



Region 10: Test results for Kittitas, WA

Summary

In FEMA-Region 10 the Kittitas area is split up in multiple parts. This test encompasses total about 210 square miles. A LiDAR data acquisition was ordered for a 2' equivalent contour accuracy, which equals the highest specification level. The area was flown and post-processed by Aerometric. CompassData performed the quality control of the collected and processed LiDAR data with a fundamental vertical accuracy (FVA) and a consolidated vertical accuracy (CVA) assessment, respectively. The planning, data collection, data processing, and data testing were successfully accomplished by the STARR members.

Index

- Final Test Results
- FVA Test
- CVA Test
- Distribution of Testing Points
- FVA Test Details
- CVA Test Details

Final Test Results

The vertical accuracy requirements based on flood risk and terrain slope are met with 11.7 cm and 15.2 cm for both FVA and CVA testing. The mandatory requirements for the highest specification for vertical accuracy, 95% confidence levels are for FVA < 24.5 cm and CVA < 36.3 cm.

FVA Test

Tested 11.7 cm fundamental vertical accuracy at 95% confidence level in open terrain using $RMSE_{(z)} \times 1.9600$. The Root Mean Square Error for the elevation differences between GPS control points and LiDAR points is 6.0 cm calculated with 20 FVA points.

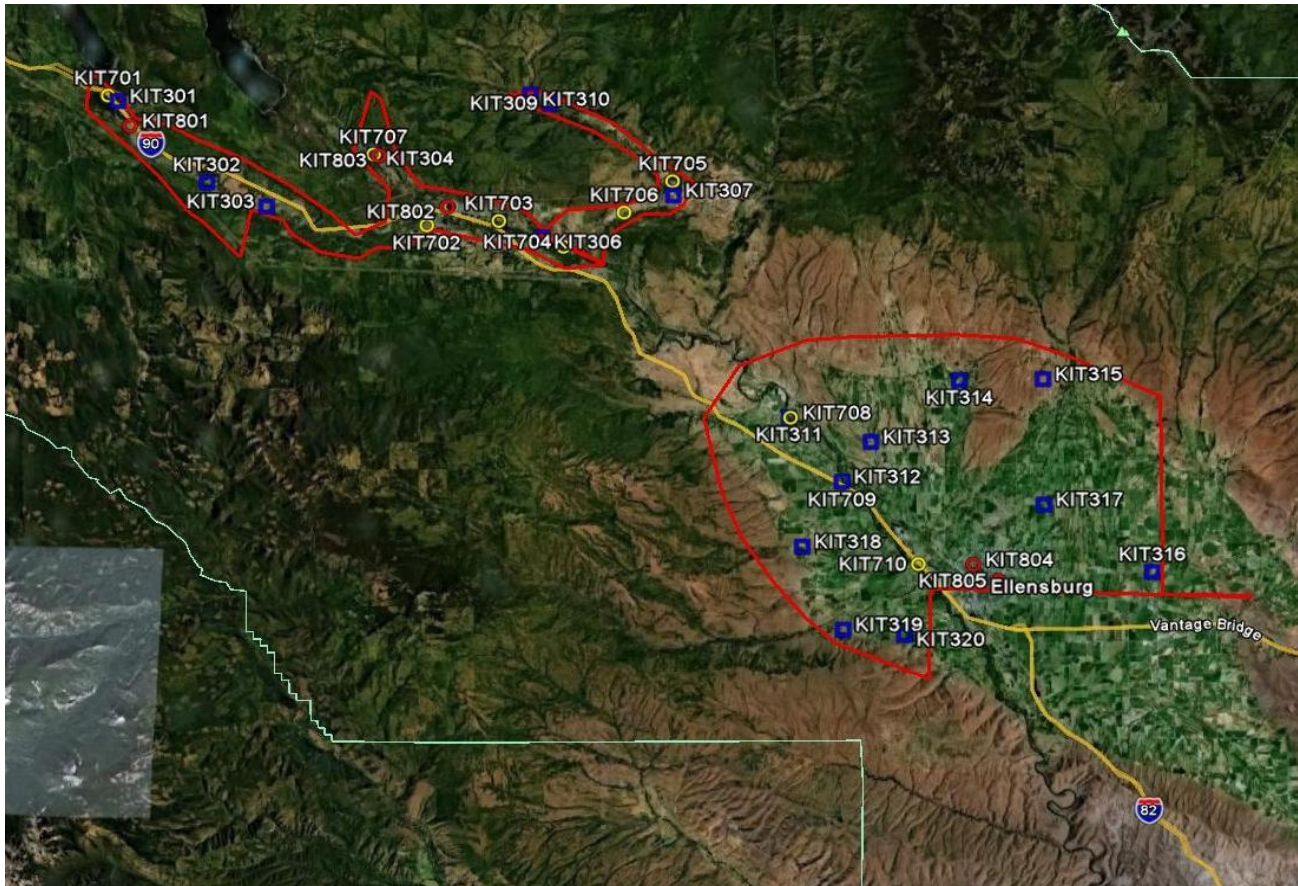
CVA Test

Tested 15.2 cm consolidated vertical accuracy at 95th percentile in: open terrain, forest terrain, and urban terrain. The Root Mean Square Error for the elevation differences between GPS control points and LiDAR points is 7.3 cm calculated with 20 supplemental vertical accuracy points (SVA).








