

# Ground Control Survey Report



UNITED STATES GEOLOGICAL SURVEY  
CO San Juan 2017 D17

TASK ORDER NUMBER: G17PD01197

Contractor: Woolpert, Inc.  
Woolpert Project # 77866

September 2017

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UNITED STATES GEOLOGICAL SURVEY – CO San Juan 2017 D17

Task Order G17PD01197

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# Section 1: Survey Report

## TASK ORDER NAME: UNITED STATES GEOLOGICAL SURVEY – CO San Juan LiDAR 2017 D17

### Task Order: #G17PD01197

This report contains a comprehensive outline of the Ground Control Survey that supported the Colorado San Juan airborne LiDAR collection. All surveys were performed in such a way as to achieve ground control accuracies that meet or exceed the National Mapping Accuracy Standards.

## Project Area

The project area consists of approximately 232 square miles over portions of San Juan County, CO.

## Purpose

The purpose of this survey was to establish three-dimensional coordinates for 45 LiDAR primary control points and 75 ground classification check points. The points were collected per the flight layout and were uniformly dispersed over the project area.

## Date of Survey

Ground control field missions took place on September 25th through October 4th, 2017.

## Monumentation

Prior to aerial acquisition, Woolpert field crews performed a field reconnaissance to verify the existence and suitability of pre-selected existing National Geodetic Survey (NGS) control stations. These existing NSRS control stations were utilized as checks to ensure that quality x, y, and z coordinate values were computed for each of the newly established LiDAR control stations. Recovery information sheets for the existing NGS control stations can be found in Section 4 of this report. A control diagram showing the ground control stations used to support this mapping project can be found in Section 5 of this report.

## Accuracy Standards

The relative accuracy of the lidar data will be  $\leq 8$  cm RMSEZ between adjacent swaths with a maximum difference of  $\pm 16$  cm. The data collected shall meet the National Standard for Spatial Database Accuracy (NSSDA) accuracy standards. The NSSDA standards specify that vertical accuracy be reported at the 95 percent confidence level for data tested by an independent source of higher accuracy. The accuracy (ACCz) for the derived DEM shall be calculated in three ways, and reported in the metadata accordingly. The RMSEZ (Non-Vegetated) is required to meet  $\leq 10.0$  cm. The Non-Vegetated Vertical Accuracy (NVA) is required to meet  $\leq 19.6$  cm at a 95% confidence level, derived according to NSSDA, i.e., based on RMSEZ of 10.0 cm in the “open terrain” and/or “urban” land cover categories. The Vegetated Vertical Accuracy (VVA) is required to meet  $\leq 29.4$  cm at a 95th percentile level, derived according to ASPRS Guidelines, Vertical Accuracy Reporting for Lidar Data, i.e., based on the 95th percentile error in Vegetated land cover categories combined (Brush Lands/Trees and Forested Areas).

## GPS Equipment

Woolpert utilized 2 Trimble Navigation R8 Model 3 GNSS dual-frequency GPS receivers, 1 Trimble Navigation R10 Model GNSS dual-frequency GPS receiver and 1 TSC3 data collector for this project.

## Methodology

### Real-Time Kinematic (RTK) GPS

The field crew utilized Real-Time Kinematic (RTK) and GPS Rapid Static methods throughout the ground control data collection process. Using these techniques, observations were performed on a total of 45 LiDAR control points and 75 ground classification check points. The survey was conducted using a 1-second epoch rate, in a fixed solution RTK mode, with each observation lasting between 60 to 180 seconds. Each station was occupied twice to insure the necessary horizontal and vertical accuracies were being met for this LiDAR / photogrammetric project.

### GPS Data Analysis and Processing

The field crew chief processed all session baselines each day using Trimble Navigation's Trimble Business Center (TBC) Version 4.01 baseline processor with the accompanying broadcast ephemeris. Daily processing ensured the integrity of the network as it was constructed, and allowed the field crews to immediately reschedule observations of poor baselines.

### Datum Reference and Final Coordinates

The spatial reference system for this project is will be UTM Zone 13 North. The datum shall be NAD83 (2011) meters to 2 decimal places horizontal and NAVD88 Meters vertical using the latest geoid model (GEOID12B) Units for both the horizontal and vertical datum will be expressed in meters to two (2) decimal places.

### Quality Assurance

Existing NSRS published continuously operating reference stations were utilized to assure that there were no discrepancies in the field observation data. Close examinations of the residuals showed no distortions in orientation or scale. The ground control data meets positional accuracies necessary to support 1.0 point per 0.3 meters squared (1' GSD) data at 95% confidence level as outlined in the Geospatial Positioning Accuracy Standards, Part 3: National Standard for Spatial Data Accuracy (NSSDA), published by the Federal Geographic Data Committee (FGDC-STD-007.3-1998).

## Section 2: Ground Control / Geodetic Control Coordinate Listings

- Coordinate System: Grid
- Horizontal Datum: NAD83 2011 UTM 13 North
- Vertical Datum: NAVD88
- Geoid Model: GEOID 12B
- Units: Meter

Point No.	UTM Zone 13 North		Ortho Height (NAVD88) (m)	Description
	UTM Northing (m)	UTM Easting (m)		
1001	4186692.15	254464.14	3184.33	LiDAR Control
1002	4187969.59	255832.44	2997.22	LiDAR Control
1003	4189456.77	260596.52	2903.80	LiDAR Control
1003 A	4189423.61	260611.50	2903.12	LiDAR Control
1004	4193940.95	253899.27	3253.30	LiDAR Control
1005	4200794.91	274666.83	3351.39	LiDAR Control
1006	4190829.08	271741.37	2952.86	LiDAR Control
1007	4194050.34	276249.70	3444.80	LiDAR Control
1008	4201493.06	276937.39	3850.43	LiDAR Control
1009	4183346.63	264506.40	3174.50	LiDAR Control
1010	4185184.12	265701.74	3106.80	LiDAR Control
1011	4187424.76	265115.37	2820.25	LiDAR Control
1011 A	4187492.06	265099.36	2821.09	LiDAR Control
1012	4188740.84	266079.63	2842.96	LiDAR Control
1012 A	4188780.78	266120.22	2845.05	LiDAR Control
1013	4189837.36	265233.45	2902.08	LiDAR Control
1013 A	4189795.59	265247.31	2899.88	LiDAR Control
1014	4189998.37	268857.59	2924.80	LiDAR Control
1014 A	4189906.84	268832.65	2890.98	LiDAR Control
1015	4184652.20	272808.00	3289.48	LiDAR Control
1016	4184895.67	276817.21	3632.16	LiDAR Control
1016 A	4184877.50	276847.91	3631.02	LiDAR Control

Point No.	UTM Zone 13 North		Ortho Height (NAVD88) (m)	Description
	UTM Northing (m)	UTM Easting (m)		
1017	4197641.15	261331.23	3368.25	LiDAR Control
1017 A	4197729.59	261394.58	3372.51	LiDAR Control
1018	4186631.49	275239.64	3791.60	LiDAR Control
1019	4188941.49	262449.52	2878.27	LiDAR Control
1020	4192903.20	255470.42	3592.99	LiDAR Control
1020 A	4192894.42	255513.91	3590.62	LiDAR Control
1021	4192405.01	258555.12	3178.50	LiDAR Control
1021 A	4192364.37	258338.93	3199.16	LiDAR Control
1021 B	4192450.43	258575.45	3177.14	LiDAR Control
1022	4197177.76	270929.23	3571.56	LiDAR Control
1022 A	4197196.14	270898.84	3577.97	LiDAR Control
1023	4195413.17	264992.99	3111.46	LiDAR Control
1024	4179898.49	260787.70	3229.22	LiDAR Control
1025	4180909.38	263119.13	3226.21	LiDAR Control
1026	4180601.74	262539.67	3245.35	LiDAR Control
1027	4179821.91	262148.23	3314.65	LiDAR Control
1028	4177794.38	257201.38	3030.89	LiDAR Control
1029	4173198.34	253557.19	2859.17	LiDAR Control
1030	4189256.10	267460.77	2862.01	LiDAR Control
1031	4189542.15	267964.83	2886.68	LiDAR Control
1032	4189966.90	269714.92	2933.63	LiDAR Control
1033	4190376.08	270788.21	2951.94	LiDAR Control
1033 A	4190321.33	270791.57	2930.94	LiDAR Control
2001	4198815.95	261948.26	3340.54	NVA
2001 A	4198788.70	261910.12	3342.19	NVA
2001 B	4198826.92	261967.17	3339.75	NVA
2002	4179870.15	260779.24	3226.06	NVA
2002 A	4179840.54	260751.94	3223.24	NVA
2003	4193701.24	254493.08	3335.87	NVA
2003 A	4193687.33	254523.37	3339.50	NVA
2004	4187508.28	264914.24	2821.55	NVA
2004 A	4187497.21	264751.52	2822.84	NVA
2004 B	4187467.30	265040.66	2820.17	NVA
2005	4190064.82	270169.58	2933.89	NVA

Point No.	UTM Zone 13 North		Ortho Height (NAVD88) (m)	Description
	UTM Northing (m)	UTM Easting (m)		
2005 A	4190026.56	270218.15	2916.48	NVA
2006	4196075.88	274342.44	3073.48	NVA
2007	4201493.43	273211.01	3471.85	NVA
2008	4185746.75	276105.32	3768.57	NVA
2009	4192793.23	260148.36	3047.52	NVA
2009 A	4192814.44	260115.63	3050.53	NVA
2010	4199163.64	267445.03	3507.81	NVA
2010 A	4199209.57	267432.54	3511.40	NVA
2011	4192491.56	264408.86	3022.07	NVA
2012	4196331.73	265563.52	3143.04	NVA
2012 A	4196367.44	265578.27	3144.23	NVA
2013	4192672.45	276705.09	3393.42	NVA
2013 A	4193562.87	275893.83	3264.45	NVA
2014	4185153.37	253149.63	3253.52	NVA
2014 A	4185195.08	253137.49	3252.24	NVA
2014 B	4185149.56	253125.91	3254.61	NVA
2015	4190198.54	255092.32	3648.17	NVA
2015 A	4190158.70	255071.98	3639.27	NVA
2016	4187817.81	256877.21	2980.30	NVA
2017	4188616.16	258529.99	2950.45	NVA
2017 A	4188584.40	258497.45	2950.70	NVA
2018	4197977.98	270197.99	3747.00	NVA
2018 A	4198004.17	270102.55	3738.50	NVA
2019	4198177.76	273668.84	3821.65	NVA
2020	4199671.59	274152.38	3644.92	NVA
2020 A	4199683.28	274120.39	3650.73	NVA
2021	4201518.66	275393.25	3626.92	NVA
2022	4188509.13	272930.23	3052.74	NVA
2023	4187405.69	270027.71	3231.41	NVA
2023 A	4187416.68	270025.54	3230.57	NVA
2024	4196671.78	271938.12	3373.00	NVA
2025	4197058.21	258833.01	3758.65	NVA
2025 A	4197082.61	258877.66	3752.69	NVA
2025 B	4197069.45	258965.88	3750.23	NVA

Point No.	UTM Zone 13 North		Ortho Height (NAVD88) (m)	Description
	UTM Northing (m)	UTM Easting (m)		
3001	4198824.02	261940.38	3339.23	VVA
3001 A	4198728.23	261867.08	3341.69	VVA
3001 B	4198816.86	261900.29	3342.37	VVA
3002	4185220.74	253213.94	3249.61	VVA
3002 A	4185224.31	253105.05	3251.67	VVA
3002 B	4185123.35	253125.93	3254.35	VVA
3003	4179873.90	260809.79	3227.82	VVA
3003 A	4179823.28	260794.54	3217.37	VVA
3004	4193726.64	274078.29	2997.90	VVA
3004 A	4193744.26	273993.42	2991.51	VVA
3005	4188239.26	257926.99	2965.92	VVA
3005 A	4188276.35	257968.74	2964.71	VVA
3006	4190721.87	271620.58	2949.20	VVA
3006 A	4190749.81	271581.65	2946.86	VVA
3007	4187545.91	265079.25	2820.30	VVA
3007 A	4187570.63	265105.35	2820.70	VVA
3008	4192323.78	260204.54	3071.27	VVA
3008 A	4192302.36	260179.21	3067.10	VVA
3009	4195213.14	259212.60	3199.29	VVA
3009 A	4195205.29	259180.04	3200.97	VVA
3009 B	4195245.66	259185.33	3203.11	VVA
3010	4198622.11	267343.28	3429.25	VVA
3010 A	4198652.64	267360.20	3430.59	VVA
3011	4196704.63	265936.05	3158.77	VVA
3011 A	4196727.95	265999.22	3160.75	VVA
3012	4192437.06	264401.10	3014.45	VVA
3013	4200760.46	274701.64	3345.01	VVA
3013 A	4200737.92	274676.49	3339.26	VVA
3014	4183304.00	264507.27	3176.25	VVA
3014 A	4183389.05	264488.84	3176.82	VVA



- Coordinate System: Geodetic
- Horizontal Datum: NAD83 (2011) Epoch 2010.00
- Vertical Datum: NAVD88
- Units: Meter

