Important Flow Over a Trapizoidal and Triangular Weir or Notch Formulas PDF

Formulas
Examples
with Units

List of 20
Important Flow Over a Trapizoidal and Triangular Weir or Notch Formulas

1) Flow Over a Trapizoidal Weir or Notch Formulas

1.1) Additional Head given Discharge for Cipolletti Weir Considering Velocity Formula

Evaluate Formula

Formula

$$H_V = \left(H_{Stillwater}^{\frac{3}{2}} - \left(\frac{Q_C}{1.86 \cdot L_w} \right) \right)^{\frac{2}{3}}$$

Example with Units

$$5.8826\,m = \left(6.6\,m^{\frac{3}{2}} - \left(\frac{15\,m^3/s}{1.86 \cdot 3\,m} \right) \right)^{\frac{2}{3}}$$

1.2) Coefficient of Discharge given Discharge for Cipolletti Weir Formula

Evaluate Formula

Formula

$$C_d = \frac{Q_C \cdot 3}{2 \cdot \sqrt{2 \cdot g} \cdot L_w \cdot S_w^{\frac{3}{2}}}$$

Example with Units

$$0.5989 = \frac{15\,m^3/s \cdot 3}{2 \cdot \sqrt{2 \cdot 9.8\,m/s^2} \cdot 3\,m \cdot 2\,m^{\frac{3}{2}}}$$

1.3) Discharge for Cipolletti Weir Formula

Evaluate Formula

Formula

$$Q_C = \left(\frac{2}{3} \right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot L_w \cdot S_w^{\frac{3}{2}}$$

Example with Units

$$16.529\,m^3/s = \left(\frac{2}{3} \right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,m/s^2} \cdot 3\,m \cdot 2\,m^{\frac{3}{2}}$$

1.4) Discharge for Cipolletti Weir if Velocity is Considered Formula

Evaluate Formula

Formula

$$Q_C = 1.86 \cdot L_w \cdot \left(H_{Stillwater}^{\frac{3}{2}} - H_V^{\frac{3}{2}} \right)$$

Example with Units

$$39.5611\,m^3/s = 1.86 \cdot 3\,m \cdot \left(6.6\,m^{\frac{3}{2}} - 4.6\,m^{\frac{3}{2}} \right)$$

1.5) Discharge over Cipolletti Weir by Francis Cipolletti Formula

Evaluate Formula

Formula

$$Q_C = 1.86 \cdot L_w \cdot S_w^{\frac{3}{2}}$$

Example with Units

$$15.7826\,m^3/s = 1.86 \cdot 3\,m \cdot 2\,m^{\frac{3}{2}}$$

1.6) Discharge over Trapezoidal Notch if overall Coefficient of Discharge for Trapezoidal notch Formula

Evaluate Formula

Formula

$$Q_C = \left(\left(C_d \cdot \sqrt{2 \cdot g} \cdot S_w^{\frac{3}{2}} \right) \cdot \left(\left(\frac{2}{3} \right) \cdot L_w + \left(\frac{8}{15} \right) \cdot S_w \cdot \tan\left(\frac{\theta}{2} \right) \right) \right)$$

Example with Units

$$18.8911\,\text{m}^3/\text{s} = \left(\left(0.66 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot 2\,\text{m}^{\frac{3}{2}} \right) \cdot \left(\left(\frac{2}{3} \right) \cdot 3\,\text{m} + \left(\frac{8}{15} \right) \cdot 2\,\text{m} \cdot \tan\left(\frac{30^\circ}{2} \right) \right) \right)$$

1.7) Head given Discharge for Cipolletti Weir Formula

Evaluate Formula

Formula

$$S_w = \left(\frac{3 \cdot Q_C}{2 \cdot C_d \cdot \sqrt{2 \cdot g} \cdot L_w} \right)^{\frac{2}{3}}$$

Example with Units

$$1.8747\,\text{m} = \left(\frac{3 \cdot 15\,\text{m}^3/\text{s}}{2 \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot 3\,\text{m}} \right)^{\frac{2}{3}}$$

1.8) Head given Discharge for Cipolletti Weir using Velocity Formula

Evaluate Formula

Formula

$$H_{Stillwater} = \left(\left(\frac{Q_C}{1.86 \cdot L_w} \right) + H_V^{\frac{3}{2}} \right)^{\frac{2}{3}}$$

Example with Units

$$5.4016\,\text{m} = \left(\left(\frac{15\,\text{m}^3/\text{s}}{1.86 \cdot 3\,\text{m}} \right) + 4.6\,\text{m}^{\frac{3}{2}} \right)^{\frac{2}{3}}$$

1.9) Head given Discharge over Cipolletti Weir Formula

Evaluate Formula

Formula

$$S_w = \left(\frac{Q_C}{1.86 \cdot L_w} \right)^{\frac{2}{3}}$$

Example with Units

$$1.9333\,\text{m} = \left(\frac{15\,\text{m}^3/\text{s}}{1.86 \cdot 3\,\text{m}} \right)^{\frac{2}{3}}$$

1.10) Length of Crest given Discharge for Cipolletti Weir Formula

Evaluate Formula

Formula

$$L_w = \frac{3 \cdot Q_C}{2 \cdot C_d \cdot \sqrt{2 \cdot g} \cdot S_w^{\frac{3}{2}}}$$

Example with Units

$$2.7225\,\text{m} = \frac{3 \cdot 15\,\text{m}^3/\text{s}}{2 \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot 2\,\text{m}^{\frac{3}{2}}}$$

1.11) Length of Crest given Discharge over Cipolletti Weir by Francis, Cipolletti Formula

