

DPH-9.1 Report on Overlap Consistency (interswath)

The USGS Lidar Base Specification Version 1.3 states: "Overlap consistency is a measure of the geometric agreement of two overlapping swaths, and a fundamental measure of the quality of the calibration or boresight adjustment of the data in each lift. It is of particular importance because the match between the swaths of a single lift is a strong indicator of the geometric quality of the overall dataset, establishing the quality and accuracy limits of all downstream data and products. The principles used with swaths can also be applied to the overlap between lifts and projects as well. Overlap consistency will be assessed at multiple locations within overlap in nonvegetated areas of only single returns. Assessment is limited to areas of <10-degree slope. To the degree that the data allow, test areas should be located such that the full width of the overlap is represented. The overlap areas that will be tested are those between the following:

- (1) Adjacent, overlapping parallel swaths within a project,
- (2) Cross-tie swaths and a sample of intersecting project swaths in both flight directions; and
- (3) Adjacent, overlapping lifts.

Each overlap area will be evaluated using a signed difference raster with a cell size equal to the ANPS, rounded up to the next integer, then doubled. The difference rasters will be statistically summarized to verify that RMSD_z values do not exceed the limits set forth in the 'Swath overlap' column of Table 2 for the QL of information that is being collected."

Table 2. Relative vertical accuracy for light detection and ranging swath data.

[QL, quality level; RMSD_z, root mean square difference in the z direction; m, meter; ≤, less than or equal to]

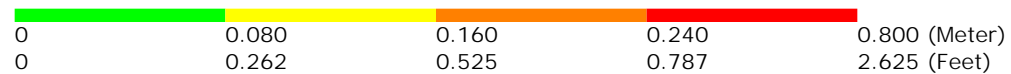
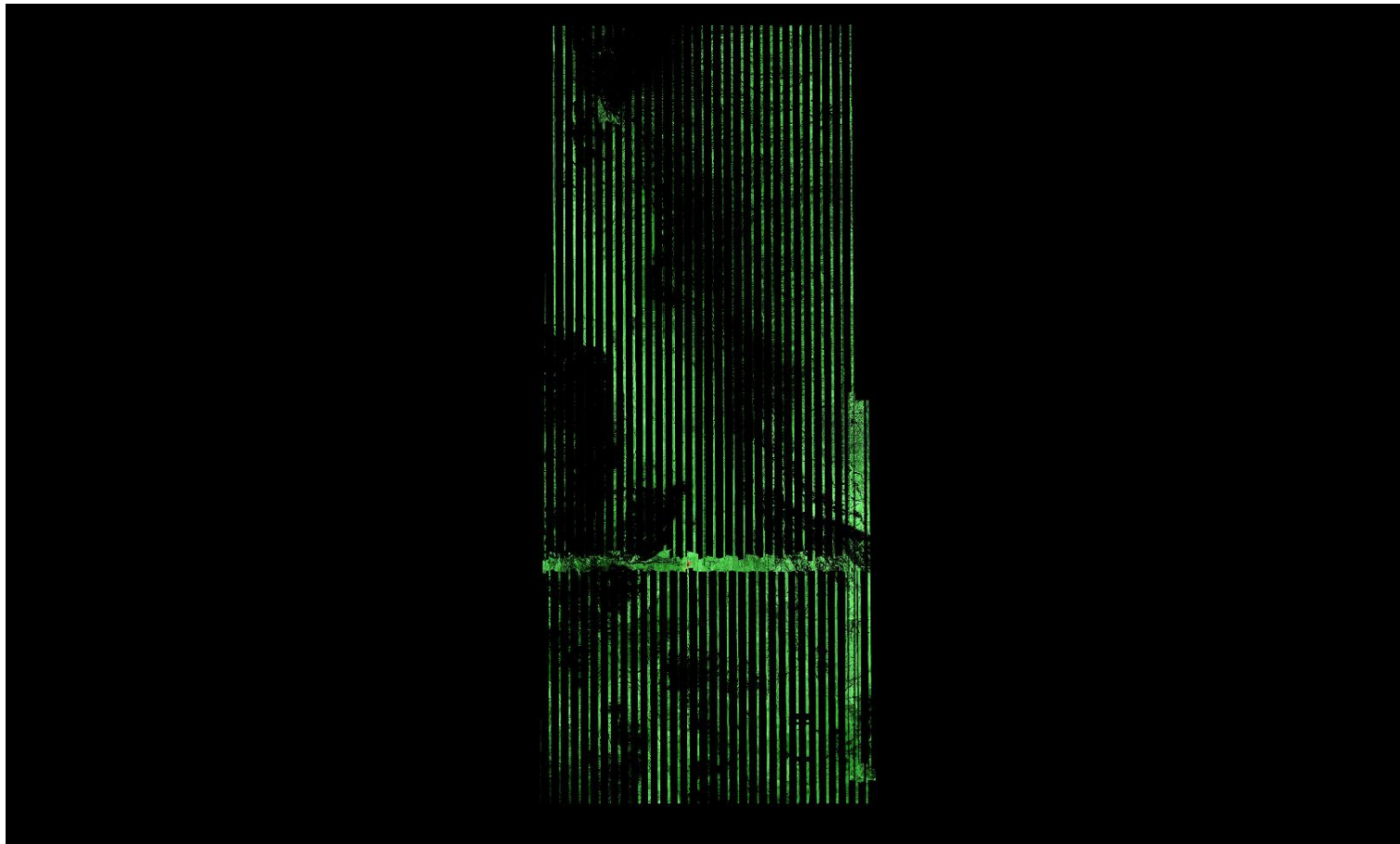
Quality level	Smooth surface repeatability, RMSD _z (m)	Swath overlap difference, RMSD _z (m)
QL0	≤0.03	≤0.04
QL1	≤0.06	≤0.08
QL2	≤0.06	≤0.08
QL3	≤0.12	≤0.16

