

PSOMAS

2015 PAG LiDAR Data Accuracy Assessment



Pima Association of Governments



Pima County Regional Flood Control District

Project No. 7PIM130303 | 07.30.2015

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Prepared by Psomas

Project No. 7PIM130303

July 30, 2015

Introduction

In December of 2014 Psomas was contracted by the Pima County Regional Flood Control District to provide the Elevation Data Horizontal and Vertical Accuracy Assessment for the Pima Association of Governments 2015 LiDAR and Aerial Imagery acquisition. Psomas has a long and distinguished history of surveying in Pima County and welcomed the opportunity to participate in this vital local project.

Project Description

The main project area is comprised of approximately 2,203 square miles of eastern Pima County and a smaller area of 36 square miles located in the northeast corner of the County. The LiDAR data was acquired in March of 2015 by Sanborn Map Company using a Leica ALS70 Airborne Laser Scanner. The project horizontal datum is Arizona State Plane, Central zone, NAD83 (2011), epoch 2010.0, with units in International Feet. The vertical datum is NAVD88. Orthometric heights (elevations) were derived from ellipsoid heights using a high resolution geoid model, Geoid12A. The data acquisition was designed to comply with the requirements for QL2/QL3 LiDAR accuracy as stated in the USGS Survey Standards, Chapter 4 of Book 11, LiDAR Base Specifications for inclusion in the USGS 3DEP program. This report primarily deals with the absolute vertical accuracy of Non-Vegetated LiDAR coverage, and a limited subset of points to estimate horizontal accuracy.

Methodology

Pima County, and the metro Tucson area in particular, has a well-established geodetic control network. Recent surveys by local agencies have densified the control and provided an opportunity to evaluate this data, as well new check points collected specifically for this project. The quantity and location of check points was designed to meet the recommendations in the Positional Accuracy Standards for Digital Geospatial Data as published by the American Society for Photogrammetry and Remote Sensing (ASPRS) 2014 (see Figure 1). All new check points were collected in open, flat areas, such as parking lots, school yards, and parks. In rural areas the check points were positioned on flat, open areas away from trees and dense vegetation. All of the urban environment and a majority of the rural areas are classified as Non-vegetated. A small portion of the project in the extreme southeast corner is at higher elevation and could be classified as Vegetated depending on the amount of seasonal rainfall and native grass growth in the spring. A total of 274 points were selected for this project, comprised of 132 new check points and 142 control points included from existing sources. A list of the check points can be found in Appendix A.

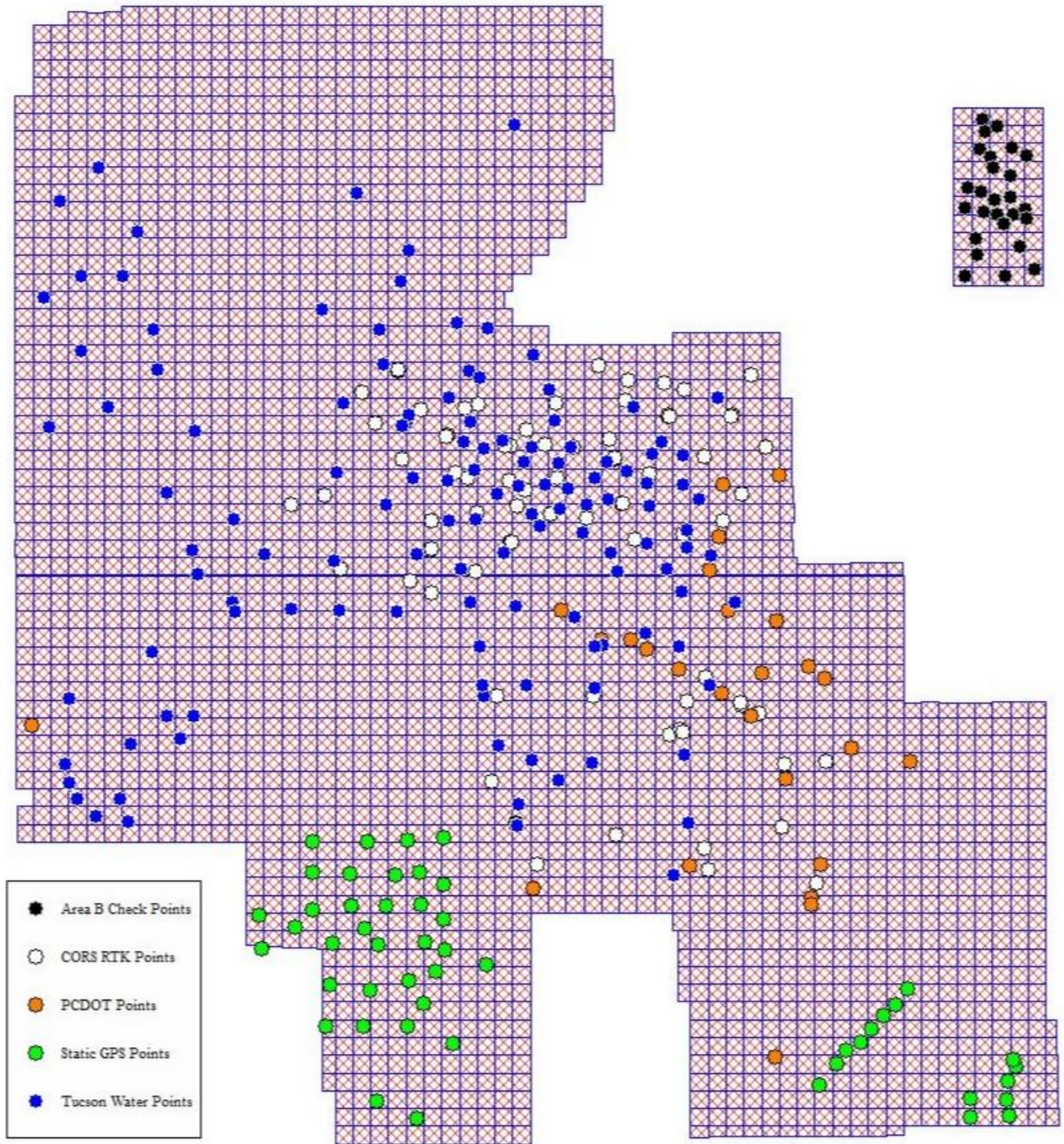


Figure 1

QL2/QL3 Check Point Distribution

The check points can be classified into 4 groups that reflect the Survey method used to collect the location and elevation: Static GPS, RTK GPS, CORS RTK, and OPUS GPS. The following describes each method in more detail.

- 1) Static GPS points: these check points were collected and post-processed to FGDC local network accuracy standards. Primarily used in areas of the coverage that lack existing survey control and/or validation points. The minimum occupation time was 30 minutes per point and at least 2 CORS stations vector ties to each point. Points were then post-processed in Trimble Business Center to the 95% confidence level. Points used for RTK base stations were double occupied and submitted to OPUS for further validation.
- 2) GPS RTK points: Supplemental check points on structures and identifiable objects. These points were collected using a traditional GPS Real Time Kinematic (RTK) base-rover methodology.
- 3) CORS RTK points: random points collected from single base line RTK solution using the nearest AZCORS station. These points were collected at sites that offered an open expanse and varied surfaces, such as school playgrounds, parks, large parking lots, and open terrain.
- 4) Tucson Water geodetic points: existing survey monuments located at various well sites throughout the area. These points were collected in Static mode and processed using OPUS. All of these points involved multiple observations and additional verification by Tucson Water surveyors.
- 5) Pima County DOT OPUS points: randomly distributed points collected in Static mode and processed using OPUS. Most are 2 hour single occupations and are focused mainly on local survey control, benchmarks, and random points on highly identifiable objects.

Vertical Accuracy Assessment

The vertical accuracy assessment was performed using Applied Imagery's Quick Terrain Modeler program. A list of tiles was generated by evaluating the check point locations against the tile index. This list was used to load the corresponding LAS files into QT Modeler. The check points were loaded into the Point Query Utility which compares the elevation of the points to elevations in the model. QT Modeler then creates a TIN surface at each point to calculate the surface elevation and reports the elevation differences. The method used is in compliance with standards for establishing RMSE and quality control of LIDAR surveys. The output from the Point Query Utility was converted to an MS Excel file for further computational analysis. Fourteen (14) points were eliminated as outliers and removed from the analysis. The results can be found in Appendix B.

Results of the Absolute Vertical Accuracy Assessment

Per the project specifications the absolute vertical accuracy for Quality Level 2 is ≤ 10 cm, or ≤ 19.6 cm at the 95% confidence level. The subset of 132 newly collected check points yielded an RMSEz of 9.7 cm. The entire combined set of 260 check points resulted in an RMSEz = 9.76 cm.

This data set was tested to meet ASPRS Positional Accuracy Standards for Digital Geospatial Data (2014) for a 10 cm RMSEz Vertical Accuracy Class. Actual NVA accuracy was found to be RMSEz = 9.76 cm, equating to ± 19.13 cm at 95% confidence level. No assessment of the VVA accuracy is included due to the lack of qualifying land cover areas.

Horizontal Accuracy Assessment

Horizontal error in LiDAR is mainly a function of the position and attitude errors at the sensor, and the flying height. An estimate of the horizontal error can be made assuming the positional, attitudinal, and height accuracies are known. This error estimate comes from the LiDAR provider and per the ASPRS Positional Accuracy Standards for Digital Geospatial Data (2014) those values are:

GNSS Positional Error= 2cm
IMU Error= 0.5°
Mean Flying Height= 3,200m

From this the estimated horizontal positional error is calculated to be 0.50 cm.

Well defined points typically used for checking planimetric accuracies in topographic mapping and orthophotography may not be appropriate for LiDAR analysis. For this project we collected a small number of check points that fell at the end of paint stripes and other high contrast features for use as horizontal checks. Most of the rural areas within the coverage did not contain adequate features for horizontal assessment. In the smaller area we were able to collect the deck of 2 bridges for comparison the LiDAR data. Unfortunately the LiDAR point spacing did not provide enough density to make exact measurement of these features and no definable assessment of the horizontal accuracy can be made with this methodology.

This report is based upon field work and office calculations performed under my direct supervision.

