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Santa Clara, CA Year 5 Lidar 312020310

Ground Survey Report

June, 2020

Executive Summary

[The County of Santa Clara, CA](#) (Santa Clara) contracted with [The Sanborn Map Company, Inc.](#) (Sanborn) to provide ground survey in the support of aerial survey of lidar for the Santa Clara, CA Year 5 Lidar project. A GNSS ground survey network has been designed and implemented into the project process to establish a common basis for geo-referencing the lidar and ortho imagery data products. A total of one hundred and twenty-five (125) ground survey points (70 NVA + 55 VVA) were established, all points will serve for lidar accuracy validation.

The adjusted GNSS survey network of points meets a final adjusted RMS 1/3 of the required product accuracy for Lidar (USGS – QL1).

The GNSS survey network was designed, processed and adjusted using Trimble Business Center (TBC) version 5.20. Final coordinates are in NAD83 (2011), State Plane California Zone III (FIPS 0403), NAVD88 (Geoid18), U.S. Survey Feet. Published monuments and/or reference stations were utilized to control the network.

NGS CORS: MHCB, P217, P242, P254, SLAC, ZOA1

NGS Monument(s): AA1864, AA1871, AA1872, AI8013, DG6887, DG6890, HS2738, HS2787, HS4392, HS5407

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Introduction

This report contains the technical write-up of the differential GNSS Ground Survey performed in support of lidar products.

Sanborn oversaw the survey team(s) for execution of the GNSS ground survey; all fieldwork including reconnaissance of existing control points, establishment of additional control points, and GNSS surveys. All GNSS data processing and reductions were performed in support of the Santa Clara, CA Year 5 Lidar project. **Figure 1** illustrates the initial survey plan within the project Area of Interest (AOI).

