Tacheometry: Distance and Level by Stadia Hairs

Horizontal distance, vertical component and reduced level of a staff station from the stadia intercept and vertical angle, with the instrument constants.

Method: Stadia tacheometry with a vertical staff (surveying texts)

Input parameters

Unit system: SI

Parameter	Value	Unit
Staff intercept (top − bottom hair)	1.2500	m
Vertical angle (positive elevation)	6.0000	°
Multiplying constant	100.00	
Additive constant	0	m
Reduced level of the instrument station	150.00	m
Height of the instrument axis	1.4500	m
Middle hair reading	1.8750	m

Calculated results

Parameter	Value	Unit
Horizontal distance K s cos²θ + C cos θ	123.63	m
Vertical component K s sinθ cosθ + C sin θ	12.994	m
Reduced level of the staff station	162.57	m

Notes for this case

- Staff held vertical.

Formula and method

$$D = Ks\cos^2\theta + C\cos\theta, \quad V = Ks\sin\theta\cos\theta + C\sin\theta, \quad RL_p = RL_s + h_i + V - h$$

Variables

S	Staff intercept (top − bottom hair)	m
θ	Vertical angle (positive elevation)	rad
K	Multiplying constant	-
C	Additive constant	m
RL_s	Reduced level of the instrument station	m
h_i	Height of the instrument axis	m
h	Middle hair reading	m
D	Horizontal distance K s cos²θ + C cos θ	m
V	Vertical component K s sinθ cosθ + C sin θ	m
RL_p	Reduced level of the staff station	m

Method and standards

Stadia geometry.

Assumptions and limits

- Vertical staff.

References

- Stadia tacheometry with a vertical staff (surveying texts)

Report details

Report reference	FCC-CS2H-5NWE (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/surveying/tacheometry-stadia

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.