Positional Accuracy at 95 % (NSSDA) from RMSE

Horizontal and vertical accuracy at 95 % confidence from root-mean-square errors in x, y and z against checkpoints, by the NSSDA method.

Method: National Standard for Spatial Data Accuracy; FGDC-STD-007.3-1998; …

Input parameters

Unit system: SI

Parameter	Value	Unit
RMSE in easting (x)	50.000	mm
RMSE in northing (y)	45.000	mm
RMSE in elevation (z)	80.000	mm

Calculated results

Parameter	Value	Unit
Radial RMSE	67.268	mm
Horizontal accuracy at 95 %	116.27	mm
Vertical accuracy at 95 %	156.80	mm
x–y ratio (0.6–1 for the approximation)	0.90000	

Notes for this case

• NSSDA: compare at least 20 well-distributed checkpoints with an independent source of higher accuracy; RMSE in each axis. If RMSE_x = RMSE_y, horizontal accuracy = 1.7308·RMSE_r (RMSE_r = √(RMSE_x² + RMSE_y²)); otherwise, for ratios between 0.6 and 1, about 2.4477 × ½(RMSE_x + RMSE_y). Vertical accuracy = 1.9600·RMSE_z. Report as 'tested … metres horizontal accuracy at 95 % confidence level'.

Formula and method

$$RMSE_r = \sqrt{RMSE_x^2 + RMSE_y^2}, \quad Acc_r = 1.7308\,RMSE_r \ (\text{or } 2.4477\frac{RMSE_x + RMSE_y}{2}), \quad Acc_z = 1.96\,RMSE_z$$

Variables

$RMSE_x$	RMSE in easting (x)	m
$RMSE_y$	RMSE in northing (y)	m
$RMSE_z$	RMSE in elevation (z)	m
$RMSE_r$	Radial RMSE	m
Acc_r	Horizontal accuracy at 95 %	m
Acc_z	Vertical accuracy at 95 %	m
$RMSE_{min}/RMSE_{max}$	x–y ratio (0.6–1 for the approximation)	-

Method and standards

Map accuracy.

Assumptions and limits

- Normally distributed, unbiased errors; independent checkpoints.

References

National Standard for Spatial Data Accuracy, FGDC-STD-007.3-1998, Geospatial Positioning Accuracy Standards, Part 3: National Standard for Spatial Data Accuracy

Report details

Report reference	FCC-08E4-C4Y8 (the same inputs always give the same reference)
Generated	23 November 2026, 18:08 UTC
Calculator	Positional Accuracy at 95 % (NSSDA) from RMSE
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 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/surveying/nssda-positional-accuracy

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.