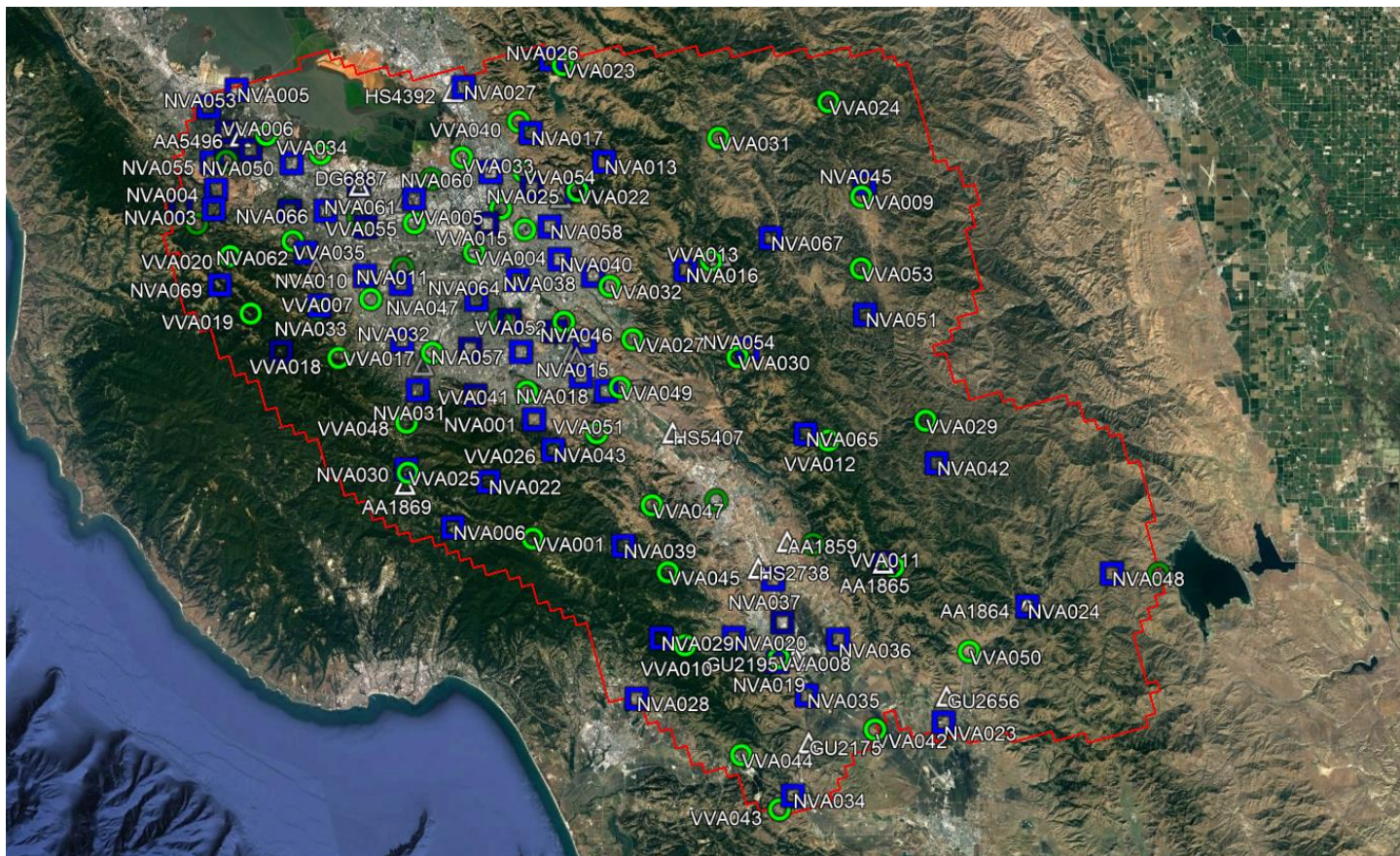


Figure 1: Survey Plan and AOI

Survey Purpose

The GNSS Survey Network includes sixteen (16) control point(s): NGS CORS (MHCB, P217, P242, P254, SLAC, ZOA1), and NGS Monument(s) (AA1864, AA1871, AA1872, AI8013, DG6887, DG6890, HS2738, HS2787, HS4392, HS5407). The control points are tied to seventy (70) Non-vegetated Vertical Accuracy: NVA001 – NVA070, and fifty-five (55) Vegetated Vertical Accuracy: VVA001 – VVA055. The GNSS Log Sheets of the observed points can be found in **Attachment A**. The NGS Data Sheets, OPUS Reports, and Trimble CenterPoint RTX Reports referenced for the control points can be found in **Attachment B**. **Attachment C** contains the TBC Baseline Processing Reports. **Attachment D** contains the photos of the observed points in the GNSS Network Survey. The sketches of the observed points can be found in **Attachment E**. The ground control points were strategically positioned to satisfy aerial survey requirements for the area of interest (AOI).

Duration/Time Period

The GNSS ground survey was performed from March 11th, 2020 to May 8th, 2020.

Equipment

The GNSS ground survey was performed using survey grade Trimble R8 L1/L2 GNSS Antennas attached to 2 meter fixed-height rods, leveled over each observed point.

Field Procedures

A careful reconnaissance was undertaken prior to the monumentation and subsequent GNSS survey. The satellite window provided a minimum of 4-hour constellation coverage; GNSS observation sessions were scheduled between 08:00 and 18:00 local time. All baseline processing, analysis, and preliminary reductions were performed upon receiving the data for quality control. No difficulties were experienced during this survey.