The purpose of this section is to show a thematically rendered map of a flightline separation raster for all of the data processed. Processing has been done to isolate measurements either to specific classes of points or to clusters of single returns (depending on the method selected), limited within areas of <10 degree slope. The colors are graduated by the selected QL's swath overlap difference RMSD_z limits. Only overlap areas are shown in the raster. The color is overlaid on a lidar intensity background to show land cover features. The swath overlap difference RMSD_z values are reported on the following page(s).

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[Data Source - Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Production\Final_Client_Deliverables\Lot6_utm13\point_cloud\Swaths](#)

[Result Path - Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Admin\OA_OC\Lot6\DPH_9_1\FlightlineSeparation_SingleFile_Measurable_GRID.jp2](#)



A maximum vertical separation cutoff has been applied to this graphic for the purpose of masking out disruptive features that do not show calibration issues between flight lines (e.g., trees, moving cars, etc.).

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Adjacent Flight Line 1	Adjacent Flight Line 2	Area 1 (square Meter)	Area 2 (square Meter)	Overlap Area (square Meter)	RMSDz (Meter/Feet)
02061	02399	2933910.523	4272593.778	1993649.635	0.133 / 0.437
02109	02399	6727712.956	5418176.825	4126338.248	0.114 / 0.376
02401	02770	647025.132	1209434.299	3057.758	0.031 / 0.102
02401	02812	5556481.549	4943790.518	3792413.443	0.019 / 0.061
02401	02459	201430583.525	201086977.259	37448100.874	0.026 / 0.084
02401	02339	200418661.203	200056446.767	37987527.128	0.026 / 0.086
02401	02851	5954234.972	5371567.906	2342840.554	0.024 / 0.078
02457	02150	5190320.111	4925652.414	3353539.757	0.015 / 0.050
02457	02514	198074656.288	197912704.525	34729419.049	0.025 / 0.083
02457	02109	6824182.081	6567989.660	2827290.579	0.022 / 0.072
02457	02399	198067659.340	196285680.385	35999922.471	0.026 / 0.085
02886	02085	96739773.100	97115292.254	17133861.064	0.021 / 0.070
02886	02201	5357432.568	6231045.933	3894474.462	0.023 / 0.076
02886	02339	4929528.512	4916922.885	2197482.353	0.021 / 0.070
02886	02851	96736988.453	97730981.573	19454145.267	0.021 / 0.069
02237	02270	7827473.124	7332491.595	4163552.258	0.022 / 0.071
02237	02199	6289187.932	8047872.637	4933874.571	0.019 / 0.064
02237	02165	96330213.486	98300622.101	17074465.335	0.020 / 0.067
02237	02440	95298807.490	97586582.255	17992879.415	0.022 / 0.072
02770	02812	96037296.203	97216684.468	19301547.328	0.024 / 0.079
02770	02459	7128170.156	6199709.752	4767760.094	0.021 / 0.070
02770	02516	5077405.119	5640929.016	2128376.924	0.028 / 0.093
02770	02725	387974489.064	381293366.064	15682575.038	0.022 / 0.072
02150	02514	5125642.380	5046907.605	2240222.068	0.017 / 0.057
02150	02109	95385434.754	94329060.095	16157190.212	0.023 / 0.077
02150	02091	96222074.018	96959672.647	17405205.198	0.024 / 0.079
02135	02076	137500869.022	114200546.312	24798585.120	0.024 / 0.080
02135	02153	3398336.391	4484294.279	1780429.487	0.021 / 0.070
02135	02204	138184596.566	140300096.271	25080697.216	0.022 / 0.072
02135	02094	7083146.035	6693559.223	4743130.142	0.016 / 0.054
02135	02804	63613143.446	64893479.691	37401653.000	0.020 / 0.064
02131	02756	199593651.956	197329952.934	36150897.354	0.024 / 0.078

