Calibration Points Survey Report

“Nebraska Northeast Phase 2” USGS Contract: G16PC0020

Task Order Number: 140G0220F0002

Prepared for:

Geological Survey United States (USGS)

Prepared By:

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1. INTRODUCTION

1.1 Project Summary

Merrick and Company is under contract through Dewberry Engineers to the United States Geological Survey to provide 80 Calibration Points in the State of Nebraska. Under the above referenced USGS Task Order, Merrick is tasked to complete the quality assurance of LiDAR products. As part of this work Merrick staff completed Check Point surveys that will be used to evaluate vertical and horizontal accuracy. The ground survey was conducted October 30, 2020 thru November 23, 2020.

Existing NGS Control Points were located and surveyed to check the accuracy of the RTX/GPS survey equipment with the results shown in Section 2.4 of this Report.

As an internal QA/QC procedure and to verify that the Calibration Points meet the 95% confidence level approximately 50% of the points were re-observed and are shown in Section 5 of this report.

Final horizontal coordinates are referenced to UTM zone 14 North, NAD83 (2011) in meters. Final Vertical elevations are referenced to NAVD88 in meters using Geoid model 2018(Geoid18).

1.2 Points of Contact

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

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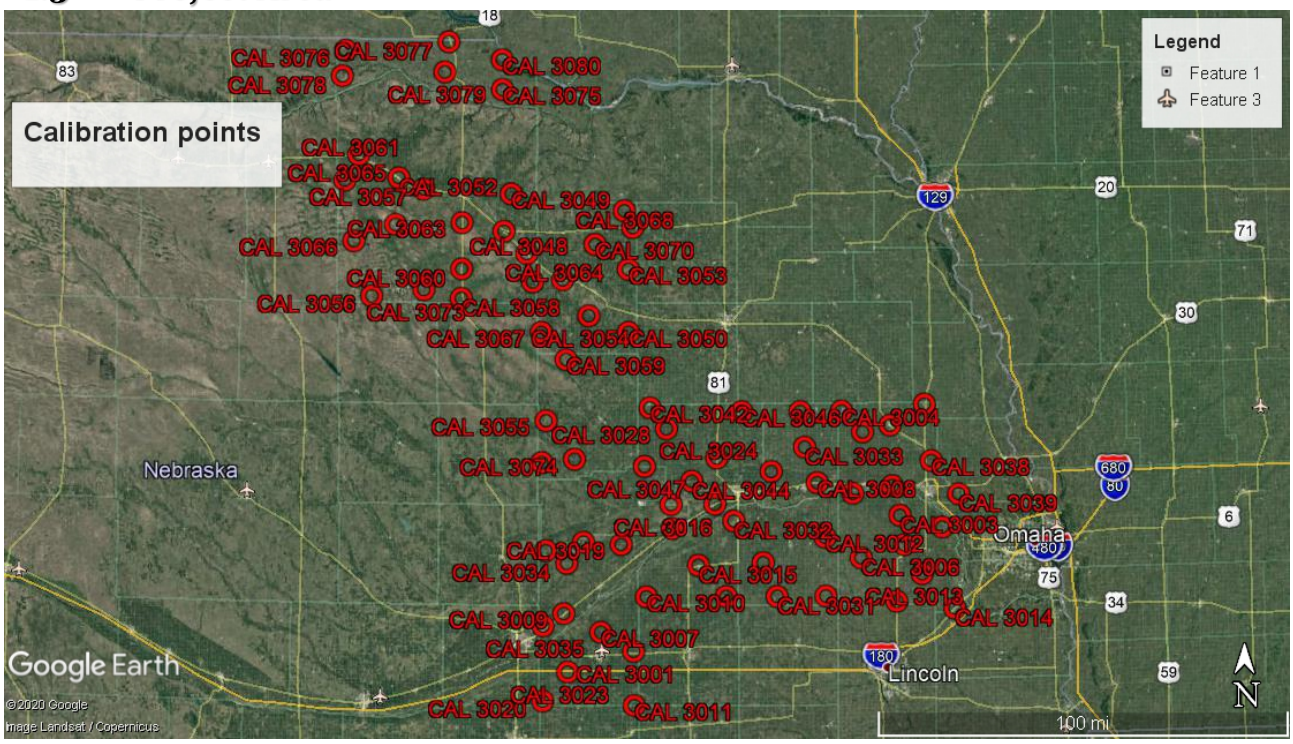
1.3 Project Area



PROJECT DETAILS

2.1 Survey Equipment

In performing the GPS observations Trimble R-10 GNSS receiver/antenna attached to a 1.344meter fixed height pole with a Trimble TSC3 Data Collector to collect GPS raw data were used to perform the field surveys. Pole height was used for stability in windy conditions and lock on satellites while traveling in truck.

2.2 Survey Point Detail

The 80 Check Points were well distributed throughout the project area.

A sketch was made for each location and a nail was set at the point where possible or at an identifiable point. The Check Point locations are detailed on the “Check Point Documentation Report” sheets attached to this report.

2.3 Network Design

Equipment used for this project included two Trimble R10 GNSS receiver with RTX service provided by Trimble (A satellite-based service using worldwide continuously operating reference stations). Horizontal and vertical measurements were verified by recovering and observing coordinates from the Trimble R10 GNSS receiver with the RTX service to 43 NGS (National Geodetic Survey) ground stations

2.4 Field Survey Procedures and Analysis

Merrick field surveyors used Trimble R-10 GNSS receivers, which is a geodetic quality dual frequency GPS receiver, to collect data at each surveyed location.