Personnel navigated to points using local maps, or GNSS navigation. The field crews had approximate geodetic coordinates loaded for the required observation points. Upon arriving at the desired location the field personnel initiated a search for the point locations. The receiver was set on the 2 meter fixed-height rod and leveled over the point. The GNSS survey was set up as FastStatic survey style connected via session to the established base station located at an NGS Monument. Field crew members followed a session schedule established by office personnel to facilitate observation location and duration.

The GNSS Log Sheet was produced with the following information: Point ID, Stamping (if available), Date, Observer Name, Antenna Height Measurement Point, Antenna Height, Start Time and End Time. Digital photographs were taken at each point showing the control point surveyed and its relationship to its surroundings.

Processing

All static baselines and vectors for the Santa Clara, CA Year 5 Lidar project were processed using Trimble Business Center (TBC) version 5.20 software. Fixed solutions were adopted for all baselines using the broadcast ephemeris.

Each day of observation was imported into TBC along with at least one additional GNSS Reference station. The Sanborn operated base station and the additional reference station(s) were sent to Trimble's CenterPoint RTX online processor for network corrected coordinates. The corrected coordinates are compared to any known or published coordinates to identify blunders or busts as result of transformed coordinate systems or human error. The base station and reference stations are set as control and the baselines for each surveyed point are processed as a single network. The vertical loops of the network are reviewed for closure with minimal remaining offset.

