

C-2 Report on Multiple Discrete Returns

The USGS Lidar Base Specification Version 2.1 states: "Deriving and delivering multiple discrete returns are required in all conventional lidar data collection efforts. Data collection shall be capable of at least three returns per pulse. Full waveform collection is acceptable and is promoted; however, full waveform data are regarded as supplemental information."

The purpose of this section is to report on the presence and quantities of lidar returns in the LAS data. Empty return columns can indicate a collection or processing problem dealing with lidar return attribute information.

[Data Source - Y:\Mapping\Projects\65220751_NE_Southwest\Production\Final_Client_Deliverables\Projectwide\UTM14\point_cloud\Swaths](#)

File	First return	Second return	Third return	Other returns	Total points
CS_00001.las	500,651,874	12,493,648	1,624,469	65,153	514,835,144
CS_00002.las	474,598,599	750,067	100,990	5,549	475,455,205
CS_00003.las	484,024,784	23,990,889	3,645,654	162,290	511,823,617
CS_00004.las	447,405,845	11,218,689	1,820,673	101,052	460,546,259
CS_00005.las	474,962,140	16,363,004	2,059,503	79,928	493,464,575
CS_00006.las	143,558,731	469,823	58,674	2,867	144,090,095
CS_00007.las	503,483,418	16,445,044	2,241,143	94,557	522,264,162
CS_00008.las	473,525,772	24,025,116	3,731,341	168,867	501,451,096
CS_00009.las	449,494,654	5,417,701	452,676	20,042	455,385,073
CS_00010.las	508,031,695	18,204,043	2,535,964	107,206	528,878,908
CS_00011.las	454,499,660	1,424,439	158,938	8,422	456,091,459
CS_00012.las	474,408,323	20,597,438	3,320,332	157,525	498,483,618
CS_00013.las	431,780,113	5,082,703	455,823	23,454	437,342,093
CS_00014.las	415,020,785	3,948,510	334,915	16,569	419,320,779
CS_00015.las	470,778,142	887,257	130,299	6,781	471,802,479
CS_00016.las	481,759,981	354,910	39,561	1,815	482,156,267
CS_00017.las	465,981,491	16,084,025	2,298,339	106,271	484,470,126
CS_00018.las	469,423,850	17,525,808	2,491,110	118,121	489,558,889
CS_00019.las	460,537,592	1,632,185	170,225	6,613	462,346,615
CS_00020.las	435,798,457	3,369,400	348,298	17,376	439,533,531
CS_00021.las	447,931,684	5,707,362	774,657	42,119	454,455,822
CS_00022.las	444,997,023	6,009,422	674,262	30,940	451,711,647
CS_00023.las	479,309,434	14,709,402	2,008,653	82,257	496,109,746
CS_00024.las	514,934,307	13,701,765	1,753,942	71,170	530,461,184
CS_00025.las	493,429,174	16,510,449	2,213,583	90,363	512,243,569

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File	First return	Second return	Third return	Other returns	Total points
CS_00026.las	438,581,729	1,312,848	131,677	5,375	440,031,629
CS_00027.las	489,597,935	33,928,711	5,625,509	287,146	529,439,301
CS_00028.las	437,309,623	348,178	38,115	1,337	437,697,253
CS_00029.las	463,453,524	21,740,905	2,863,922	105,474	488,163,825
CS_00030.las	444,573,516	1,460,597	169,283	8,666	446,212,062
CS_00031.las	447,262,179	7,417,384	1,087,413	50,515	455,817,491
CS_00032.las	463,828,147	19,055,593	2,559,923	101,687	485,545,350
CS_00033.las	484,382,944	10,415,379	1,298,570	50,874	496,147,767
CS_00034.las	441,503,687	3,221,826	354,772	16,298	445,096,583
CS_00035.las	468,927,810	1,810,177	217,473	9,656	470,965,116
CS_00036.las	459,948,888	20,607,648	2,913,650	128,338	483,598,524
CS_00037.las	478,126,538	22,444,781	3,039,410	123,152	503,733,881
CS_00038.las	461,946,807	1,258,200	131,242	6,127	463,342,376
CS_00039.las	436,103,779	9,418,989	1,421,508	71,165	447,015,441
CS_00040.las	487,497,339	25,495,119	3,453,793	131,271	516,577,522
CS_00041.las	461,943,878	3,106,382	352,645	20,002	465,422,907
CS_00042.las	500,042,677	23,999,282	3,408,549	141,458	527,591,966
CS_00043.las	469,238,028	14,810,374	2,029,054	85,447	486,162,903
CS_00044.las	481,650,136	27,811,752	4,260,469	194,131	513,916,488
CS_00045.las	430,631,652	6,301,295	984,693	53,947	437,971,587
CS_00046.las	432,347,081	4,471,434	436,533	19,407	437,274,455
CS_00048.las	466,914,588	522,074	67,851	3,713	467,508,226
CS_00049.las	481,408,905	14,875,837	2,319,465	104,891	498,709,098
CS_00050.las	420,921,630	5,461,464	679,172	35,531	427,097,797
CS_00051.las	476,281,206	484,861	55,692	2,559	476,824,318
CS_00052.las	57,223,312	1,847,963	187,382	5,669	59,264,326
CS_00053.las	453,690,160	2,426,129	153,309	7,268	456,276,866
CS_00054.las	438,134,749	3,332,099	274,029	10,873	441,751,750
CS_00055.las	452,495,581	4,237,933	419,524	16,508	457,169,546
CS_00056.las	600,350,095	1,886,003	141,938	4,517	602,382,553
CS_00057.las	484,317,233	2,321,155	218,051	11,829	486,868,268
CS_00058.las	471,323,912	2,255,345	178,696	7,872	473,765,825
CS_00059.las	484,509,879	1,180,691	114,156	4,994	485,809,720
CS_00060.las	411,988,636	1,433,936	72,573	2,029	413,497,174

