

What Kind of Accuracy Can I Expect from a MobileMapper CX?

Date: 11 April 2010

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GPS accuracy is a function of canopy, satellite constellation, distance to correction data (if Post-Processed) and collection technique. It is difficult to quote an exact number, however it is reasonable to run a test in average conditions and look at the results.

In this report, I repeatedly collected a point 18 times, with another random point 5 meters distant occupied between each point.

There were 8 to 10 SV's in view. The PDOP was 1.5 to 1.6.

ArcPad was configured to average each point for 15 seconds.

The antenna was mounted on a quick-connect to facilitate repeatable placement. The intermediate point was random in a 0.5 meter area and was hand-held.

Points were post-processed to the NGS CORS station ZLC1, 12.2 KM distant.

Conclusions

Real-time WAAS corrected 1-sigma results are sub-meter.

Post-processed 1-sigma results are centimeter horizontal and decimeter vertical.

The observations had no flyers and the measurement ranges were consistent with the standard deviations.

Note: The average position for the Raw data is WAAS corrected and thus ITRF2000 framed while the post-processed data is purposely framed to NAD83-CORS96.

Equipment

MobileMapper CX:	OS 5.26, GPS FW E033, SN 012047016412-2
With Precision External Antenna:	Model 110457-02, SN 19310
ArcPad:	7.1.0.161
Post-processing extension	1.0.0.4

Raw WAAS Corrected Results

(Utah Central NAD83 Geoid09 Meters)

Feature	Easting	Northing	Height
1	472650.685	2266786.404	1442.948
2	472650.639	2266786.332	1443.048
3	472650.606	2266786.333	1443.026
4	472650.629	2266786.273	1442.798
5	472650.804	2266786.249	1442.765
6	472650.898	2266786.287	1442.732
7	472650.892	2266786.251	1442.732
8	472650.836	2266786.289	1442.808
9	472650.802	2266786.391	1442.793
10	472650.719	2266786.513	1442.844
11	472650.675	2266786.446	1442.808
12	472650.677	2266786.394	1442.768

13	472650.710	2266786.558	1442.775
14	472650.700	2266786.819	1442.904
15	472650.687	2266787.135	1443.120
16	472650.677	2266787.420	1443.412
17	472650.630	2266787.598	1443.514
18	472650.644	2266787.643	1443.607

MIN	472650.644	2266786.404	1442.948
MAX	472650.685	2266787.643	1443.607
RNG	0.042	1.239	0.659
AVG	472650.665	2266787.023	1443.277
STD	0.029	0.877	0.466

Results: These results (Horz 0.88 Meter 1-sigma) are substantially better than the specifications of 1 meter CEP.

Post-Processed Results

(Utah Central NAD83 Geoid09 Meters)

Feature	Easting	Northing	Height	Horizontal Error (m)	Vertical Error (m)
1	472652.182	2266785.997	1442.788	0.257	0.522
2	472652.231	2266786.006	1442.600	0.269	0.544
3	472652.238	2266786.008	1442.586	0.270	0.549
4	472652.248	2266786.055	1442.629	0.260	0.541
5	472652.218	2266785.951	1442.617	0.269	0.562
6	472652.262	2266786.014	1442.522	0.272	0.570
7	472652.233	2266785.999	1442.613	0.268	0.573
8	472652.243	2266786.030	1442.615	0.269	0.574
9	472652.200	2266785.968	1442.832	0.260	0.545
10	472652.221	2266785.965	1442.859	0.259	0.550
11	472652.217	2266786.079	1442.850	0.265	0.551
12	472652.211	2266785.966	1442.887	0.250	0.531
13	472652.208	2266785.977	1442.880	0.253	0.535
14	472652.200	2266785.950	1442.883	0.252	0.536
15	472652.207	2266785.969	1442.875	0.248	0.534
16	472652.220	2266785.978	1442.873	0.246	0.533
17	472652.212	2266785.976	1442.928	0.233	0.523
18	472652.193	2266785.963	1442.975	0.219	0.499
MIN	472652.182	2266785.963	1442.788		
MAX	472652.193	2266785.997	1442.975		
RNG	0.011	0.035	0.186		
AVG	472652.188	2266785.980	1442.881		
STD	0.008	0.000	0.132		

Results: The 2D-horizontal range is 0.036 meters with nearly 0 1-sigma standard deviation. Vertical range was 0.19 meters with 0.13 meter s1-sigma standard deviation.

The predicted Horizontal and Vertical Errors are extremely pessimistic when compared with the measured range of observations. (In other words “Measurements which repeat to 0.01 cm have in indicated accuracy of 0.25 meters.”)

All data used in this comparison is available in this archive:

http://www.magprogps.com/ms/MMCX_Accuracy/QuickProject2010-04-110915.zip