Point No.	Geodetic Coordinates NAD-83 (2011) Epoch 2010.00		Ellipsoid Height (m)	Description
	Latitude (N)	Longitude (W)		
1001	37°47'40.65413"	-107°47'18.90549"	3168.58	LiDAR Control
1002	37°48'23.37525"	-107°46'24.57122"	2981.51	LiDAR Control
1003	37°49'16.11662"	-107°43'11.73023"	2888.20	LiDAR Control
1003 A	37°49'15.05587"	-107°43'11.07881"	2887.53	LiDAR Control
1004	37°51'35.03103"	-107°47'50.84720"	3237.59	LiDAR Control
1005	37°55'36.53357"	-107°33'49.52874"	3336.23	LiDAR Control
1006	37°50'10.87714"	-107°35'37.89787"	2937.53	LiDAR Control
1007	37°51'59.31611"	-107°32'37.22280"	3429.60	LiDAR Control
1008	37°56'01.17965"	-107°32'17.39104"	3835.35	LiDAR Control
1009	37°46'01.73557"	-107°40'24.83115"	3158.98	LiDAR Control
1010	37°47'02.39848"	-107°39'38.16082"	3091.33	LiDAR Control
1011	37°48'14.48130"	-107°40'04.72102"	2804.75	LiDAR Control
1011 A	37°48'16.64772"	-107°40'05.45324"	2805.59	LiDAR Control
1012	37°48'58.02942"	-107°39'26.86011"	2827.49	LiDAR Control
1012 A	37°48'59.36140"	-107°39'25.24778"	2829.57	LiDAR Control
1013	37°49'32.78813"	-107°40'02.71244"	2886.60	LiDAR Control
1013 A	37°49'31.44727"	-107°40'02.09739"	2884.39	LiDAR Control
1014	37°49'41.33732"	-107°37'34.80273"	2909.41	LiDAR Control
1014 A	37°49'38.34789"	-107°37'35.71682"	2875.59	LiDAR Control
1015	37°46'51.61530"	-107°34'47.33028"	3274.25	LiDAR Control
1016	37°47'03.06332"	-107°32'03.85697"	3616.99	LiDAR Control
1016 A	37°47'02.50133"	-107°32'02.58317"	3615.85	LiDAR Control
1017	37°53'42.07130"	-107°42'51.44078"	3352.77	LiDAR Control
1017 A	37°53'44.99756"	-107°42'48.95532"	3357.02	LiDAR Control
1018	37°47'57.93890"	-107°33'10.22745"	3776.43	LiDAR Control
1019	37°49'01.15851"	-107°41'55.41055"	2862.73	LiDAR Control
1020	37°51'02.92058"	-107°46'45.35917"	3577.33	LiDAR Control
1020 A	37°51'02.67802"	-107°46'43.57097"	3574.96	LiDAR Control

Point No.	Geodetic Coordinates NAD-83 (2011) Epoch 2010.00		Ellipsoid Height (m)	Description
	Latitude (N)	Longitude (W)		
1021	37°50'49.73377"	-107°44'38.67847"	3162.88	LiDAR Control
1021 A	37°50'48.21028"	-107°44'47.46542"	3183.54	LiDAR Control
1021 B	37°50'51.22516"	-107°44'37.90197"	3161.52	LiDAR Control
1022	37°53'35.92798"	-107°36'18.33687"	3556.33	LiDAR Control
1022 A	37°53'36.49615"	-107°36'19.60081"	3562.74	LiDAR Control
1023	37°52'33.28805"	-107°40'19.06273"	3096.04	LiDAR Control
1024	37°44'06.50241"	-107°42'52.57549"	3213.57	LiDAR Control
1025	37°44'41.44967"	-107°41'18.61148"	3210.64	LiDAR Control
1026	37°44'30.93792"	-107°41'41.90191"	3229.76	LiDAR Control
1027	37°44'05.29624"	-107°41'56.96015"	3299.03	LiDAR Control
1028	37°42'54.90943"	-107°45'16.40572"	3015.08	LiDAR Control
1029	37°40'22.45188"	-107°47'39.48480"	2843.13	LiDAR Control
1030	37°49'16.00073"	-107°38'31.02503"	2846.58	LiDAR Control
1031	37°49'25.73435"	-107°38'10.75883"	2871.26	LiDAR Control
1032	37°49'41.09759"	-107°36'59.73142"	2918.25	LiDAR Control
1033	37°49'55.33366"	-107°36'16.33730"	2936.59	LiDAR Control
1033 A	37°49'53.56174"	-107°36'16.13746"	2915.59	LiDAR Control
2001	37°54'20.72904"	-107°42'27.60053"	3325.07	NVA
2001 A	37°54'19.80968"	-107°42'29.12842"	3326.72	NVA
2001 B	37°54'21.10218"	-107°42'26.84012"	3324.28	NVA
2002	37°44'05.57604"	-107°42'52.88705"	3210.41	NVA
2002 A	37°44'04.59056"	-107°42'53.96609"	3207.59	NVA
2003	37°51'27.83860"	-107°47'26.28109"	3320.18	NVA
2003 A	37°51'27.41740"	-107°47'25.02571"	3323.81	NVA
2004	37°48'17.00194"	-107°40'13.03476"	2806.05	NVA
2004 A	37°48'16.49228"	-107°40'19.66886"	2807.34	NVA
2004 B	37°48'15.79090"	-107°40'07.82251"	2804.67	NVA
2005	37°49'44.68431"	-107°36'41.26337"	2918.53	NVA
2005 A	37°49'43.48800"	-107°36'39.23497"	2901.12	NVA
2006	37°53'03.27999"	-107°33'57.48682"	3058.23	NVA
2007	37°55'57.87229"	-107°34'49.89481"	3456.67	NVA
2008	37°47'30.02469"	-107°32'33.87929"	3753.41	NVA
2009	37°51'03.82971"	-107°43'34.02299"	3031.95	NVA
2009 A	37°51'04.48588"	-107°43'35.38601"	3034.95	NVA

Point No.	Geodetic Coordinates NAD-83 (2011) Epoch 2010.00		Ellipsoid Height (m)	Description
	Latitude (N)	Longitude (W)		
2010	37°54'37.11488"	-107°38'43.14931"	3492.50	NVA
2010 A	37°54'38.59236"	-107°38'43.71327"	3496.09	NVA
2011	37°50'58.05060"	-107°40'39.51853"	3006.60	NVA
2012	37°53'03.58956"	-107°39'56.80745"	3127.64	NVA
2012 A	37°53'04.76081"	-107°39'56.24587"	3128.83	NVA
2013	37°51'15.05351"	-107°32'17.06988"	3378.23	NVA
2013 A	37°51'43.19975"	-107°32'51.22994"	3249.23	NVA
2014	37°46'49.50911"	-107°48'10.70604"	3237.74	NVA
2014 A	37°46'50.84936"	-107°48'11.25278"	3236.47	NVA
2014 B	37°46'49.36259"	-107°48'11.66974"	3238.84	NVA
2015	37°49'34.90005"	-107°46'57.51725"	3632.48	NVA
2015 A	37°49'33.58945"	-107°46'58.29979"	3623.58	NVA
2016	37°48'19.45962"	-107°45'41.71045"	2964.62	NVA
2017	37°48'46.91257"	-107°44'35.15477"	2934.82	NVA
2017 A	37°48'45.85243"	-107°44'36.44605"	2935.06	NVA
2018	37°54'01.20234"	-107°36'49.16342"	3731.77	NVA
2018 A	37°54'01.96438"	-107°36'53.09745"	3723.28	NVA
2019	37°54'10.80873"	-107°34'27.40934"	3806.46	NVA
2020	37°54'59.66273"	-107°34'09.31325"	3629.74	NVA
2020 A	37°55'00.01310"	-107°34'10.63534"	3635.55	NVA
2021	37°56'00.64073"	-107°33'20.61491"	3611.81	NVA
2022	37°48'56.74563"	-107°34'46.68809"	3037.46	NVA
2023	37°48'18.36346"	-107°36'44.02133"	3216.11	NVA
2023 A	37°48'18.71773"	-107°36'44.12246"	3215.27	NVA
2024	37°53'20.43899"	-107°35'36.49513"	3357.76	NVA
2025	37°53'20.80817"	-107°44'32.91270"	3743.13	NVA
2025 A	37°53'21.64151"	-107°44'31.11624"	3737.17	NVA
2025 B	37°53'21.29900"	-107°44'27.49269"	3734.72	NVA
3001	37°54'20.98311"	-107°42'27.93270"	3323.76	VVA
3001 A	37°54'17.80933"	-107°42'30.81698"	3326.22	VVA
3001 B	37°54'20.71307"	-107°42'29.56395"	3326.90	VVA
3002	37°46'51.75514"	-107°48'08.16264"	3233.84	VVA
3002 A	37°46'51.76500"	-107°48'12.61329"	3235.89	VVA
3002 B	37°46'48.51325"	-107°48'11.63690"	3238.58	VVA

Point No.	Geodetic Coordinates NAD-83 (2011) Epoch 2010.00		Ellipsoid Height (m)	Description
	Latitude (N)	Longitude (W)		
3003	37°44'05.72629"	-107°42'51.64479"	3212.17	VVA
3003 A	37°44'04.07138"	-107°42'52.20696"	3201.72	VVA
3004	37°51'46.89483"	-107°34'05.64423"	2982.61	VVA
3004 A	37°51'47.39030"	-107°34'09.13385"	2976.22	VVA
3005	37°48'34.12243"	-107°44'59.33576"	2950.28	VVA
3005 A	37°48'35.36461"	-107°44'57.67468"	2949.06	VVA
3006	37°50'07.29339"	-107°35'42.71284"	2933.87	VVA
3006 A	37°50'08.16382"	-107°35'44.33548"	2931.53	VVA
3007	37°48'18.37429"	-107°40'06.33796"	2804.80	VVA
3007 A	37°48'19.19977"	-107°40'05.30037"	2805.20	VVA
3008	37°50'48.66772"	-107°43'31.16629"	3055.70	VVA
3008 A	37°50'47.94940"	-107°43'32.17585"	3051.52	VVA
3009	37°52'21.37132"	-107°44'15.17406"	3183.74	VVA
3009 A	37°52'21.08594"	-107°44'16.49596"	3185.41	VVA
3009 B	37°52'22.39908"	-107°44'16.32800"	3187.56	VVA
3010	37°54'19.46915"	-107°38'46.68283"	3413.93	VVA
3010 A	37°54'20.47445"	-107°38'46.02615"	3415.27	VVA
3011	37°53'16.02090"	-107°39'42.00834"	3143.38	VVA
3011 A	37°53'16.83524"	-107°39'39.45194"	3145.37	VVA
3012	37°50'56.27695"	-107°40'39.77168"	2998.98	VVA
3013	37°55'35.44790"	-107°33'48.06545"	3329.85	VVA
3013 A	37°55'34.69499"	-107°33'49.06962"	3324.10	VVA
3014	37°46'00.35446"	-107°40'24.74583"	3160.74	VVA
3014 A	37°46'03.09401"	-107°40'25.59750"	3161.30	VVA

# Section 3: Ground / Geodetic Control Photos

This section contains the station recovery information sheets and photographs regarding the ground control positions established for the project. The stations appear as they are ordered in the final coordinate listing of Section 2.

The data is assembled on the following pages.



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>30-Sep-17</b>
Station Name	<b>1001</b>	File Name	<b>LGC_093017_EN</b>

Methodology RTK base <input checked="" type="checkbox"/> RTK VRS <input type="checkbox"/> Rapid Static <input type="checkbox"/>	Photo Control Point (PCP) <input type="checkbox"/> LiDAR Control Point (LCP) <input checked="" type="checkbox"/> LiDAR QC Point (LQC) <input type="checkbox"/> Control Station <input type="checkbox"/> Session # <input type="checkbox"/>
--	--

WGS 84 COORDINATES: Latitude <b>N37°47'40.65475"</b> Longitude <b>W107°47'18.91812"</b> Ellipsoidal Height <b>10398.083 SFT</b>	Receiver : R10 <input type="text" value="6719"/> R8 <input type="text"/> Other, specify <input type="text"/>
Type of Mark <input type="text"/> Mark Stamping <input type="text"/>	Antenna Height: <b>6.562</b> USFT <b>2.000</b> METERS
	Start Time : <input type="text"/> Stop Time : <input type="text"/> PDOP Begin : <input type="text"/> PDOP End : <input type="text"/> Start Time : <input type="text"/> Stop Time : <input type="text"/> PDOP Begin : <input type="text"/> PDOP End : <input type="text"/>

Weather Conditions: **RAIN 37°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

EAST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>30-Sep-17</b>
Station Name	<b>1002</b>	File Name	<b>LGC_093017_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°48'23.37589"</b>	R10	<input type="text" value="6719"/>
Longitude	<b>W107°46'24.58385"</b>	R8	<input type="text"/>
Ellipsoidal Height	<b>9784.325 SFT</b>	Other, specify	<input type="text"/>
Type of Mark	<input type="text"/>	Antenna Height:	<input type="text" value="6.562"/> USFT
Mark Stamping	<input type="text"/>		<input type="text" value="2.000"/> METERS
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :

Weather Conditions: **RAIN 37°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

WEST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>03-Oct-17</b>
Station Name	<b>1003 A</b>	File Name	<b>LGC_100317_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°49'15.05657"</b>	R10	<b>6719</b>
Longitude	<b>W107°43'11.09138"</b>	R8	
Ellipsoidal Height	<b>9475.984 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____

Weather Conditions: **SUNNY 55°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

SOUTH





## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>30-Sep-17</b>
Station Name	<b>1003</b>	File Name	<b>LGC_093017_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°49'16.11732"</b>	R10	<b>6719</b>
Longitude	<b>W107°43'11.74280"</b>	R8	
Ellipsoidal Height	<b>9478.204 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :

