Cipolletti and Broad-Crested Weir Discharge

Discharge over a Cipolletti (trapezoidal, 1:4 sides) weir and over a broad-crested weir from crest length and head, with the critical depth on the broad crest.

Method: Classical engineering hydrology relations: weir formulas

Input parameters

Unit system: SI

Parameter	Value	Unit
Crest length (bottom width)	1.5000	m
Head over the crest	0.30000	m
Broad-crested weir coefficient	0.90000	

Calculated results

Parameter	Value	Unit
Cipolletti weir	0.45844	m³/s
Broad-crested weir	0.37813	m³/s
Critical depth on the broad crest	200.00	mm

Notes for this case

• A Cipolletti weir has side slopes of 1 horizontal to 4 vertical, chosen so the added side area offsets end contractions; its discharge is Q = 1.86LH^1.5 (SI), proportional to crest length. On a broad crest the flow passes through critical depth 2H/3, giving Q = C_d·L·√g·(2H/3)^1.5 = 1.705C_d·L·H^1.5; C_d is 0.85–1.0 depending on the upstream rounding and crest length. Neglect of approach velocity is assumed; keep the weir free-flowing (tailwater below the crest).

Formula and method

$$Q_C = 1.86 L H^{3/2}, \quad Q_B = C_d L \sqrt{g} \left(\frac{2H}{3}\right)^{3/2} = 1.705 C_d L H^{3/2}$$

Variables

L	Crest length (bottom width)	m
H	Head over the crest	m
C_d	Broad-crested weir coefficient	-
Q_C	Cipolletti weir	m³/s
Q_B	Broad-crested weir	m³/s
y_c	Critical depth on the broad crest	m

Method and standards

Weirs.

Assumptions and limits

- Negligible approach velocity; free flow.

References

Classical engineering hydrology relations: weir formulas

Report details

Report reference	FCC-B27G-YJ3C (the same inputs always give the same reference)
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/civil/hydraulics/cipolletti-broad-crested-weir

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.