Distribution of Testing Points

Region 10, Kittitas, WA



Legend:

-  FVA points in open terrain on hard surface
-  FVA points in open terrain used as well in CVA test
-  SVA points in open terrain
-  SVA points in urban terrain
-  SVA points in forest terrain

According to the area to be tested the 20 FVA points are evenly distributed. Additional 15 SVA points are distributed in respect to the available major land classes.



FVA Test Details

FVA	Latitude(GPS)	Longitude(GPS)	Northing(GPS)	Easting(GPS)	MSL (GPS)	MSL (LiDAR)	Δ Z
KIT301	47.250792	-121.188383	5234625.971	637081.690	678.396	678.380	0.02
KIT302	47.207640	-121.121247	5229950.836	642277.072	650.309	650.350	-0.04
KIT303	47.195030	-121.077295	5228630.657	645639.963	636.586	636.600	-0.01
KIT304	47.222882	-120.996632	5231879.335	651670.302	687.507	687.470	0.04
KIT305	47.187893	-120.903161	5228177.11	658850.980	572.721	572.760	-0.04
KIT306	47.178991	-120.871563	5227252.645	661271.694	564.182	564.200	-0.02
KIT307	47.200908	-120.772926	5229896.635	668675.622	606.100	606.070	0.03
KIT308	47.207629	-120.773046	5230643.165	668645.252	611.651	611.610	0.04
KIT309	47.255225	-120.879912	5235706.906	660408.943	675.735	675.600	0.13
KIT310	47.180574	-120.836437	5227501.666	663928.184	571.812	571.760	0.05
KIT311	47.082858	-120.688811	5216963.799	675434.272	506.970	506.800	0.17
KIT312	47.049158	-120.647921	5213311.586	678650.594	490.246	490.210	0.04
KIT313	47.070067	-120.626039	5215685.258	680242.028	539.909	539.920	-0.01
KIT314	47.102806	-120.561328	5219474.39	685041.462	620.308	620.320	-0.01
KIT315	47.103290	-120.497361	5219681.573	689893.199	703.675	703.700	-0.03
KIT316	47.011801	-120.433653	5209672.107	695060.550	532.155	532.070	0.08
KIT317	47.036639	-120.497774	5212274.286	690098.830	554.660	554.630	0.03
KIT318	47.016339	-120.677079	5209598.525	676544.196	586.987	586.970	0.02
KIT319	46.970733	-120.649546	5204593.335	678788.773	578.491	578.440	0.05
KIT320	46.967530	-120.601749	5204347.598	682435.246	511.672	511.700	-0.03

ΔZ Mean	0.04	RMSE:	0.060
ΔZ Min	-0.04	*1.96	0.117
ΔZ Max	0.17		

Metadata

UTM 10 North, NAD83, NAVD88

All units in meters where applicable.

HAE - GEOID09 = NAVD88

Note:

All 20 of the FVA points (open terrain) passed. 100% of the points are within the 24.5 cm confidence level. The FVA test is passed.



CVA Test Details

SVA	Latitude(GPS)	Longitude(GPS)	Northing(GPS)	Easting(GPS)	MSL (GPS)	MSL (LiDAR)	Δ Z
KIT301	47.250792	-121.188383	5234625.971	637081.690	678.380	678.396	-0.02
KIT305	47.187893	-120.903161	5228177.110	658850.980	572.760	572.721	0.04
KIT310	47.180574	-120.836437	5227501.666	663928.184	571.760	571.812	-0.05
KIT315	47.103290	-120.497361	5219681.573	689893.199	703.700	703.675	0.03
KIT320	46.967530	-120.601749	5204347.598	682435.246	511.700	511.672	0.03
KIT701	47.253537	-121.195615	5234918.352	636527.366	667.562	667.52	0.04
KIT702	47.184921	-120.957432	5227737.817	654748.347	588.831	588.81	0.02
KIT703	47.187782	-120.902396	5228166.371	658909.297	572.009	572.2	-0.19
KIT704	47.174692	-120.854703	5226809.863	662562.244	560.573	560.69	-0.12
KIT705	47.207626	-120.773537	5230641.783	668608.100	610.675	610.74	-0.07
KIT706	47.191843	-120.809776	5228810.241	665913.012	578.670	578.82	-0.15
KIT707	47.222575	-120.996891	5231844.675	651651.587	688.401	688.45	-0.05
KIT708	47.082537	-120.688966	5216927.768	675423.517	506.068	506.02	0.05
KIT709	47.049000	-120.647262	5213295.553	678701.158	488.547	488.59	-0.04
KIT710	47.006595	-120.596937	5208699.691	682668.107	468.896	468.94	-0.04
KIT711	47.197746	-121.059909	5228965.039	646949.322	620.763	620.78	-0.02
KIT801	47.237532	-121.179127	5233168.784	637816.456	661.999	661.97	0.03
KIT802	47.194952	-120.942091	5228883.048	655881.213	582.833	582.84	-0.01
KIT803	47.222008	-120.992834	5231789.647	651960.371	681.279	681.33	-0.05
KIT804	47.004788	-120.550979	5208607.094	686167.733	480.622	480.55	0.07
KIT805	46.996144	-120.533389	5207688.556	687535.046	497.322	497.26	0.06

ΔZ Mean	0.04	RMSE:	0.073
ΔZ Min	-0.19	*1.96	0.143
ΔZ Max	0.07	95 Percentile	0.152

Metadata

UTM 10 North, NAD83, NAVD88
 All units in meters where applicable.
 HAE - GEOID09 = NAVD88

Note:

All 20 of the SVA points (open, forest, and urban terrain) passed. 100% of the points are within the 36.3 cm confidence level. The CVA test is passed.