After each day of observation has been processed and reviewed the entire survey network is combined together for a holistic review of the Horizontal and Vertical Precision along with any points or baselines failing to meet the minimum acceptance criteria of the required network accuracy. The results of this review can be found in the Accuracy section of this report.

NAD83 (2011) was utilized and incorporated into the reductions, thereby allowing rigorous interpolation of the geoidal undulation values at each point in the network. This provides a useful method of estimating the elevations at all points in the network. The Survey Network Diagrams (**Appendix A**) and the Final Adjusted Coordinates (**Appendix B**) can be found below.

Accuracy

Lidar Category	Value
RMSE _z (ft)	≤0.328
@ 95-Percent Confidence Level (ft)	≤0.643

Table 1: Lidar Absolute Accuracy Requirements

The final survey networked coordinates yielded station levels of 0.073ft horizontally (X, Y) and 0.140ft vertically (Z) at 2σ or (95-Percent Confidence Level) meeting and/or exceeding project requirements.

Coordinate Reference System

Horizontal Datum:	North American Datum of 1983 (2011)
Projection:	State Plane California Zone III (FIPS 0403)
Vertical Datum:	North American Vertical Datum of 1988
Geoid Model:	Geoid18
Units:	U.S. Survey Feet

Contact Information

Questions regarding technical aspects of this report should be addressed to:

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The image is an aerial photograph of the San Francisco Bay Area, overlaid with a complex network of blue lines representing flight paths or data connections. The network is centered around the San Francisco Peninsula and extends across the bay and into the surrounding regions. Numerous points are marked with labels, including:

- NVA005**, **NVA007**, **NVA008**, **NVA004**, **NVA003**, **NVA035**, **VVA020**, **NVA069**, **VVA019**, **VVA018**, **NVA032**, **NVA063**, **NVA044**, **NVA048**, **VVA025**, **NVA022**, **NVA006**, **VVA001**, **NVA039**, **VVA045**, **NVA029**, **NVA028**, **VVA044**, **VVA043**, **NVA026**, **NVA027**, **HS4392**, **NVA017**, **NVA013**, **NVA025**, **VVA022**, **NVA058**, **NVA040**, **NVA038**, **NVA016**, **NVA064**, **VVA032**, **NVA047**, **NVA002**, **NVA068**, **NVA046**, **NVA015**, **NVA054**, **VVA030**, **NVA001**, **NVA018**, **NVA043**, **VVA051**, **HS5407**, **VVA012**, **NVA065**, **VVA002**, **P217**, **VVA046**, **HS2738**, **NVA037**, **VVA011**, **NVA042**, **NVA048**, **NVA024**, **AA1864**, **VVA050**, **NVA021**, **NVA036**, **VVA008**, **NVA019**, **NVA035**, **P242**, **VVA042**, **NVA023**, **NVA034**, **VVA043**, **NVA051**, **VVA053**, **NVA067**, **VVA031**, **NVA045**, **VVA009**, **P254**, **VVA024**, **NVA026**, **VVA023**, **HS4392**, **NVA014**, **NVA015**, **NVA058**, **NVA040**, **NVA038**, **NVA016**, **NVA064**, **VVA032**, **NVA047**, **NVA002**, **NVA068**, **NVA046**, **NVA015**, **NVA054**, **VVA030**, **NVA001**, **NVA018**, **NVA043**, **VVA051**, **HS5407**, **VVA012**, **NVA065**, **VVA002**, **P217**, **VVA046**, **HS2738**, **NVA037**, **VVA011**, **NVA042**, **NVA048**, **NVA024**, **AA1864**, **VVA050**, **NVA021**, **NVA036**, **VVA008**, **NVA019**, **NVA035**, **P242**, **VVA042**, **NVA023**, **NVA034**, **VVA043**, **NVA051**, **VVA053**, **NVA067**, **VVA031**, **NVA045**, **VVA009**, **P254**, **VVA024**, **NVA026**, **VVA023**, **HS4392**, **NVA014**, **NVA015**, **NVA058**, **NVA040**, **NVA038**, **NVA016**, **NVA064**, **VVA032**, **NVA047**, **NVA002**, **NVA068**, **NVA046**, **NVA015**, **NVA054**, **VVA030**, **NVA001**, **NVA018**, **NVA043**, **VVA051**, **HS5407**, **VVA012**, **NVA065**, **VVA002**, **P217**, **VVA046**, **HS2738**, **NVA037**, **VVA011**, **NVA042**, **NVA048**, **NVA024**, **AA1864**, **VVA050**, **NVA021**, **NVA036**, **VVA008**, **NVA019**, **NVA035**, **P242**, **VVA042**, **NVA023**, **NVA034**, **VVA043**, **NVA051**, **VVA053**, **NVA067**, **VVA031**, **NVA045**, **VVA009**, **P254**, **VVA024**, **NVA026**, **VVA023**, **HS4392**, **NVA014**, **NVA015**, **NVA058**, **NVA040**, **NVA038**, **NVA016**, **NVA064**, **VVA032**, **NVA047**, **NVA002**, **NVA068**, **NVA046**, **NVA015**, **NVA054**, **VVA030**, **NVA001**, **NVA018**, **NVA043**, **VVA051**, **HS5407**, **VVA012**, **NVA065**, **VVA002**, **P217**, **VVA046**, **HS2738**, **NVA037**, **VVA011**, **NVA042**, **NVA048**, **NVA024**, **AA1864**, **VVA050**, **NVA021**, **NVA036**, **VVA008**, **NVA019**, **NVA035**, **P242**, **VVA042**, **NVA023**, **NVA034**, **VVA043**, **NVA051**, **VVA053**, **NVA067**, **VVA031**, **NVA045**, **VVA009**, **P254**, **VVA024**, **NVA026**, **VVA023**, **HS4392**, **NVA014**, **NVA015**, **NVA058**, **NVA040**, **NVA038**, **NVA016**, **NVA064**, **VVA032**, **NVA047**, **NVA002**, **NVA068**, **NVA046**, **NVA015**, **NVA054**, **VVA030**, **NVA001**, **NVA018**, **NVA043**, **VVA051**, **HS5407**, **VVA012**, **NVA065**, **VVA002**, **P217**, **VVA046**, **HS2738**, **NVA037**, **VVA011**, **NVA042**, **NVA048**, **NVA024**, **AA1864**, **VVA050**, **NVA021**, **NVA036**, **VVA008**, **NVA019**, **NVA035**, **P242**, **VVA042**, **NVA023**, **NVA034**, **VVA043**, **NVA051**, **VVA053**, **NVA067**, **VVA031**, **NVA045**, **VVA009**, **P254**, **VVA024**, **NVA026**, **VVA023**, **HS4392**, **NVA014**, **NVA015**, **NVA058**, **NVA040**, **NVA038**, **NVA016**, **NVA064**, **VVA032**, **NVA047**, **NVA002**, **NVA068**, **NVA046**, **NVA015**, **NVA054**, **VVA030**, **NVA001**, **NVA018**, **NVA043**, **VVA051**, **HS5407**, **VVA012**, **NVA065**, **VVA002**, **P217**, **VVA046**, **HS2738**, **NVA037**, **VVA011**, **NVA042**, **NVA048**, **NVA024**, **AA1864**, **VVA050**, **NVA021**, **NVA036**, **VVA008**, **NVA019**, **NVA035**, **P242**, **VVA042**, **NVA023**, **NVA034**, **VVA043**, **NVA051**, **VVA053**, **NVA067**, **VVA031**, **NVA045**, **VVA009**, **P254**, **VVA024**, **NVA026**, **VVA023**, **HS4392**, **NVA014**, **NVA015**, **NVA058**, **NVA040**, **NVA038**, **NVA016**, **NVA064**, **VVA032**, **NVA047**, **NVA002**, **NVA068**, **NVA046**, **NVA015**, **NVA054**, **VVA030**, **NVA001**, **NVA018**, **NVA043**, **VVA051**, **HS5407**, **VVA012**, **NVA065**, **VVA002**, **P217**, **VVA046**, **HS2738**, **NVA037**, **VVA011**, **NVA042**, **NVA048**, **NVA024**, **AA1864**, **VVA050**, **NVA021**, **NVA036**, **VVA008**, **NVA019**, **NVA035**, **P242**, **VVA042**, **NVA023**, **NVA034**, **VVA043**, **NVA0**

