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Report of Horizontal and Vertical Accuracy Testing
Pictometry Airborne Oblique Imagery
Los Angeles Region Imagery Acquisition Consortium 2 (LAR-IAC2)

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Reference: FGDC Geospatial Positioning Accuracy Standards
Part 3: National Standard for Spatial Data Accuracy (NSSDA)

Published in 1998, the NSSDA implements a statistical and testing methodology for estimating the positional accuracy of points on maps and in digital geospatial data, with respect to georeferenced ground positions of higher accuracy, reported at the 95% confidence level. The NSSDA replaces the 1947 National Map Accuracy Standard (NMAS) for digital geospatial data. The NMAS is applicable only to graphic maps, where accuracy is defined by map scale. The NSSDA was developed to report accuracy of digital geospatial data that is not constrained by scale, to include digital imagery, especially oblique imagery where the image scale varies between the foreground and background.

The *georeferenced ground positions of higher accuracy*, referred to generically as *QA/QC checkpoints*, were provided by LAR-IAC from multiple sources. Most checkpoints were X's painted on asphalt and accurately surveyed as control points, used as *target points* by photogrammetric firms for aerial triangulation. Because these checkpoints are accurate, well-defined and photo-identifiable on the airborne oblique imagery, Dewberry measured the x-, y- and z-coordinates on these checkpoints on each of the 4-view Pictometry images, where visible, to compute errors in Eastings (Δx), errors in Northings (Δy), and errors in elevations (Δz). For each checkpoint, Dewberry also averaged the Eastings, Northings and elevations for all views that were visible; for many, the average resulted from four views, but some points were obscured by buildings, trees, cars, etc., so the average resulted from the mean of three, two, and (in a few cases) only one view.

All errors were squared and averaged to compute the mean square errors; then the square root was taken of the mean square errors to compute the root-mean-square-errors ($RMSE_x$, $RMSE_y$, $RMSE_r$, and $RMSE_z$). $RMSE_r$ is the radial statistic which equals the square root of $[RMSE_x^2 + RMSE_y^2]$. The NSSDA absolute accuracy statistic ($Accuracy_r$) is computed as $RMSE_r$ x 1.7308 to report the tested horizontal accuracy at the 95% confidence level, and $Accuracy_z$ is computed as $RMSE_z$ x 1.9600 to report the tested vertical accuracy at the 95% confidence level. Accuracy statistics are summarized in Table 1.

Table 1. Accuracy Statistics for LAR-IAC's Pictometry Imagery

Pictometry Airborne Oblique Imagery	Accuracy Statistic	North View (feet)	South View (feet)	East View (feet)	West View (feet)	Average of All Views[1] (feet)
Number of Points Visible on 216 Usable Targets		186	188	188	188	190
Horizontal Accuracy	**$RMSE_x$**	1.26	1.3	2.76	2.29	0.91
	$RMSE_y$	2.69	2.36	1.34	1.40	0.85
	$RMSE_r$	2.97	2.70	3.07	2.68	1.25
	$Accuracy_r$	5.14	4.67	5.31	4.65	2.16
Vertical Accuracy	**$RMSE_z$**	1.50	1.16	1.53	1.21	1.22
	$Accuracy_z$	2.94	2.27	2.99	2.38	2.39

[1] Average is of 4-views if the target point was visible from all four directions; average is of 3-views if the target point was visible only from three directions; average is of 2-views if the target point was visible only from two directions; a few points were visible from only one direction.

Pictometry images cover trapezoidal areas on the ground. Points in the foreground are imaged at larger scale with higher accuracy; points in the background are imaged at smaller scale with lower accuracy. When coordinates were averaged from north-view, south-view, east-view, and west-view images, the averaged coordinates were normally more accurate than coordinates from individual views, as summarized with the following accuracy statements:

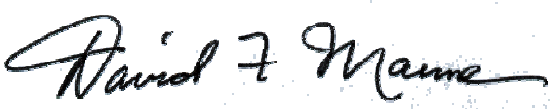
Accuracy of clearly-defined surveyed targets measured on Pictometry north-view images:
North-view coordinates tested 5.14 ft horizontal accuracy at 95% confidence level
North-view coordinates tested 2.94 ft vertical accuracy at 95% confidence level

Accuracy of clearly-defined surveyed targets measured on Pictometry south-view images:
South-view coordinates tested 4.67 ft horizontal accuracy at 95% confidence level
South-view coordinates tested 2.27 ft vertical accuracy at 95% confidence level

Accuracy of clearly-defined surveyed targets measured on Pictometry east-view images:
East-view coordinates tested 5.31 ft horizontal accuracy at 95% confidence level
East-view coordinates tested 2.99 ft vertical accuracy at 95% confidence level

Accuracy of clearly-defined surveyed targets measured on Pictometry west-view images:
West-view coordinates tested 4.65 ft horizontal accuracy at 95% confidence level
West-view coordinates tested 2.38 ft vertical accuracy at 95% confidence level

Accuracy of clearly-defined surveyed targets on Pictometry 4-view images with coordinates averaged from all views in which targets were visible and could be measured:
All-view averaged coordinates tested 2.16 ft horizontal accuracy at 95% confidence level
All-view averaged coordinates tested 2.39 ft vertical accuracy at 95% confidence level



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