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File	First return	Second return	Third return	Other returns	Total points
CS_00061.las	672,550,484	1,999,706	137,852	4,025	674,692,067
CS_00062.las	33,452,131	150,028	15,255	548	33,617,962
CS_00063.las	55,283,071	111,320	8,595	225	55,403,211
CS_00064.las	471,055,943	3,695,915	406,202	21,331	475,179,391
CS_00065.las	481,874,117	2,526,082	226,047	11,353	484,637,599
CS_00066.las	401,530,452	2,374,998	202,147	8,599	404,116,196
CS_00067.las	650,119,448	2,309,100	185,157	9,117	652,622,822
CS_00068.las	469,321,230	2,123,446	165,071	7,997	471,617,744
CS_00069.las	643,403,216	2,174,652	127,609	3,357	645,708,834
CS_00070.las	404,744,147	2,977,508	253,798	8,199	407,983,652
CS_00071.las	412,039,184	2,941,301	268,022	12,349	415,260,856
CS_00072.las	450,886,403	2,633,986	194,129	7,276	453,721,794
CS_00073.las	749,247,049	2,216,321	172,823	6,638	751,642,831
CS_00074.las	658,392,177	2,025,178	201,288	8,704	660,627,347
CS_00075.las	417,879,914	1,790,696	135,795	5,783	419,812,188
CS_00076.las	613,871,587	2,102,157	125,222	3,574	616,102,540
CS_00077.las	499,324,168	2,640,608	199,899	8,747	502,173,422
CS_00078.las	627,232,348	1,332,838	97,321	3,093	628,665,600
CS_00079.las	639,833,522	2,905,857	308,437	18,942	643,066,758
CS_00080.las	607,917,643	1,353,909	155,950	8,446	609,435,948
CS_00081.las	624,564,010	2,365,522	157,898	4,334	627,091,764
CS_00082.las	656,351,023	1,919,208	157,215	6,043	658,433,489
CS_00083.las	751,951,961	2,499,277	159,209	5,392	754,615,839
CS_00084.las	315,701,939	4,391,308	536,425	24,706	320,654,378
CS_00085.las	406,614,294	2,393,938	225,603	10,740	409,244,575
CS_00086.las	613,161,841	2,055,846	128,963	3,414	615,350,064
CS_00087.las	596,514,003	2,383,027	181,245	8,909	599,087,184
CS_00088.las	412,217,045	3,107,977	288,846	15,118	415,628,986
CS_00089.las	602,783,029	1,965,895	148,564	5,705	604,903,193
CS_00090.las	715,759,847	2,697,120	161,582	4,057	718,622,606
CS_00091.las	600,461,011	2,733,751	261,761	13,145	603,469,668
CS_00092.las	440,571,641	4,580,220	489,260	18,814	445,659,935
CS_00093.las	491,560,762	3,219,961	284,401	12,940	495,078,064
CS_00094.las	480,507,365	2,914,968	254,694	12,236	483,689,263