Appendix B – Adjusted Coordinates

ID	Easting (US survey foot)	Northing (US survey foot)	Elevation (US survey foot)	Feature Code	Projection Scale Factor	Height Scale Factor	Combined Scale Factor
AA1864	6324913.944	1837544.841	411.766	NGS	1.0000059239	0.9999853849	0.9999913086
AA1871	6101391.488	1947026.632	435.274	NGS	0.9999558403	0.9999842958	0.9999401368
AA1872	6152723.648	1954404.866	60.450	NGS	0.9999530589	1.0000022302	0.9999552890
AI8013	6225948.800	1948270.177	3497.172	NGS	0.9999547823	0.9998377126	0.9997925022
DG6887	6115439.136	1972516.975	36.014	NGS	0.9999476261	1.0000034017	0.9999510276
DG6890	6082995.564	2002125.395	9.104	NGS	0.9999401600	1.0000046805	0.9999448402
HS2738	6240039.986	1850570.918	266.753	NGS	0.9999989093	0.9999923478	0.9999912571
HS2787	6182012.295	1918487.235	190.707	NGS	0.9999662023	0.9999959763	0.9999621788
HS4392	6145361.290	2001730.616	31.044	NGS	0.9999400187	1.0000036135	0.9999436320
HS5407	6213542.542	1893492.582	338.204	NGS	0.9999769796	0.9999889063	0.9999658862
MHCB	6229522.104	1948853.679	4244.928	CORS	0.9999545684	0.9998019507	0.9997565281
NVA001	6169713.514	1898124.167	395.609	NVA	0.9999751151	0.9999861656	0.9999612811
NVA002	6162406.187	1929403.934	249.287	NVA	0.9999619630	0.9999931890	0.9999551523
NVA003	6069217.677	1965736.486	405.024	NVA	0.9999498895	0.9999857337	0.9999356239
NVA004	6069938.059	1971770.171	271.523	NVA	0.9999480730	0.9999921243	0.9999401978
NVA005	6076808.003	2003109.950	6.399	NVA	0.9999399650	1.0000048099	0.9999447746
NVA006	6143613.395	1864525.835	1966.629	NVA	0.9999919680	0.9999110416	0.9999030104
NVA007	6073528.054	1989878.547	74.132	NVA	0.9999431148	1.0000015711	0.9999446858
NVA008	6081291.199	1983301.151	52.045	NVA	0.9999447856	1.0000026297	0.9999474151
NVA009	6093321.555	1964751.481	176.642	NVA	0.9999500617	0.9999966722	0.9999467340
NVA010	6116768.452	1944024.458	227.599	NVA	0.9999568062	0.9999942420	0.9999510485
NVA011	6128149.675	1941291.218	172.776	NVA	0.9999577183	0.9999968670	0.9999545854
NVA012	6117178.800	1959331.384	118.875	NVA	0.9999516392	0.9999994431	0.9999510823
NVA013	6192916.537	1978801.856	2290.285	NVA	0.9999455293	0.9998954633	0.9998409984
NVA014	6155509.855	1959826.371	56.701	NVA	0.9999512903	1.0000024076	0.9999536978
NVA015	6184732.052	1911428.541	196.981	NVA	0.9999691415	0.9999956729	0.9999648146
NVA016	6218198.359	1944453.563	2354.025	NVA	0.9999561366	0.9998924038	0.9998485452
NVA017	6169772.623	1988185.844	562.798	NVA	0.9999431485	0.9999781441	0.9999212938
NVA018	6192584.011	1906755.582	218.983	NVA	0.9999711128	0.9999946156	0.9999657286
NVA019	6245705.974	1820985.631	265.734	NVA	1.0000165203	0.9999924280	1.0000089482
NVA020	6232005.232	1828669.403	264.579	NVA	1.0000118453	0.9999924732	1.0000043184
NVA021	6247547.645	1833281.841	206.631	NVA	1.0000089317	0.9999952417	1.0000041733
NVA022	6155019.248	1878762.971	3301.107	NVA	0.9999845026	0.9998471883	0.9998316932
NVA023	6297968.591	1801282.008	196.343	NVA	1.0000290006	0.9999957672	1.0000247677
NVA024	6324933.270	1837454.022	403.737	NVA	1.0000059774	0.9999857690	0.9999917463
NVA025	6184108.930	1969714.173	550.928	NVA	0.9999481407	0.9999786948	0.9999268366
NVA026	6175108.362	2008802.216	929.307	NVA	0.9999384123	0.9999605774	0.9998989922
NVA027	6148718.499	2002902.066	81.216	NVA	0.9999397485	1.0000012076	0.9999409560
NVA028	6200998.901	1809996.961	145.887	NVA	1.0000239429	0.9999982158	1.0000221587
NVA029	6208956.433	1828892.322	1848.331	NVA	1.0000118851	0.9999167246	0.9999286087
NVA030	6129114.991	1882979.401	1494.724	NVA	0.9999826035	0.9999335943	0.9999161990