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July 28, 2015



APPENDIX A
2015 PAG LiDAR Vertical Accuracy Assessment

2015 PAG LiDAR ACCURACY ASSESSMENT												CS	Concrete shot
Datum: NAD83(2011) Epoch 2010.0												GS	Ground shot
Projection: Arizona State Plane (ACS83), Central Zone, International Feet												PS	Pavement shot
Ellipsoid: GRS80												MON	Survey Monument
Geoid: Geoid12A												60D	Nail
Vertical Datum: NAVD88												NGS	National Geodetic Survey
POINT NO.	PID	LATITUDE (N)	LONGITUDE (W)	HGT (IFT)	SOURCE	N (ACS83-C)	E (ACS83-C)	ELEV. (IFT)	rms_x	rms_y	rms_z	Description	CLASS
101		31°57'18.948500"	111°06'51.366260"	3652.784	Static GPS	348384.43	948855.94	3749.74	0.019	0.019	0.052	MON/ 1/2" REBAR PANEL POINT	Non-veg
102		31°57'18.055710"	111°03'53.407340"	3302.269	Static GPS	348414.27	964187.37	3399.28	0.018	0.015	0.045	MON/ 1/2" REBAR PANEL POINT	Non-veg
103		31°57'18.559720"	111°01'41.440170"	3049.209	Static GPS	348556.59	975557.16	3146.22	0.020	0.018	0.060	MON/ 1/2" REBAR PANEL POINT	Non-veg
104		31°57'26.467780"	110°59'42.363450"	2799.707	Static GPS	349439.06	985810.26	2896.68	0.020	0.018	0.054	MON/ 1/2" REBAR PANEL POINT	Non-veg
105		31°55'17.024900"	110°59'42.667060"	2824.619	Static GPS	336360.83	985893.63	2921.59	0.029	0.021	0.052	MON/ 1/2" REBAR PANEL POINT	Non-veg
106		31°55'51.102380"	111°01'01.378940"	3096.258	Static GPS	339745.20	979082.61	3193.24	0.030	0.023	0.090	MON/ 1/2" REBAR PANEL POINT	Non-veg
107		31°55'44.974250"	111°02'22.061660"	3164.434	Static GPS	339069.75	972135.25	3261.42	0.030	0.024	0.065	MON/ 1/2" REBAR PANEL POINT	Non-veg
108		31°55'50.016430"	111°04'47.768190"	3496.881	Static GPS	339479.70	959572.83	3593.82	0.026	0.022	0.065	MON/ 1/2" REBAR PANEL POINT	Non-veg
109		31°55'54.233980"	111°06'51.816270"	3730.734	Static GPS	339824.46	948882.14	3827.61	0.020	0.015	0.046	MON/ 1/2" REBAR PANEL POINT	Non-veg
110		31°53'56.359970"	111°09'49.326370"	4288.257	Static GPS	327804.66	933667.54	4384.98	0.104	0.118	0.411	MON/ 1/2" REBAR PANEL POINT	Non-veg
111		31°54'10.185440"	111°06'51.133190"	3784.488	Static GPS	329311.75	949018.93	3881.31	0.029	0.023	0.089	MON/ 1/2" REBAR PANEL POINT	Non-veg
112		31°54'18.714790"	111°04'47.926060"	3496.477	Static GPS	330254.19	959631.65	3593.37	0.023	0.020	0.060	MON/ 1/2" REBAR PANEL POINT	Non-veg
113		31°54'19.592430"	111°02'52.912950"	3266.117	Static GPS	330419.48	969545.66	3363.06	0.037	0.040	0.113	MON/ 1/2" REBAR PANEL POINT	Non-veg
114		31°54'22.735280"	111°00'58.223040"	3101.840	Static GPS	330820.29	979429.80	3198.80	0.034	0.026	0.076	MON/ 1/2" REBAR PANEL POINT	Non-veg
115		31°53'39.690040"	110°59'47.011660"	2834.352	Static GPS	326521.02	985604.82	2931.31	0.041	0.041	0.183	MON/ 1/2" REBAR PANEL POINT	Non-veg
116		31°53'14.159210"	111°04'02.665120"	3576.174	Static GPS	323762.00	963583.45	3673.07	0.020	0.018	0.062	MON/ 1/2" REBAR PANEL POINT	Non-veg
117		31°53'19.853730"	111°07'48.015390"	3869.915	Static GPS	324190.25	944152.68	3966.71	0.028	0.022	0.058	MON/ 1/2" REBAR PANEL POINT	Non-veg
118		31°52'20.611620"	111°09'39.773700"	4153.860	Static GPS	318134.02	934557.35	4250.63	0.025	0.027	0.074	MON/ 1/2" REBAR PANEL POINT	Non-veg
119		31°52'36.064830"	111°05'48.961880"	3563.815	Static GPS	319839.12	954450.17	3660.68	0.034	0.024	0.070	MON/ 1/2" REBAR PANEL POINT	Non-veg
120		31°52'31.496560"	111°03'20.055110"	3313.719	Static GPS	319480.21	967292.57	3410.63	0.029	0.022	0.054	MON/ 1/2" REBAR PANEL POINT	Non-veg
121		31°52'35.630400"	111°00'48.442090"	2975.569	Static GPS	320001.21	980360.93	3072.53	0.034	0.032	0.080	MON/ 1/2" REBAR PANEL POINT	Non-veg
122		31°50'49.856950"	111°01'42.335190"	3030.357	Static GPS	309275.07	975801.45	3127.32	0.030	0.025	0.074	MON/ 1/2" REBAR PANEL POINT	Non-veg
123		31°50'23.094770"	111°03'45.718880"	3238.065	Static GPS	306486.85	965181.36	3335.05	0.024	0.023	0.075	MON/ 1/2" REBAR PANEL POINT	Non-veg
124		31°50'38.247170"	111°06'00.049160"	3423.589	Static GPS	307929.22	953583.65	3520.54	0.027	0.022	0.070	MON/ 1/2" REBAR PANEL POINT	Non-veg
125		31°50'27.623750"	111°07'50.657150"	3607.019	Static GPS	306785.68	944049.04	3703.95	0.023	0.026	0.072	MON/ 1/2" REBAR PANEL POINT	Non-veg
126		31°50'36.201780"	111°09'32.120110"	3902.600	Static GPS	307589.26	935292.20	3999.49	0.023	0.020	0.056	MON/ 1/2" REBAR PANEL POINT	Non-veg
127		31°48'53.485660"	111°09'47.569130"	3809.911	Static GPS	297201.64	934032.04	3906.98	0.019	0.018	0.058	MON/ 1/2" REBAR PANEL POINT	Non-veg
128		31°48'20.202890"	111°08'14.419220"	3635.535	Static GPS	293893.44	942091.89	3732.65	0.022	0.020	0.056	MON/ 1/2" REBAR PANEL POINT	Non-veg
129		31°48'43.058770"	111°06'13.753120"	3450.252	Static GPS	296279.64	952487.66	3547.33	0.026	0.023	0.056	MON/ 1/2" REBAR PANEL POINT	Non-veg
130		31°48'43.131020"	111°04'09.717360"	3179.999	Static GPS	296368.65	963188.85	3277.09	0.034	0.036	0.133	MON/ 1/2" REBAR PANEL POINT	Non-veg
131		31°48'42.447840"	111°01'45.107060"	2969.427	Static GPS	296399.11	975667.53	3066.49	0.029	0.028	0.069	MON/ 1/2" REBAR PANEL POINT	Non-veg
132		31°49'46.954790"	111°00'53.839020"	2947.840	Static GPS	302954.38	980036.87	3044.84	0.026	0.020	0.062	MON/ 1/2" REBAR PANEL POINT	Non-veg
133		31°51'16.028320"	111°00'11.152800"	2865.933	Static GPS	311985.00	983644.57	2962.89	0.023	0.021	0.073	MON/ 1/2" REBAR PANEL POINT	Non-veg
134		31°52'14.951740"	110°59'42.820620"	2812.403	Static GPS	317960.71	986037.59	2909.35	0.031	0.026	0.078	MON/ 1/2" REBAR PANEL POINT	Non-veg
135		31°51'33.899310"	110°57'28.002430"	2838.547	Static GPS	313914.35	997700.14	2935.34	0.021	0.016	0.045	MON/ 1/2" REBAR PANEL POINT	Non-veg
136		31°47'53.782860"	110°59'16.199010"	2876.212	Static GPS	291588.25	988560.52	2973.09	0.020	0.019	0.060	MON/ 1/2" REBAR PANEL POINT	Non-veg
137		31°45'16.286140"	111°03'28.856580"	3037.347	Static GPS	275494.01	966879.53	3134.60	0.019	0.016	0.047	MON/ 1/2" REBAR PANEL POINT	Non-veg
138		31°44'26.030030"	111°01'17.156450"	2993.802	Static GPS	270507.39	978294.38	3090.85	0.012	0.010	0.030	MON/ 1/2" REBAR PANEL POINT	Non-veg
200		32°30'28.24575"	110°29'52.55052"	2653.947	Static GPS	551391.68	1137365.82	2745.99	0.020	0.015	0.052	MON/60D TOPO PT	Non-veg
201		32°29'56.04158"	110°29'44.65657"	2675.616	Static GPS	548145.89	1138085.24	2767.65	0.020	0.015	0.047	MON/60D TOPO PT	Non-veg
202		32°29'07.33567"	110°30'02.85626"	2735.896	Static GPS	543202.60	1136591.82	2827.93	0.019	0.017	0.049	MON/60D TOPO PT	Non-veg
203		32°28'43.76748"	110°29'29.42064"	2691.392	Static GPS	540858.78	1139487.79	2783.42	0.020	0.015	0.050	MON/60D TOPO PT	Non-veg

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2015 PAG LiDAR Vertical Accuracy Assessment

POINT NO.	PID	LATITUDE (N)	LONGITUDE (W)	HGT (IFT)	SOURCE	N (ACS83-C)	E (ACS83-C)	ELEV. (IFT)	rms_x	rms_y	rms_z	Description	CLASS
204		32°28'13.88235"	110°29'20.63593"	2707.267	Static GPS	537848.44	1140280.78	2799.28	0.022	0.012	0.046	MON/60D TOPO PT	Non-veg
205		32°27'09.04281"	110°30'02.02156"	2895.505	Static GPS	531248.08	1136821.98	2987.49	0.020	0.015	0.045	MON/60D TOPO PT	Non-veg
206		32°27'21.20410"	110°30'42.88781"	2946.461	Static GPS	532430.91	1133303.87	3038.42	0.016	0.021	0.042	MON/60D TOPO PT	Non-veg
207		32°26'14.05905"	110°29'50.48370"	2765.333	Static GPS	525704.20	1137884.56	2857.30	0.015	0.016	0.041	MON/60D TOPO PT	Non-veg
207A		32°26'14.05937"	110°29'50.48354"	2765.136	Static GPS	525704.24	1137884.57	2857.11	0.015	0.012	0.050	MON/60D TOPO PT	Non-veg
208		32°26'24.83459"	110°30'54.28966"	3028.122	Static GPS	526721.02	1132401.64	3120.03	0.013	0.010	0.042	MON/60D TOPO PT	Non-veg
209		32°24'57.36298"	110°30'18.53370"	2843.103	Static GPS	517920.98	1135582.89	2935.00	0.035	0.052	0.105	MON/60D TOPO PT	Non-veg
210		32°24'15.61450"	110°30'15.97278"	3113.609	Static GPS	513704.54	1135858.18	3205.47	0.015	0.012	0.042	MON/60D TOPO PT	Non-veg
211		32°23'16.10198"	110°30'54.20550"	3311.395	Static GPS	507646.75	1132659.02	3403.14	0.017	0.012	0.047	MON/60D TOPO PT	Non-veg
212		32°25'37.51912"	110°28'47.69913"	2804.255	Static GPS	522083.19	1143315.34	2896.22	0.009	0.007	0.027	MON/60D TOPO PT	Non-veg
213	CZ1802	32°20'42.11811"	110°24'51.61614"	3011.851	Static GPS	492506.26	1163971.23	3103.60	0.008	0.007	0.000	NGS_PT BELL	Non-veg
214		32°24'34.29691"	110°27'54.83672"	2822.733	Static GPS	515754.80	1147933.36	2914.66	0.017	0.013	0.038	MON/60D TOPO PT	Non-veg
215		32°23'29.64056"	110°27'06.33344"	2918.093	Static GPS	509276.94	1152181.29	3009.98	0.016	0.015	0.046	MON/60D TOPO PT	Non-veg
218		32°26'06.56499"	110°29'06.09903"	2878.795	Static GPS	524997.58	1141698.81	2970.77	0.014	0.011	0.031	MON/60D TOPO PT	Non-veg
219		32°26'03.74905"	110°28'17.12926"	2938.364	Static GPS	524769.51	1145899.84	3030.31	0.011	0.009	0.033	MON/60D TOPO PT	Non-veg
220		32°26'20.05219"	110°27'36.33250"	3028.436	Static GPS	526464.72	1149374.08	3120.34	0.012	0.009	0.035	MON/60D TOPO PT	Non-veg
221		32°25'52.69744"	110°27'30.71578"	2957.300	Static GPS	523706.63	1149893.21	3049.20	0.012	0.010	0.028	MON/60D TOPO PT	Non-veg
222		32°26'54.07362"	110°28'25.25243"	2770.622	Static GPS	529846.24	1145134.87	2862.59	0.014	0.010	0.030	MON/60D TOPO PT	Non-veg
223		32°27'52.31323"	110°28'20.90139"	2737.007	Static GPS	535737.38	1145428.10	2828.97	0.012	0.009	0.028	MON/60D TOPO PT	Non-veg
224		32°28'46.47960"	110°27'30.53402"	2969.376	Static GPS	541270.53	1149668.86	3061.24	0.013	0.012	0.036	MON/60D TOPO PT	Non-veg
225		32°29'10.14436"	110°28'18.82750"	2872.899	Static GPS	543605.97	1145499.27	2964.84	0.009	0.010	0.043	MON/60D TOPO PT	Non-veg
226		32°30'12.09693"	110°29'02.44257"	2666.649	Static GPS	549816.95	1141679.02	2758.64	0.014	0.014	0.033	MON/60D TOPO PT	Non-veg
227		32°23'15.04515"	110°28'43.12930"	3094.467	Static GPS	507689.17	1143900.78	3186.35	0.014	0.011	0.036	MON/60D TOPO PT	Non-veg
228		31°44'13.09228"	110°31'12.91739"	4848.156	Static GPS	270840.80	1134118.45	4940.00	0.011	0.011	*	MON/60D TOPO PT	Non-veg
229		31°45'03.93166"	110°31'13.13710"	4858.373	Static GPS	275978.15	1134033.59	4950.12	0.036	0.027	0.079	MON/60D TOPO PT	Non-veg
230		31°44'16.01166"	110°29'08.66342"	4911.802	Static GPS	271275.13	1144845.63	5003.34	0.027	0.029	0.070	MON/60D TOPO PT	Non-veg
231		31°44'59.72832"	110°29'15.67644"	5010.772	Static GPS	275685.01	1144181.98	5102.23	0.029	0.033	0.089	MON/60D TOPO PT	Non-veg
232		31°45'51.91419"	110°29'09.23976"	5123.754	Static GPS	280966.02	1144668.48	5215.08	0.023	0.025	0.069	MON/60D TOPO PT	Non-veg
233		31°46'31.43509"	110°28'45.75583"	5245.255	Static GPS	284986.58	1146643.29	5336.46	0.028	0.021	0.063	MON/60D TOPO PT	Non-veg
234		31°46'53.49045"	110°28'51.83804"	5227.538	Static GPS	287208.49	1146088.80	5318.73	0.023	0.018	0.061	MON/60D TOPO PT	Non-veg
300	CG1041	31°45'48.35643"	110°39'25.58616"	4695.87	Static GPS	279948.69	1091458.94	4788.67	0.013	0.013	0.040	NGS_SONOITA	Non-veg
301		31°46'47.87023"	110°38'27.13709"	4534.354	Static GPS	286021.56	1096434.74	4627.02	0.021	0.016	0.054	MON/60D TOPO PT	Non-veg
302		31°47'23.61088"	110°37'55.89993"	4469.918	Static GPS	289665.02	1099088.53	4562.49	0.025	0.025	0.069	MON/60D TOPO PT	Non-veg
303		31°47'45.75631"	110°37'08.46243"	4414.45	Static GPS	291951.53	1103156.29	4506.91	0.027	0.029	0.076	MON/60D TOPO PT	Non-veg
304		31°48'20.61183"	110°36'32.44319"	4358.91	Static GPS	295511.08	1106222.64	4451.26	0.026	0.032	0.066	MON/60D TOPO PT	Non-veg
305		31°48'59.23189"	110°35'51.33789"	4312.534	Static GPS	299456.69	1109722.59	4404.75	*	*	*	MON/60D TOPO PT	Non-veg
306		31°50'11.37056"	110°34'32.93700"	4207.744	Static GPS	306829.51	1116397.72	4299.72	0.027	0.023	0.067	MON/60D TOPO PT	Non-veg
307		31°49'30.35080"	110°35'12.45304"	4211.826	Static GPS	302642.32	1113039.42	4303.93	0.023	0.018	0.062	MON/60D TOPO PT	Non-veg
4001		32°17'17.60191"	111°00'45.51350"	2181.317	CORS RTK	469762.16	979359.51	2277.28	n/a	n/a	0.075	GS/ GRASS	Non-veg
4002		32°19'09.19358"	111°01'57.33850"	2138.708	CORS RTK	480987.78	973100.97	2234.68	n/a	n/a	0.100	GS/ GRASS	Non-veg
4003		32°19'10.05842"	111°01'59.55704"	2137.958	CORS RTK	481073.61	972909.87	2233.93	n/a	n/a	0.107	CS/ TENNIS COURT	Non-veg
4004		32°18'06.86073"	111°03'57.10104"	2229.947	CORS RTK	474605.50	962873.93	2326.19	n/a	n/a	0.117	CS/ B BALL COURT	Non-veg
4005		32°16'41.14265"	111°03'13.90445"	2284.108	CORS RTK	465972.84	966651.10	2380.34	n/a	n/a	0.085	GS/ GRASS	Non-veg
4006		32°13'22.51407"	111°06'04.47521"	3067.553	CORS RTK	445786.01	952160.00	3164.01	n/a	n/a	0.083	PS	Non-veg
4007		32°15'00.47190"	111°01'47.99092"	2310.386	CORS RTK	455859.65	974110.88	2406.57	n/a	n/a	0.040	PS	Non-veg
4008		32°14'23.19813"	110°58'51.37699"	2250.147	CORS RTK	452221.64	989310.83	2346.16	n/a	n/a	0.061	GS/ GRASS	Non-veg
4009		32°14'06.42486"	110°58'15.77273"	2287.604	CORS RTK	450553.40	992383.71	2383.58	n/a	n/a	0.056	GS/ GRASS	Non-veg
4010		32°13'59.83070"	110°55'57.77472"	2376.507	CORS RTK	449993.48	1004242.74	2472.23	n/a	n/a	0.086	GS/ GRASS	Non-veg
4011		32°12'31.61345"	110°57'43.41424"	2325.337	CORS RTK	440996.76	995248.17	2421.43	n/a	n/a	0.088	GS/ DIRT	Non-veg
4012		32°09'45.67895"	110°57'50.84956"	2393.464	CORS RTK	424222.57	994757.86	2489.86	n/a	n/a	0.075	GS/ DIRT	Non-veg

