Reservoir and Pond Storage from Contour Areas

Storage volume of a dam reservoir, farm pond or tank from the water-spread areas of successive contours, by the trapezoidal and the cone (prismoidal) formulas.

Method: Trapezoidal (average end area) and cone (prismoidal) formulas for storage between contours

Input parameters

Unit system: SI

Parameter	Value	Unit
Contour interval	2.0000	m
Area at the lowest contour (0 for the bed)	2.0000	ha
Area at contour 2	4.5000	ha
Area at contour 3	7.2000	ha
Area at contour 4 (0 = unused)	10.800	ha
Area at contour 5 (0 = unused)	14.100	ha
Area at contour 6 (0 = unused)	0	ha

Calculated results

Parameter	Value	Unit
Storage by the trapezoidal formula	611.00	ML
Storage by the cone formula	606.34	ML
Depth from the lowest to the highest contour used	8.0000	m
Number of contours used	5.0000	

Notes for this case

• Each slice between two contours holds the contour interval times the mean area (trapezoidal formula) or h/3 ($A_1 + A_2 + \sqrt{A_1 A_2}$) (cone, or prismoidal, formula). The cone formula suits basins whose sides slope evenly and gives slightly less; the difference is the error you should expect from either. Measure the areas with a planimeter or GIS from a contour survey; the storage up to each contour gives the elevation–capacity curve.

Formula and method

$$V_t = \sum \frac{h}{2}(A_i + A_{i+1}), \quad V_c = \sum \frac{h}{3}\left(A_i + A_{i+1} + \sqrt{A_i A_{i+1}}\right)$$

Variables

h	Contour interval	m
A_1	Area at the lowest contour (0 for the bed)	m²
A_2	Area at contour 2	m²
A_3	Area at contour 3	m²
A_4	Area at contour 4 (0 = unused)	m²
A_5	Area at contour 5 (0 = unused)	m²
A_6	Area at contour 6 (0 = unused)	m²
V_t	Storage by the trapezoidal formula	m³
V_c	Storage by the cone formula	m³
H	Depth from the lowest to the highest contour used	m
n	Number of contours used	-

Method and standards

Storage formulas.

Assumptions and limits

- Equal contour interval; areas measured at each contour.

References

Trapezoidal (average end area) and cone (prismoidal) formulas for storage between contours

Report details

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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/reservoir-storage-from-contours

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.