Weather Conditions: **RAIN 37°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

WEST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>02-Oct-17</b>
Station Name	<b>1004</b>	File Name	<b>LGC_100217_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°51'35.03098"</b>	R10	<input type="text" value="6719"/>
Longitude	<b>W107°47'50.84730"</b>	R8	<input type="text"/>
Ellipsoidal Height	<b>10622.007 SFT</b>	Other, specify	<input type="text"/>
Type of Mark	<input type="text"/>	Antenna Height:	<input type="text" value="6.562"/> USFT
Mark Stamping	<input type="text"/>		<input type="text" value="2.000"/> METERS
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :

Weather Conditions: **CLOUDY 36°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH



WEST





## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<u>San Juan LiDAR</u>	Operator Name	<u>Erik Noyer</u>
Project Number	<u>77866</u>	Date of Survey	<u>28-Sep-17</u>
Station Name	<u>1005</u>	File Name	<u>LGC_092817_EN</u>


Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	

WGS 84 COORDINATES:		Receiver :	
Latitude	<u>N37°55'36.56518"</u>	R10	<u>6719</u>
Longitude	<u>W107°33'49.62281"</u>	R8	
Ellipsoidal Height	<u>10961.757 SFT</u>	Other, specify	
Type of Mark		Antenna Height:	<u>6.562</u> USFT
Mark Stamping			<u>2.000</u> METERS
		Start Time :	
		PDOP Begin :	
		Stop Time :	
		Start Time :	
		PDOP Begin :	
		Stop Time :	



Weather Conditions: SNOW 32°

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH 

WEST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>26-Sep-17</b>
Station Name	<b>1006</b>	File Name	<b>LGC_092617_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°50'10.87792"</b>	R10	<input type="text" value="6719"/>
Longitude	<b>W107°35'37.91028"</b>	R8	<input type="text"/>
Ellipsoidal Height	<b>9640.031 SFT</b>	Other, specify	<input type="text"/>
Type of Mark	<input type="text"/>	Antenna Height:	<input type="text" value="6.562"/> USFT
Mark Stamping	<input type="text"/>		<input type="text" value="2.000"/> METERS
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :

Weather Conditions: **SUNNY 55°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

WEST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<u>San Juan LiDAR</u>	Operator Name	<u>Erik Noyer</u>
Project Number	<u>77866</u>	Date of Survey	<u>28-Sep-17</u>
Station Name	<u>1007</u>	File Name	<u>LGC_092817_EN</u>


Methodology	RTK base <input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS <input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static <input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
		Control Station	<input type="checkbox"/>
		Session #	

WGS 84 COORDINATES:		Receiver :	
Latitude	<u>N37°51'59.34781"</u>	R10	<u>6719</u>
Longitude	<u>W107°32'37.31675"</u>	R8	
Ellipsoidal Height	<u>11268.076 SFT</u>	Other, specify	
Type of Mark		Antenna Height:	<u>6.562</u> USFT
Mark Stamping			<u>2.000</u> METERS
		Start Time :	
		PDOP Begin :	
		Stop Time :	
		PDOP End :	


Weather Conditions: SUNNY 30°

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH 

WEST





## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>29-Sep-17</b>
Station Name	<b>1008</b>	File Name	<b>LGC_092917_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°56'01.21129"</b>	R10	<b>6719</b>
Longitude	<b>W107°32'17.48514"</b>	R8	
Ellipsoidal Height	<b>12599.283 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____

Weather Conditions: **CLOUDY 30°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

NORTH



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>27-Sep-17</b>
Station Name	<b>1009</b>	File Name	<b>LGC_092717_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>	
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>	
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>	
			Control Station	<input type="checkbox"/>	
			Session #	<input type="checkbox"/>	

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°46'01.73621"</b>	R10	<input type="text" value="6719"/>
Longitude	<b>W107°40'24.84360"</b>	R8	<input type="text"/>
Ellipsoidal Height	<b>10366.568 SFT</b>	Other, specify	<input type="text"/>
Type of Mark	<input type="text"/>	Antenna Height:	<input type="text" value="6.562"/> USFT
Mark Stamping	<input type="text"/>		<input type="text" value="2.000"/> METERS
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :

Weather Conditions: **CLOUDY 37°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH



### GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<u>San Juan LiDAR</u>	Operator Name	<u>Erik Noyer</u>
Project Number	<u>77866</u>	Date of Survey	<u>27-Sep-17</u>
Station Name	<u>1010</u>	File Name	<u>LGC_092717_EN</u>

Methodology	RTK base <input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS <input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static <input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
		Control Station	<input type="checkbox"/>
		Session #	

WGS 84 COORDINATES:		Receiver :	
Latitude	<u>N37°47'02.39915"</u>	R10	<u>6719</u>
Longitude	<u>W107°39'38.17327"</u>	R8	
Ellipsoidal Height	<u>10144.614 SFT</u>	Other, specify	
Type of Mark		Antenna Height:	<u>6.562</u> USFT
Mark Stamping			<u>2.000</u> METERS
		Start Time :	
		PDOP Begin :	
		Stop Time :	
		PDOP End :	

Weather Conditions: CLOUDY 35°

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

The sketch area contains a north arrow pointing upwards. Below it is a photograph of a dirt road winding through a forest. A survey station is mounted on a tripod on the right side of the road. A yellow triangle with the number '1010' is overlaid on the photograph to indicate the station's location.





## GPS STATION RECOVERY - GPS LOG SHEET

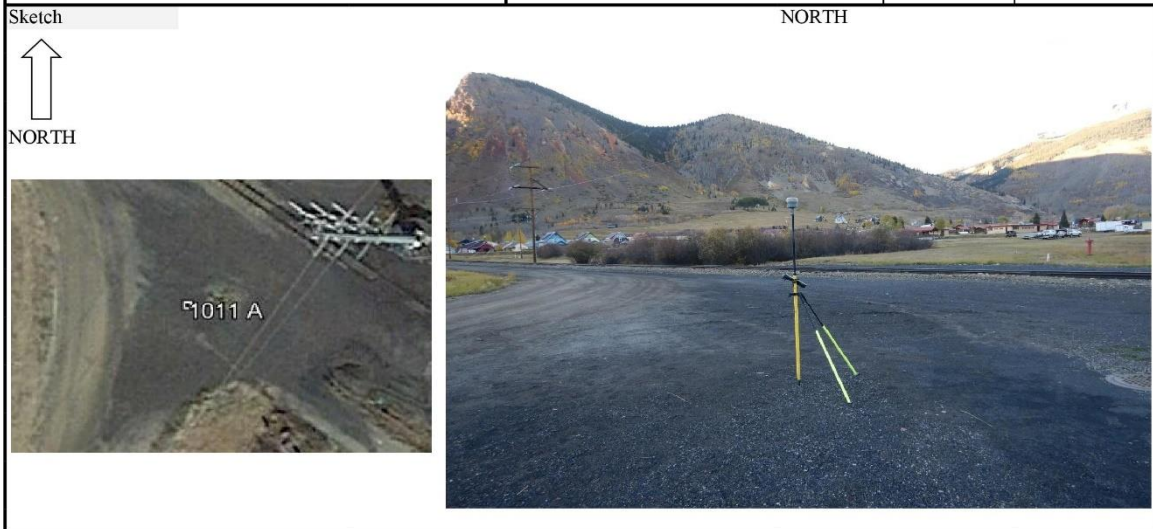
Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>03-Oct-17</b>
Station Name	<b>1011 A</b>	File Name	<b>LGC_100317_EN</b>

Methodology	RTK base <input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS <input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static <input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
		Control Station	<input type="checkbox"/>
		Session #	

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°48'16.64843"</b>	R10	<b>6719</b>
Longitude	<b>W107°40'05.46573"</b>	R8	
Ellipsoidal Height	<b>9207.152 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :

Weather Conditions: **SUNNY 55°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W





## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>25-Sep-17</b>
Station Name	<b>1011</b>	File Name	<b>LGC_092517_EN</b>

Methodology RTK base <input checked="" type="checkbox"/> RTK VRS <input type="checkbox"/> Rapid Static <input type="checkbox"/>	Photo Control Point (PCP) <input type="checkbox"/> LiDAR Control Point (LCP) <input checked="" type="checkbox"/> LiDAR QC Point (LQC) <input type="checkbox"/> Control Station <input type="checkbox"/> Session # <input type="checkbox"/>
--	--

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°48'14.48200"</b>	R10	<input type="text" value="6719"/>
Longitude	<b>W107°40'04.73351"</b>	R8	<input type="text"/>
Ellipsoidal Height	<b>9204.398 SFT</b>	Other, specify	<input type="text"/>
Type of Mark	<input type="text"/>	Antenna Height:	<input type="text" value="6.562"/> USFT <input type="text" value="2.000"/> METERS
Mark Stamping	<input type="text"/>	Start Time :	<input type="text"/>
		PDOP Begin :	<input type="text"/>
		Start Time :	<input type="text"/>
		PDOP Begin :	<input type="text"/>
		Stop Time :	<input type="text"/>
		PDOP End :	<input type="text"/>

Weather Conditions: **SUNNY 55°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

WEST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>03-Oct-17</b>
Station Name	<b>1012 A</b>	File Name	<b>LGC_100317_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>


WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°48'59.36213"</b>	R10	<b>6719</b>
Longitude	<b>W107°39'25.26026"</b>	R8	
Ellipsoidal Height	<b>9285.836 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____

Weather Conditions: **SUNNY 55°**


To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH



EAST





## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>25-Sep-17</b>
Station Name	<b>1012</b>	File Name	<b>LGC_092517_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°48'58.03015"</b>	R10	<input type="text" value="6719"/>
Longitude	<b>W107°39'26.87259"</b>	R8	<input type="text"/>
Ellipsoidal Height	<b>9278.992 SFT</b>	Other, specify	<input type="text"/>
Type of Mark	<input type="text"/>	Antenna Height:	<input type="text" value="6.562"/> USFT
Mark Stamping	<input type="text"/>		<input type="text" value="2.000"/> METERS
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :

Weather Conditions: **SUNNY 55°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

1012 ▲

WEST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>03-Oct-17</b>
Station Name	<b>1013 A</b>	File Name	<b>LGC_100317_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°49'31.44800"</b>	R10	<input type="text" value="6719"/>
Longitude	<b>W107°40'02.10990"</b>	R8	<input type="text"/>
Ellipsoidal Height	<b>9465.69 SFT</b>	Other, specify	<input type="text"/>
Type of Mark	<input type="text"/>	Antenna Height:	<input type="text" value="6.562"/> USFT
Mark Stamping	<input type="text"/>		<input type="text" value="2.000"/> METERS
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :

Weather Conditions: **SUNNY 55°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

SOUTH



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>27-Sep-17</b>
Station Name	<b>1013</b>	File Name	<b>LGC_092717_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>


WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°49'32.78886"</b>	R10	<b>6719</b>
Longitude	<b>W107°40'02.72494"</b>	R8	
Ellipsoidal Height	<b>9472.922 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :

Weather Conditions: **SUNNY 28°**


To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

↑  
NORTH



WEST





## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>03-Oct-17</b>
Station Name	<b>1014 A</b>	File Name	<b>LGC_100317_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°49'38.34865"</b>	R10	<b>6719</b>
Longitude	<b>W107°37'35.72927"</b>	R8	
Ellipsoidal Height	<b>9436.802 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____

Weather Conditions: **SUNNY 55°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

EAST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>25-Sep-17</b>
Station Name	<b>1014</b>	File Name	<b>LGC_092517_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>


WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°49'41.33808"</b>	R10	<input type="text" value="6719"/>
Longitude	<b>W107°37'34.81518"</b>	R8	<input type="text"/>
Ellipsoidal Height	<b>9547.781 SFT</b>	Other, specify	<input type="text"/>
Type of Mark	<input type="text"/>	Antenna Height:	<input type="text" value="6.562"/> USFT
Mark Stamping	<input type="text"/>		<input type="text" value="2.000"/> METERS
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :

Weather Conditions: **SUNNY 55°**


To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

↑  
NORTH



WEST







## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<u>San Juan LiDAR</u>	Operator Name	<u>Erik Noyer</u>
Project Number	<u>77866</u>	Date of Survey	<u>26-Sep-17</u>
Station Name	<u>1015</u>	File Name	<u>LGC_092617_EN</u>

Methodology RTK base <input checked="" type="checkbox"/> RTK VRS <input type="checkbox"/> Rapid Static <input type="checkbox"/>	Photo Control Point (PCP) <input type="checkbox"/> LiDAR Control Point (LCP) <input checked="" type="checkbox"/> LiDAR QC Point (LQC) <input type="checkbox"/> Control Station <input type="checkbox"/> Session # <input type="checkbox"/>
--	--

WGS 84 COORDINATES:		Receiver :	
Latitude	<u>N37°46'51.61601"</u>	R10	<u>6719</u>
Longitude	<u>W107°34'47.34261"</u>	R8	
Ellipsoidal Height	<u>10744.728 SFT</u>	Other, specify	
Type of Mark		Antenna Height:	<u>6.562</u> USFT <u>2.000</u> METERS
Mark Stamping		Start Time :	
		PDOP Begin :	
		Stop Time :	
		PDOP End :	

Weather Conditions: SUNNY 55°

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

NORTH



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>26-Sep-17</b>
Station Name	<b>1016 A</b>	File Name	<b>LGC_092617_EN</b>