Evaluate Formula

Formula

$$L_w = \frac{Q_C}{1.86 \cdot S_w^{\frac{3}{2}}}$$

Example with Units

$$2.8512\,\text{m} = \frac{15\,\text{m}^3/\text{s}}{1.86 \cdot 2\,\text{m}^{\frac{3}{2}}}$$

1.12) Length of Crest when Discharge for Cipolletti Weir and Velocity is Considered Formula

Evaluate Formula

Formula

$$L_w = \frac{Q_C}{1.86 \cdot \left(H_{Stillwater}^{\frac{3}{2}} - H_V^{\frac{3}{2}} \right)}$$

Example with Units

$$1.1375\,\text{m} = \frac{15\,\text{m}^3/\text{s}}{1.86 \cdot \left(6.6\,\text{m}^{\frac{3}{2}} - 4.6\,\text{m}^{\frac{3}{2}} \right)}$$

2) Flow over a Triangular Weir or Notch Formulas

2.1) Coefficient of Discharge when Discharge for Triangular Weir when Angle is 90 Formula

Evaluate Formula

Formula

$$C_d = \frac{Q_{tri}}{\left(\frac{8}{15}\right) \cdot \sqrt{2 \cdot g} \cdot S_w^{\frac{5}{2}}}$$

Example with Units

$$0.7487 = \frac{10\,\text{m}^3/\text{s}}{\left(\frac{8}{15}\right) \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot 2\,\text{m}^{\frac{5}{2}}}$$

2.2) Discharge for Entire Triangular Weir Formula

Evaluate Formula

Formula

$$Q_{tri} = \left(\frac{8}{15}\right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot \tan\left(\frac{\theta}{2}\right) \cdot S_w^{\frac{5}{2}}$$

Example with Units

$$2.3621\,\text{m}^3/\text{s} = \left(\frac{8}{15}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot \tan\left(\frac{30°}{2}\right) \cdot 2\,\text{m}^{\frac{5}{2}}$$

2.3) Discharge for Triangular Weir if Angle is at 90 Formula

Evaluate Formula

Formula

$$Q_{tri} = \left(\frac{8}{15}\right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot S_w^{\frac{3}{2}}$$

Example with Units

$$4.4077\,\text{m}^3/\text{s} = \left(\frac{8}{15}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot 2\,\text{m}^{\frac{3}{2}}$$

2.4) Discharge for Triangular Weir if Coefficient Discharge is Constant Formula

Evaluate Formula

Formula

$$Q_{tri} = 1.418 \cdot S_w^{\frac{5}{2}}$$

Example with Units

$$8.0214\,\text{m}^3/\text{s} = 1.418 \cdot 2\,\text{m}^{\frac{5}{2}}$$

2.5) Discharge for Triangular Weir if Velocity is Considered Formula

Evaluate Formula

Formula

$$Q_{tri} = \left(\frac{8}{15}\right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot \tan\left(\frac{\theta}{2}\right) \cdot \left(\left(S_w + H_V\right)^{\frac{5}{2}} - H_V^{\frac{5}{2}}\right)$$

Example with Units

$$27.7783\,\text{m}^3/\text{s} = \left(\frac{8}{15}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot \tan\left(\frac{30°}{2}\right) \cdot \left(\left(2\,\text{m} + 4.6\,\text{m}\right)^{\frac{5}{2}} - 4.6\,\text{m}^{\frac{5}{2}}\right)$$

2.6) Head for Discharge for Entire Triangular Weir Formula

Evaluate Formula

Formula

$$S_w = \left(\frac{Q_{tri}}{\left(\frac{8}{15}\right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot \tan\left(\frac{\theta}{2}\right)}\right)^{\frac{2}{5}}$$

Example with Units

$$3.5621\,\text{m} = \left(\frac{10\,\text{m}^3/\text{s}}{\left(\frac{8}{15}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot \tan\left(\frac{30°}{2}\right)}\right)^{\frac{2}{5}}$$

2.7) Head when Coefficient Discharge is Constant Formula

Evaluate Formula

Formula

$$S_w = \left(\frac{Q_{tri}}{1.418}\right)^{\frac{2}{5}}$$

Example with Units

$$2.1844\,\text{m} = \left(\frac{10\,\text{m}^3/\text{s}}{1.418}\right)^{\frac{2}{5}}$$

2.8) Head when Discharge for Triangular Weir Angle is 90 Formula

Evaluate Formula

Formula

$$S_w = \frac{Q_{tri}}{\left(\left(\frac{8}{15}\right) \cdot C_d \cdot \sqrt{2 \cdot g}\right)^{\frac{2}{5}}}$$

Example with Units

$$8.374\,\text{m} = \frac{10\,\text{m}^3/\text{s}}{\left(\left(\frac{8}{15}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2}\right)^{\frac{2}{5}}}$$

Variables used in list of Flow Over a Trapizoidal and Triangular Weir or Notch Formulas above

- C_d Coefficient of Discharge
- **g** Acceleration due to Gravity *(Meter per Square Second)*
- $H_{Stillwater}$ Still Water Head *(Meter)*
- H_V Velocity Head *(Meter)*
- L_w Length of Weir Crest *(Meter)*
- Q_C Discharge by Cipolletti *(Cubic Meter per Second)*
- Q_{tri} Discharge through Triangular Weir *(Cubic Meter per Second)*
- S_w Height of Water above Crest of Weir *(Meter)*
- **θ** Theta *(Degree)*

Constants, Functions, Measurements used in list of Flow Over a Trapizoidal and Triangular Weir or Notch Formulas above

- 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.
- Functions: **tan**, tan(Angle)
  The tangent of an angle is a trigonometric ratio of the length of the side opposite an angle to the length of the side adjacent to an angle in a right triangle.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Acceleration** in Meter per Square Second (m/s²)
  Acceleration Unit Conversion
- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m³/s)
  Volumetric Flow Rate Unit Conversion

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