

C-2 Report on Multiple Discrete Returns

The USGS Lidar Base Specification Version 1.3 states: "Deriving and delivering multiple discrete returns is 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\65220171_USGS-TX_West_Texas\Production\Final_Client_Deliverables\Lot8_utm13\point_cloud\Swaths](#)

File	First return	Second return	Third return	Other returns	Total points
CS_02002.las	306,170,762	1,581,986	11,615	178	307,764,541
CS_02029.las	318,539,608	2,238,424	60,474	1,287	320,839,793
CS_02032.las	318,612,743	1,801,626	9,535	135	320,424,039
CS_02034.las	304,321,695	1,070,001	7,114	48	305,398,858
CS_02067.las	137,807,176	1,389,209	9,912	09	139,206,306
CS_02070.las	312,734,120	1,158,553	8,455	77	313,901,205
CS_02073.las	304,530,707	1,331,690	9,899	95	305,872,391
CS_02075.las	125,213,562	448,106	2,303	18	125,663,989
CS_02096.las	64,859,394	1,006,292	8,903	14	65,874,603
CS_02099.las	60,396,838	779,620	5,929	06	61,182,393
CS_02122.las	312,882,501	5,505,061	236,671	9,294	318,633,527
CS_02123.las	326,626,116	7,473,277	101,827	2,585	334,203,805
CS_02126.las	295,121,653	1,866,945	42,323	938	297,031,859
CS_02129.las	295,732,984	1,503,123	11,810	167	297,248,084
CS_02132.las	316,125,746	1,347,314	13,408	181	317,486,649
CS_02134.las	1,464,074	12,053	52	00	1,476,179
CS_02153.las	13,254,555	108,180	288	00	13,363,023
CS_02156.las	52,268,572	958,698	9,250	07	53,236,527
CS_02160.las	53,588,460	238,112	384	00	53,826,956
CS_02170.las	295,210,700	1,991,739	60,066	1,741	297,264,246
CS_02186.las	301,512,030	5,507,828	148,391	4,654	307,172,903
CS_02187.las	308,334,898	7,021,343	132,597	4,141	315,492,979
CS_02188.las	299,834,551	8,954,286	458,238	23,107	309,270,182
CS_02189.las	311,465,099	11,504,631	1,080,038	81,782	324,131,550
CS_02193.las	329,429,357	2,034,230	23,182	282	331,487,051

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CS_02197.las	304,721,164	1,721,619	14,320	252	306,457,355
CS_02200.las	303,416,379	1,143,999	7,789	74	304,568,241
CS_02204.las	174,100,050	1,745,986	38,774	263	175,885,073
CS_02222.las	59,950,753	595,658	1,763	00	60,548,174
CS_02225.las	61,592,112	700,049	6,914	24	62,299,099
CS_02229.las	58,386,435	483,431	7,569	08	58,877,443
CS_02240.las	311,583,824	2,239,147	51,630	1,217	313,875,818
CS_02257.las	317,272,794	6,688,513	216,574	9,281	324,187,162
CS_02258.las	323,506,236	8,019,199	376,868	20,040	331,922,343
CS_02259.las	361,345,544	12,328,946	884,131	51,882	374,610,503
CS_02260.las	323,184,284	13,752,320	1,592,246	137,555	338,666,405
CS_02264.las	291,702,017	1,515,063	14,899	133	293,232,112
CS_02268.las	307,076,312	1,902,471	14,720	206	308,993,709
CS_02271.las	300,205,542	1,195,834	13,848	362	301,415,586
CS_02275.las	432,431,632	3,748,798	66,488	451	436,247,369
CS_02278.las	413,535,769	4,729,256	120,790	694	418,386,509
CS_02294.las	51,333,219	455,705	1,602	02	51,790,528
CS_02297.las	53,196,134	322,299	408	00	53,518,841
CS_02301.las	76,046,919	3,087,184	85,358	170	79,219,631
CS_02310.las	294,722,700	2,121,313	61,565	1,870	296,907,448
CS_02324.las	301,250,023	6,847,936	172,733	5,265	308,275,957
CS_02325.las	313,071,133	7,389,202	478,675	27,660	320,966,670
CS_02326.las	247,819,797	3,044,613	22,971	109	250,887,490
CS_02327.las	308,911,904	14,811,899	2,020,117	204,346	325,948,266
CS_02331.las	317,370,834	1,823,728	17,857	150	319,212,569
CS_02338.las	317,059,832	1,366,412	10,566	138	318,436,948
CS_02345.las	523,161,980	6,152,947	176,153	1,085	529,492,165
CS_02359.las	60,378,322	557,216	2,406	07	60,937,951
CS_02361.las	60,356,140	737,907	1,780	00	61,095,827
CS_02365.las	61,735,357	5,867,360	257,802	966	67,861,485
CS_02373.las	308,390,470	1,931,311	47,213	1,384	310,370,378
CS_02387.las	333,744,916	8,115,225	268,043	10,247	342,138,431
CS_02388.las	331,095,399	7,909,890	345,550	22,319	339,373,158
CS_02390.las	211,252,546	16,981,385	2,604,359	265,713	231,104,003