Methodology	RTK base	<input type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input checked="" type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°47'02.51468"</b>	R10	<b>6719</b>
Longitude	<b>W107°32'02.60772"</b>	R8	
Ellipsoidal Height	<b>11862.964 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____

Weather Conditions: **SUNNY 55°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH



SOUTH





## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>26-Sep-17</b>
Station Name	<b>1016</b>	File Name	<b>LGC_092617_EN</b>

Methodology	RTK base	<input type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input checked="" type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°47'03.08395"</b>	R10	
Longitude	<b>W107°32'03.87954"</b>	R8	<b>2150</b>
Ellipsoidal Height	<b>11853.329 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____

Weather Conditions: **SUNNY 55°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

WEST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>01-Oct-17</b>
Station Name	<b>1017 A</b>	File Name	<b>LGC_100117_EN</b>
Methodology	RTK base <input checked="" type="checkbox"/> RTK VRS <input type="checkbox"/> Rapid Static <input type="checkbox"/>	Photo Control Point (PCP) <input type="checkbox"/> LiDAR Control Point (LCP) <input checked="" type="checkbox"/> LiDAR QC Point (LQC) <input type="checkbox"/> Control Station <input type="checkbox"/> Session # <input type="checkbox"/>	


WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°53'44.99761"</b>	R10	<b>6719</b>
Longitude	<b>W107°42'48.95529"</b>	R8	
Ellipsoidal Height	<b>11013.835 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :

Weather Conditions: **CLOUDY 40°**


To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH



WEST





## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>01-Oct-17</b>
Station Name	<b>1017</b>	File Name	<b>LGC_100117_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>	
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>	
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>	
			Control Station	<input type="checkbox"/>	
			Session #	<input type="checkbox"/>	

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°53'42.07134"</b>	R10	<input type="text" value="6719"/>
Longitude	<b>W107°42'51.44075"</b>	R8	<input type="text"/>
Ellipsoidal Height	<b>10999.882 SFT</b>	Other, specify	<input type="text"/>
Type of Mark	<input type="text"/>	Antenna Height:	<input type="text" value="6.562"/> USFT
Mark Stamping	<input type="text"/>		<input type="text" value="2.000"/> METERS
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :

Weather Conditions: **CLOUDY 40°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

SOUTH



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>26-Sep-17</b>
Station Name	<b>1018</b>	File Name	<b>LGC_092617_EN</b>

Methodology RTK base <input checked="" type="checkbox"/> RTK VRS <input type="checkbox"/> Rapid Static <input type="checkbox"/>	Photo Control Point (PCP) <input type="checkbox"/> LiDAR Control Point (LCP) <input checked="" type="checkbox"/> LiDAR QC Point (LQC) <input type="checkbox"/> Control Station <input type="checkbox"/> Session # <input type="checkbox"/>
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WGS 84 COORDINATES: Latitude <b>N37°47'57.93964"</b> Longitude <b>W107°33'10.23976"</b> Ellipsoidal Height <b>12392.298 SFT</b>	Receiver : R10 <input type="text" value="6719"/> R8 <input type="text"/> Other, specify <input type="text"/> Antenna Height: <b>6.562</b> USFT <b>2.000</b> METERS Start Time : _____ Stop Time : _____ PDOP Begin : _____ PDOP End : _____ Start Time : _____ Stop Time : _____ PDOP Begin : _____ PDOP End : _____
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Weather Conditions: **SUNNY 55°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

WEST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>27-Sep-17</b>
Station Name	<b>1019</b>	File Name	<b>LGC_092717_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>	
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>	
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>	
			Control Station	<input type="checkbox"/>	
			Session #	<input type="checkbox"/>	

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°49'01.15921"</b>	R10	<b>6719</b>
Longitude	<b>W107°41'55.42308"</b>	R8	
Ellipsoidal Height	<b>9394.612 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :

Weather Conditions: **RAIN 39°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

SOUTH



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>02-Oct-17</b>
Station Name	<b>1020 A</b>	File Name	<b>LGC_100217_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°51'02.67795"</b>	R10	<b>6719</b>
Longitude	<b>W107°46'43.57102"</b>	R8	
Ellipsoidal Height	<b>11728.835 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :

Weather Conditions: **SNOW 32°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

EAST





## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	San Juan LiDAR	Operator Name	Erik Noyer
Project Number	77866	Date of Survey	02-Oct-17
Station Name	1020	File Name	LGC_100217_EN

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	N37°51'02.92051"	R10	6719
Longitude	W107°46'45.35923"	R8	
Ellipsoidal Height	11736.625 SFT	Other, specify	
Type of Mark		Antenna Height:	6.562 USFT
Mark Stamping			2.000 METERS
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :

Weather Conditions: **CLOUDY 36°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

EAST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>02-Oct-17</b>
Station Name	<b>1021 A</b>	File Name	<b>LGC_100217_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°50'48.21022"</b>	R10	<input type="text" value="6719"/>
Longitude	<b>W107°44'47.46541"</b>	R8	<input type="text"/>
Ellipsoidal Height	<b>10444.66 SFT</b>	Other, specify	<input type="text"/>
Type of Mark	<input type="text"/>	Antenna Height:	<input type="text" value="6.562"/> USFT
Mark Stamping	<input type="text"/>		<input type="text" value="2.000"/> METERS
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :

Weather Conditions: **SNOW 32°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

NORTH



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>02-Oct-17</b>
Station Name	<b>1021 B</b>	File Name	<b>LGC_100217_EN</b>

Methodology	RTK base <input checked="" type="checkbox"/>	RTK VRS <input type="checkbox"/>	Rapid Static <input type="checkbox"/>	Photo Control Point (PCP) <input type="checkbox"/>	LiDAR Control Point (LCP) <input checked="" type="checkbox"/>	LiDAR QC Point (LQC) <input type="checkbox"/>
				Control Station		
				Session #		


WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°50'51.22511"</b>	R10	<b>6719</b>
Longitude	<b>W107°44'37.90197"</b>	R8	
Ellipsoidal Height	<b>10372.432 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :

Weather Conditions: **SNOW 32°**


To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH



SOUTH





### GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>02-Oct-17</b>
Station Name	<b>1021</b>	File Name	<b>LGC_100217_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°50'49.73372"</b>	R10	<b>6719</b>
Longitude	<b>W107°44'38.67847"</b>	R8	
Ellipsoidal Height	<b>10376.885 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :

Weather Conditions: **CLOUDY 38°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

EAST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>29-Sep-17</b>
Station Name	<b>1022 A</b>	File Name	<b>LGC_092917_EN</b>

Methodology RTK base <input checked="" type="checkbox"/> RTK VRS <input type="checkbox"/> Rapid Static <input type="checkbox"/>	Photo Control Point (PCP) <input type="checkbox"/> LiDAR Control Point (LCP) <input checked="" type="checkbox"/> LiDAR QC Point (LQC) <input type="checkbox"/> Control Station <input type="checkbox"/> Session # <input type="checkbox"/>
--	--

WGS 84 COORDINATES:					
Latitude	<b>N37°53'36.52775"</b>	Receiver :			
Longitude	<b>W107°36'19.69480"</b>	R10	<b>6719</b>		
Ellipsoidal Height	<b>11704.891 SFT</b>	R8			
		Other, specify			
Type of Mark		Antenna Height:	<b>6.562</b>	USFT	
Mark Stamping			<b>2.000</b>	METERS	
		Start Time :		Stop Time :	
		PDOP Begin :		PDOP End :	
		Start Time :		Stop Time :	
		PDOP Begin :		PDOP End :	

Weather Conditions: **CLOUDY 32°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

WEST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>29-Sep-17</b>
Station Name	<b>1022</b>	File Name	<b>LGC_092917_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°53'35.95958"</b>	R10	<b>6719</b>
Longitude	<b>W107°36'18.43086"</b>	R8	
Ellipsoidal Height	<b>11683.86 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____

Weather Conditions: **CLOUDY 32°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

EAST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>27-Sep-17</b>
Station Name	<b>1023</b>	File Name	<b>LGC_092717_EN</b>

Methodology RTK base <input checked="" type="checkbox"/> RTK VRS <input type="checkbox"/> Rapid Static <input type="checkbox"/>	Photo Control Point (PCP) <input type="checkbox"/> LiDAR Control Point (LCP) <input checked="" type="checkbox"/> LiDAR QC Point (LQC) <input type="checkbox"/> Control Station <input type="checkbox"/> Session # <input type="checkbox"/>
--	--

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°52'33.28883"</b>	R10	<input type="text" value="6719"/>
Longitude	<b>W107°40'19.07528"</b>	R8	<input type="text"/>
Ellipsoidal Height	<b>10160.084 SFT</b>	Other, specify	<input type="text"/>
Type of Mark	<input type="text"/>	Antenna Height:	<input type="text" value="6.562"/> USFT <input type="text" value="2.000"/> METERS
Mark Stamping	<input type="text"/>	Start Time :	<input type="text"/> Stop Time : <input type="text"/>
		PDOP Begin :	<input type="text"/> PDOP End : <input type="text"/>
		Start Time :	<input type="text"/> Stop Time : <input type="text"/>
		PDOP Begin :	<input type="text"/> PDOP End : <input type="text"/>

Weather Conditions: **SUNNY 28°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

WEST



## GPS STATION RECOVERY - GPS LOG SHEET

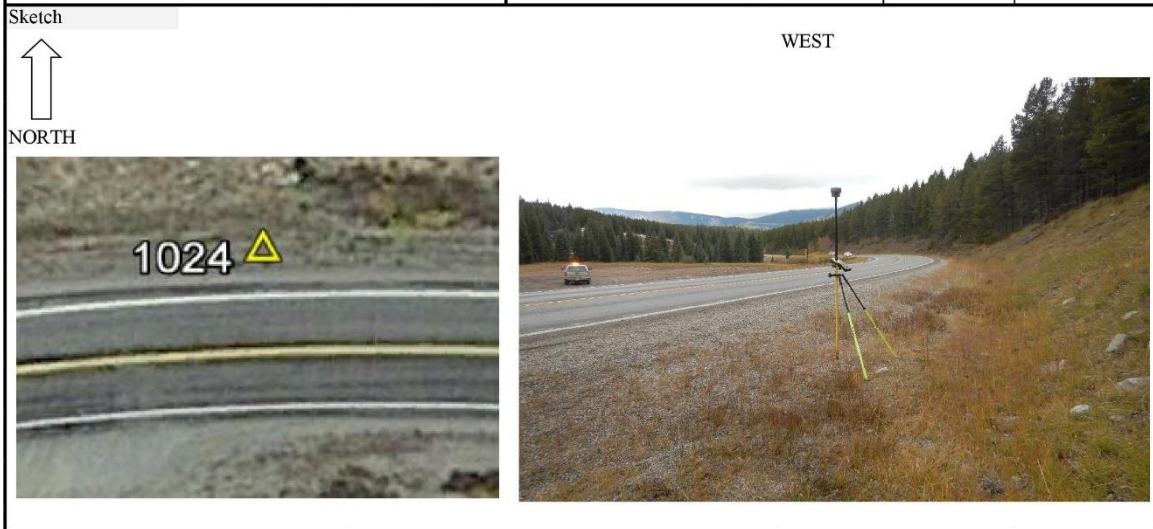
Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>29-Sep-17</b>
Station Name	<b>1024</b>	File Name	<b>LGC_092917_EN</b>

Methodology RTK base <input checked="" type="checkbox"/> RTK VRS <input type="checkbox"/> Rapid Static <input type="checkbox"/>	Photo Control Point (PCP) <input type="checkbox"/> LiDAR Control Point (LCP) <input checked="" type="checkbox"/> LiDAR QC Point (LQC) <input type="checkbox"/> Control Station <input type="checkbox"/> Session # <input type="checkbox"/>
--	--

WGS 84 COORDINATES: Latitude <b>N37°44'06.50241"</b> Longitude <b>W107°42'52.57549"</b> Ellipsoidal Height <b>10543.192 SFT</b>	Receiver : R10 <input type="text" value="6719"/> R8 <input type="text"/> Other, specify <input type="text"/>
Type of Mark <input type="text"/> Mark Stamping <input type="text"/>	Antenna Height: <b>6.562</b> USFT <b>2.000</b> METERS
	Start Time : <input type="text"/> Stop Time : <input type="text"/> PDOP Begin : <input type="text"/> PDOP End : <input type="text"/> Start Time : <input type="text"/> Stop Time : <input type="text"/> PDOP Begin : <input type="text"/> PDOP End : <input type="text"/>

Weather Conditions: **CLOUDY 39°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W







## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<u>San Juan LiDAR</u>	Operator Name	<u>Erik Noyer</u>
Project Number	<u>77866</u>	Date of Survey	<u>29-Sep-17</u>
Station Name	<u>1025</u>	File Name	<u>LGC_092917_EN</u>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	

WGS 84 COORDINATES:		Receiver :	
Latitude	<u>N37°44'41.44970"</u>	R10	<u>6719</u>
Longitude	<u>W107°41'18.61145"</u>	R8	
Ellipsoidal Height	<u>10533.559 SFT</u>	Other, specify	
Type of Mark		Antenna Height:	<u>6.562</u> USFT
Mark Stamping			<u>2.000</u> METERS
		Start Time :	
		PDOP Begin :	
		Stop Time :	
		PDOP End :	