APPENDIX A
2015 PAG LiDAR Vertical Accuracy Assessment

POINT NO.	PID	LATITUDE (N)	LONGITUDE (W)	HGT (IFT)	SOURCE	N (ACS83-C)	E (ACS83-C)	ELEV. (IFT)	rms_x	rms_y	rms_z	Description	CLASS
4013		32°09'22.93251"	111°01'23.35321"	2405.579	CORS RTK	421767.29	976510.20	2502.22	n/a	n/a	0.090	GS/ DIRT	Non-veg
4014		32°09'23.22678"	111°01'25.16170"	2406.984	CORS RTK	421795.74	976354.48	2503.63	n/a	n/a	0.078	GS/ GRASS	Non-veg
4017		32°18'33.73313"	110°49'24.10440"	2636.875	CORS RTK	478000.56	1037774.85	2730.27	n/a	n/a	0.091	PS	Non-veg
4018		32°19'16.43166"	110°51'03.05733"	2810.560	CORS RTK	482230.08	1029239.46	2904.01	n/a	n/a	0.079	GS/ GRASS	Non-veg
4019		32°17'34.58446"	110°53'23.52474"	2543.545	CORS RTK	471819.91	1017284.29	2638.06	n/a	n/a	0.084	PS	Non-veg
4020		32°15'38.76650"	110°54'00.05157"	2334.579	CORS RTK	460085.79	1014259.80	2429.73	n/a	n/a	0.099	GS/ GRASS	Non-veg
4021		32°15'31.52922"	110°52'26.56964"	2367.659	CORS RTK	459431.41	1022294.07	2462.55	n/a	n/a	0.091	GS/ DIRT	Non-veg
4022		32°17'41.50874"	110°49'34.79792"	2544.640	CORS RTK	472713.49	1036910.77	2638.35	n/a	n/a	0.094	GS/ DIRT	Non-veg
4023		32°15'52.82309"	110°50'27.87621"	2394.634	CORS RTK	461683.90	1032464.81	2489.05	n/a	n/a	0.073	CS	Non-veg
4024		32°14'54.70293"	110°50'12.18119"	2446.590	CORS RTK	455823.93	1033871.56	2541.17	n/a	n/a	0.077	CS	Non-veg
4025		32°14'58.52197"	110°50'12.32085"	2443.018	CORS RTK	456209.76	1033855.69	2537.58	n/a	n/a	0.084	GS/ GRASS	Non-veg
4026		32°14'07.28928"	110°53'20.64966"	2410.564	CORS RTK	450873.60	1017731.66	2505.88	n/a	n/a	0.068	GS/ GRASS	Non-veg
4027		32°12'14.44278"	110°51'45.29552"	2518.615	CORS RTK	439549.05	1026033.76	2613.93	n/a	n/a	0.076	GS/ GRASS	Non-veg
4028		32°11'10.99428"	110°49'07.82584"	2603.480	CORS RTK	433272.55	1039629.42	2698.42	n/a	n/a	0.091	CS	Non-veg
4029		32°11'26.32800"	110°46'30.31967"	2763.676	CORS RTK	434963.07	1053149.01	2857.92	n/a	n/a	0.083	GS/ DIRT	Non-veg
4030		32°12'02.39744"	110°44'16.96830"	2810.356	CORS RTK	438731.81	1064568.76	2903.90	n/a	n/a	0.092	PS	Non-veg
4031		32°13'15.29752"	110°43'16.16174"	2668.837	CORS RTK	446156.71	1069711.75	2762.02	n/a	n/a	0.083	PS	Non-veg
4034		32°12'54.61785"	110°49'51.99742"	2525.974	CORS RTK	443705.91	1035727.61	2620.83	n/a	n/a	0.086	CS	Non-veg
4035		32°12'53.33467"	110°49'48.54144"	2526.141	CORS RTK	443579.24	1036025.83	2620.99	n/a	n/a	0.084	GS/ DIRT	Non-veg
4036		32°14'12.51969"	110°48'16.52507"	2503.070	CORS RTK	451662.37	1043848.37	2597.38	n/a	n/a	0.055	PS	Non-veg
4037		32°15'01.05738"	110°45'19.01644"	2525.488	CORS RTK	456728.91	1059041.97	2619.00	n/a	n/a	0.061	CS	Non-veg
4038		32°15'01.43440"	110°45'16.95028"	2525.066	CORS RTK	456768.93	1059219.00	2618.57	n/a	n/a	0.059	GS/ GRASS	Non-veg
4039		32°15'24.83821"	110°41'56.10991"	2725.550	CORS RTK	459325.29	1076440.42	2818.21	n/a	n/a	0.080	BCSM	Non-veg
4040		32°16'54.50093"	110°43'45.39953"	2661.751	CORS RTK	468281.42	1066954.96	2754.55	n/a	n/a	0.095	PS	Non-veg
4041		32°16'51.01528"	110°43'47.11368"	2656.879	CORS RTK	467927.53	1066811.70	2749.70	n/a	n/a	0.109	GS/ GRASS	Non-veg
4042		32°18'47.49085"	110°42'41.71749"	3660.565	CORS RTK	479761.20	1072293.78	3752.61	n/a	n/a	0.096	PS	Non-veg
4043		32°18'07.32259"	110°46'22.22058"	2697.984	CORS RTK	475494.43	1053413.30	2790.92	n/a	n/a	0.059	PS	Non-veg
4044		32°18'25.64651"	110°47'25.37355"	2714.847	CORS RTK	477288.84	1047973.36	2807.88	n/a	n/a	0.062	GS/ DIRT	Non-veg
4045		32°16'52.40274"	110°47'17.10463"	2523.450	CORS RTK	467873.17	1048782.23	2616.96	n/a	n/a	0.059	GS/ GRASS	Non-veg
4046		32°16'57.03011"	110°47'14.62013"	2520.136	CORS RTK	468343.05	1048990.60	2613.61	n/a	n/a	0.039	GS/ DIRT	Non-veg
4047		32°16'53.62510"	110°47'10.46509"	2535.981	CORS RTK	468002.70	1049350.94	2629.46	n/a	n/a	0.046	CS	Non-veg
4048		32°12'26.96069"	110°53'43.84863"	2448.764	CORS RTK	440715.74	1015835.41	2544.39	n/a	n/a	0.078	PS	Non-veg
4049		32°13'34.02737"	110°55'07.92680"	2407.265	CORS RTK	447425.39	1008548.60	2502.94	n/a	n/a	0.104	PS	Non-veg
4050		32°16'19.20277"	110°55'00.05936"	2285.918	CORS RTK	464123.74	1009068.96	2381.10	n/a	n/a	0.097	GS/ GRASS	Non-veg
4052		32°03'57.36675"	110°51'31.22828"	2737.757	CORS RTK	389328.58	1027735.89	2833.86	n/a	n/a	0.065	PS	Non-veg
4053		32°02'06.58167"	110°47'23.08111"	2946.523	CORS RTK	378349.33	1049206.41	3041.65	n/a	n/a	0.083	GS/ DIRT	Non-veg
4054		32°02'23.64209"	110°46'47.50853"	2965.763	CORS RTK	380105.46	1052250.41	3060.72	n/a	n/a	0.094	GS/ DIRT	Non-veg
4055		32°02'15.36949"	110°46'36.82454"	2974.958	CORS RTK	379279.17	1053178.89	3069.86	n/a	n/a	0.101	PS	Non-veg
4056	CZ1476	32°03'39.01788"	110°46'23.37305"	2955.541	CORS RTK	387744.55	1054247.25	3050.37	n/a	n/a	0.117	CHK/ E 430	Non-veg
4057		32°03'05.53689"	110°42'28.95465"	3079.686	CORS RTK	384580.91	1074458.77	3173.45	n/a	n/a	0.110	2"BCSM WLB RLS12214	Non-veg
4058		32°03'28.67831"	110°43'25.72373"	3096.678	CORS RTK	386865.15	1069546.97	3190.70	n/a	n/a	0.100	CS	Non-veg
4059		32°03'33.55522"	110°43'27.70280"	3094.478	CORS RTK	387356.11	1069371.20	3188.52	n/a	n/a	0.091	GS/GRASS	Non-veg
4060		32°03'34.38258"	110°43'28.14384"	3094.917	CORS RTK	387439.30	1069332.32	3188.96	n/a	n/a	0.086	GS/ DIRT	Non-veg
4061		32°04'48.08241"	110°45'19.66180"	2981.633	CORS RTK	394782.49	1059654.99	3076.15	n/a	n/a	0.086	PS	Non-veg
4062		32°00'41.10656"	110°41'08.44854"	3319.680	CORS RTK	370063.54	1081554.08	3413.01	n/a	n/a	0.081	PS	Non-veg
4063		32°00'48.81159"	110°38'52.32164"	3340.034	CORS RTK	370977.75	1093266.23	3432.87	n/a	n/a	0.111	GS/ DIRT	Non-veg
4064		31°55'10.13766"	110°39'25.43106"	3890.445	CORS RTK	336719.28	1090813.79	3983.17	n/a	n/a	0.098	GS/ DIRT	Non-veg
4065		31°57'47.62280"	110°41'16.15323"	3575.484	CORS RTK	352524.41	1081089.88	3668.73	n/a	n/a	0.084	PS	Non-veg
4066		31°56'49.16699"	110°45'31.71716"	3427.587	CORS RTK	346374.40	1059136.29	3521.90	n/a	n/a	0.036	CS	Non-veg
4067		31°55'50.34882"	110°45'21.35649"	3648.458	CORS RTK	340440.14	1060092.72	3742.59	n/a	n/a	0.053	CS	Non-veg
4068		31°57'29.20535"	110°50'19.17710"	2906.078	CORS RTK	350164.66	1034327.31	3001.91	n/a	n/a	0.080	PS	Non-veg