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Adjacent Flight Line 1	Adjacent Flight Line 2	Area 1 (square Meter)	Area 2 (square Meter)	Overlap Area (square Meter)	RMSDz (Meter/Feet)
02131	02690	4924442.053	5291659.604	2707344.114	0.024 / 0.080
02131	02199	199497914.554	198991641.076	36642861.883	0.025 / 0.082
02131	02165	7108375.313	7566441.954	4731914.382	0.025 / 0.083
02756	01004	5238214.000	5510633.131	2437927.641	0.023 / 0.075
02756	02690	5654837.600	4964377.344	3172614.886	0.022 / 0.074
02756	02711	197329952.934	195138150.572	35003942.258	0.027 / 0.088
02085	02201	6002157.410	6166212.156	2468255.552	0.036 / 0.119
02085	02716	7268334.674	5209153.265	4685450.600	0.030 / 0.099
02085	02144	97155349.540	95096747.428	18601725.089	0.021 / 0.069
01002	01003	97402271.012	97064196.444	17237102.729	0.027 / 0.087
01002	02664	7161206.222	6811687.649	3507199.422	0.029 / 0.095
01002	02616	6861028.201	7332525.358	4758838.208	0.045 / 0.149
01002	02485	97724859.464	97401714.578	18507402.949	0.027 / 0.090
02812	02459	4755956.032	4918199.528	2045507.553	0.025 / 0.082
02812	02851	97036239.397	97098265.636	17043639.868	0.022 / 0.072
02451	02509	196809057.084	196825358.529	30918130.307	0.024 / 0.079
02451	02367	5660616.619	5181342.967	3124524.515	0.025 / 0.081
02451	02393	196566748.403	196167858.953	35212448.605	0.026 / 0.084
02451	02303	6123793.427	6479725.158	3312167.293	0.024 / 0.079
02570	02621	198418339.969	196782375.818	34214041.449	0.026 / 0.084
02570	02514	198550951.758	196419569.121	36052455.386	0.026 / 0.085
02570	02091	4918023.320	4612919.118	2026334.799	0.016 / 0.053
02570	02148	6155996.215	4853029.266	3503982.003	0.016 / 0.054
01003	01004	96933541.741	97671195.094	18801694.339	0.026 / 0.084
01003	02664	5001772.031	5655140.561	3107104.757	0.025 / 0.082
01003	02711	5360432.857	3680277.439	2647692.683	0.029 / 0.094
02201	02339	200685381.998	200056446.767	37432182.275	0.024 / 0.078
02201	02716	200855956.226	197007670.609	37785843.814	0.026 / 0.084
02621	02669	196403863.489	196812046.974	34616166.760	0.028 / 0.090
02621	02148	5217883.974	5217015.783	2335935.504	0.018 / 0.060
02621	02213	5577135.741	6717795.476	4022418.268	0.017 / 0.056