Weather Conditions: CLOUDY 40°

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

NORTH

NORTH



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<u>San Juan LiDAR</u>	Operator Name	<u>Erik Noyer</u>
Project Number	<u>77866</u>	Date of Survey	<u>29-Sep-17</u>
Station Name	<u>1026</u>	File Name	<u>LGC_092917_EN</u>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	


WGS 84 COORDINATES:		Receiver :	
Latitude	<u>N37°44'30.93794"</u>	R10	<u>6719</u>
Longitude	<u>W107°41'41.90188"</u>	R8	
Ellipsoidal Height	<u>10596.313 SFT</u>	Other, specify	
Type of Mark		Antenna Height:	<u>6.562</u> USFT
Mark Stamping			<u>2.000</u> METERS
		Start Time :	
		PDOP Begin :	
		Stop Time :	
		Start Time :	
		PDOP Begin :	
		Stop Time :	

Weather Conditions: CLOUDY 40°


To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH ↑



EAST





## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<u>San Juan LiDAR</u>	Operator Name	<u>Erik Noyer</u>
Project Number	<u>77866</u>	Date of Survey	<u>29-Sep-17</u>
Station Name	<u>1027</u>	File Name	<u>LGC_092917_EN</u>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<u>N37°44'05.29625"</u>	R10	<u>6719</u>
Longitude	<u>W107°41'56.96012"</u>	R8	
Ellipsoidal Height	<u>10823.565 SFT</u>	Other, specify	
Type of Mark		Antenna Height:	<u>6.562</u> USFT
Mark Stamping			<u>2.000</u> METERS
		Start Time :	
		PDOP Begin :	
		Stop Time :	
		PDOP End :	

Weather Conditions: CLOUDY 39°

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

WEST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>29-Sep-17</b>
Station Name	<b>1028</b>	File Name	<b>LGC_092917_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>	
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>	
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>	
			Control Station	<input type="checkbox"/>	
			Session #	<input type="checkbox"/>	

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°42'54.90938"</b>	R10	<b>6719</b>
Longitude	<b>W107°45'16.40578"</b>	R8	
Ellipsoidal Height	<b>9891.981 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____

Weather Conditions: **CLOUDY 36°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>29-Sep-17</b>
Station Name	<b>1029</b>	File Name	<b>LGC_092917_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>	
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>	
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>	
			Control Station	<input type="checkbox"/>	
			Session #	<input type="checkbox"/>	

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°40'22.45174"</b>	R10	<b>6719</b>
Longitude	<b>W107°47'39.48490"</b>	R8	
Ellipsoidal Height	<b>9327.841 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :


Weather Conditions: **CLOUDY 40°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W


Sketch

↑

NORTH



NORTH





## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<u>San Juan LiDAR</u>	Operator Name	<u>Erik Noyer</u>
Project Number	<u>77866</u>	Date of Survey	<u>25-Sep-17</u>
Station Name	<u>1030</u>	File Name	<u>LGC_092517_EN</u>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	

WGS 84 COORDINATES:		Receiver :	
Latitude	<u>N37°49'16.00147"</u>	R10	<u>6719</u>
Longitude	<u>W107°38'31.03749"</u>	R8	
Ellipsoidal Height	<u>9341.621 SFT</u>	Other, specify	
Type of Mark		Antenna Height:	<u>6.562</u> USFT
Mark Stamping			<u>2.000</u> METERS
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____

Weather Conditions: SUNNY 55°


To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch




NORTH



1030 

NORTH





## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>25-Sep-17</b>
Station Name	<b>1031</b>	File Name	<b>LGC_092517_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>	
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>	
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>	
			Control Station	<input type="checkbox"/>	
			Session #	<input type="checkbox"/>	

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°49'25.73510"</b>	R10	<input type="text" value="6719"/>
Longitude	<b>W107°38'10.77129"</b>	R8	<input type="text"/>
Ellipsoidal Height	<b>9422.598 SFT</b>	Other, specify	<input type="text"/>
Type of Mark	<input type="text"/>	Antenna Height:	<input type="text" value="6.562"/> USFT
Mark Stamping	<input type="text"/>		<input type="text" value="2.000"/> METERS
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :
		Start Time :	<input type="text"/> Stop Time :
		PDOP Begin :	<input type="text"/> PDOP End :

Weather Conditions: **SUNNY 55°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

WEST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>26-Sep-17</b>
Station Name	<b>1032</b>	File Name	<b>LGC_092617_EN</b>

Methodology	RTK base	<input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS	<input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static	<input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
			Control Station	<input type="checkbox"/>
			Session #	<input type="checkbox"/>

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°49'41.09835"</b>	R10	<b>6719</b>
Longitude	<b>W107°36'59.74385"</b>	R8	
Ellipsoidal Height	<b>9576.786 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :
		Start Time :	Stop Time :
		PDOP Begin :	PDOP End :

Weather Conditions: **SUNNY 55°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH

EAST





## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>03-Oct-17</b>
Station Name	<b>1033 A</b>	File Name	<b>LGC_100317_EN</b>

Methodology	RTK base <input checked="" type="checkbox"/>	Photo Control Point (PCP)	<input type="checkbox"/>
	RTK VRS <input type="checkbox"/>	LiDAR Control Point (LCP)	<input checked="" type="checkbox"/>
	Rapid Static <input type="checkbox"/>	LiDAR QC Point (LQC)	<input type="checkbox"/>
		Control Station	<input type="checkbox"/>
		Session #	

WGS 84 COORDINATES:		Receiver :	
Latitude	<b>N37°49'53.56252"</b>	R10	<b>6719</b>
Longitude	<b>W107°36'16.14989"</b>	R8	
Ellipsoidal Height	<b>9568.049 SFT</b>	Other, specify	
Type of Mark		Antenna Height:	<b>6.562</b> USFT
Mark Stamping			<b>2.000</b> METERS
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____
		Start Time :	_____ Stop Time : _____
		PDOP Begin :	_____ PDOP End : _____

Weather Conditions: **SUNNY 55°**

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch

NORTH ↑

WEST



## GPS STATION RECOVERY - GPS LOG SHEET

Project Name	<b>San Juan LiDAR</b>	Operator Name	<b>Erik Noyer</b>
Project Number	<b>77866</b>	Date of Survey	<b>26-Sep-17</b>
Station Name	<b>1033</b>	File Name	<b>LGC_092617_EN</b>

Methodology RTK base <input checked="" type="checkbox"/> RTK VRS <input type="checkbox"/> Rapid Static <input type="checkbox"/>	Photo Control Point (PCP) <input type="checkbox"/> LiDAR Control Point (LCP) <input checked="" type="checkbox"/> LiDAR QC Point (LQC) <input type="checkbox"/> Control Station <input type="checkbox"/> Session # <input type="checkbox"/>
--	--

WGS 84 COORDINATES: Latitude <b>N37°49'55.33443"</b> Longitude <b>W107°36'16.34972"</b> Ellipsoidal Height <b>9636.940 SFT</b>	Receiver : R10 <input type="text" value="6719"/> R8 <input type="text"/> Other, specify <input type="text"/> Antenna Height: <b>6.562</b> USFT <b>2.000</b> METERS Start Time : <input type="text"/> Stop Time : <input type="text"/> PDOP Begin : <input type="text"/> PDOP End : <input type="text"/> Start Time : <input type="text"/> Stop Time : <input type="text"/> PDOP Begin : <input type="text"/> PDOP End : <input type="text"/>
Type of Mark <input type="text"/> Mark Stamping <input type="text"/>	Weather Conditions: <b>SUNNY 55°</b>

To Reach Description :	Witness Ties :		
	Reference Object	Distance	N-E-S-W

Sketch  NORTH	WEST 

## Section 4: Existing NGS Datasheets

This section contains the published National Geodetic Survey (NGS) datasheets for those existing monumented control stations that were used to establish 3-dimensional coordinates for each of the newly established ground control survey points for the project.

National Geodetic Survey, Retrieval Date = OCTOBER 2, 2017

```

HL0394 *****
HL0394 DESIGNATION - G 441
HL0394 PID - HL0394
HL0394 STATE/COUNTY- CO/SAN JUAN
HL0394 COUNTRY - US
HL0394 USGS QUAD - ENGINEER MOUNTAIN (1975)
HL0394
HL0394 *CURRENT SURVEY CONTROL
HL0394
-----
HL0394* NAD 83(2011) POSITION- 37 40 24.08919(N) 107 47 25.32229(W) ADJUSTED
HL0394* NAD 83(2011) ELLIP HT- 2865.195 (meters) (06/27/12) ADJUSTED
HL0394* NAD 83(2011) EPOCH - 2010.00
HL0394* NAVD 88 ORTHO HEIGHT - 2881.240 (meters) 9452.87 (feet) ADJUSTED
HL0394
-----
HL0394 GEOID HEIGHT - -16.022 (meters) GEOID12B
HL0394 NAD 83(2011) X - -1,545,072.224 (meters) COMP
HL0394 NAD 83(2011) Y - -4,815,117.662 (meters) COMP
HL0394 NAD 83(2011) Z - 3,878,562.187 (meters) COMP
HL0394 LAPLACE CORR - 7.91 (seconds) DEFLEC12B
HL0394 DYNAMIC HEIGHT - 2877.107 (meters) 9439.31 (feet) COMP
HL0394 MODELED GRAVITY - 979,091.2 (mgal) NAVD 88
HL0394
HL0394 VERT ORDER - FIRST CLASS II
HL0394
HL0394 Network accuracy estimates per FGDC Geospatial Positioning Accuracy
HL0394 Standards:
HL0394 FGDC (95% conf, cm) Standard deviation (cm) CorrNE
HL0394 Horiz Ellip SD_N SD_E SD_h (unitless)
HL0394 -----
HL0394 NETWORK 1.71 3.80 0.70 0.68 1.94 -0.29796352
HL0394 -----
HL0394 Click here for local accuracies and other accuracy information.
HL0394
HL0394
HL0394.The horizontal coordinates were established by GPS observations
HL0394.and adjusted by the National Geodetic Survey in June 2012.
HL0394
HL0394.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
HL0394.been affixed to the stable North American tectonic plate. See
HL0394.NA2011 for more information.
HL0394
HL0394.The horizontal coordinates are valid at the epoch date displayed above
HL0394.which is a decimal equivalence of Year/Month/Day.
HL0394
HL0394.The orthometric height was determined by differential leveling and
HL0394.adjusted by the NATIONAL GEODETIC SURVEY

```

HL0394.in June 1991.

HL0394

HL0394.Significant digits in the geoid height do not necessarily reflect accuracy.

HL0394.GEOID12B height accuracy estimate available [here](#).

HL0394

HL0394.The X, Y, and Z were computed from the position and the ellipsoidal ht.

HL0394

HL0394.The Laplace correction was computed from DEFLEC12B derived deflections.

HL0394

HL0394.The ellipsoidal height was determined by GPS observations

HL0394.and is referenced to NAD 83.

HL0394

HL0394.The dynamic height is computed by dividing the NAVD 88

HL0394.geopotential number by the normal gravity value computed on the

HL0394.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45

HL0394.degrees latitude ( $g = 980.6199$  gals.).

HL0394

HL0394.The modeled gravity was interpolated from observed gravity values.

HL0394

HL0394. The following values were computed from the NAD 83(2011) position.

HL0394

HL0394;	North	East	Units	Scale	Factor	Converg.
HL0394;SPC CO S	- 419,003.761	712,374.713	MT	0.99994932	-1 24	17.5
HL0394;SPC CO S	- 1,374,681.51	2,337,182.70	sFT	0.99994932	-1 24	17.5
HL0394;UTM 13	- 4,173,238.466	253,905.722	MT	1.00034602	-1 42	22.4

HL0394

HL0394! - Elev Factor x Scale Factor = Combined Factor

HL0394!SPC CO S - 0.99955060 x 0.99994932 = 0.99949994

HL0394!UTM 13 - 0.99955060 x 1.00034602 = 0.99989646

HL0394

HL0394\_U.S. NATIONAL GRID SPATIAL ADDRESS: 13SBB5390573238 (NAD 83)

HL0394

HL0394 SUPERSEDED SURVEY CONTROL

HL0394

HL0394	NAD 83(2007)-	37 40 24.08874(N)	107 47 25.32253(W)	AD(2002.00)	0
HL0394	ELLIP H (02/10/07)	2865.218 (m)		GP(2002.00)	
HL0394	ELLIP H (12/03/02)	2865.210 (m)		GP( )	4 2
HL0394	NAD 83(1992)-	37 40 24.08841(N)	107 47 25.32182(W)	AD( )	1
HL0394	ELLIP H (07/06/97)	2865.213 (m)		GP( )	3 1
HL0394	NAVD 88	2881.24 (m)	9452.9 (f)	LEVELING	3

HL0394

HL0394.Superseded values are not recommended for survey control.

HL0394

HL0394.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.

HL0394.See file [dsdata.pdf](#) to determine how the superseded data were derived.

HL0394

HL0394\_MARKER: DB = BENCH MARK DISK

HL0394\_SETTING: 66 = SET IN ROCK OUTCROP

HL0394\_STAMPING: G 441 1985

HL0394\_MARK LOGO: NGS

HL0394\_MAGNETIC: O = OTHER; SEE DESCRIPTION

HL0394\_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD

HL0394+STABILITY: POSITION/ELEVATION WELL

HL0394\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

HL0394+SATELLITE: SATELLITE OBSERVATIONS - July 08, 1993

HL0394

HL0394	HISTORY	- Date	Condition	Report By
HL0394	HISTORY	- 1985	MONUMENTED	NGS
HL0394	HISTORY	- 19910709	GOOD	USPSQD
HL0394	HISTORY	- 19930708	GOOD	NGS

HL0394

HL0394 STATION DESCRIPTION

HL0394

HL0394'DESCRIBED BY NATIONAL GEODETIC SURVEY 1985

HL0394'27.5 KM (17.1 MI) SOUTH FROM SILVERTON.