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POINT NO.	PID	LATITUDE (N)	LONGITUDE (W)	HGT (IFT)	SOURCE	N (ACS83-C)	E (ACS83-C)	ELEV. (IFT)	rms_x	rms_y	rms_z	Description	CLASS
4069		31°56'08.78759"	110°54'36.62437"	2725.497	CORS RTK	341824.70	1012223.09	2822.16	n/a	n/a	0.114	PS	Non-veg
4070		31°58'05.70846"	110°55'46.44492"	2620.822	CORS RTK	353584.39	1006098.72	2717.65	n/a	n/a	0.102	GS/GRASS	Non-veg
4071		31°58'02.78826"	110°55'46.11506"	2620.994	CORS RTK	353289.56	1006129.83	2717.82	n/a	n/a	0.117	CS	Non-veg
4072	CZ2516	32°00'03.73625"	110°57'06.02083"	2564.208	CORS RTK	365449.51	999137.45	2661.14	n/a	n/a	0.094	CHK/ NN-43	Non-veg
4073		32°03'59.14991"	110°56'45.95264"	2550.394	CORS RTK	389254.22	1000651.78	2647.23	n/a	n/a	0.105	GS/GRASS	Non-veg
4074		32°10'47.55527"	111°00'20.19571"	2333.211	CORS RTK	430364.29	981867.15	2429.65	n/a	n/a	0.070	CS/ B BALL COURT	Non-veg
4075		32°10'50.35097"	111°00'15.00290"	2319.196	CORS RTK	430650.59	982311.05	2415.62	n/a	n/a	0.077	GS/ GRASS	Non-veg
4076		32°09'58.95267"	111°05'13.10597"	2449.636	CORS RTK	425249.16	956731.45	2546.53	n/a	n/a	0.080	GS	Non-veg
4077		32°12'55.99269"	111°07'51.08627"	2543.484	CORS RTK	443037.68	943021.51	2640.31	n/a	n/a	0.086	PS	Non-veg
4078		32°08'48.77485"	111°00'17.18778"	2354.772	CORS RTK	418363.22	982227.37	2451.42	n/a	n/a	0.106	GS	Non-veg
4079		32°08'48.56328"	111°00'14.47184"	2354.482	CORS RTK	418343.82	982461.05	2451.13	n/a	n/a	0.105	CS/ B BALL COURT	Non-veg
4080		32°11'09.33495"	110°55'56.24315"	2418.588	CORS RTK	432765.10	1004532.09	2514.66	n/a	n/a	0.068	GS/ GRASS	Non-veg
4081		32°11'08.84516"	110°55'51.80299"	2419.204	CORS RTK	432719.10	1004914.13	2515.27	n/a	n/a	0.091	CS/ TENNIS COURT	Non-veg
4082		32°12'49.72948"	110°55'33.65624"	2379.618	CORS RTK	442928.37	1006379.70	2475.45	n/a	n/a	0.099	GS/ GRASS	Non-veg
4083		32°15'35.80817"	110°55'52.38570"	2309.581	CORS RTK	459696.86	1004616.61	2405.05	n/a	n/a	0.089	GS/ GRASS	Non-veg
4084		32°15'34.58223"	110°56'12.30646"	2303.816	CORS RTK	459557.31	1002907.17	2399.34	n/a	n/a	0.083	CS/ SIDEWALK	Non-veg
4085		32°17'34.00038"	110°57'36.90905"	2227.923	CORS RTK	471559.76	995534.85	2323.32	n/a	n/a	0.085	GS/ GRASS	Non-veg
4086		32°17'22.49348"	110°58'18.88324"	2224.362	CORS RTK	470364.98	991942.13	2319.93	n/a	n/a	0.065	PS/ PARKING LOT	Non-veg
4087		32°16'05.73984"	110°59'20.10520"	2219.632	CORS RTK	462562.67	986753.89	2315.52	n/a	n/a	0.050	GS/ GRASS	Non-veg
4088		32°16'01.99757"	110°59'22.61358"	2219.198	CORS RTK	462182.63	986541.79	2315.10	n/a	n/a	0.059	CS/ TENNIS COURT	Non-veg
4089		32°12'09.77717"	111°00'13.06680"	2311.498	CORS RTK	438678.39	982409.29	2407.80	n/a	n/a	0.059	GS/ GRASS	Non-veg
6000		32°25'37.50761"	110°28'44.20976"	2839.234	RTK GPS	522086.05	1143614.45	2931.20	n/a	n/a	0.034	Bridge Deck1	Non-veg
6001		32°25'37.50848"	110°28'44.54262"	2839.26	RTK GPS	522085.76	1143585.92	2931.22	n/a	n/a	0.035	Bridge Deck1	Non-veg
6002		32°25'37.50954"	110°28'44.87682"	2838.613	RTK GPS	522085.48	1143557.27	2930.58	n/a	n/a	0.035	Bridge Deck1	Non-veg
6003		32°25'38.66012"	110°28'46.00887"	2836.261	RTK GPS	522200.46	1143458.67	2928.23	n/a	n/a	0.038	Bridge Deck1	Non-veg
6004		32°25'39.84493"	110°28'47.17402"	2834.947	RTK GPS	522318.86	1143357.19	2926.91	n/a	n/a	0.041	Bridge Deck1	Non-veg
6005		32°25'39.84321"	110°28'46.83591"	2835.513	RTK GPS	522319.08	1143386.17	2927.48	n/a	n/a	0.040	Bridge Deck1	Non-veg
6006		32°25'39.84221"	110°28'46.50548"	2835.178	RTK GPS	522319.36	1143414.50	2927.14	n/a	n/a	0.040	Bridge Deck1	Non-veg
6007		32°25'38.72793"	110°28'45.41038"	2836.682	RTK GPS	522208.00	1143509.88	2928.65	n/a	n/a	0.041	Bridge Deck1 CLO	Non-veg
6008		32°26'43.91103"	110°29'18.04522"	2751.601	RTK GPS	528758.30	1140624.42	2843.59	n/a	n/a	0.064	Bridge Deck2	Non-veg
6009		32°26'42.54930"	110°29'18.15607"	2751.773	RTK GPS	528620.55	1140616.76	2843.76	n/a	n/a	0.066	Bridge Deck2	Non-veg
6012		32°26'40.90463"	110°29'18.28952"	2751.834	RTK GPS	528454.18	1140607.55	2843.83	n/a	n/a	0.067	Bridge Deck2	Non-veg
6013		32°26'40.91802"	110°29'18.52133"	2752.141	RTK GPS	528455.26	1140587.66	2844.13	n/a	n/a	0.067	Bridge Deck2	Non-veg
6014		32°26'40.93178"	110°29'18.75482"	2751.842	RTK GPS	528456.39	1140567.64	2843.83	n/a	n/a	0.067	Bridge Deck2	Non-veg
6015		32°26'42.57102"	110°29'18.62172"	2751.739	RTK GPS	528622.21	1140576.83	2843.73	n/a	n/a	0.066	Bridge Deck2	Non-veg
6019		32°26'43.93874"	110°29'18.50959"	2751.612	RTK GPS	528760.57	1140584.59	2843.60	n/a	n/a	0.068	Bridge Deck2	Non-veg
6022		32°26'45.36889"	110°29'18.39365"	2751.457	RTK GPS	528905.24	1140592.59	2843.45	n/a	n/a	0.068	Bridge Deck2	Non-veg
6025		32°26'46.93171"	110°29'18.26611"	2751.119	RTK GPS	529063.34	1140601.41	2843.11	n/a	n/a	0.070	Bridge Deck2	Non-veg
6028		32°26'46.91891"	110°29'18.03439"	2751.376	RTK GPS	529062.31	1140621.28	2843.37	n/a	n/a	0.070	Bridge Deck2	Non-veg
6029		32°26'46.90507"	110°29'17.80170"	2751.069	RTK GPS	529061.18	1140641.24	2843.06	n/a	n/a	0.072	Bridge Deck2	Non-veg
6030		32°26'45.35224"	110°29'17.92805"	2751.388	RTK GPS	528904.10	1140632.51	2843.38	n/a	n/a	0.070	Bridge Deck2 CLO	Non-veg
14516E_E17		32°14' 6.91891	110°41 12.36837	2661.375	OPUS	451493.59	1080286.91	2753.49	n/a	n/a	n/a	3 1/4" BLM BRASS CAP 1975	Non-veg
14516E_G05		32°13' 41.71827	110°44 16.80640	2636.699	OPUS	448769.20	1064472.59	2729.93	n/a	n/a	n/a	CHISELED"X" NW COR. MAILBOX CONCRETE	Non-veg
14516E_504		32°11' 18.37359	110°44 33.91676	2949.275	OPUS	434266.90	1063161.00	3042.96	n/a	n/a	n/a	3 1/2" BRASS DISK"47 DOR 1975"	Non-veg
15514E_J18		32°7' 55.79597	110°53 12.78349	2593.094	OPUS	413338.43	1018766.74	2689.00	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE"H 355 1960"	Non-veg
15515E_P09		32°6 34.66986	110°49 23.25650	2754.836	OPUS	405334.69	1038586.95	2850.32	n/a	n/a	n/a	3 1/2" BRASS DISK IN PLASTIC SLEEVE"7 DOR 1975"	Non-veg
15515E_S12		32°6 6.07064	110°48 32.48845	2806.942	OPUS	402489.16	1042983.29	2902.35	n/a	n/a	n/a	3 1/2" BRASS DISK IN PLASTIC SLEEVE"6 DOR 1975"	Non-veg
15515E_W19		32°5 9.49746	110°46 47.97593	2897.661	OPUS	396865.67	1052033.65	2992.16	n/a	n/a	n/a	3 1/2" BRASS DISK"N 317"	Non-veg
15516E_M16		32°7 20.11780	110°41 25.73382	2940.128	OPUS	410369.58	1079607.51	3033.46	n/a	n/a	n/a	#3 REBAR W/TAG LS 13007	Non-veg

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POINT NO.	PID	LATITUDE (N)	LONGITUDE (W)	HGT (IFT)	SOURCE	N (ACS83-C)	E (ACS83-C)	ELEV. (IFT)	rms_x	rms_y	rms_z	Description	CLASS
15516E_X13		32°4 56.41197	110°42 15.93486	3040.233	OPUS	395798.17	1075453.47	3133.55	n/a	n/a	n/a	CHISELED"X" ON NW COR. CONCRETE	Non-veg
15517E_Y02		32°4 37.48829	110°38 53.98550	3329.108	OPUS	394085.59	1092851.48	3421.52	n/a	n/a	n/a	CHISELED"X" @ CENTER OF CONCRETE SLAB	Non-veg
16510E_J01		32°2 45.85474	111°22 4.69717	2507.402	OPUS	380927.90	870003.81	2605.81	n/a	n/a	n/a	#4 REBAR W/TAG PCDOT REF 37	Non-veg
16516E_J11		32°2 59.11763	110°42 53.15832	3133.573	OPUS	383908.94	1072382.85	3227.14	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE"G 317 1952"	Non-veg
16516E_W18		32°0 0.27045	110°41 4.07595	3373.924	OPUS	365941.08	1081977.63	3466.22	n/a	n/a	n/a	3" ALUMINUM DISK IN CENTER OF HEADWALL	Non-veg
16517E_Q08		32°1 25.67161	110°37 28.11431	3367.769	OPUS	374788.65	1100472.26	3460.32	n/a	n/a	n/a	CHISELED"X" SE COR. CONCRETE MAILBOX BASE	Non-veg
16517E_T21		32°0 45.24957	110°34 14.30972	3571.982	OPUS	370907.40	1117208.76	3663.98	n/a	n/a	n/a	#4 REBAR W/TAG"PCDOT 37"	Non-veg
17514E_U12		31°55 4.18930	110°54 49.99814	2774.587	OPUS	335286.24	1011131.06	2871.24	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE"RITA 1935"	Non-veg
17515E_R21		31°56 2.49945	110°46 21.19487	3437.405	OPUS	341613.14	1054922.90	3531.70	n/a	n/a	n/a	2 1/2" GLO BRASS CAP	Non-veg
19516E_K16		31°47 6.88590	110°41 47.27842	4816.066	OPUS	287744.92	1079136.71	4908.81	n/a	n/a	n/a	#4 REBAR W/TAG"PCDOT GPS"	Non-veg
3rd Ave D-A PRV		32°12'14.01949"	110°57'50.92872"	2329.531	OPUS	439213.06	994618.30	2425.66	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
4_101		32°08'07.41721"	111°07'54.65427"		OPUS	413874.05	942927.71	2461.84	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
551+26.73		32°22'37.80106"	111°21'19.73479"		OPUS	501395.70	873244.66	2033.59	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
A-002B		32°14'30.14599"	110°57'52.18293"		OPUS	452968.45	994388.63	2400.90	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
A-027		32°15'49.69417"	110°56'19.95481"		OPUS	461078.48	1002236.50	2392.14	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
A-030A		32°14'0.47119"	110°59'17.7809"		OPUS	449905.28	987062.92	2336.56	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
A-036		32°16'43.9827"	110°58'03.13246"		OPUS	466485.15	993328.62	2332.09	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
A-055A		32°17'51.89136"	110°59'12.8421"		OPUS	473295.34	987284.52	2291.51	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
A-058A		32°10'39.36736"	111°09'22.91209"		OPUS	429174.54	935230.52	2418.23	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
A-060A		32°21'01.40844"	111°03'0.43936"		OPUS	492283.57	967594.43	2302.53	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
ACP 997		31°57'59.5127"	110°55'40.85148"		OPUS	352962.70	1006586.27	2722.13	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
AF-001A		32°28'37.37512"	111°18'16.3022"		OPUS	537818.81	888766.70	1910.12	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
AF-014A		32°23'37.02226"	111°16'58.80247"		OPUS	507505.23	895585.42	1997.01	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
AF-017A		32°20'07.76487"	111°19'18.1432"		OPUS	486290.28	883755.98	2070.74	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
AF-025A		32°16'38.17057"	111°21'03.87072"		OPUS	465061.01	874796.93	2150.04	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
AF-044A		32°17'30.94161"	111°17'51.52089"		OPUS	470484.85	891279.20	2145.18	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
AJO 1 B-C BOOSTER		32°10'35.33607"	111°01'01.30318"		OPUS	429099.75	978344.57	2477.70	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Alvernon Boosters F-1		32°19'50.47663"	110°54'36.8926"		OPUS	485493.15	1010857.57	2928.36	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
AV-008A		32°08'26.1918"	111°11'05.95315"		OPUS	415655.46	926466.24	2389.54	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
AV-009A		32°08'0.28886"	111°10'59.29473"		OPUS	413041.82	927056.55	2415.02	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
B-003B		32°13'23.43751"	110°56'39.26592"		OPUS	446283.28	1000712.20	2438.31	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
B-007B		32°13'45.12422"	110°55'27.32646"		OPUS	448531.36	1006871.80	2493.01	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
B-026		32°15'31.84219"	110°54'42.04295"		OPUS	459352.08	1010660.62	2425.73	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
B-027A		32°15'30.18699"	110°52'36.32182"		OPUS	459287.65	1021457.96	2457.39	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
B-092A		32°19'05.18928"	110°58'07.53118"		OPUS	480751.68	992824.83	2499.33	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
B-096A		32°16'44.8843"	110°53'29.81781"		OPUS	466792.17	1016792.10	2469.19	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
B-110A		32°12'26.48161"	110°54'38.55047"		OPUS	440623.01	1011135.96	2517.71	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
B-111A		32°14'50.56882"	110°55'09.27082"		OPUS	455159.32	1008361.32	2449.63	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
B-C Booster		32°08'01.99908"	111°05'18.57583"		OPUS	413427.02	956352.20	2525.90	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
C-014		32°11'52.48224"	110°54'18.96166"		OPUS	437202.96	1012851.33	2541.35	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
C-019		32°12'51.55655"	110°51'45.19261"		OPUS	443299.73	1026005.82	2588.35	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
C-033A		32°13'46.05073"	110°53'59.36071"		OPUS	448695.66	1014427.00	2519.51	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
C-043A		32°12'38.65421"	110°53'12.19548"		OPUS	441923.39	1018543.68	2564.11	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
C-046		32°13'34.8226"	110°52'47.32156"		OPUS	447620.13	1020625.97	2541.91	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
C-069		32°08'08.06692"	110°55'38.44185"		OPUS	414461.08	1006230.29	2608.84	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
C-084A		32°15'10.90895"	110°48'08.59342"		OPUS	457570.14	1044468.40	2529.66	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
C-092		32°21'21.2381"	110°58'45.51184"		OPUS	494471.73	989445.25	2557.24	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
C-110		32°14'48.20075"	110°50'36.31477"		OPUS	455146.06	1031805.53	2523.45	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
C-114		32°14'04.55128"	110°51'19.42344"		OPUS	450698.16	1028146.85	2552.19	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
C-116		32°14'23.10985"	110°49'31.67034"		OPUS	452666.39	1037383.11	2575.34	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg

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POINT NO.	PID	LATITUDE (N)	LONGITUDE (W)	HGT (IFT)	SOURCE	N (ACS83-C)	E (ACS83-C)	ELEV. (IFT)	rms_x	rms_y	rms_z	Description	CLASS
C-126		32°10'38.96556"	110°56'20.2133"		OPUS	429677.32	1002500.03	2522.58	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
CAP Sections 13-14-2		32°12'16.92288"	111°11'01.74679"		OPUS	438973.84	926669.09	2384.87	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Cmo de la Tierra B-C		32°07'57.36481"	111°02'11.96002"		OPUS	413085.96	972402.37	2534.80	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Cmo del Cerro A-C		32°17'40.00465"	111°05'0.81178"		OPUS	471848.60	957426.86	2406.79	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
CP999		32°08'21.48295"	110°58'06.98363"		OPUS	415701.95	993445.90	2516.03	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
D-003A		32°11'33.81325"	110°52'0.57512"		OPUS	435430.32	1024760.99	2634.82	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
D-007A		32°10'37.11534"	110°50'25.71821"		OPUS	429781.20	1032969.67	2722.80	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
D-018		32°13'06.41282"	110°50'35.01544"		OPUS	444860.75	1032019.93	2609.05	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
D-046A & B		32°15'04.8135"	110°46'28.50246"		OPUS	457044.48	1053070.48	2592.77	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
D-048		32°13'49.72293"	110°48'26.17983"		OPUS	449350.00	1043042.89	2616.09	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
D-058		32°15'42.61333"	110°47'37.85814"		OPUS	460801.64	1047074.34	2588.83	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Danforth E-Zone		32°11'36.32097"	110°46'17.93655"		OPUS	435984.25	1054202.41	2886.08	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
DEVINE RESEVOIR		32°18'47.45054"	110°57'32.3645"		OPUS	478985.89	995858.64	2510.47	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
E-003A		32°12'43.89572"	110°48'21.16173"		OPUS	442702.11	1043542.71	2684.13	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
E-008A		32°09'45.13748"	110°50'07.20533"		OPUS	424544.45	1034613.60	2766.10	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
E-012A		32°11'02.2571"	110°48'28.67971"		OPUS	432424.10	1043002.72	2691.01	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
E-029		32°06'18.75815"	110°50'58.76715"		OPUS	403644.39	1030387.87	2805.11	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
E-030A		32°0'58.56274"	111°20'17.67082"		OPUS	370134.25	879273.19	2798.55	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
EW-006R		32°16'41.91256"	111°01'33.73132"		OPUS	466120.92	975250.38	2264.59	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
EW-008R_BSM		32°17'03.10374"	111°01'26.30618"		OPUS	468267.71	975870.01	2261.28	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
F-001A		32°03'11.10304"	111°14'43.36281"		OPUS	383693.81	907971.94	2823.29	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
F-004A		32°10'25.34028"	110°44'57.64702"		OPUS	428885.26	1061179.83	2995.10	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
F-005		32°13'0.3495"	110°45'37.19619"		OPUS	444513.48	1057612.02	2835.55	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
G Ajo CZ0794		32°06'11.69599"	111°15'33.38251"		OPUS	401916.26	903556.04	2481.09	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
G-005A		32°06'13.46753"	110°46'47.07758"		OPUS	403331.06	1052042.77	2960.63	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
G-009A		32°08'12.52789"	110°43'40.4689"		OPUS	415536.15	1067961.70	2893.34	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
G-010A		32°01'52.13441"	111°16'41.54658"		OPUS	375652.38	897848.22	2937.10	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
G-115		31°58'19.59213"	111°16'53.58398"		OPUS	354169.14	896938.21	3481.39	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
G-Zone Reserv		32°02'07.87825"	111°13'59.2556"		OPUS	377328.78	911808.26	3094.51	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
H U BM		32°10'20.27307"	111°05'32.44111"		OPUS	427390.88	955052.99	2572.48	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
H-003A		32°01'11.31812"	110°46'33.17747"		OPUS	372809.75	1053561.18	3111.40	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
H-115		31°58'34.61942"	111°18'39.88582"		OPUS	355635.13	887773.35	3241.68	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
H292		32°19'15.17404"	111°15'07.39803"		OPUS	481102.24	905301.48	2114.50	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Hermans Rd D-Zone		32°06'15.7001"	110°51'22.40849"		OPUS	403315.29	1028357.40	2784.34	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
HILLS 1 F-G		32°21'06.23051"	110°57'03.29573"		OPUS	493033.03	998226.83	2899.54	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
I K I-Zone		31°59'21.21345"	111°17'21.22623"		OPUS	360381.99	894521.11	3303.32	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
J115		31°59'22.76984"	111°19'40.70373"		OPUS	360471.72	882508.54	3042.60	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Naranja Dr. C-Zone		32°24'43.23131"	111°01'21.47967"		OPUS	514770.20	975896.09	2699.39	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Old Vail G-Zone		32°04'23.01847"	110°45'10.38301"		OPUS	392258.23	1060480.66	3095.17	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
PF-001		32°04'21.17642"	110°51'26.52496"		OPUS	391738.62	1028117.00	2828.16	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
R-009A		32°09'55.09806"	110°58'37.36175"		OPUS	425139.27	990751.36	2462.70	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
RB 102 CAVSARP		32°13'32.42251"	111°14'38.82331"		OPUS	446481.35	907970.53	2255.06	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
RB 206		32°10'53.65847"	111°13'17.31975"		OPUS	430482.41	915075.29	2311.37	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Redhawk E-Zone		32°27'23.71596"	111°04'09.66575"		OPUS	530870.96	961349.83	2897.63	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Reid Park Rclm		32°12'26.55092"	110°54'43.9884"		OPUS	440625.64	1010668.67	2512.18	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Rockcliff E-G Booster		32°17'19.73969"	110°49'08.86307"		OPUS	470536.24	1039159.46	2780.71	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
RR-001A		32°10'48.66613"	110°46'16.40387"		OPUS	431169.76	1054385.41	2866.52	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
SC-007A		32°06'19.91488"	110°57'37.50587"		OPUS	403439.41	996089.49	2566.24	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
SC-008		32°01'44.18923"	110°56'39.84018"		OPUS	375620.75	1001300.58	2637.33	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
SC-012A		32°04'01.53977"	110°57'29.87707"		OPUS	389461.94	996869.93	2610.68	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
SC-016		32°04'31.95977"	110°57'32.30601"		OPUS	392534.12	996633.63	2582.65	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg

APPENDIX A
2015 PAG LiDAR Vertical Accuracy Assessment

POINT NO.	PID	LATITUDE (N)	LONGITUDE (W)	HGT (IFT)	SOURCE	N (ACS83-C)	E (ACS83-C)	ELEV. (IFT)	rms_x	rms_y	rms_z	Description	CLASS
SC-020		32°0'59.10759"	110°54'51.81857"		OPUS	371150.10	1010641.96	2724.87	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
SC-023A		31°58'58.01908"	110°55'36.91322"		OPUS	358878.00	1006871.44	2708.22	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
SC-027A		32°0'05.74486"	110°53'27.50098"		OPUS	365825.74	1017952.69	2759.88	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
SC-033		32°0'53.09635"	110°51'34.24779"		OPUS	370704.73	1027658.35	2842.97	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
SL-001A		32°09'48.08575"	110°47'24.35372"		OPUS	424986.00	1048609.51	2823.57	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Snyder Rd. E-G		32°17'43.80882"	110°44'33.88626"		OPUS	473218.65	1062737.80	2765.11	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Speedway1		32°14'08.05295"	111°01'14.31692"		OPUS	450586.45	977046.90	2419.67	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
SS-18		32°12'10.17976"	110°59'15.75449"		OPUS	438761.26	987333.33	2372.68	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Starr Pass D-E		32°12'56.91994"	111°02'44.12206"		OPUS	443334.68	969391.76	2705.36	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Sycamore Canyon I - 2		31°55'35.64667"	110°47'14.09481"		OPUS	338851.72	1050392.47	3511.54	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Trails End F-Zone		32°14'24.44698"	111°05'24.84933"		OPUS	452070.59	955515.79	2987.37	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Valley View		32°18'11.13041"	110°53'42.58762"		OPUS	475497.53	1015612.78	2681.20	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
W-001A		32°25'39.28406"	111°16'10.3023"		OPUS	519885.34	899669.01	1973.74	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
W-003A		32°27'07.37586"	111°20'25.82204"		OPUS	528662.10	877721.08	1910.54	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
W-005A		32°23'36.73045"	111°19'17.95955"		OPUS	507407.20	883654.34	1987.48	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
WC 1/4 Secs 5-4 T16;		32°04'01.40099"	111°20'01.9481"		OPUS	388617.13	880527.11	2551.38	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
WR-016B		32°21'07.29246"	111°15'20.64503"		OPUS	492425.25	904094.87	2053.11	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Y-001A&B		32°21'59.10378"	111°06'07.94005"		OPUS	497987.77	951465.86	2135.84	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg
Z-015		32°19'25.40215"	111°02'46.69033"		OPUS	482591.09	968852.69	2221.46	n/a	n/a	n/a	3 1/2" BRASS DISK IN CONCRETE	Non-veg

APPENDIX B

PAG RDC 2015 LiDAR Vertical Accuracy Assessment							
Point Query File: T:\7PIM130303\SURVEY\TECHNICAL_REPORTS\Vertical Check_Residuals.csv							
RMSE :	0.320	ift					
Z Bias :	0.126						
Point Count:	260						
Outliers	0						
ID	Y (IFT)	X (IFT)	Z1	Z2	DZ	Square	Counter
101	348384.430	948855.940	3749.740	3750.367	0.627	0.393	1
102	348414.270	964187.370	3399.280	3399.749	0.469	0.220	1
103	348556.590	975557.160	3146.220	3146.609	0.389	0.151	1
104	349439.060	985810.260	2896.680	2896.721	0.041	0.002	1
105	336360.830	985893.630	2921.590	2922.132	0.542	0.294	1
106	339745.200	979082.610	3193.240	3193.515	0.275	0.075	1
107	339069.750	972135.250	3261.420	3262.091	0.671	0.450	1
108	339479.700	959572.830	3593.820	3594.130	0.310	0.096	1
109	339824.460	948882.140	3827.610	3827.885	0.275	0.076	1
110	327804.660	933667.540	4384.980	4385.495	0.515	0.265	1
111	329311.750	949018.930	3881.310	3881.653	0.343	0.117	1
112	330254.190	959631.650	3593.370	3593.772	0.402	0.162	1
113	330419.480	969545.660	3363.060	3363.437	0.377	0.142	1
114	330820.290	979429.800	3198.800	3198.955	0.155	0.024	1
115	326521.020	985604.820	2931.310	2931.561	0.251	0.063	1
116	323762.000	963583.450	3673.070	3673.260	0.190	0.036	1
117	324190.250	944152.680	3966.710	3966.861	0.151	0.023	1
119	319839.120	954450.170	3660.680	3660.735	0.055	0.003	1
120	319480.210	967292.570	3410.630	3411.195	0.565	0.319	1
121	320001.210	980360.930	3072.530	3072.758	0.228	0.052	1
122	309275.070	975801.450	3127.320	3128.120	0.800	0.640	1
123	306486.850	965181.360	3335.050	3334.998	-0.052	0.003	1
124	307929.220	953583.650	3520.540	3520.853	0.313	0.098	1
129	296279.640	952487.660	3547.330	3547.790	0.460	0.212	1
130	296368.650	963188.850	3277.090	3277.412	0.322	0.103	1
131	296399.110	975667.530	3066.490	3067.000	0.510	0.260	1
132	302954.380	980036.870	3044.840	3045.017	0.177	0.031	1
133	311985.000	983644.570	2962.890	2963.083	0.193	0.037	1
134	317960.710	986037.590	2909.350	2909.789	0.439	0.193	1

APPENDIX B

ID	Y (IFT)	X (IFT)	Z1	Z2	DZ	Square	Counter
135	313914.350	997700.140	2935.340	2935.649	0.309	0.096	1
136	291588.250	988560.520	2973.090	2973.086	-0.004	0.000	1
137	275494.010	966879.530	3134.600	3134.357	-0.243	0.059	1
138	270507.390	978294.380	3090.850	3090.970	0.120	0.014	1
228	270840.800	1134118.450	4940.000	4940.126	0.126	0.016	1
229	275978.150	1134033.590	4950.120	4950.290	0.170	0.029	1
230	271275.130	1144845.630	5003.340	5003.695	0.355	0.126	1
231	275685.010	1144181.980	5102.230	5102.813	0.583	0.339	1
232	280966.020	1144668.480	5215.080	5215.666	0.586	0.343	1
233	284986.580	1146643.290	5336.460	5336.915	0.455	0.207	1
234	287208.490	1146088.800	5318.730	5319.286	0.556	0.309	1
300	279948.690	1091458.940	4788.670	4788.688	0.018	0.000	1
301	286021.560	1096434.740	4627.020	4627.556	0.536	0.287	1
302	289665.020	1099088.530	4562.490	4562.801	0.311	0.097	1
303	291951.530	1103156.290	4506.910	4507.196	0.286	0.082	1
304	295511.080	1106222.640	4451.260	4451.854	0.594	0.353	1
305	299456.690	1109722.590	4404.750	4405.364	0.614	0.377	1
306	306829.510	1116397.720	4299.720	4300.282	0.562	0.316	1
307	302642.320	1113039.420	4303.930	4304.511	0.581	0.338	1
4001	469762.160	979359.510	2277.280	2277.356	0.076	0.006	1
4002	480987.780	973100.970	2234.680	2234.715	0.035	0.001	1
4003	481073.610	972909.870	2233.930	2233.918	-0.012	0.000	1
4004	474605.500	962873.930	2326.190	2326.293	0.103	0.011	1
4005	465972.840	966651.100	2380.340	2380.483	0.143	0.020	1
4006	445786.010	952160.000	3164.010	3164.107	0.097	0.009	1
4007	455859.650	974110.880	2406.570	2406.809	0.239	0.057	1
4008	452221.640	989310.830	2346.160	2346.096	-0.064	0.004	1
4009	450553.400	992383.710	2383.580	2383.765	0.185	0.034	1
4010	449993.480	1004242.740	2472.230	2472.628	0.398	0.158	1
4011	440996.760	995248.170	2421.430	2421.569	0.139	0.019	1
4012	424222.570	994757.860	2489.860	2490.097	0.237	0.056	1
4013	421767.290	976510.200	2502.220	2502.471	0.251	0.063	1
4014	421795.740	976354.480	2503.630	2503.861	0.231	0.053	1
4017	478000.560	1037774.850	2730.270	2730.617	0.347	0.120	1
4018	482230.080	1029239.460	2904.010	2904.268	0.258	0.066	1

