{m/s}}$$

28) Energy Loss given Flow Quantity for Full Flowing Sewer

Open Calculator

$$S = \left(\left(\frac{Q_w \cdot n}{0.463 \cdot D_{is}^{\frac{8}{3}}} \right)^2 \right)$$

$$3553.701\text{J} = \left(\left(\frac{14.61\text{m}^3/\text{s} \cdot 0.012}{0.463 \cdot (150\text{mm})^{\frac{8}{3}}} \right)^2 \right)$$

29) Energy Loss given Full Flow Velocity in Sewer

Open Calculator

$$S = \left(\frac{V_f \cdot n_c}{0.59 \cdot d_i^{\frac{2}{3}}} \right)^2$$

$$9.1E\hat{}\text{-}6J = \left(\frac{1.12m/s \cdot 0.017}{0.59 \cdot (35m)^{\frac{2}{3}}} \right)^2$$

30) Flow Quantity for Full Flowing Sewer

Open Calculator

$$Q_w = \frac{0.463 \cdot S^{\frac{1}{2}} \cdot d_i^{\frac{8}{3}}}{n_c}$$

$$504849.4m^3/s = \frac{0.463 \cdot (2J)^{\frac{1}{2}} \cdot (35m)^{\frac{8}{3}}}{0.017}$$

31) Full flow velocity in sewer

Open Calculator

$$V_f = \frac{0.59 \cdot d_i^{\frac{2}{3}} \cdot S^{\frac{1}{2}}}{n_c}$$

$$525.1662m/s = \frac{0.59 \cdot (35m)^{\frac{2}{3}} \cdot (2J)^{\frac{1}{2}}}{0.017}$$

32) Inside Diameter given Flow Quantity for Full Flowing Sewer

Open Calculator

fx
$$d_i = \left(\frac{Q_w \cdot n_c}{0.463 \cdot S^{\frac{1}{2}}} \right)^{\frac{3}{8}}$$

ex
$$0.695226\text{m} = \left(\frac{14.61\text{m}^3/\text{s} \cdot 0.017}{0.463 \cdot (2\text{J})^{\frac{1}{2}}} \right)^{\frac{3}{8}}$$

33) Inside Diameter given Full Flow Velocity in Sewer

Open Calculator

fx
$$d_i = \left(\frac{V_f \cdot n_c}{0.59 \cdot S^{\frac{1}{2}}} \right)^{\frac{3}{2}}$$

ex
$$0.003447\text{m} = \left(\frac{1.12\text{m/s} \cdot 0.017}{0.59 \cdot (2\text{J})^{\frac{1}{2}}} \right)^{\frac{3}{2}}$$

Variables Used

- **a** Depression in Curb Inlet *(Foot)*
- A_{cs} Cross-Sectional Area *(Square Meter)*
- A_o Area of Opening *(Square Meter)*
- A_s Area for Siphon Throat *(Square Meter)*
- A_{siphon} Siphon Throat Area *(Square Meter)*
- **C** Conversion Factor
- C_d Coefficient of Discharge
- $C_{d'}$ Discharge Coefficient
- **D** Depth *(Meter)*
- d_i Inner Diameter *(Meter)*
- D_{is} Inner Diameter of Sewer *(Millimeter)*
- **g** Acceleration due to Gravity *(Meter per Square Second)*
- **h** Depth of Flow Over Weir *(Meter)*
- **H** Head of Liquid *(Meter)*
- L_o Length of Opening *(Foot)*
- L_{weir} Length of Weir *(Meter)*
- **n** Manning's Roughness Coefficient
- n_c Roughness Coefficient of Conduit Surface
- **P** Perimeter of Grate Opening *(Foot)*
- **Q** Volume Flow Rate *(Cubic Meter per Second)*
- Q_i Inlet Capacity *(Cubic Meter per Second)*
- Q_{ro} Runoff Quantity *(Cubic Foot per Second)*

- Q_w Water Flow *(Cubic Meter per Second)*
- r_H Hydraulic Radius *(Meter)*
- S Energy Loss *(Joule)*
- V_f Flow Velocity *(Meter per Second)*
- y Depth of Flow at Inlet *(Foot)*

Constants, Functions, Measurements used

- Measurement: **Length** in Meter (m), Foot (ft), Millimeter (mm)
  Length Unit Conversion
- Measurement: **Area** in Square Meter (m^2)
  Area Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Acceleration** in Meter per Square Second (m/s^2)
  Acceleration Unit Conversion
- Measurement: **Energy** in Joule (J)
  Energy Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m^3/s), Cubic Foot per Second (ft^3/s)
  Volumetric Flow Rate Unit Conversion

Check other formula lists

- Design of a Chlorination System for Wastewater Disinfection Formulas
- Design of a Circular Settling Tank Formulas
- Design of a Plastic Media Trickling Filter Formulas
- Design of a Solid Bowl Centrifuge for Sludge Dewatering Formulas
- Design of an Aerated Grit Chamber Formulas
- Design of an Aerobic Digester Formulas
- Design of an Anaerobic Digester Formulas
- Design of Rapid Mix Basin and Flocculation Basin Formulas
- Design of Trickling Filter using NRC Equations Formulas
- Disposing of the Sewage Effluents Formulas
- Estimating the Design Sewage Discharge Formulas
- Fire Demand Formulas
- Flow Velocity in Straight Sewers Formulas
- Noise Pollution Formulas
- Population Forecast Method Formulas
- Quality and Characteristics of Sewage Formulas
- Sanitary System Sewer Design Formulas
- Sewers their Construction , Maintenance and Required Appurtenances Formulas
- Sizing a Polymer Dilution or Feed System Formulas
- Water Demand and Quantity Formulas

Feel free to SHARE this document with your friends!

PDF Available in

9/24/2024 | 5:41:03 AM UTC *Please leave your feedback here...*