Cut and Fill Volumes from a Grid of Levels

Cut and fill volumes over a 3 × 3 grid of ground levels (four squares) to a formation level, with mixed squares split by the four-corner method.

Method: Grid (borrow-pit) method with four-corner mixed squares; Uren and Price; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Grid spacing	10.000	m
Formation level	100.00	m
Level row 1, col 1	101.20	m
Level row 1, col 2	100.80	m
Level row 1, col 3	100.30	m
Level row 2, col 1	100.90	m
Level row 2, col 2	100.20	m
Level row 2, col 3	99.600	m
Level row 3, col 1	100.40	m
Level row 3, col 2	99.700	m
Level row 3, col 3	99.100	m

Calculated results

Parameter	Value	Unit
Cut volume	134.16	m^3
Fill volume	39.158	m^3
Net (+ surplus cut)	95.000	m^3
Plan area	400.00	m^2

Notes for this case

• Each square: mean of four corner depths × area; squares crossing the formation are split by V_c = a²(Σh₊)²/(4Σ|h|) and V_f = a²(Σh₋)²/(4Σ|h|). Apply bulking and shrinkage factors before balancing cut against fill.

Formula and method

$$V = \frac{a^2}{4}\sum h \ \text{(all cut or fill)}, \quad V_c = \frac{a^2\left(\sum h_+\right)^2}{4\sum |h|}, \quad V_f = \frac{a^2\left(\sum h_-\right)^2}{4\sum |h|}$$

Variables

a	Grid spacing	m
FL	Formation level	m
z_1	Level row 1, col 1	m
z_2	Level row 1, col 2	m
z_3	Level row 1, col 3	m
z_4	Level row 2, col 1	m
z_5	Level row 2, col 2	m
z_6	Level row 2, col 3	m
z_7	Level row 3, col 1	m

z_8	Level row 3, col 2	m
z_9	Level row 3, col 3	m
V_c	Cut volume	m³
V_f	Fill volume	m³
$V_c - V_f$	Net (+ surplus cut)	m³
A	Plan area	m²

Method and standards

Grid method.

Assumptions and limits

- Square grid; planar faces within each square.

References

Grid (borrow-pit) method with four-corner mixed squares, Uren and Price, Surveying for Engineers (Palgrave)

Report details

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

This calculator online

https://calc.firecad.com/civil/quantities/cut-fill-grid-levels

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.