APPENDIX B

ID	Y (IFT)	X (IFT)	Z1	Z2	DZ	Square	Counter
4019	471819.910	1017284.290	2638.060	2638.234	0.174	0.030	1
4020	460085.790	1014259.800	2429.730	2429.878	0.148	0.022	1
4021	459431.410	1022294.070	2462.550	2462.695	0.145	0.021	1
4022	472713.490	1036910.770	2638.350	2638.525	0.175	0.031	1
4023	461683.900	1032464.810	2489.050	2489.252	0.202	0.041	1
4024	455823.930	1033871.560	2541.170	2541.445	0.275	0.076	1
4025	456209.760	1033855.690	2537.580	2537.867	0.287	0.082	1
4026	450873.600	1017731.660	2505.880	2506.469	0.589	0.347	1
4027	439549.050	1026033.760	2613.930	2614.125	0.195	0.038	1
4028	433272.550	1039629.420	2698.420	2698.646	0.226	0.051	1
4029	434963.070	1053149.010	2857.920	2858.314	0.394	0.155	1
4030	438731.810	1064568.760	2903.900	2903.960	0.060	0.004	1
4031	446156.710	1069711.750	2762.020	2762.075	0.055	0.003	1
4034	443705.910	1035727.610	2620.830	2621.097	0.267	0.071	1
4035	443579.240	1036025.830	2620.990	2621.112	0.122	0.015	1
4036	451662.370	1043848.370	2597.380	2597.655	0.275	0.076	1
4037	456728.910	1059041.970	2619.000	2619.235	0.235	0.055	1
4038	456768.930	1059219.000	2618.570	2618.734	0.164	0.027	1
4039	459325.290	1076440.420	2818.210	2818.188	-0.022	0.000	1
4040	468281.420	1066954.960	2754.550	2754.751	0.201	0.040	1
4041	467927.530	1066811.700	2749.700	2749.971	0.271	0.073	1
4042	479761.200	1072293.780	3752.610	3752.574	-0.036	0.001	1
4043	475494.430	1053413.300	2790.920	2791.258	0.338	0.114	1
4044	477288.840	1047973.360	2807.880	2808.049	0.169	0.029	1
4045	467873.170	1048782.230	2616.960	2617.231	0.271	0.074	1
4046	468343.050	1048990.600	2613.610	2613.928	0.318	0.101	1
4047	468002.700	1049350.940	2629.460	2629.689	0.229	0.052	1
4048	440715.740	1015835.410	2544.390	2544.372	-0.018	0.000	1
4049	447425.390	1008548.600	2502.940	2503.178	0.238	0.057	1
4050	464123.740	1009068.960	2381.100	2381.151	0.051	0.003	1
4052	389328.580	1027735.890	2833.860	2833.977	0.117	0.014	1
4053	378349.330	1049206.410	3041.650	3041.677	0.027	0.001	1
4054	380105.460	1052250.410	3060.720	3060.933	0.213	0.045	1
4055	379279.170	1053178.890	3069.860	3070.057	0.197	0.039	1
4056	387744.550	1054247.250	3050.370	3050.952	0.582	0.339	1
4057	384580.910	1074458.770	3173.450	3173.829	0.379	0.143	1

APPENDIX B

ID	Y (IFT)	X (IFT)	Z1	Z2	DZ	Square	Counter
4058	386865.150	1069546.970	3190.700	3190.923	0.223	0.050	1
4059	387356.110	1069371.200	3188.520	3188.902	0.382	0.146	1
4060	387439.300	1069332.320	3188.960	3189.032	0.072	0.005	1
4061	394782.490	1059654.990	3076.150	3076.430	0.280	0.079	1
4062	370063.540	1081554.080	3413.010	3413.212	0.202	0.041	1
4063	370977.750	1093266.230	3432.870	3433.257	0.387	0.150	1
4064	336719.280	1090813.790	3983.170	3983.370	0.200	0.040	1
4065	352524.410	1081089.880	3668.730	3668.977	0.247	0.061	1
4066	346374.400	1059136.290	3521.900	3522.109	0.209	0.044	1
4067	340440.140	1060092.720	3742.590	3741.806	-0.784	0.615	1
4068	350164.660	1034327.310	3001.910	3002.103	0.193	0.037	1
4069	341824.700	1012223.090	2822.160	2822.329	0.169	0.028	1
4070	353584.390	1006098.720	2717.650	2718.130	0.480	0.231	1
4071	353289.560	1006129.830	2717.820	2717.782	-0.038	0.001	1
4072	365449.510	999137.450	2661.140	2661.207	0.067	0.004	1
4073	389254.220	1000651.780	2647.230	2647.707	0.477	0.228	1
4074	430364.290	981867.150	2429.650	2429.819	0.169	0.029	1
4075	430650.590	982311.050	2415.620	2415.932	0.312	0.097	1
4076	425249.160	956731.450	2546.530	2546.825	0.295	0.087	1
4077	443037.680	943021.510	2640.310	2640.356	0.046	0.002	1
4078	418363.220	982227.370	2451.420	2451.586	0.166	0.027	1
4079	418343.820	982461.050	2451.130	2451.285	0.155	0.024	1
4080	432765.100	1004532.090	2514.660	2515.067	0.407	0.165	1
4081	432719.100	1004914.130	2515.270	2515.607	0.337	0.113	1
4082	442928.370	1006379.700	2475.450	2475.829	0.379	0.144	1
4083	459696.860	1004616.610	2405.050	2405.285	0.235	0.055	1
4084	459557.310	1002907.170	2399.340	2399.224	-0.116	0.013	1
4085	471559.760	995534.850	2323.320	2323.412	0.092	0.008	1
4086	470364.980	991942.130	2319.930	2320.122	0.192	0.037	1
4087	462562.670	986753.890	2315.520	2315.788	0.268	0.072	1
4088	462182.630	986541.790	2315.100	2315.323	0.223	0.050	1
4089	438678.390	982409.290	2407.800	2407.982	0.182	0.033	1
14S16E_E17	451493.590	1080286.910	2753.490	2753.567	0.077	0.006	1
14S16E_G05	448769.200	1064472.590	2729.930	2729.528	-0.403	0.162	1
14S16E_504	434266.900	1063161.000	3042.960	3043.442	0.482	0.232	1

APPENDIX B

ID	Y (IFT)	X (IFT)	Z1	Z2	DZ	Square	Counter
15514E_J18	413338.430	1018766.740	2689.000	2688.893	-0.107	0.011	1
15515E_P09	405334.690	1038586.950	2850.320	2850.478	0.158	0.025	1
15515E_S12	402489.160	1042983.290	2902.350	2902.186	-0.164	0.027	1
15515E_W19	396865.670	1052033.650	2992.160	2992.029	-0.131	0.017	1
15516E_M16	410369.580	1079607.510	3033.460	3033.394	-0.066	0.004	1
15516E_X13	395798.170	1075453.470	3133.550	3133.755	0.205	0.042	1
15517E_Y02	394085.590	1092851.480	3421.520	3421.495	-0.025	0.001	1
16510E_J01	380927.900	870003.810	2605.810	2606.166	0.356	0.127	1
16516E_J11	383908.940	1072382.850	3227.140	3227.711	0.571	0.326	1
16516E_W18	365941.080	1081977.630	3466.220	3466.707	0.487	0.237	1
16517E_Q08	374788.650	1100472.260	3460.320	3460.803	0.483	0.233	1
16517E_T21	370907.400	1117208.760	3663.980	3663.933	-0.047	0.002	1
17514E_U12	335286.240	1011131.060	2871.240	2871.433	0.193	0.037	1
17515E_R21	341613.140	1054922.900	3531.700	3532.170	0.470	0.221	1
19516E_K16	287744.920	1079136.710	4908.810	4909.291	0.481	0.231	1
3rd Ave D-A PRV	439213.060	994618.300	2425.660	2425.082	-0.579	0.335	1
4_101	413874.050	942927.710	2461.840	2461.627	-0.213	0.045	1
551+26.73	501395.700	873244.660	2033.090	2032.960	-0.130	0.017	1
A-002B	452968.450	994388.630	2400.450	2400.274	-0.176	0.031	1
A-027	461078.480	1002236.500	2392.140	2391.880	-0.260	0.067	1
A-030A	449905.280	987062.920	2336.560	2336.567	0.007	0.000	1
A-036	466485.150	993328.620	2332.090	2331.886	-0.204	0.042	1
A-055A	473295.340	987284.520	2291.510	2291.872	0.362	0.131	1
A-058A	429174.540	935230.520	2418.230	2418.434	0.204	0.042	1
A-060A	492283.570	967594.430	2302.530	2302.752	0.222	0.049	1
ACP 997	352962.700	1006586.270	2722.130	2722.305	0.175	0.031	1
AF-001A	537818.810	888766.700	1909.120	1909.211	0.091	0.008	1
AF-014A	507505.230	895585.420	1997.010	1997.003	-0.007	0.000	1
AF-017A	486290.280	883755.980	2069.240	2069.692	0.452	0.204	1
AF-025A	465061.010	874796.930	2149.540	2149.192	-0.349	0.121	1
AF-044A	470484.850	891279.200	2145.180	2144.848	-0.332	0.110	1
AJO 1 B-C BOOSTER	429099.750	978344.570	2477.700	2477.850	0.150	0.023	1
Alvernon Boosters F-H	485493.150	1010857.570	2928.360	2928.995	0.635	0.403	1
AV-008A	415655.460	926466.240	2389.540	2389.763	0.223	0.050	1
AV-009A	413041.820	927056.550	2415.020	2414.889	-0.131	0.017	1

APPENDIX B

ID	Y (IFT)	X (IFT)	Z1	Z2	DZ	Square	Counter
B-003B	446283.280	1000712.200	2438.310	2438.216	-0.094	0.009	1
B-007B	448531.360	1006871.800	2493.010	2493.238	0.228	0.052	1
B-026	459352.080	1010660.620	2425.730	2425.695	-0.035	0.001	1
B-027A	459287.650	1021457.960	2456.010	2456.295	0.285	0.081	1
B-092A	480751.680	992824.830	2499.330	2498.899	-0.432	0.186	1
B-096A	466792.170	1016792.100	2469.190	2469.339	0.149	0.022	1
B-110A	440623.010	1011135.960	2517.710	2517.503	-0.207	0.043	1
B-111A	455159.320	1008361.320	2449.630	2449.404	-0.226	0.051	1
B-C Booster	413427.020	956352.200	2525.900	2525.830	-0.070	0.005	1
C-014	437202.960	1012851.330	2541.350	2541.213	-0.138	0.019	1
C-019	443299.730	1026005.820	2588.350	2588.330	-0.020	0.000	1
C-033A	448695.660	1014427.000	2519.510	2519.548	0.038	0.001	1
C-043A	441923.390	1018543.680	2564.110	2564.457	0.347	0.120	1
C-046	447620.130	1020625.970	2541.910	2542.530	0.620	0.384	1
C-069	414461.080	1006230.290	2608.840	2609.335	0.495	0.245	1
C-084A	457570.140	1044468.400	2529.660	2529.578	-0.082	0.007	1
C-092	494471.730	989445.250	2557.240	2556.737	-0.503	0.253	1
C-110	455146.060	1031805.530	2523.450	2523.650	0.200	0.040	1
C-114	450698.160	1028146.850	2552.190	2552.001	-0.189	0.036	1
C-116	452666.390	1037383.110	2575.340	2575.612	0.272	0.074	1
C-126	429677.320	1002500.030	2522.580	2522.488	-0.092	0.008	1
CAP Sections 13-14-23-2	438973.840	926669.090	2384.870	2385.126	0.256	0.066	1
Cmo de la Tierra B-C	413085.960	972402.370	2534.800	2535.377	0.577	0.332	1
Cmo del Cerro A-C	471848.600	957426.860	2406.790	2406.910	0.120	0.014	1
CP999	415701.950	993445.900	2516.030	2516.237	0.207	0.043	1
D-003A	435430.320	1024760.990	2634.820	2634.694	-0.126	0.016	1
D-007A	429781.200	1032969.670	2722.800	2722.608	-0.193	0.037	1
D-018	444860.750	1032019.930	2609.050	2609.047	-0.003	0.000	1
D-046A & B	457044.480	1053070.480	2592.770	2592.947	0.177	0.031	1
D-048	449350.000	1043042.890	2616.090	2615.835	-0.255	0.065	1
D-058	460801.640	1047074.340	2587.830	2587.892	0.062	0.004	1
Danforth E-Zone	435984.250	1054202.410	2886.080	2886.170	0.090	0.008	1
DEVINE RESEVOIR	478985.890	995858.640	2510.470	2510.938	0.468	0.219	1
E-003A	442702.110	1043542.710	2684.130	2684.230	0.100	0.010	1
E-008A	424544.450	1034613.600	2766.100	2766.274	0.174	0.030	1
E-012A	432424.100	1043002.720	2691.010	2691.455	0.445	0.198	1