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File	First return	Second return	Third return	Other returns	Total points
CS_00095.las	593,262,072	1,281,141	123,913	5,448	594,672,574
CS_00096.las	490,069,555	2,784,079	230,477	9,039	493,093,150
CS_00097.las	77,067,993	126,857	13,108	549	77,208,507
CS_00098.las	63,372,048	149,318	18,478	951	63,540,795
CS_00099.las	642,624,694	1,727,372	185,970	9,440	644,547,476
CS_00100.las	670,079,469	1,437,787	134,147	4,799	671,656,202
CS_00101.las	417,807,395	2,055,931	174,356	8,597	420,046,279
CS_00102.las	807,855,185	2,262,169	198,490	9,000	810,324,844
CS_00103.las	401,904,534	1,889,287	173,013	8,915	403,975,749
CS_00104.las	603,217,134	1,844,598	128,464	3,791	605,193,987
CS_00105.las	421,611,293	1,924,794	162,025	7,380	423,705,492
CS_00106.las	116,487,893	1,096,582	92,585	2,883	117,679,943
CS_00107.las	707,555,654	995,429	96,719	4,018	708,651,820
CS_00108.las	3,949,644	7,776	372	09	3,957,801
CS_00109.las	708,783,981	1,308,993	138,952	6,882	710,238,808
CS_00110.las	807,276,323	1,917,665	123,171	4,971	809,322,130
CS_00111.las	618,174,192	1,171,645	118,599	5,623	619,470,059
CS_00112.las	733,327,850	1,045,181	99,524	3,776	734,476,331
CS_00113.las	692,331,273	1,135,139	133,134	6,957	693,606,503
CS_00114.las	637,590,987	1,915,556	140,600	7,414	639,654,557
CS_00116.las	60,396,116	35,760	4,155	122	60,436,153
CS_00117.las	721,025,741	1,454,623	79,453	3,149	722,562,966
CS_00118.las	637,183,487	1,578,958	158,505	8,056	638,929,006
CS_00119.las	723,770,912	937,635	93,565	4,094	724,806,206
CS_00120.las	684,402,030	920,777	87,648	3,780	685,414,235
CS_00121.las	539,320,601	1,253,857	162,530	8,505	540,745,493
CS_00122.las	753,262,449	1,101,135	117,390	5,466	754,486,440
CS_00123.las	724,264,427	1,379,959	147,100	7,395	725,798,881
CS_00124.las	598,939,117	1,529,307	180,601	9,469	600,658,494
CS_00125.las	601,916,176	1,353,092	111,118	3,272	603,383,658
CS_00126.las	882,293,248	1,790,813	197,752	10,161	884,291,974
CS_00127.las	268,336,347	764,648	78,915	3,452	269,183,362
CS_00129.las	477,533,535	604,570	50,747	1,770	478,190,622
CS_01036.las	162,255,217	56,056	6,438	372	162,318,083

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File	First return	Second return	Third return	Other returns	Total points
CS_01037.las	112,721,063	25,249	1,331	68	112,747,711
CS_01041.las	87,950,952	109,558	9,869	363	88,070,742
CS_01042.las	312,192,515	1,645,195	68,640	4,330	313,910,680
CS_01043.las	377,556,001	3,899,811	111,626	7,158	381,574,596
CS_01044.las	363,247,636	1,897,823	141,531	11,439	365,298,429
CS_01045.las	377,637,257	1,010,400	113,931	8,262	378,769,850
CS_01046.las	367,618,414	1,358,087	164,865	12,272	369,153,638
CS_01047.las	367,439,198	2,401,280	266,505	16,030	370,123,013
CS_01048.las	366,958,508	2,162,630	274,161	18,637	369,413,936
CS_01049.las	367,510,210	4,058,600	369,871	19,869	371,958,550
CS_01050.las	363,878,127	5,689,099	485,919	29,734	370,082,879
CS_01051.las	365,055,196	1,052,532	122,737	9,344	366,239,809
CS_01052.las	366,415,665	1,475,978	189,560	15,319	368,096,522
CS_01053.las	368,739,072	2,374,875	240,784	11,329	371,366,060
CS_01054.las	356,875,360	4,871,919	642,631	32,581	362,422,491
CS_01056.las	358,674,911	5,996,926	1,072,643	73,789	365,818,269
CS_01057.las	342,133,152	4,082,802	696,415	46,414	346,958,783
CS_01058.las	326,827,546	1,062,379	126,342	8,185	328,024,452
CS_01059.las	326,263,880	1,740,494	232,020	15,216	328,251,610
CS_01060.las	331,888,515	2,051,216	308,331	20,812	334,268,874
CS_01061.las	335,182,296	2,185,800	334,839	23,838	337,726,773
CS_01062.las	338,201,321	1,477,360	208,473	14,729	339,901,883
CS_01063.las	358,775,262	2,069,824	393,666	40,402	361,279,154
CS_01064.las	363,760,477	890,336	152,218	11,272	364,814,303
CS_01065.las	367,797,903	230,411	35,940	2,279	368,066,533
CS_01066.las	364,820,861	436,989	73,111	6,398	365,337,359
CS_01067.las	362,360,308	316,928	46,961	3,554	362,727,751
CS_01068.las	360,490,445	348,133	49,432	2,715	360,890,725
CS_01069.las	413,699,699	1,874,305	351,380	26,365	415,951,749
CS_01070.las	157,633,923	467,990	72,021	3,999	158,177,933
Total	72,527,017,561	743,342,485	95,446,117	4,397,096	73,370,203,259