HL0394'27.5 KM (17.1 MI) SOUTHERLY ALONG U.S. HIGHWAY 550 FROM ITS JUNCTION

HL0394'WITH STATE HIGHWAY 110 IN SILVERTON, NEAR THE WEST END OF A 2- BY

HL0394'12-FOOT EXPOSED AREA OF BEDROCK AT THE NORTH END OF A SMALL HIGHWAY

HL0394'CUT AND THE SOUTHEAST END OF A SMALL HIGHWAY PULLOUT, 5.6 KM (3.5 MI)

HL0394'SOUTH OF THE SUMMIT OF COAL BANK PASS, AND 23.5 (77.1 FT) EAST OF THE

HL0394'CENTERLINE OF THE HIGHWAY.

HL0394'THE MARK IS 0.4 METERS E FROM A WITNESS POST

HL0394'THE MARK IS 1.5 M ABOVE THE HIGHWAY.

HL0394

HL0394 STATION RECOVERY (1991)

HL0394

HL0394'RECOVERY NOTE BY US POWER SQUADRON 1991 (WLR)

HL0394'RECOVERED IN GOOD CONDITION.

HL0394

HL0394 STATION RECOVERY (1993)

HL0394

HL0394'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1993 (RSC)

HL0394'RECOVERED AS DESCRIBED.

National Geodetic Survey, Retrieval Date = SEPTEMBER 30, 2017

HL0429 \*\*\*\*\*

HL0429 DESIGNATION - L 439

HL0429 PID - HL0429

HL0429 STATE/COUNTY- CO/SAN JUAN

HL0429 COUNTRY - US

HL0429 USGS QUAD - SILVERTON (1955)

HL0429

HL0429 \*CURRENT SURVEY CONTROL

HL0429

HL0429\* NAD 83(1986) POSITION- 37 50 04.0 (N) 107 43 28.5 (W) HD\_HELD2

HL0429\* [NAVD 88](#) ORTHO HEIGHT - 3038.530 (meters) 9968.91 (feet) ADJUSTED

HL0429

HL0429 GEOID HEIGHT - -15.587 (meters) GEOID12B

HL0429 DYNAMIC HEIGHT - 3034.097 (meters) 9954.37 (feet) COMP

HL0429 MODELED GRAVITY - 979,060.4 (mgal) NAVD 88

HL0429

HL0429 VERT ORDER - FIRST CLASS II

HL0429

HL0429.The horizontal coordinates were established by autonomous hand held GPS

HL0429.observations and have an estimated accuracy of +/- 10 meters.

HL0429.

HL0429.The orthometric height was determined by differential leveling and

HL0429.adjusted by the NATIONAL GEODETIC SURVEY

HL0429.in June 1991.

HL0429

HL0429.Significant digits in the geoid height do not necessarily reflect accuracy.

HL0429.GEOID12B height accuracy estimate available [here](#).

HL0429

HL0429.[Photographs](#) are available for this station.

HL0429

HL0429.The dynamic height is computed by dividing the NAVD 88

HL0429.geopotential number by the normal gravity value computed on the

HL0429.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45

HL0429.degrees latitude (g = 980.6199 gals.).

HL0429

HL0429.The modeled gravity was interpolated from observed gravity values.

HL0429

HL0429;		North	East	Units	Estimated Accuracy
HL0429;SPC CO S	-	436,737.	718,602.	MT	(+/- 10 meters HH2 GPS)

HL0429

HL0429\_U.S. NATIONAL GRID SPATIAL ADDRESS: 13SBB6022990944(NAD 83)

HL0429

SUPERSEDED SURVEY CONTROL

HL0429

HL0429.No superseded survey control is available for this station.

HL0429

HL0429\_MARKER: DB = BENCH MARK DISK

HL0429\_SETTING: 66 = SET IN ROCK OUTCROP

HL0429\_STAMPING: L 439 1985

HL0429\_MARK LOGO: NGS

HL0429\_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL

HL0429

HL0429	HISTORY	-	Date	Condition	Report By
HL0429	HISTORY	-	1985	MONUMENTED	NGS
HL0429	HISTORY	-	19910705	GOOD	USPSQD
HL0429	HISTORY	-	20090723	GOOD	GEOCAC

HL0429

STATION DESCRIPTION

HL0429

HL0429'DESCRIBED BY NATIONAL GEODETIC SURVEY 1985

HL0429'6.4 KM (4.0 MI) NORTH FROM SILVERTON.

HL0429'6.4 KM (4.0 MI) NORTHERLY ALONG U.S. HIGHWAY 550 FROM ITS JUNCTION

HL0429'WITH STATE HIGHWAY 110 IN SILVERTON, 0.5 KM (0.3 MI) NORTH OF MILEPOST

HL0429'74, IN THE SOUTH END OF A 10- BY 24-FOOT EXPOSED AREA OF OUTCROPPING

HL0429'BEDROCK, 9.0 M (29.5 FT) EAST OF THE CENTERLINE OF THE HIGHWAY, 2.5 M

HL0429'(8.2 FT) NORTHWEST OF THE CENTER OF A TRACK ROAD, AND 0.5 M (1.6 FT)

HL0429'NORTH OF THE SOUTH END OF THE BEDROCK.

HL0429'THE MARK IS 0.3 METERS SE FROM A WITNESS POST

HL0429'THE MARK IS 1.3 M ABOVE THE HIGHWAY.

HL0429

HL0429 STATION RECOVERY (1991)

HL0429

HL0429'RECOVERY NOTE BY US POWER SQUADRON 1991 (WLR)

HL0429'RECOVERED IN GOOD CONDITION.

HL0429

HL0429 STATION RECOVERY (2009)

HL0429

HL0429'RECOVERY NOTE BY GEOCACHING 2009 (TFW)  
HL0429'RECOVERED IN GOOD CONDITION.

National Geodetic Survey, Retrieval Date = SEPTEMBER 25, 2017

HL0424 \*\*\*\*\*

HL0424 DESIGNATION - M 439  
HL0424 PID - HL0424  
HL0424 STATE/COUNTY- CO/SAN JUAN  
HL0424 COUNTRY - US  
HL0424 USGS QUAD - SILVERTON (1955)

HL0424

HL0424 \*CURRENT SURVEY CONTROL

HL0424

HL0424\* NAD 83(1986) POSITION- 37 48 19. (N) 107 40 15. (W) SCALED  
HL0424\* [NAVD 88](#) ORTHO HEIGHT - 2822.745 (meters) 9260.96 (feet) ADJUSTED

HL0424

HL0424 GEOID HEIGHT - -15.506 (meters) GEOID12B  
HL0424 DYNAMIC HEIGHT - 2818.684 (meters) 9247.63 (feet) COMP  
HL0424 MODELED GRAVITY - 979,089.6 (mgal) NAVD 88

HL0424

HL0424 VERT ORDER - FIRST CLASS II

HL0424

HL0424.The horizontal coordinates were scaled from a topographic map and have  
HL0424.an estimated accuracy of +/- 6 seconds.

HL0424.

HL0424.The orthometric height was determined by differential leveling and  
HL0424.adjusted by the NATIONAL GEODETIC SURVEY

HL0424.in June 1991.

HL0424

HL0424.Significant digits in the geoid height do not necessarily reflect accuracy.  
HL0424.GEOID12B height accuracy estimate available [here](#).

HL0424

HL0424.The dynamic height is computed by dividing the NAVD 88  
HL0424.geopotential number by the normal gravity value computed on the  
HL0424.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45  
HL0424.degrees latitude (g = 980.6199 gals.).

HL0424

HL0424.The modeled gravity was interpolated from observed gravity values.

HL0424

HL0424;  
HL0424;SPC CO S - North East Units Estimated Accuracy  
433,390. 723,260. MT (+/- 180 meters Scaled)

HL0424

HL0424\_U.S. NATIONAL GRID SPATIAL ADDRESS: 13SBB648875(NAD 83)

HL0424

HL0424 SUPERSEDED SURVEY CONTROL

HL0424

HL0424.No superseded survey control is available for this station.

HL0424

HL0424\_MARKER: I = METAL ROD

HL0424\_SETTING: 15 = METAL ROD DRIVEN INTO GROUND. SEE TEXT FOR ADDITIONAL

HL0424+WITH SETTING: INFORMATION.

HL0424\_STAMPING: M 439 1985

HL0424\_MARK LOGO: NGS

HL0424\_PROJECTION: FLUSH

HL0424\_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL

HL0424\_ROD/PIPE-DEPTH: 2.4 meters

HL0424

HL0424	HISTORY	- Date	Condition	Report By
HL0424	HISTORY	- 1985	MONUMENTED	NGS
HL0424	HISTORY	- 19910705	GOOD	USPSQD

HL0424

HL0424 STATION DESCRIPTION

HL0424

HL0424'DESCRIBED BY NATIONAL GEODETIC SURVEY 1985

HL0424'IN SILVERTON.

HL0424'IN SILVERTON, AT THE JUNCTION OF U.S. HIGHWAY 550 AND STATE HIGHWAY  
HL0424'110, IN A TRIANGLE FORMED BY THE HIGHWAY JUNCTION, 48.1 M (157.8 FT)

HL0424'NORTHWEST OF THE CENTERLINE OF STATE HIGHWAY 110, 21.2 M (69.6 FT)

HL0424'SOUTH OF A PAVED ROAD, 20.9 M (68.6 FT) NORTHEAST OF THE CENTERLINE OF

HL0424'U.S. HIGHWAY 550, AND 1.6 M (5.2 FT) NORTHEAST OF A UTILITY POLE.

HL0424'NOTE--ACCESS TO DATUM POINT IS HAD THROUGH A 5-INCH LOGO CAP.

HL0424'THE MARK IS 0.45 METERS SW FROM A WITNESS POST

HL0424'THE MARK IS 0.6 M BELOW THE HIGHWAY.

HL0424

HL0424 STATION RECOVERY (1991)

HL0424

HL0424'RECOVERY NOTE BY US POWER SQUADRON 1991 (WLR)

HL0424'RECOVERED IN GOOD CONDITION.

National Geodetic Survey, Retrieval Date = SEPTEMBER 27, 2017

HL0411 \*\*\*\*\*

HL0411 DESIGNATION - M 441

HL0411 PID - HL0411

HL0411 STATE/COUNTY- CO/SAN JUAN

HL0411 COUNTRY - US

HL0411 USGS QUAD - SNOWDON PEAK (1972)

HL0411

HL0411 \*CURRENT SURVEY CONTROL

HL0411

HL0411\* NAD 83(2011) POSITION- 37 43 57.28346(N) 107 43 13.22977(W) ADJUSTED

HL0411\* NAD 83(2011) ELLIP HT- 3172.356 (meters) (06/27/12) ADJUSTED

HL0411\* NAD 83(2011) EPOCH - 2010.00

HL0411\* [NAVD 88](#) ORTHO HEIGHT - 3188.070 (meters) 10459.53 (feet) ADJUSTED

HL0411

HL0411 GEOID HEIGHT - -15.671 (meters) GEOID12B

HL0411 NAD 83(2011) X - -1,538,036.011 (meters) COMP

HL0411 NAD 83(2011) Y - -4,813,403.016 (meters) COMP

HL0411 NAD 83(2011) Z - 3,883,952.969 (meters) COMP

HL0411 LAPLACE CORR - 6.88 (seconds) DEFLEC12B

HL0411 DYNAMIC HEIGHT - 3183.339 (meters) 10444.00 (feet) COMP

HL0411 MODELED GRAVITY - 979,029.3 (mgal) NAVD 88

HL0411

HL0411 VERT ORDER - FIRST CLASS II

HL0411

HL0411 Network accuracy estimates per FGDC Geospatial Positioning Accuracy

HL0411 Standards:

HL0411	FGDC (95% conf, cm)	Standard deviation (cm)	CorrNE
HL0411	Horiz Ellip	SD_N SD_E SD_h	(unitless)





HL0411 ELLIP H (12/03/02) 3172.372 (m) GP ( ) 4 2  
 HL0411 NAD 83(1992)- 37 43 57.28268(N) 107 43 13.22925(W) AD ( ) 1  
 HL0411 ELLIP H (07/06/97) 3172.373 (m) GP ( ) 3 1  
 HL0411 NAVD 88 (07/06/97) 3188.0 (m) GEOID96 model used GPS OBS

HL0411

HL0411.Superseded values are not recommended for survey control.

HL0411

HL0411.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.

HL0411.See file [dsdata.pdf](#) to determine how the superseded data were derived.

HL0411

HL0411\_MARKER: DB = BENCH MARK DISK

HL0411\_SETTING: 66 = SET IN ROCK OUTCROP

HL0411\_STAMPING: M 441 1985

HL0411\_MARK LOGO: NGS

HL0411\_MAGNETIC: O = OTHER; SEE DESCRIPTION

HL0411\_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD

HL0411+STABILITY: POSITION/ELEVATION WELL

HL0411\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

HL0411+SATELLITE: SATELLITE OBSERVATIONS - July 08, 1993

HL0411

HL0411	HISTORY	- Date	Condition	Report By
HL0411	HISTORY	- 1985	MONUMENTED	NGS
HL0411	HISTORY	- 19910708	GOOD	USPSQD
HL0411	HISTORY	- 19930708	GOOD	NGS

HL0411

HL0411 STATION DESCRIPTION

HL0411

HL0411'DESCRIBED BY NATIONAL GEODETIC SURVEY 1985

HL0411'12.8 KM (7.95 MI) SOUTH FROM SILVERTON.