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CS_02394.las	294,648,038	1,753,926	17,252	170	296,419,386
CS_02400.las	294,521,885	1,500,253	10,125	180	296,032,443
CS_02403.las	427,892,013	3,538,900	46,920	278	431,478,111
CS_02405.las	415,496,081	6,731,454	209,804	1,698	422,439,037
CS_02421.las	54,169,113	625,078	2,142	01	54,796,334
CS_02425.las	66,324,312	6,494,549	268,309	1,252	73,088,422
CS_02446.las	302,393,618	7,989,157	236,085	7,771	310,626,631
CS_02447.las	324,868,851	7,949,662	246,259	9,811	333,074,583
CS_02458.las	307,671,644	1,300,003	7,453	52	308,979,152
CS_02462.las	452,348,119	3,989,555	54,983	319	456,392,976
CS_02464.las	548,523,037	15,409,916	707,425	8,512	564,648,890
CS_02476.las	51,691,053	569,788	3,532	07	52,264,380
CS_02483.las	69,956,577	6,515,521	295,728	1,446	76,769,272
CS_02491.las	299,115,857	1,854,633	28,658	600	300,999,748
CS_02505.las	335,022,495	9,662,311	286,563	8,820	344,980,189
CS_02506.las	322,351,879	7,015,141	156,252	4,663	329,527,935
CS_02515.las	308,987,416	1,015,150	5,970	64	310,008,600
CS_02519.las	424,510,790	3,995,216	59,475	312	428,565,793
CS_02521.las	420,290,266	17,281,818	828,302	11,570	438,411,956
CS_02539.las	65,861,544	6,281,522	278,307	1,497	72,422,870
CS_02547.las	306,819,422	2,145,045	26,182	400	308,991,049
CS_02553.las	293,140,212	2,811,367	114,057	3,852	296,069,488
CS_02555.las	501,642,608	17,643,981	1,127,226	22,541	520,436,356
CS_02561.las	299,276,504	8,286,370	232,388	6,902	307,802,164
CS_02562.las	309,248,444	7,436,646	202,911	10,343	316,898,344
CS_02566.las	318,167,285	1,877,903	20,472	204	320,065,864
CS_02574.las	448,254,021	4,791,661	68,499	301	453,114,482
CS_02576.las	530,923,657	26,863,897	1,264,904	17,025	559,069,483
CS_02592.las	75,915,129	6,139,850	265,394	1,501	82,321,874
CS_02605.las	303,535,914	3,540,532	190,079	7,866	307,274,391
CS_02607.las	461,745,887	18,261,090	1,195,432	26,441	481,228,850
CS_02613.las	344,652,017	8,649,369	214,005	7,707	353,523,098
CS_02614.las	321,967,512	8,680,779	230,549	11,333	330,890,173
CS_02617.las	296,336,095	1,750,099	23,318	407	298,109,919

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CS_02622.las	18,114,102	54,434	1,354	11	18,169,901
CS_02625.las	424,156,071	4,400,634	74,189	476	428,631,370
CS_02627.las	433,698,081	21,456,634	1,014,647	12,891	456,182,253
CS_02641.las	60,929,769	6,185,990	313,773	2,563	67,432,095
CS_02652.las	320,335,447	3,147,034	140,941	5,281	323,628,703
CS_02655.las	499,387,876	20,695,052	1,632,799	49,684	521,765,411
CS_02661.las	313,667,713	7,930,915	116,706	3,011	321,718,345
CS_02662.las	314,848,155	8,499,668	268,332	9,781	323,625,936
CS_02673.las	444,772,770	5,242,830	143,098	1,169	450,159,867
CS_02675.las	541,140,972	20,665,550	946,645	10,061	562,763,228
CS_02688.las	65,167,573	7,664,598	379,604	3,204	73,214,979
CS_02700.las	299,024,444	3,215,956	166,754	7,606	302,414,760
CS_02710.las	331,780,703	8,524,130	353,016	15,745	340,673,594
CS_02719.las	390,167,228	6,124,448	199,027	2,140	396,492,843
CS_02721.las	424,782,331	10,154,567	485,439	6,335	435,428,672
CS_02744.las	319,082,897	3,085,385	108,003	4,417	322,280,702
CS_02748.las	468,745,997	17,472,670	1,309,436	38,464	487,566,567
CS_02755.las	304,971,408	8,148,502	323,699	14,743	313,458,352
CS_02764.las	454,551,244	6,784,174	139,256	1,143	461,475,817
CS_02789.las	293,037,064	2,478,196	33,981	530	295,549,771
CS_02925.las	68,952,340	3,041,773	76,924	707	72,071,744
CS_02965.las	46,154,096	1,740,043	52,614	664	47,947,417
CS_02990.las	988,778	73,942	212	00	1,062,932
CS_03028.las	528,915,813	5,224,831	73,125	346	534,214,115
CS_03031.las	453,370,545	3,659,861	36,912	153	457,067,471
CS_09000.las	27,208,856	625,194	4,274	24	27,838,348
Total	32,727,167,941	637,515,301	29,776,865	1,261,614	33,395,721,721