# Backfill and Compacted Fill Volume (Swell and Shrinkage)

Bank and loose volumes of fill to bring, and the truck loads, for a compacted volume from the soil's shrinkage and swell factors.

**Method:** Bank; loose and compacted volume relations (earthmoving practice)

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Compacted volume required | 500.00 | m³ |
| Shrinkage from bank to compacted<br>Compacted volume is smaller than the bank volume by this share. | 10.000 | % |
| Swell from bank to loose | 25.000 | % |
| Truck capacity (loose) | 10.000 | m³ |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Bank volume needed | 555.56 | m³ |
| Loose volume to bring | 694.44 | m³ |
| Truck loads (rounded up) | 70.000 | |

## Formula and method

$$V_b = \frac{V_c}{1 - s_h}, \quad V_l = V_b(1 + s_w)$$

### Variables

| | | |
|---|---|---|
| $V_c$ | Compacted volume required | m³ |
| $s_h$ | Shrinkage from bank to compacted | - |
| $s_w$ | Swell from bank to loose | - |
| $V_t$ | Truck capacity (loose) | m³ |
| $V_b$ | Bank volume needed | m³ |
| $V_l$ | Loose volume to bring | m³ |
| $N$ | Truck loads (rounded up) | - |

### Method and standards

Volume factors.

### Assumptions and limits

- Uniform material.

### References

- Bank
- loose and compacted volume relations (earthmoving practice)

## Report details

| | |
|---|---|
| Report reference | FCC-29Q2-4A4H (the same inputs always give the same reference) |
| Generated | 17 November 2026, 19:34 UTC |
| Calculator | Backfill and Compacted Fill Volume (Swell and Shrinkage) |
| Method last reviewed | 12 November 2026 |
| Software release | FireCAD Calc, release of 17 November 2026 |
| 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/quantities/backfill-compaction-volume

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.