HL0411'12.8 KM (7.95 MI) SOUTHERLY ALONG U.S. HIGHWAY 550 FROM ITS JUNCTION

HL0411'WITH STATE HIGHWAY 110 IN SILVERTON, IN A 4- BY 20-FOOT EXPOSED AREA

HL0411'OF BEDROCK IN A SMALL HIGHWAY CUT, 2.4 KM (1.5 MI) SOUTHWEST OF THE

HL0411'SUMMIT OF MOLAS PASS, 57.5 M (188.6 FT) EAST OF THE ENTRANCE TO THE

HL0411'EAST LIME CREEK REST AREA, AND 9.1 M (29.8 FT) NORTH OF THE CENTERLINE

HL0411'OF THE HIGHWAY.

HL0411'THE MARK IS 0.2 METERS W FROM A WITNESS POST

HL0411'THE MARK IS 0.5 M ABOVE THE HIGHWAY.

HL0411

HL0411 STATION RECOVERY (1991)

HL0411

HL0411'RECOVERY NOTE BY US POWER SQUADRON 1991 (WLR)

HL0411'RECOVERED IN GOOD CONDITION.

HL0411

HL0411 STATION RECOVERY (1993)

HL0411

HL0411'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1993 (RSC)

HL0411'RECOVERED AS DESCRIBED.

National Geodetic Survey, Retrieval Date = AUGUST 10, 2017

HL0646 \*\*\*\*\*

HL0646 CBN - This is a Cooperative Base Network Control Station.

HL0646 DESIGNATION - V T

HL0646 PID - HL0646

HL0646 STATE/COUNTY- CO/SAN JUAN

HL0646 COUNTRY - US  
 HL0646 USGS QUAD - SILVERTON (1955)  
 HL0646  
 HL0646 \*CURRENT SURVEY CONTROL  
 HL0646  
 HL0646\* NAD 83(2011) POSITION- 37 47 58.62946(N) 107 40 26.79222(W) ADJUSTED  
 HL0646\* NAD 83(2011) ELLIP HT- 2911.787 (meters) (06/27/12) ADJUSTED  
 HL0646\* NAD 83(2011) EPOCH - 2010.00  
 HL0646\* [NAVD 88](#) ORTHO HEIGHT - 2927.3 (meters) 9604. (feet) GPS OBS  
 HL0646  
 HL0646 NAVD 88 orthometric height was determined with geoid model GEOID12A  
 HL0646 GEOID HEIGHT - -15.509 (meters) GEOID12A  
 HL0646 GEOID HEIGHT - -15.509 (meters) GEOID12B  
 HL0646 NAD 83(2011) X - -1,532,704.759 (meters) COMP  
 HL0646 NAD 83(2011) Y - -4,810,102.130 (meters) COMP  
 HL0646 NAD 83(2011) Z - 3,889,678.416 (meters) COMP  
 HL0646 LAPLACE CORR - -1.48 (seconds) DEFLEC12B  
 HL0646  
 HL0646 Network accuracy estimates per FGDC Geospatial Positioning Accuracy  
 HL0646 Standards:  
 HL0646 FGDC (95% conf, cm) Standard deviation (cm) CorrNE  
 HL0646 Horiz Ellip SD\_N SD\_E SD\_h (unitless)  
 HL0646 -----  
 HL0646 NETWORK 0.93 2.27 0.41 0.35 1.16 0.04224476  
 HL0646 -----  
 HL0646 Click [here](#) for local accuracies and other accuracy information.  
 HL0646  
 HL0646  
 HL0646.The horizontal coordinates were established by GPS observations  
 HL0646.and adjusted by the National Geodetic Survey in June 2012.  
 HL0646  
 HL0646.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has  
 HL0646.been affixed to the stable North American tectonic plate. See  
 HL0646.[NA2011](#) for more information.  
 HL0646  
 HL0646.The horizontal coordinates are valid at the epoch date displayed above  
 HL0646.which is a decimal equivalence of Year/Month/Day.  
 HL0646  
 HL0646.The orthometric height was determined by GPS observations and a  
 HL0646.high-resolution geoid model.  
 HL0646  
 HL0646.Significant digits in the geoid height do not necessarily reflect accuracy.  
 HL0646.GEOID12B height accuracy estimate available [here](#).  
 HL0646  
 HL0646.The X, Y, and Z were computed from the position and the ellipsoidal ht.  
 HL0646  
 HL0646.The Laplace correction was computed from DEFLEC12B derived deflections.  
 HL0646  
 HL0646.The ellipsoidal height was determined by GPS observations  
 HL0646.and is referenced to NAD 83.  
 HL0646  
 HL0646. The following values were computed from the NAD 83(2011) position.  
 HL0646  
 HL0646;

North	East	Units Scale Factor Converg.
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HL0646;SPC CO S - 432,768.079 722,953.773 MT 0.99994558 -1 20 00.8  
 HL0646;SPC CO S - 1,419,839.94 2,371,890.84 sFT 0.99994558 -1 20 00.8  
 HL0646;UTM 13 - 4,186,951.531 264,561.524 MT 1.00028279 -1 38 23.0  
 HL0646  
 HL0646!  
 HL0646!SPC CO S - Elev Factor x Scale Factor = Combined Factor  
 HL0646!SPC CO S - 0.99954330 x 0.99994558 = 0.99948890  
 HL0646!UTM 13 - 0.99954330 x 1.00028279 = 0.99982596  
 HL0646  
 HL0646: Primary Azimuth Mark Grid Az  
 HL0646:SPC CO S - KENDALL 2 104 02 53.8  
 HL0646:UTM 13 - KENDALL 2 104 21 16.0  
 HL0646

HL0646\_U.S. NATIONAL GRID SPATIAL ADDRESS: 13SBB6456186951(NAD 83)

HL0646

PID	Reference Object	Distance	Geod. Az
			ddmmss.s
HL0644	KENDALL 2	APPROX. 2.9 KM	1024253.0

HL0646

HL0646

SUPERSEDED SURVEY CONTROL

HL0646

HL0646	NAD 83(2007)-	37 47 58.62907(N)	107 40 26.79248(W)	AD(2002.00)	0
HL0646	ELLIP H (02/10/07)	2911.810 (m)		GP(2002.00)	
HL0646	ELLIP H (10/21/02)	2911.815 (m)		GP( )	4 2
HL0646	NAD 83(1992)-	37 47 58.62850(N)	107 40 26.79158(W)	AD( )	B
HL0646	ELLIP H (05/26/92)	2911.826 (m)		GP( )	4 1
HL0646	NAD 83(1986)-	37 47 58.62077(N)	107 40 26.80551(W)	AD( )	3
HL0646	NAD 27	- 37 47 58.64276(N)	107 40 24.59773(W)	AD( )	3
HL0646	NAVD 88 (03/16/99)	2927.3 (m)	UNKNOWN model used	GPS OBS	
HL0646	NAVD 88 (07/06/97)	2927.2 (m)	GEOID96 model used	GPS OBS	
HL0646	NAVD 88 (05/26/92)	2926.7 (m)	UNKNOWN model used	GPS OBS	
HL0646	NGVD 29 (07/19/86)	2925.3 (m)	9597.	(f) VERT ANG	

HL0646

HL0646.Superseded values are not recommended for survey control.

HL0646

HL0646.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.

HL0646.See file [dsdata.pdf](#) to determine how the superseded data were derived.

HL0646

HL0646\_MARKER: DB = BENCH MARK DISK

HL0646\_SETTING: 66 = SET IN ROCK OUTCROP

HL0646\_STAMPING: VABM 9599 V T 1952

HL0646\_MARK LOGO: USGS

HL0646\_PROJECTION: FLUSH

HL0646\_MAGNETIC: O = OTHER; SEE DESCRIPTION

HL0646\_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD

HL0646+STABILITY: POSITION/ELEVATION WELL

HL0646\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

HL0646+SATELLITE: SATELLITE OBSERVATIONS - May 30, 2014

HL0646

HISTORY	Date	Condition	Report By
HL0646	1952	MONUMENTED	USGS
HL0646	1952	GOOD	USGS
HL0646	19910628	GOOD	NGS

HL0646 HISTORY - 19930708 GOOD NGS  
 HL0646 HISTORY - 19980715 GOOD CODOT  
 HL0646 HISTORY - 20140530 GOOD WOOLPT

HL0646

HL0646 STATION DESCRIPTION

HL0646

HL0646'DESCRIBED BY US GEOLOGICAL SURVEY 1952

HL0646'STATION IS LOCATED ABOUT 1.0 MI. SSW. OF SILVERTON, COLORADO, AND

HL0646'205 FT. E. OF HIGHWAY, ON THE HIGHEST POINT OF A SMALL KNOLL.

HL0646'

HL0646'TO REACH FROM THE POST OFFICE AT SILVERTON, DRIVE S. ALONG HIGHWAY

HL0646'550 FOR 1.9 MI. TO WIDE GRADUAL CURVE AND STATION SITE.

HL0646'

HL0646'STATION MARK--STANDARD TABLET, STAMPED ---V.T. 1952 VABM 9598---,

HL0646'CEMENTED IN GRANITE OUTCROP.

HL0646'

HL0646'REFERENCE MARKS--NONE.

HL0646

HL0646 STATION RECOVERY (1952)

HL0646

HL0646'RECOVERY NOTE BY US GEOLOGICAL SURVEY 1952

HL0646'RECOVERED IN GOOD CONDITION.

HL0646

HL0646 STATION RECOVERY (1991)

HL0646

HL0646'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1991

HL0646'STATION IS LOCATED ABOUT 1.5 KM (0.9 MI) SOUTHWEST OF SILVERTON, IN

HL0646'THE SAN JUAN NATIONAL FOREST, 1 KM (0.6 MI) SOUTHEAST OF A HAIRPIN

HL0646'HIGHWAY CURVE, JUST OFF US HIGHWAY 550, IN THE MIDDLE OF A SLOPING

HL0646'NORTHWEST-SOUTHEAST RIDGE THAT PARALLELS THE HIGHWAY AND IS ON THE

HL0646'EAST SLOPE OF SULTAN MOUNTAIN. OWNERSHIP--US FOREST SERVICE.

HL0646'TO REACH FROM THE JUNCTION OF US HIGHWAY 550 AND STATE HIGHWAY 110 AT

HL0646'THE SOUTHWEST END OF A LARGE TRAFFIC TRIANGLE JUST SOUTHWEST OF

HL0646'SILVERTON, GO SOUTHWEST ON HIGHWAY 550 FOR 0.75 MI (1.21 KM) TO A

HL0646'TRACK ROAD AND GATE ON THE RIGHT JUST PAST A HAIRPIN CURVE. CONTINUE

HL0646'UPGRADE FOR 0.35 MI (0.56 KM) TO A NARROW TURNOUT ON THE LEFT

HL0646'OPPOSITE A BROKEN ROCK FACE AND THE END OF TRUCK TRAVEL. CONTINUE

HL0646'UPHILL FOR 0.9 MI (1.4 KM) TO A TURNOUT ON THE LEFT AND ENOUGH ROOM

HL0646'TO TURN AROUND. PACK DOWN INTO RAVINE, THEN RIGHT, SOUTHEAST, FOR

HL0646'150 FT (45.7 M) , THEN LEFT, EASTERLY, UP SIDE OF RIDGE FOR 150 FT

HL0646'(45.7 M) TO STATION.

HL0646'NOTE--300 FT PACK TO STATION.

HL0646'STATION MARK PROJECTS 5 MM FROM A DRILL HOLE IN A 1 M (3.3 FT) X 2.6 M

HL0646'(8.5 FT) X 0.1 M (0.3 FT) HIGH ROCK OUTCROP ABOUT 60 M (196.8 FT)

HL0646'NORTHWEST OF HIGH GROUND. IT IS ABOUT 100 M (328.1 FT) NORTHEAST OF,

HL0646'AND 5 M (16.4 FT) HIGHER THAN THE HIGHWAY, 150 M (492.1 FT) EAST OF

HL0646'THE TURNOUT, 0.9 M (3.0 FT) WEST OF A FIBERGLASS WITNESS POST, 7.8 M

HL0646'(25.6 FT) WEST-SOUTHWEST OF A 40-CM SPRUCE TREE, 6.0 M (19.7 FT)

HL0646'NORTHWEST OF THE NORTHWEST AND HIGHEST END OF A 1 M (3.3 FT) X 1 M

HL0646'(3.3 FT) X 0.5 M (1.6 FT) HIGH BOULDER SITTING ON TOP OF THE GROUND.

HL0646'DESCRIBED BY G.R.HEID

HL0646

HL0646 STATION RECOVERY (1993)

HL0646

HL0646'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1993 (RSC)  
 HL0646'RECOVERED AS DESCRIBED.  
 HL0646  
 HL0646 STATION RECOVERY (1998)  
 HL0646  
 HL0646'RECOVERY NOTE BY COLORADO DEPARTMENT OF TRANSPORTATION 1998 (RSC)  
 HL0646'RECOVERED AS DESCRIBED.  
 HL0646  
 HL0646 STATION RECOVERY (2014)  
 HL0646  
 HL0646'RECOVERY NOTE BY WOOLPERT CONSULTANTS 2014 (ZJH)  
 HL0646'RECOVERED AS DESCRIBED.