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Adjacent Flight Line 1	Adjacent Flight Line 2	Area 1 (square Meter)	Area 2 (square Meter)	Overlap Area (square Meter)	RMSDz (Meter/Feet)
02469	02623	5633585.271	6268463.315	3756191.689	0.025 / 0.082
02469	02572	1076.715	1281750.722	400.940	0.050 / 0.165
02469	02525	95771673.949	95199449.736	16810654.658	0.018 / 0.061
02469	02671	4088958.424	4946668.153	2154952.709	0.028 / 0.091
02469	02411	97679222.056	97196349.583	18635070.876	0.019 / 0.064
02514	02091	5019820.307	6185801.901	3599248.306	0.016 / 0.051
02061	02109	94998655.272	95114467.815	16705587.867	0.024 / 0.080
02061	02337	5152426.611	5916580.865	3360312.276	0.039 / 0.127
02061	02440	95212368.089	96267154.880	17033028.393	0.022 / 0.071
02100	02053	99296154.939	21087805.509	17697597.723	0.024 / 0.079
02100	02161	99341036.104	99621921.580	19248481.123	0.024 / 0.080
02100	02192	4717768.328	20528.733	2837483.942	0.015 / 0.048
02100	02263	4038155.114	4361491.721	2190217.162	0.019 / 0.063
02509	02427	6321356.510	6584412.120	4083025.414	0.026 / 0.085
02509	02565	196825358.529	197197635.352	35276345.505	0.026 / 0.084
02509	02367	4033769.164	4908921.449	2565763.408	0.025 / 0.083
02195	02616	25495129.986	25435770.415	16954606.600	0.032 / 0.105
02195	02127	25115885.670	24643597.008	3748970.959	0.038 / 0.126
02195	02565	25368768.737	25431012.707	13866197.748	0.030 / 0.098
01004	02690	97498262.285	97426843.208	17777560.289	0.025 / 0.082
01004	02711	6708634.273	4589320.734	3952771.292	0.025 / 0.083
02664	02616	394129733.766	391571464.436	34547814.291	0.026 / 0.087
02664	02127	26040180.152	24973545.599	16062550.590	0.027 / 0.090
02664	02711	197782738.200	195998196.256	33936713.290	0.024 / 0.080
02053	02192	14151.130	9982.352	1456684.137	0.014 / 0.047
02762	02076	64514563.759	38787933.859	34495072.978	0.021 / 0.069
02762	02717	201125667.287	200858649.233	37295853.817	0.024 / 0.079
02762	02212	6802641.423	7246505.683	5280045.348	0.023 / 0.076
02762	02352	5778919.725	5031012.388	2029739.061	0.025 / 0.082
02762	02804	200965186.232	184460454.138	38467440.472	0.025 / 0.082
02669	02716	197369531.448	196762820.412	33767380.981	0.027 / 0.087

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Adjacent Flight Line 1	Adjacent Flight Line 2	Area 1 (square Meter)	Area 2 (square Meter)	Overlap Area (square Meter)	RMSDz (Meter/Feet)
02669	02213	5592562.582	5577189.889	2284698.319	0.023 / 0.074
02669	02144	5870491.604	4152239.629	3347673.605	0.019 / 0.063
02270	02337	199024173.272	198640056.606	35726250.399	0.027 / 0.088
02270	02199	199530818.327	198940138.325	35034698.724	0.026 / 0.085
02270	02440	5308200.075	4990995.408	3094253.815	0.018 / 0.059
02076	02212	81896275.149	82528117.901	60018223.318	0.018 / 0.058
02076	02094	6228585.388	6807357.263	3090426.266	0.018 / 0.059
02076	02804	38702129.119	64808714.483	38628316.158	0.021 / 0.070
02616	02127	25599007.993	24892081.220	13794262.663	0.032 / 0.105
02616	02565	196125738.681	196905772.235	32663905.401	0.026 / 0.085
02616	02485	5478913.196	4929470.525	2742241.111	0.033 / 0.107
02294	02275	13952.148	7928.282	254281.627	0.025 / 0.083
02294	02222	793012.975	8840216.506	2019633.275	0.029 / 0.095
02337	02399	198042907.279	196285680.385	35170441.652	0.025 / 0.083
02337	02440	5117935.373	4864916.764	2389963.795	0.023 / 0.074
02153	02204	5672004.410	5400104.191	3337120.762	0.027 / 0.088
02153	02094	19765688.411	20178374.332	3802513.993	0.020 / 0.065
02153	02222	19765688.411	94111.908	4247802.873	0.023 / 0.074
02091	02148	96619861.596	95458042.427	17149865.858	0.022 / 0.072
02717	02212	6548853.334	6165134.365	183518.142	0.033 / 0.109
02717	02352	6165914.703	5479966.623	4391854.796	0.028 / 0.091
02717	02671	200815065.104	201256427.589	38344245.085	0.025 / 0.081
02717	02411	4931680.321	4943531.382	1734998.070	0.033 / 0.109
02204	02275	139955721.694	44351757.758	25066983.257	0.023 / 0.077
02204	02222	6620797.796	42984.588	3010912.959	0.028 / 0.093
02459	02516	200763282.476	200788128.766	38173382.988	0.026 / 0.084
02516	02572	200969491.068	201278010.517	37341100.297	0.024 / 0.080
02516	02725	7037969.676	7388296.986	5400147.850	0.024 / 0.080
02275	02222	5635.529	3214049.695	3992148.453	0.025 / 0.082
02275	03031	15485565.356	242331.304	446907.232	0.032 / 0.104
02148	02213	96290358.722	97320462.259	18545729.694	0.021 / 0.068