NVA031	6133063.504	1907829.465	351.403	NVA	0.9999710244	0.9999882886	0.9999593133
NVA032	6128310.717	1923411.745	284.086	NVA	0.9999645285	0.9999915310	0.9999560598
NVA033	6102206.298	1934710.759	553.063	NVA	0.9999603007	0.9999786470	0.9999389485
NVA034	6250029.106	1778839.337	155.159	NVA	1.0000450488	0.9999977810	1.0000428298
NVA035	6254821.394	1810304.008	166.529	NVA	1.0000233114	0.9999971913	1.0000205026
NVA036	6264948.140	1827758.026	192.920	NVA	1.0000121728	0.9999959037	1.0000080764
NVA037	6244630.279	1846942.900	252.278	NVA	1.0000009366	0.9999930438	0.9999939805
NVA038	6188995.761	1943064.233	261.271	NVA	0.9999567619	0.9999925822	0.9999493444
NVA039	6197432.011	1858034.547	679.699	NVA	0.9999950621	0.9999725818	0.9999676440
NVA040	6178385.461	1948339.280	120.853	NVA	0.9999549738	0.9999993173	0.9999542911
NVA041	6089908.640	1920513.616	2635.784	NVA	0.9999659618	0.9998790163	0.9998449822
NVA042	6340889.399	1841604.611	996.749	NVA	1.0000034665	0.9999573924	0.9999608588
NVA043	6175619.867	1888524.653	478.737	NVA	0.9999795693	0.9999821822	0.9999617519
NVA044	6151502.285	1906189.729	308.392	NVA	0.9999716183	0.9999903446	0.9999619632
NVA045	6275069.564	1971005.322	2257.594	NVA	0.9999474408	0.9998969397	0.9998443860
NVA046	6186114.528	1922348.226	258.221	NVA	0.9999646108	0.9999927433	0.9999573543
NVA047	6151914.664	1936017.147	144.197	NVA	0.9999595148	0.9999982241	0.9999577390
NVA048	6351812.099	1847344.638	1352.353	NVA	1.0000001187	0.9999403832	0.9999405019
NVA049	6115172.902	1972399.579	36.207	NVA	0.9999476614	1.0000033925	0.9999510537
NVA050	6093989.190	1979778.697	15.176	NVA	0.9999456787	1.0000043957	0.9999500741
NVA051	6274083.963	1943952.215	2330.508	NVA	0.9999560852	0.9998934767	0.9998495666
NVA052	6073345.065	1981178.647	137.359	NVA	0.9999453955	0.9999985466	0.9999439422
NVA053	6067871.600	1997775.569	40.118	NVA	0.9999412187	1.0000031965	0.9999444149
NVA054	6217418.635	1915582.243	1013.697	NVA	0.9999672088	0.9999565663	0.9999237765
NVA055	6068595.042	1980357.962	209.022	NVA	0.9999456429	0.9999951169	0.9999407601
NVA056	6058655.665	1966160.443	452.034	NVA	0.9999498187	0.9999834830	0.9999333026
NVA057	6165870.548	1919394.834	176.957	NVA	0.9999659245	0.9999966423	0.9999625669
NVA058	6175462.503	1958640.319	153.327	NVA	0.9999515755	0.9999977599	0.9999493356
NVA059	6170002.374	1970754.802	187.871	NVA	0.9999478942	0.9999961046	0.9999439990
NVA060	6156967.166	1975975.865	32.574	NVA	0.9999464535	1.0000035522	0.9999500055
NVA061	6132631.958	1967916.775	22.070	NVA	0.9999489013	1.0000040695	0.9999529706
NVA062	6098168.743	1951486.744	341.942	NVA	0.9999543267	0.9999887608	0.9999430881
NVA063	6149823.463	1920576.917	203.977	NVA	0.9999655392	0.9999953585	0.9999608979
NVA064	6165164.950	1942047.586	104.964	NVA	0.9999572439	1.0000000935	0.9999573374
NVA065	6255479.589	1892496.925	2634.331	NVA	0.9999772096	0.9998790269	0.9998562392
NVA066	6104605.790	1964515.823	126.215	NVA	0.9999500751	0.9999990886	0.9999491637
NVA067	6245216.331	1954120.704	2205.045	NVA	0.9999527467	0.9998994743	0.9998522258
NVA068	6176899.383	1925645.342	288.335	NVA	0.9999633493	0.9999913114	0.9999546610
NVA069	6070742.621	1941696.859	2246.724	NVA	0.9999579240	0.9998976308	0.9998555591
NVA070	6279709.471	1851607.512	854.708	NVA	0.9999980811	0.9999641860	0.9999622671
P217	6226119.588	1862583.948	345.545	CORS	0.9999923977	0.9999885674	0.9999809652
P242	6280217.742	1807148.034	158.190	CORS	1.0000252062	0.9999975977	1.0000228038
P254	6280481.151	2002205.875	3634.963	CORS	0.9999395325	0.9998310637	0.9997706064
SLAC	6066751.824	1978635.413	317.487	CORS	0.9999461277	0.9999899276	0.9999360558
VVA001	6168862.529	1860581.833	3076.211	VVA	0.9999938898	0.9998579554	0.9998518461
VVA002	6226732.904	1871944.928	350.691	VVA	0.9999874732	0.9999883144	0.9999757878

