# Intraswath Repeatability Testing

Processing Procedures

Terrasolid's LP360 Planar Statistics point cloud task was utilized to evaluate best-fitting of laser points to a plane within each flight. It computes the quality of fit values, which are stored as attributes in a shapefile. It is desired that the data within each swath fits within 6cm of a given plane thus accrediting the sensor as being well-calibrated for variable noise. Testing is to be done on first returns only.

Process

Numerous sample locations on each lift 50 square meters or larger were drawn as polygons into a shapefile (see 3 accompanying lift shapefiles). These locations are preferably on a hard surface and flat with little or no paint lines or change in material type which could skew testing due to greater intensity range. The shapefile is loaded in LP360 with a single flight line of data using only first returns. The point cloud task is run and results are written into the shapefile in terms of standard deviation from the plane into the StdDev field. This data tells us how the point values are "spread out" on the plane. Lesser standard deviation means the points are more tightly clustered about the plane. Ideal testing locations as large stretches of flat, paved areas with mono-material type in Waushara County were not copious due to the rural geography. Therefore some of the testing sites may have bordered on ideal and could have presented results toward the higher end of the deviation spectrum than desired.
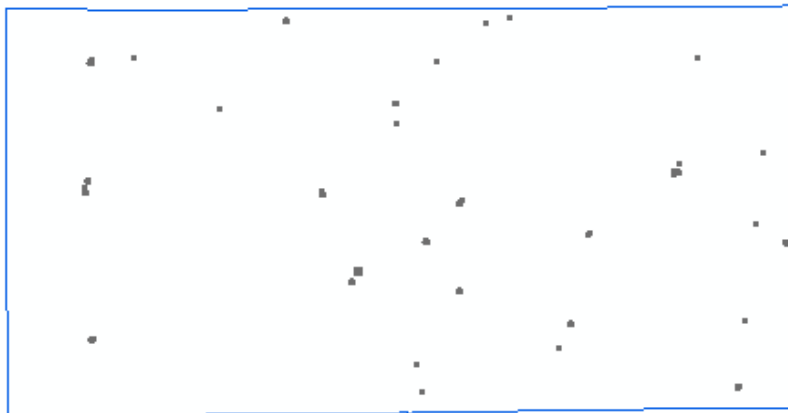
Waushara project bound and dispersed testing locations

Results

Lift intraswath testing site standard deviation values

110717A	110717B	110817
Site StdDev	Site StdDev	Site StdDev
0.1966	0.1855	0.1376
0.1740	0.1828	0.1214
0.2153	0.2078	0.1717
0.1997	0.2116	0.1124
0.2095	0.1420	0.1279
0.2083	0.1201	0.1466
0.2062	0.1344	0.1545
0.1901	0.1382	0.1336
0.2042	0.1355	0.1357
0.1922	0.1455	0.1460
0.2190	0.1200	0.1122
0.2278	0.1629	0.1368
0.2240	0.1378	0.1703
0.2209	0.1492	0.1469
0.2254	0.1484	0.1497
0.1276	0.1936	0.1633
0.1424	0.2083	0.1420
0.1225	0.2107	0.1777
0.1350	0.1594	0.1967
	0.1890	0.1698
	0.1929	0.1279
	0.2065	0.1702
	0.2011	0.1371
	0.2012	0.1880
	0.2128	0.1128
	0.1830	0.1284
	0.1934	0.1429
	0.1823	
	0.1802	
	0.1947	
	0.1884	
	0.1877	
	0.2092	
	0.2008	
	0.1913	
	0.1890	
	0.1851	
	0.1777	

	0.1665	
	0.1826	
	0.1704	
	0.1785	
	0.2042	
	0.1708	
0.1916ft / 5.84cm	**0.1780ft / 5.43cm**	**0.1467ft / 4.47cm**

Each lift's site Standard Deviation results were added and divided by the quantity of sample sites to provide an average deviation value for the given lift. The lifts passed the 6cm requirement.

Lift ID	No. of Sample Sites	Standard Deviation
110717A	19	5.84 cm
110717B	44	5.43 cm
110817	27	4.47 cm