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Adjacent Flight Line 1	Adjacent Flight Line 2	Area 1 (square Meter)	Area 2 (square Meter)	Overlap Area (square Meter)	RMSDz (Meter/Feet)
02161	02330	6328655.471	6928028.275	3584252.684	0.022 / 0.071
02161	02231	99973804.034	100616185.705	18012741.181	0.024 / 0.080
02161	02263	6625431.943	5618735.333	3816100.825	0.023 / 0.075
02330	02231	5765289.106	4581934.538	3088306.932	0.022 / 0.071
02330	02393	197676086.533	194711298.522	33881385.477	0.024 / 0.078
02330	02263	197274566.465	197190436.453	35544362.143	0.022 / 0.074
02690	02165	97493593.827	97042034.819	18749149.587	0.023 / 0.076
02212	02352	97580583.942	97226730.385	19037076.271	0.020 / 0.065
02212	02094	22623973.020	22615694.248	4428466.727	0.020 / 0.065
02212	02804	5751509.968	5872716.202	1945880.466	0.030 / 0.097
02352	02671	4402642.285	2652179.290	95403.046	0.037 / 0.123
02352	02411	97129433.922	96902898.355	17015893.968	0.019 / 0.064
02427	02565	6223186.420	5625947.865	3047640.391	0.028 / 0.092
02427	02367	97393891.836	97538691.411	19207892.812	0.027 / 0.088
02427	02485	97338468.682	97491019.083	17827663.153	0.026 / 0.084
02339	02851	5171632.479	6330888.207	4561664.439	0.017 / 0.056
02199	02165	6970926.457	6810896.348	3149883.433	0.024 / 0.079
02623	02572	200530008.751	199905120.152	38252732.169	0.025 / 0.081
02623	02525	2664347.179	2328915.315	1040706.994	0.025 / 0.082
02623	02671	200629136.384	201256427.589	37018105.202	0.025 / 0.082
02623	02411	4535372.004	3174483.835	62896.845	0.038 / 0.125
02231	02393	4683229.737	4014268.145	2465250.429	0.026 / 0.086
02231	02303	100699997.185	98683501.916	19331382.519	0.025 / 0.081
02572	02525	4184341.351	5427227.590	2828053.714	0.021 / 0.068
02572	02725	7035271.865	6504249.368	2811244.249	0.028 / 0.091
02192	02263	936421.767	197438216.439	34218672.964	0.020 / 0.066
02716	02144	4512698.874	4187876.231	2005690.009	0.026 / 0.084
02565	02485	5416839.473	5139857.945	3127081.738	0.026 / 0.084
02213	02144	96036212.665	95096747.428	16846686.351	0.022 / 0.071
02367	02303	97486495.371	96813394.531	17522963.451	0.027 / 0.087
02525	02725	380797798.944	370657352.492	17691341.989	0.020 / 0.066

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Adjacent Flight Line 1	Adjacent Flight Line 2	Area 1 (square Meter)	Area 2 (square Meter)	Overlap Area (square Meter)	RMSDz (Meter/Feet)
02393	02303	5823096.029	6272384.204	3518801.264	0.025 / 0.082
02671	02411	3910020.585	6364682.661	4236986.582	0.028 / 0.091
Aggregate					0.025 / 0.081

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The purpose of this section is to show a frequency distribution chart of RMSDz values.