APPENDIX B

ID	Y (IFT)	X (IFT)	Z1	Z2	DZ	Square	Counter
E-029	403644.390	1030387.870	2804.010	2804.317	0.307	0.094	1
E-030A	370134.250	879273.190	2797.750	2797.692	-0.058	0.003	1
EW-006R	466120.920	975250.380	2264.590	2264.397	-0.193	0.037	1
EW-008R_BSM	468267.710	975870.010	2261.280	2261.079	-0.201	0.040	1
F-001A	383693.810	907971.940	2823.290	2823.309	0.019	0.000	1
F-004A	428885.260	1061179.830	2993.600	2993.913	0.313	0.098	1
F-005	444513.480	1057612.020	2834.800	2834.702	-0.098	0.010	1
G Ajo CZ0794	401916.260	903556.040	2481.090	2480.921	-0.169	0.029	1
G-005A	403331.060	1052042.770	2960.630	2960.619	-0.012	0.000	1
G-009A	415536.150	1067961.700	2893.340	2892.681	-0.659	0.435	1
G-010A	375652.380	897848.220	2937.100	2936.537	-0.563	0.317	1
G-115	354169.140	896938.210	3481.390	3480.998	-0.392	0.154	1
G-Zone Reserv	377328.780	911808.260	3094.510	3094.210	-0.301	0.090	1
H U BM	427390.880	955052.990	2572.480	2572.564	0.084	0.007	1
H-003A	372809.750	1053561.180	3111.400	3111.246	-0.154	0.024	1
H-115	355635.130	887773.350	3241.010	3240.746	-0.265	0.070	1
H292	481102.240	905301.480	2114.500	2114.117	-0.383	0.147	1
Hermans Rd D-Zone	403315.290	1028357.400	2784.340	2784.344	0.004	0.000	1
HILLS 1 F-G	493033.030	998226.830	2899.540	2899.868	0.328	0.108	1
I K I-Zone	360381.990	894521.110	3303.320	3303.526	0.206	0.042	1
J115	360471.720	882508.540	3042.600	3041.838	-0.762	0.580	1
Naranja Dr. C-Zone	514770.200	975896.090	2699.390	2699.198	-0.192	0.037	1
Old Vail G-Zone	392258.230	1060480.660	3095.170	3095.114	-0.056	0.003	1
PF-001	391738.620	1028117.000	2827.360	2827.319	-0.041	0.002	1
R-009A	425139.270	990751.360	2462.700	2462.370	-0.330	0.109	1
RB 102 CAVSARP	446481.350	907970.530	2255.060	2254.761	-0.299	0.089	1
RB 206	430482.410	915075.290	2311.370	2310.634	-0.736	0.542	1
Redhawk E-Zone	530870.960	961349.830	2897.630	2897.239	-0.391	0.153	1
Reid Park Rclm	440625.640	1010668.670	2512.180	2512.048	-0.132	0.017	1
Rockcliff E-G Booster	470536.240	1039159.460	2780.710	2780.605	-0.105	0.011	1
RR-001A	431169.760	1054385.410	2866.520	2866.315	-0.205	0.042	1
SC-007A	403439.410	996089.490	2564.840	2565.060	0.220	0.048	1
SC-008	375620.750	1001300.580	2636.030	2636.446	0.416	0.173	1
SC-012A	389461.940	996869.930	2610.680	2611.209	0.529	0.280	1
SC-016	392534.120	996633.630	2582.650	2582.084	-0.566	0.320	1
SC-020	371150.100	1010641.960	2724.870	2724.688	-0.182	0.033	1

APPENDIX B

ID	Y (IFT)	X (IFT)	Z1	Z2	DZ	Square	Counter
SC-023A	358878.000	1006871.440	2708.220	2708.044	-0.176	0.031	1
SC-027A	365825.740	1017952.690	2759.880	2759.891	0.011	0.000	1
SC-033	370704.730	1027658.350	2842.970	2842.644	-0.327	0.107	1
SL-001A	424986.000	1048609.510	2821.820	2822.102	0.282	0.080	1
Snyder Rd. E-G	473218.650	1062737.800	2765.110	2765.612	0.502	0.252	1
Speedway1	450586.450	977046.900	2419.670	2419.451	-0.219	0.048	1
SS-18	438761.260	987333.330	2372.680	2372.761	0.081	0.006	1
Starr Pass D-E	443334.680	969391.760	2705.360	2705.626	0.266	0.071	1
Sycamore Canyon I - Zon	338851.720	1050392.470	3511.540	3511.523	-0.017	0.000	1
Trails End F-Zone	452070.590	955515.790	2987.370	2986.922	-0.449	0.201	1
Valley View	475497.530	1015612.780	2680.200	2680.199	-0.001	0.000	1
W-001A	519885.340	899669.010	1973.740	1973.581	-0.159	0.025	1
W-003A	528662.100	877721.080	1910.540	1910.256	-0.284	0.081	1
W-005A	507407.200	883654.340	1987.480	1988.251	0.771	0.595	1
WC 1/4 Secs 5-4 T16; R1	388617.130	880527.110	2550.380	2550.640	0.260	0.068	1
WR-016B	492425.250	904094.870	2053.110	2053.136	0.026	0.001	1
Y-001A&B	497987.770	951465.860	2135.840	2135.155	-0.685	0.469	1
Z-015	482591.090	968852.690	2221.460	2220.767	-0.693	0.480	1
				sum	32.769		
				mean	0.126		
						26.635	260
				Std. Dev.	0.295		
				rmse	0.320		

APPENDIX B

PAG RDC 2015 LiDAR Vertical Accuracy Assessment							
Point Query File: T:\7PIM130303\SURVEY\TECHNICAL_REPORTS\Vertical Check_Residuals.csv							
RMSE :	0.0976	m					
Z Bias :	0.0384						
Point Count:	260						
Outliers	0						
ID	Y (M)	X (M)	Z1	Z2	DZ	Square	Counter
101	106187.574	289211.291	1142.921	1143.112	0.191	0.036	1
102	106196.669	293884.310	1036.101	1036.244	0.143	0.020	1
103	106240.049	297349.822	958.968	959.086	0.118	0.014	1
104	106509.025	300474.967	882.908	882.921	0.012	0.000	1
105	102522.781	300500.378	890.501	890.666	0.165	0.027	1
106	103554.337	298424.380	973.300	973.383	0.084	0.007	1
107	103348.460	296306.824	994.081	994.285	0.204	0.042	1
108	103473.413	292477.799	1095.396	1095.491	0.095	0.009	1
109	103578.495	289219.276	1166.656	1166.739	0.084	0.007	1
110	99914.860	284581.866	1336.542	1336.699	0.157	0.025	1
111	100374.221	289260.970	1183.023	1183.128	0.104	0.011	1
112	100661.477	292495.727	1095.259	1095.382	0.123	0.015	1
113	100711.858	295517.517	1025.061	1025.175	0.115	0.013	1
114	100834.024	298530.203	974.994	975.041	0.047	0.002	1
115	99523.607	300412.349	893.463	893.540	0.077	0.006	1
116	98682.658	293700.236	1119.552	1119.610	0.058	0.003	1
117	98813.188	287777.737	1209.053	1209.099	0.046	0.002	1
119	97486.964	290916.412	1115.775	1115.792	0.017	0.000	1
120	97377.568	294830.775	1039.560	1039.732	0.172	0.030	1
121	97536.369	298814.011	936.507	936.577	0.069	0.005	1
122	94267.041	297424.282	953.207	953.451	0.244	0.059	1
123	93417.192	294187.279	1016.523	1016.507	-0.016	0.000	1
124	93856.826	290652.297	1073.061	1073.156	0.095	0.009	1
129	90306.034	290318.239	1081.226	1081.366	0.140	0.020	1
130	90333.165	293579.961	998.857	998.955	0.098	0.010	1
131	90342.449	297383.463	934.666	934.822	0.155	0.024	1
132	92340.495	298715.238	928.067	928.121	0.054	0.003	1
133	95093.028	299814.865	903.089	903.148	0.059	0.003	1
134	96914.424	300544.257	886.770	886.904	0.134	0.018	1

APPENDIX B

ID	Y (M)	X (M)	Z1	Z2	DZ	Square	Counter
135	95681.094	304099.003	894.692	894.786	0.094	0.009	1
136	88876.099	301313.246	906.198	906.197	-0.001	0.000	1
137	83970.574	294704.881	955.426	955.352	-0.074	0.005	1
138	82450.652	298184.127	942.091	942.128	0.037	0.001	1
228	82552.276	345679.304	1505.712	1505.750	0.038	0.001	1
229	84118.140	345653.438	1508.797	1508.848	0.052	0.003	1
230	82684.660	348948.948	1525.018	1525.126	0.108	0.012	1
231	84028.791	348746.668	1555.160	1555.337	0.178	0.032	1
232	85638.443	348894.953	1589.556	1589.735	0.179	0.032	1
233	86863.910	349496.875	1626.553	1626.692	0.139	0.019	1
234	87541.148	349327.866	1621.149	1621.318	0.169	0.029	1
300	85328.361	332676.685	1459.587	1459.592	0.006	0.000	1
301	87179.371	334193.309	1410.316	1410.479	0.163	0.027	1
302	88289.898	335002.184	1390.647	1390.742	0.095	0.009	1
303	88986.826	336242.037	1373.706	1373.793	0.087	0.008	1
304	90071.777	337176.661	1356.744	1356.925	0.181	0.033	1
305	91274.399	338243.445	1342.568	1342.755	0.187	0.035	1
306	93521.635	340278.025	1310.555	1310.726	0.171	0.029	1
307	92245.379	339254.415	1311.838	1312.015	0.177	0.031	1
4001	143183.506	298508.779	694.115	694.138	0.023	0.001	1
4002	146605.075	296601.176	681.130	681.141	0.011	0.000	1
4003	146631.236	296542.928	680.902	680.898	-0.004	0.000	1
4004	144659.756	293483.974	709.023	709.054	0.031	0.001	1
4005	142028.522	294635.255	725.528	725.571	0.044	0.002	1
4006	135875.576	290218.368	964.390	964.420	0.029	0.001	1
4007	138946.021	296908.996	733.523	733.595	0.073	0.005	1
4008	137837.156	301541.941	715.110	715.090	-0.019	0.000	1
4009	137328.676	302478.555	726.515	726.572	0.056	0.003	1
4010	137158.013	306093.187	753.536	753.657	0.121	0.015	1
4011	134415.812	303351.642	738.052	738.094	0.042	0.002	1
4012	129303.039	303202.196	758.909	758.982	0.072	0.005	1
4013	128554.670	297640.309	762.677	762.753	0.077	0.006	1
4014	128563.342	297592.846	763.106	763.177	0.070	0.005	1
4017	145694.571	316313.774	832.186	832.292	0.106	0.011	1
4018	146983.728	313712.187	885.142	885.221	0.078	0.006	1

APPENDIX B

ID	Y (M)	X (M)	Z1	Z2	DZ	Square	Counter
4019	143810.709	310068.252	804.081	804.134	0.053	0.003	1
4020	140234.149	309146.387	740.582	740.627	0.045	0.002	1
4021	140034.694	311595.233	750.585	750.629	0.044	0.002	1
4022	144083.072	316050.403	804.169	804.223	0.053	0.003	1
4023	140721.253	314695.274	758.662	758.724	0.062	0.004	1
4024	138935.134	315124.051	774.549	774.632	0.084	0.007	1
4025	139052.735	315119.214	773.454	773.542	0.088	0.008	1
4026	137426.273	310204.610	763.792	763.972	0.180	0.032	1
4027	133974.550	312735.090	796.726	796.785	0.060	0.004	1
4028	132061.473	316879.047	822.478	822.547	0.069	0.005	1
4029	132576.744	320999.818	871.094	871.214	0.120	0.014	1
4030	133725.456	324480.558	885.109	885.127	0.018	0.000	1
4031	135988.565	326048.141	841.864	841.880	0.017	0.000	1
4034	135241.561	315689.776	798.829	798.910	0.081	0.007	1
4035	135202.952	315780.673	798.878	798.915	0.037	0.001	1
4036	137666.690	318164.983	791.681	791.765	0.084	0.007	1
4037	139210.972	322795.992	798.271	798.343	0.071	0.005	1
4038	139223.170	322849.951	798.140	798.190	0.050	0.003	1
4039	140002.348	328099.040	858.990	858.984	-0.007	0.000	1
4040	142732.177	325207.872	839.587	839.648	0.061	0.004	1
4041	142624.311	325164.206	838.109	838.191	0.083	0.007	1
4042	146231.214	326835.144	1143.796	1143.785	-0.011	0.000	1
4043	144930.702	321080.374	850.672	850.776	0.103	0.011	1
4044	145477.638	319422.280	855.842	855.893	0.052	0.003	1
4045	142607.742	319668.824	797.649	797.732	0.083	0.007	1
4046	142750.962	319732.335	796.628	796.725	0.097	0.009	1
4047	142647.223	319842.167	801.459	801.529	0.070	0.005	1
4048	134330.158	309626.633	775.530	775.524	-0.006	0.000	1
4049	136375.259	307405.613	762.896	762.969	0.073	0.005	1
4050	141464.916	307564.219	725.759	725.775	0.016	0.000	1
4052	118667.351	313253.899	863.761	863.796	0.036	0.001	1
4053	115320.876	319798.114	927.095	927.103	0.008	0.000	1
4054	115856.144	320725.925	932.907	932.972	0.065	0.004	1
4055	115604.291	321008.926	935.693	935.753	0.060	0.004	1
4056	118184.539	321334.562	929.753	929.930	0.177	0.031	1
4057	117220.261	327495.033	967.268	967.383	0.115	0.013	1