National Geodetic Survey, Retrieval Date = SEPTEMBER 30, 2017

HL0433 \*\*\*\*\*  
 HL0433 DESIGNATION - Z 439  
 HL0433 PID - HL0433  
 HL0433 STATE/COUNTY- CO/SAN JUAN  
 HL0433 COUNTRY - US  
 HL0433 USGS QUAD - SILVERTON (1955)  
 HL0433  
 HL0433 \*CURRENT SURVEY CONTROL  
 HL0433  
 HL0433\* NAD 83(2011) POSITION- 37 52 10.82536(N) 107 43 22.91904(W) ADJUSTED  
 HL0433\* NAD 83(2011) ELLIP HT- 3106.415 (meters) (06/27/12) ADJUSTED  
 HL0433\* NAD 83(2011) EPOCH - 2010.00  
 HL0433\* [NAVD 88](#) ORTHO HEIGHT - 3121.872 (meters) 10242.34 (feet) ADJUSTED  
 HL0433  
 HL0433 GEOID HEIGHT - -15.539 (meters) GEOID12B  
 HL0433 NAD 83(2011) X - -1,535,405.702 (meters) COMP  
 HL0433 NAD 83(2011) Y - -4,804,392.831 (meters) COMP  
 HL0433 NAD 83(2011) Z - 3,895,941.729 (meters) COMP  
 HL0433 LAPLACE CORR - 7.25 (seconds) DEFLEC12B  
 HL0433 DYNAMIC HEIGHT - 3117.264 (meters) 10227.22 (feet) COMP  
 HL0433 MODELED GRAVITY - 979,040.2 (mgal) NAVD 88  
 HL0433  
 HL0433 VERT ORDER - FIRST CLASS II  
 HL0433  
 HL0433 Network accuracy estimates per FGDC Geospatial Positioning Accuracy  
 HL0433 Standards:  
 HL0433 FGDC (95% conf, cm) Standard deviation (cm) CorrNE  
 HL0433 Horiz Ellip SD\_N SD\_E SD\_h (unitless)  
 HL0433 -----  
 HL0433 NETWORK 1.46 4.43 0.66 0.52 2.26 0.04155984  
 HL0433 -----  
 HL0433 Click [here](#) for local accuracies and other accuracy information.  
 HL0433  
 HL0433  
 HL0433.The horizontal coordinates were established by GPS observations  
 HL0433.and adjusted by the National Geodetic Survey in June 2012.  
 HL0433  
 HL0433.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has  
 HL0433.been affixed to the stable North American tectonic plate. See  
 HL0433.[NA2011](#) for more information.

HL0433

HL0433.The horizontal coordinates are valid at the epoch date displayed above  
HL0433.which is a decimal equivalence of Year/Month/Day.

HL0433

HL0433.The orthometric height was determined by differential leveling and  
HL0433.adjusted by the NATIONAL GEODETIC SURVEY  
HL0433.in June 1991.

HL0433

HL0433.Significant digits in the geoid height do not necessarily reflect accuracy.  
HL0433.GEOID12B height accuracy estimate available [here](#).

HL0433

HL0433.The X, Y, and Z were computed from the position and the ellipsoidal ht.

HL0433

HL0433.The Laplace correction was computed from DEFLEC12B derived deflections.

HL0433

HL0433.The ellipsoidal height was determined by GPS observations

HL0433.and is referenced to NAD 83.

HL0433

HL0433.The dynamic height is computed by dividing the NAVD 88

HL0433.geopotential number by the normal gravity value computed on the

HL0433.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45

HL0433.degrees latitude (g = 980.6199 gals.).

HL0433

HL0433.The modeled gravity was interpolated from observed gravity values.

HL0433

HL0433. The following values were computed from the NAD 83(2011) position.

HL0433

HL0433;		North	East	Units	Scale	Factor	Converg.
HL0433;SPC CO S	-	440,642.428	718,831.429	MT	0.99994559	-1 21	48.8
HL0433;SPC CO S	-	1,445,674.37	2,358,366.11	sFT	0.99994559	-1 21	48.8
HL0433;UTM 13	-	4,194,850.647	260,480.074	MT	1.00030666	-1 40	20.6

HL0433

HL0433! - Elev Factor x Scale Factor = Combined Factor

HL0433!SPC CO S - 0.99951279 x 0.99994559 = 0.99945841

HL0433!UTM 13 - 0.99951279 x 1.00030666 = 0.99981930

HL0433

HL0433\_U.S. NATIONAL GRID SPATIAL ADDRESS: 13SBB6048094850 (NAD 83)

HL0433

#### SUPERSEDED SURVEY CONTROL

HL0433

HL0433	NAD 83(2007)-	37 52 10.82498(N)	107 43 22.91930(W)	AD(2002.00)	0
HL0433	ELLIP H (02/10/07)	3106.438 (m)		GP(2002.00)	
HL0433	ELLIP H (12/03/02)	3106.440 (m)		GP( )	4 2
HL0433	NAD 83(1992)-	37 52 10.82441(N)	107 43 22.91854(W)	AD( )	1
HL0433	ELLIP H (03/16/99)	3106.447 (m)		GP( )	4 1
HL0433	NAVD 88	3121.87 (m)	10242.3	(f) LEVELING	3

HL0433

HL0433.Superseded values are not recommended for survey control.

HL0433

HL0433.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.

HL0433.See file [dsdata.pdf](#) to determine how the superseded data were derived.

HL0433

HL0433\_MARKER: DV = VERTICAL CONTROL DISK

HL0433\_SETTING: 80 = SET IN A BOULDER

HL0433\_STAMPING: Z 439 1985

HL0433\_MARK LOGO: NGS

HL0433\_PROJECTION: FLUSH

HL0433\_MAGNETIC: O = OTHER; SEE DESCRIPTION

HL0433\_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO

HL0433+STABILITY: SURFACE MOTION

HL0433\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

HL0433+SATELLITE: SATELLITE OBSERVATIONS - May 29, 2014

HL0433

HL0433	HISTORY	- Date	Condition	Report By
HL0433	HISTORY	- 1985	MONUMENTED	NGS
HL0433	HISTORY	- 19910706	GOOD	USPSQD
HL0433	HISTORY	- 19980715	GOOD	CODOT
HL0433	HISTORY	- 20090723	GOOD	GEOCAC
HL0433	HISTORY	- 20140529	GOOD	WOOLPT

HL0433

HL0433 STATION DESCRIPTION

HL0433

HL0433'DESCRIBED BY NATIONAL GEODETIC SURVEY 1985

HL0433'10.4 KM (6.45 MI) NORTH FROM SILVERTON.

HL0433'10.4 KM (6.45 MI) NORTHERLY ALONG U.S. HIGHWAY 550 FROM ITS JUNCTION

HL0433'WITH STATE HIGHWAY 110 IN SILVERTON, NEAR THE CENTER OF THE SOUTHERN

HL0433'HALF OF A 6- BY 10-FOOT EXPOSED AREA OF BEDROCK IN A HIGHWAY CUT,

HL0433'0.5 KM (0.3 MI) SOUTH OF MILEPOST 77, AND 12.4 M (40.7 FT) EAST OF THE

HL0433'CENTERLINE OF THE NORTHBOUND LANES OF THE HIGHWAY.

HL0433'THE MARK IS 0.3 METERS W FROM A WITNESS POST

HL0433'THE MARK IS 1.5 M ABOVE THE HIGHWAY.

HL0433

HL0433 STATION RECOVERY (1991)

HL0433

HL0433'RECOVERY NOTE BY US POWER SQUADRON 1991 (WLR)

HL0433'RECOVERED IN GOOD CONDITION.

HL0433

HL0433 STATION RECOVERY (1998)

HL0433

HL0433'RECOVERY NOTE BY COLORADO DEPARTMENT OF TRANSPORTATION 1998 (RSC)

HL0433'THE STATION IS LOCATED ABOUT 11 MI (17.7 KM) SOUTH OF OURAY, 5 MI (8.0

HL0433'KM) NORTH-NORTHWEST OF SILVERTON AND 3 MI (4.8 KM) SOUTH OF RED

HL0433'MOUNTAIN PASS, AT U. S. HIGHWAY 550 MILEPOST 76.75.

HL0433'OWNERSHIP--COLORADO DEPT. OF TRANSPORTATION RIGHT-OF-WAY TO REACH THE

HL0433'STATION FROM THE INTERSECTION OF STATE HIGHWAY 110 AND U. S. HIGHWAY

HL0433'550 IN SILVERTON, GO NORTHERLY FOR 6.45 MI (10.38 KM) TO THE STATION

HL0433'ON THE RIGHT IN THE MIDDLE OF A LARGE ROADCUT THE MARK IS A STANDARD

HL0433'DISK SET INTO THE TOP OF A LARGE BROWN BOULDER MEASURING 2.3 M (7.5

HL0433'FT) BY 1.5 M.IT IS 15.2 M (49.9 FT) EAST FROM THE CENTER LINE OF U.

HL0433'S. HIGHWAY 550, 1.4 M (4.6 FT) NORTHWEST FROM A WITNESS POST AND

HL0433'ABOUT 1.4 M (4.6 FT) ABOVE THE HIGHWAY.

HL0433

HL0433 STATION RECOVERY (2009)

HL0433

HL0433'RECOVERY NOTE BY GEOCACHING 2009 (TFW)

HL0433'RECOVERED IN GOOD CONDITION.

HL0433

HL0433 STATION RECOVERY (2014)



HL0433

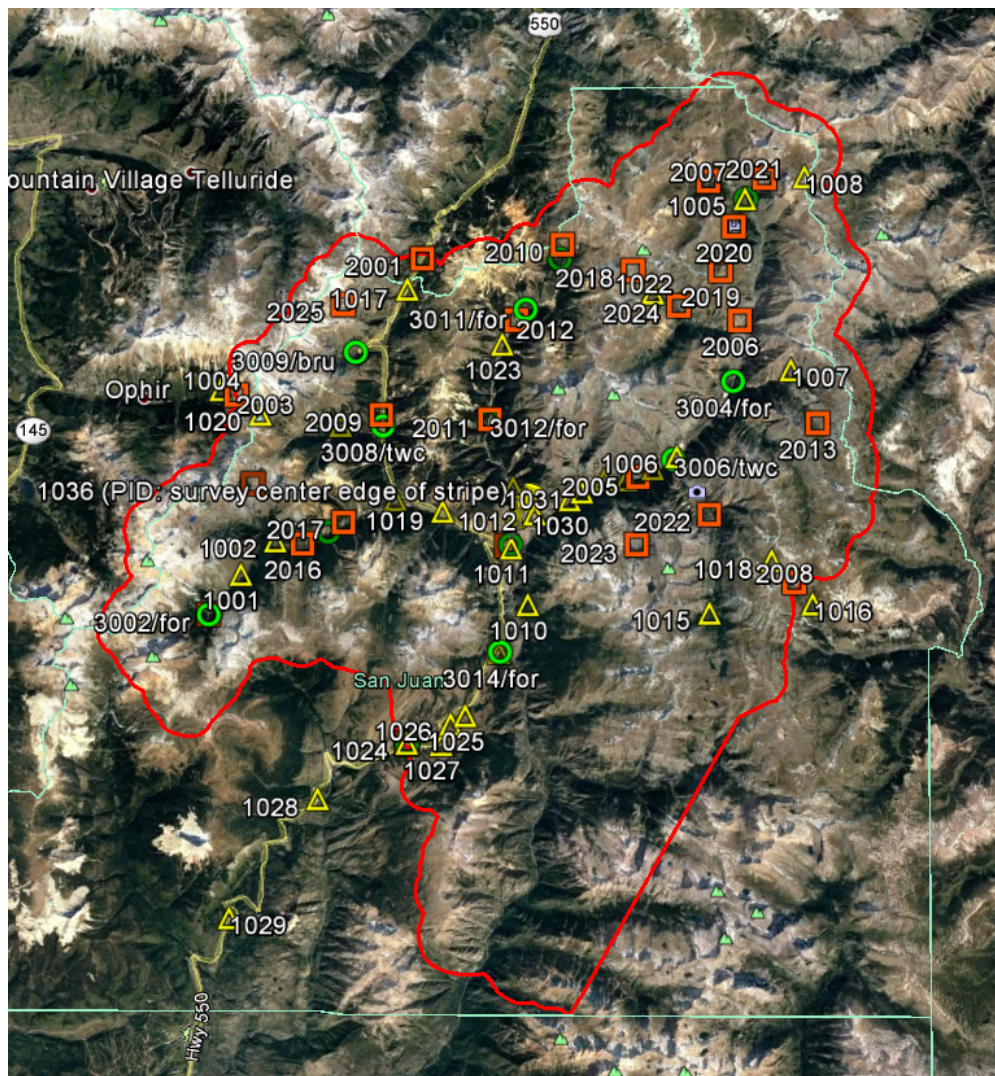
HL0433'RECOVERY NOTE BY WOOLPERT CONSULTANTS 2014 (ZJH)

HL0433'RECOVERED AS DESCRIBED.

# Section 5: GPS Control Diagram

This section contains a graphical representation of the new and existing control stations used for the project.

## Overview of Control Network



Not to Scale