VVA003	6115066.603	1961876.705	114.543	VVA	0.9999508430	0.9999996492	0.9999504922
VVA004	6151601.430	1950811.846	67.846	VVA	0.9999542648	1.0000018773	0.9999561420
VVA005	6160011.845	1964322.243	75.698	VVA	0.9999498653	1.0000014935	0.9999513588
VVA006	6086064.372	1988745.013	21.118	VVA	0.9999433455	1.0000041089	0.9999474541
VVA007	6118534.935	1936499.552	263.246	VVA	0.9999595299	0.9999925340	0.9999520643
VVA008	6246162.897	1822009.179	215.047	VVA	1.0000158733	0.9999948516	1.0000107248
VVA009	6274133.358	1966673.674	2183.544	VVA	0.9999487153	0.9999004863	0.9998492067
VVA010	6216576.097	1826466.953	494.545	VVA	1.0000133186	0.9999814761	0.9999947945
VVA011	6282801.214	1850363.457	887.897	VVA	0.9999987614	0.9999625983	0.9999613597
VVA012	6262675.431	1890175.260	2318.305	VVA	0.9999782636	0.9998941378	0.9998724037
VVA013	6226345.393	1947106.630	3384.866	VVA	0.9999551797	0.9998430831	0.9997982698
VVA014	6128743.513	1946150.752	137.797	VVA	0.9999559893	0.9999985409	0.9999545302
VVA015	6167539.838	1958071.670	97.934	VVA	0.9999517941	1.0000004247	0.9999522188
VVA016	6159502.523	1929399.794	155.022	VVA	0.9999619812	0.9999976998	0.9999596811
VVA017	6137843.321	1919369.659	278.535	VVA	0.9999661075	0.9999917938	0.9999579016
VVA018	6108151.961	1918131.685	726.650	VVA	0.9999668147	0.9999703317	0.9999371474
VVA019	6080477.790	1932475.760	2319.584	VVA	0.9999612914	0.9998941416	0.9998554371
VVA020	6074174.858	1950636.333	1849.866	VVA	0.9999547585	0.9999166139	0.9998713761
VVA021	6063716.024	1960966.557	667.653	VVA	0.9999514130	0.9999731672	0.9999245815
VVA022	6184558.166	1969549.533	561.352	VVA	0.9999481873	0.9999781950	0.9999263834
VVA023	6175245.161	2007634.764	864.470	VVA	0.9999386531	0.9999636785	0.9999023338
VVA024	6264149.433	1996564.665	2604.505	VVA	0.9999408353	0.9998803291	0.9998211715
VVA025	6129682.888	1881825.171	1311.273	VVA	0.9999831697	0.9999423685	0.9999255392
VVA026	6175676.927	1888176.273	484.801	VVA	0.9999797359	0.9999818915	0.9999616278
VVA027	6201277.283	1922800.605	666.555	VVA	0.9999643473	0.9999731883	0.9999375365
VVA028	6366707.334	1846944.575	570.690	VVA	1.0000002834	0.9999777908	0.9999780742
VVA029	6340806.437	1841506.779	990.467	VVA	1.0000035238	0.9999576929	0.9999612166
VVA030	6217352.757	1915561.220	1013.026	VVA	0.9999672179	0.9999565985	0.9999238178
VVA031	6245156.104	1954104.903	2207.121	VVA	0.9999527522	0.9998993751	0.9998521320
VVA032	6194239.024	1939518.524	438.151	NVA	0.9999580075	0.9999841119	0.9999421201
VVA033	6147948.366	1980649.736	24.815	VVA	0.9999452031	1.0000039286	0.9999491315
VVA034	6103201.775	1982421.090	11.171	VVA	0.9999449197	1.0000045864	0.9999495058
VVA035	6094101.191	1955056.327	293.852	VVA	0.9999531557	0.9999910603	0.9999442165
VVA036	6101535.161	1933622.375	569.110	VVA	0.9999607161	0.9999778769	0.9999385940
VVA037	6073329.257	1980638.165	149.413	VVA	0.9999455429	0.9999979699	0.9999435129
VVA038	6092960.234	1965400.867	172.457	VVA	0.9999498637	0.9999968724	0.9999467363
VVA039	6138235.151	1974053.482	11.513	VVA	0.9999470787	1.0000045710	0.9999516495
VVA040	6166053.620	1991717.546	622.225	VVA	0.9999422843	0.9999753053	0.9999175911
VVA041	6167551.725	1906750.209	243.803	VVA	0.9999712685	0.9999934351	0.9999647038
VVA042	6276332.072	1799145.898	161.469	VVA	1.0000305916	0.9999974542	1.0000280457
VVA043	6245738.360	1774435.380	417.805	VVA	1.0000483012	0.9999852173	1.0000335178
VVA044	6233917.600	1791684.284	134.507	VVA	1.0000360499	0.9999987545	1.0000348043
VVA045	6211397.004	1849485.749	501.285	VVA	0.9999997212	0.9999811244	0.9999808456
VVA046	6257469.003	1857750.894	819.000	VVA	0.9999948152	0.9999659082	0.9999607235
VVA047	6206669.382	1870514.198	546.162	VVA	0.9999883439	0.9999789653	0.9999673094
VVA048	6129409.529	1897473.367	749.533	VVA	0.9999756932	0.9999692337	0.9999449277

VVA049	6197061.883	1907742.974	241.372	VVA	0.9999706563	0.9999935415	0.9999641979
VVA050	6306391.621	1823243.267	276.553	VVA	1.0000147078	0.9999918828	1.0000065905
VVA051	6189519.616	1893458.749	481.601	VVA	0.9999771436	0.9999820518	0.9999591958
VVA052	6179576.117	1928498.646	163.869	VVA	0.9999622182	0.9999972626	0.9999594809
VVA053	6273720.842	1944103.851	2348.705	VVA	0.9999560335	0.9998926063	0.9998486445
VVA054	6167448.647	1975981.449	175.074	VVA	0.9999464087	0.9999967156	0.9999431245
VVA055	6132704.020	1960183.124	52.663	VVA	0.9999512883	1.0000026093	0.9999538974
ZOA1	6122180.567	2023761.014	95.382	CORS	0.9999357351	1.0000005358	0.9999362709

Attachment A – GPS Log Sheets

(Electronically Attached)

Attachment B – Data Sheets

(Electronically Attached)

Attachment C – Baseline Processing Reports

(Electronically Attached)

Attachment D – Photos

(Electronically Attached)

Attachment E – Sketches

(Electronically Attached)