APPENDIX B

ID	Y (M)	X (M)	Z1	Z2	DZ	Square	Counter
4058	117916.498	325997.916	972.525	972.593	0.068	0.005	1
4059	118066.142	325944.342	971.861	971.977	0.117	0.014	1
4060	118091.499	325932.491	971.995	972.017	0.022	0.000	1
4061	120329.703	322982.841	937.611	937.696	0.085	0.007	1
4062	112795.367	329657.684	1040.285	1040.347	0.062	0.004	1
4063	113074.018	333227.547	1046.339	1046.457	0.118	0.014	1
4064	102632.037	332480.043	1214.070	1214.131	0.061	0.004	1
4065	107449.440	329516.195	1118.229	1118.304	0.075	0.006	1
4066	105574.917	322824.741	1073.475	1073.539	0.064	0.004	1
4067	103766.155	323116.261	1140.741	1140.502	-0.239	0.057	1
4068	106730.188	315262.964	914.982	915.041	0.059	0.003	1
4069	104188.169	308525.598	860.194	860.246	0.051	0.003	1
4070	107772.522	306658.890	828.340	828.486	0.146	0.021	1
4071	107682.658	306668.372	828.392	828.380	-0.012	0.000	1
4072	111389.011	304537.095	811.115	811.136	0.020	0.000	1
4073	118644.686	304998.663	806.876	807.021	0.145	0.021	1
4074	131175.036	299273.107	740.557	740.609	0.052	0.003	1
4075	131262.300	299408.408	736.281	736.376	0.095	0.009	1
4076	129615.944	291611.746	776.182	776.272	0.090	0.008	1
4077	135037.885	287432.956	804.766	804.781	0.014	0.000	1
4078	127517.109	299382.902	747.193	747.243	0.050	0.003	1
4079	127511.196	299454.128	747.104	747.152	0.047	0.002	1
4080	131906.802	306181.381	766.468	766.592	0.124	0.015	1
4081	131892.782	306297.827	766.654	766.757	0.103	0.011	1
4082	135004.567	306744.533	754.517	754.633	0.116	0.013	1
4083	140115.603	306207.143	733.059	733.131	0.072	0.005	1
4084	140073.068	305686.105	731.319	731.284	-0.035	0.001	1
4085	143731.415	303439.022	708.148	708.176	0.028	0.001	1
4086	143367.246	302343.961	707.115	707.173	0.059	0.003	1
4087	140989.102	300762.586	705.770	705.852	0.082	0.007	1
4088	140873.266	300697.938	705.642	705.711	0.068	0.005	1
4089	133709.173	299438.352	733.897	733.953	0.056	0.003	1
14S16E_E17	137615.246	329271.450	839.264	839.287	0.023	0.001	1
14S16E_G05	136784.852	324451.245	832.083	831.960	-0.123	0.015	1
14S16E_504	132364.551	324051.473	927.494	927.641	0.147	0.022	1

APPENDIX B

ID	Y (M)	X (M)	Z1	Z2	DZ	Square	Counter
15514E_J18	125985.553	310520.102	819.607	819.575	-0.033	0.001	1
15515E_P09	123546.014	316561.302	868.778	868.826	0.048	0.002	1
15515E_S12	122678.696	317901.307	884.636	884.586	-0.050	0.002	1
15515E_W19	120964.656	320659.857	912.010	911.971	-0.040	0.002	1
15516E_M16	125080.648	329064.369	924.599	924.579	-0.020	0.000	1
15516E_X13	120639.282	327798.218	955.106	955.168	0.062	0.004	1
15517E_Y02	120117.288	333101.131	1042.879	1042.872	-0.008	0.000	1
16510E_J01	116106.824	265177.161	794.251	794.359	0.109	0.012	1
16516E_J11	117015.445	326862.293	983.632	983.806	0.174	0.030	1
16516E_W18	111538.841	329786.782	1056.504	1056.652	0.148	0.022	1
16517E_Q08	114235.581	335423.945	1054.706	1054.853	0.147	0.022	1
16517E_T21	113052.576	340525.230	1116.781	1116.767	-0.014	0.000	1
17514E_U12	102195.246	308192.747	875.154	875.213	0.059	0.003	1
17515E_R21	104123.685	321540.500	1076.462	1076.605	0.143	0.021	1
19516E_K16	87704.652	328920.869	1496.205	1496.352	0.146	0.021	1
3rd Ave D-A PRV	133872.141	303159.658	739.341	739.165	-0.176	0.031	1
4_101	126148.810	287404.366	750.369	750.304	-0.065	0.004	1
551+26.73	152825.409	266164.972	619.686	619.646	-0.040	0.002	1
A-002B	138064.784	303089.654	731.657	731.604	-0.054	0.003	1
A-027	140536.721	305481.685	729.124	729.045	-0.079	0.006	1
A-030A	137131.129	300856.778	712.183	712.186	0.002	0.000	1
A-036	142184.674	302766.563	710.821	710.759	-0.062	0.004	1
A-055A	144260.420	300924.322	698.452	698.563	0.110	0.012	1
A-058A	130812.400	285058.262	737.077	737.139	0.062	0.004	1
A-060A	150048.032	294922.782	701.811	701.879	0.068	0.005	1
ACP 997	107583.031	306807.495	829.705	829.759	0.053	0.003	1
AF-001A	163927.173	270896.090	581.900	581.927	0.028	0.001	1
AF-014A	154687.594	272974.436	608.689	608.687	-0.002	0.000	1
AF-017A	148221.277	269368.823	630.704	630.842	0.138	0.019	1
AF-025A	141750.596	266638.104	655.180	655.074	-0.106	0.011	1
AF-044A	143403.782	271661.900	653.851	653.750	-0.101	0.010	1
AJO 1 B-C BOOSTER	130789.604	298199.425	755.203	755.249	0.046	0.002	1
Alvernon Boosters F-H	147978.312	308109.387	892.564	892.758	0.193	0.037	1
AV-008A	126691.784	282386.910	728.332	728.400	0.068	0.005	1
AV-009A	125895.147	282566.836	736.098	736.058	-0.040	0.002	1

APPENDIX B

ID	Y (M)	X (M)	Z1	Z2	DZ	Square	Counter
B-003B	136027.144	305017.079	743.197	743.168	-0.029	0.001	1
B-007B	136712.359	306894.525	759.869	759.939	0.069	0.005	1
B-026	140010.514	308049.357	739.363	739.352	-0.011	0.000	1
B-027A	139990.876	311340.386	748.592	748.679	0.087	0.008	1
B-092A	146533.112	302613.008	761.796	761.664	-0.132	0.017	1
B-096A	142278.253	309918.232	752.609	752.654	0.045	0.002	1
B-110A	134301.893	308194.241	767.398	767.335	-0.063	0.004	1
B-111A	138732.561	307348.530	746.647	746.578	-0.069	0.005	1
B-C Booster	126012.556	291496.151	769.894	769.873	-0.021	0.000	1
C-014	133259.462	308717.085	774.603	774.562	-0.042	0.002	1
C-019	135117.758	312726.574	788.929	788.923	-0.006	0.000	1
C-033A	136762.437	309197.350	767.947	767.958	0.012	0.000	1
C-043A	134698.249	310452.114	781.541	781.646	0.106	0.011	1
C-046	136434.616	311086.796	774.774	774.963	0.189	0.036	1
C-069	126327.737	306698.992	795.174	795.325	0.151	0.023	1
C-084A	139467.379	318353.968	771.040	771.015	-0.025	0.001	1
C-092	150714.983	301582.912	779.447	779.293	-0.153	0.024	1
C-110	138728.519	314494.326	769.148	769.209	0.061	0.004	1
C-114	137372.799	313379.160	777.908	777.850	-0.057	0.003	1
C-116	137972.716	316194.372	784.964	785.047	0.083	0.007	1
C-126	130965.647	305562.009	768.882	768.854	-0.028	0.001	1
CAP Sections 13-14-23-2	133799.226	282448.739	726.908	726.986	0.078	0.006	1
Cmo de la Tierra B-C	125908.601	296388.242	772.607	772.783	0.176	0.031	1
Cmo del Cerro A-C	143819.453	291823.707	733.590	733.626	0.037	0.001	1
CP999	126705.954	302802.310	766.886	766.949	0.063	0.004	1
D-003A	132719.162	312347.150	803.093	803.055	-0.038	0.001	1
D-007A	130997.310	314849.155	829.909	829.851	-0.059	0.003	1
D-018	135593.557	314559.675	795.238	795.237	-0.001	0.000	1
D-046A & B	139307.158	320975.882	790.276	790.330	0.054	0.003	1
D-048	136961.880	317919.473	797.384	797.307	-0.078	0.006	1
D-058	140452.340	319148.259	788.771	788.789	0.019	0.000	1
Danforth E-Zone	132887.999	321320.895	879.677	879.705	0.027	0.001	1
DEVINE RESEVOIR	145994.899	303537.713	765.191	765.334	0.143	0.020	1
E-003A	134935.603	318071.818	818.123	818.153	0.030	0.001	1
E-008A	129401.148	315350.225	843.107	843.160	0.053	0.003	1
E-012A	131802.866	317907.229	820.220	820.355	0.136	0.018	1

APPENDIX B

ID	Y (M)	X (M)	Z1	Z2	DZ	Square	Counter
E-029	123030.810	314062.223	854.662	854.756	0.094	0.009	1
E-030A	112816.919	268002.468	852.754	852.737	-0.018	0.000	1
EW-006R	142073.656	297256.316	690.247	690.188	-0.059	0.003	1
EW-008R_BSM	142727.998	297445.179	689.238	689.177	-0.061	0.004	1
F-001A	116949.873	276749.847	860.539	860.545	0.006	0.000	1
F-004A	130724.227	323447.612	912.449	912.545	0.096	0.009	1
F-005	135487.709	322360.144	864.047	864.017	-0.030	0.001	1
G Ajo CZ0794	122504.076	275403.881	756.236	756.185	-0.051	0.003	1
G-005A	122935.307	320662.636	902.400	902.397	-0.004	0.000	1
G-009A	126655.419	325514.726	881.890	881.689	-0.201	0.040	1
G-010A	114498.845	273664.137	895.228	895.057	-0.172	0.029	1
G-115	107950.754	273386.766	1061.128	1061.008	-0.119	0.014	1
G-Zone Reserv	115009.812	277919.158	943.207	943.115	-0.092	0.008	1
H U BM	130268.740	291100.151	784.092	784.117	0.025	0.001	1
H-003A	113632.412	321125.448	948.355	948.308	-0.047	0.002	1
H-115	108397.588	270593.317	987.860	987.779	-0.081	0.006	1
H292	146639.963	275935.891	644.500	644.383	-0.117	0.014	1
Hermans Rd D-Zone	122930.500	313443.336	848.667	848.668	0.001	0.000	1
HILLS 1 F-G	150276.468	304259.538	883.780	883.880	0.100	0.010	1
I K I-Zone	109844.431	272650.034	1006.852	1006.915	0.063	0.004	1
J115	109871.780	268988.603	927.384	927.152	-0.232	0.054	1
Naranja Dr. C-Zone	156901.957	297453.128	822.774	822.715	-0.059	0.003	1
Old Vail G-Zone	119560.309	323234.505	943.408	943.391	-0.017	0.000	1
PF-001	119401.931	313370.062	861.779	861.767	-0.012	0.000	1
R-009A	129582.449	301981.015	750.631	750.530	-0.101	0.010	1
RB 102 CAVSARP	136087.515	276749.418	687.342	687.251	-0.091	0.008	1
RB 206	131211.039	278914.948	704.506	704.281	-0.224	0.050	1
Redhawk E-Zone	161809.469	293019.428	883.198	883.079	-0.119	0.014	1
Reid Park Rclm	134302.695	308051.811	765.712	765.672	-0.040	0.002	1
Rockcliff E-G Booster	143419.446	316735.803	847.560	847.528	-0.032	0.001	1
RR-001A	131420.543	321376.673	873.715	873.653	-0.062	0.004	1
SC-007A	122968.332	303608.077	781.763	781.830	0.067	0.005	1
SC-008	114489.205	305196.417	803.462	803.589	0.127	0.016	1
SC-012A	118707.999	303845.955	795.735	795.897	0.161	0.026	1
SC-016	119644.400	303773.930	787.192	787.019	-0.173	0.030	1
SC-020	113126.550	308043.669	830.540	830.485	-0.055	0.003	1

APPENDIX B

ID	Y (M)	X (M)	Z1	Z2	DZ	Square	Counter
SC-023A	109386.014	306894.415	825.465	825.412	-0.054	0.003	1
SC-027A	111503.686	310271.980	841.211	841.215	0.003	0.000	1
SC-033	112990.802	313230.265	866.537	866.438	-0.100	0.010	1
SL-001A	129535.733	319616.179	860.091	860.177	0.086	0.007	1
Snyder Rd. E-G	144237.045	323922.481	842.806	842.959	0.153	0.023	1
Speedway1	137338.750	297803.895	737.515	737.449	-0.067	0.004	1
SS-18	133734.432	300939.199	723.193	723.217	0.025	0.001	1
Starr Pass D-E	135128.410	295470.608	824.594	824.675	0.081	0.007	1
Sycamore Canyon I - Zon	103282.004	320159.625	1070.317	1070.312	-0.005	0.000	1
Trails End F-Zone	137791.116	291241.213	910.550	910.414	-0.137	0.019	1
Valley View	144931.647	309558.775	816.925	816.925	0.000	0.000	1
W-001A	158461.052	274219.114	601.596	601.548	-0.048	0.002	1
W-003A	161136.208	267529.385	582.333	582.246	-0.087	0.008	1
W-005A	154657.715	269337.843	605.784	606.019	0.235	0.055	1
WC 1/4 Secs 5-4 T16; R1	118450.501	268384.663	777.356	777.435	0.079	0.006	1
WR-016B	150091.216	275568.116	625.788	625.796	0.008	0.000	1
Y-001A&B	151786.672	290006.794	651.004	650.795	-0.209	0.044	1
Z-015	147093.764	295306.300	677.101	676.890	-0.211	0.045	1
				sum	9.988		
				mean	0.038		
						2.474	260
				Std. Dev.	0.0898		
				rmse	0.0976		



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