All locations were occupied once with approximately 50% of the locations being re- observed at a minimum of 4-hour difference in satellite configuration. Points were re-observed until a matching coordinate was obtained. All re-observations matched the initially derived station positions within the allowable tolerance of ± 5cm or within the 95% confidence level.

Field GPS observations are detailed on the "Control Point Documentation Reports" submitted as part of this report.

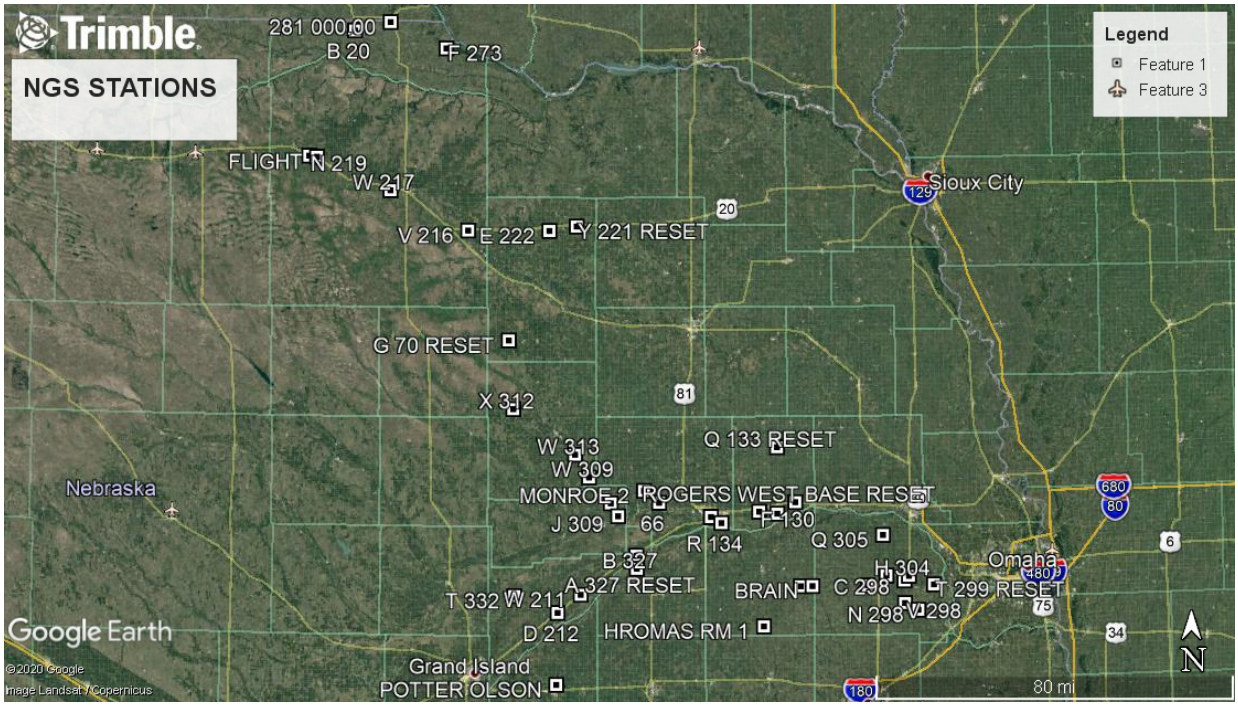
As an additional check, Merrick field crews shot 21 extra Calibration points with a B letter suffix. Those points are included at the bottom of section 3 in this report.

Forty-three (43) existing NGS monument listed in the NSRS database were located as an additional QA/QC method to check the horizontal and vertical accuracy of the RTX network. The results are as follows:

PT NAME	MEASURED VALUES			RECORD VALUES			DIFFERENCES		
	UTM ZONE 14 NORTH		NAVD 88	UTM ZONE 14 NORTH		NAVD 88	NORTHING	EASTING	ELEVATION
	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION			
	METERS	METERS	METERS	METERS	METERS	METERS			
66	4592377.668	620169.751	459.898			459.952			-0.054
281000	4760628.551	522370.929	556.758	4760628.48	522370.894	556.804	0.073	0.035	-0.046
A327RESET	4570436.361	612554.119	474.489			474.53			-0.041
B20	4757491.779	509764.846	570.156			570.079			0.077
B327	4569009.818	612637.476	474.226			474.271			-0.045
BRAIN	4563696.387	674987.336	496.921	4563696.3	674987.316	496.9	0.087	0.020	0.021
C298	4566035.788	707732.434	370.002			369.984			0.018
D212	4552985.867	584794.323	516.367			516.341			0.026
E222	4687470.910	579969.597	559.116			559.089			0.027
E309	4591938.043	603067.656	486.678			486.676			0.002
F130	4589727.115	655640.569	418.470			418.503			-0.033
F273	4751506.179	542410.794	518.360	4751506.13	542410.758	518.34	0.053	0.036	0.020
FLIGHT	4712578.641	497089.851	650.493	4712578.58	497089.828	650.5	0.058	0.023	-0.007
G70	4648739.502	566163.767	598.172	4648739.46	566163.73	598	0.045	0.037	0.172
H304	4567707.890	709292.188	366.611			366.659			-0.048
HROMASRM1	4549226.125	657990.341	498.558	4549226.08	657990.335	498.56	0.048	0.006	-0.002
J309	4587421.680	605747.338	475.017			475.059			-0.042
J329RESET	4589106.525	662089.510	411.367			411.4			-0.033
LUDI	4567755.207	701259.240	372.317	4567755.14	701259.212	372.35	0.065	0.028	-0.033
MONROE2	4596497.657	614763.184	527.426	4596497.58	614763.185	527.5	0.077	-0.001	-0.074
N219	4712924.107	494317.536	651.083			651.117			-0.034
N298	4555718.135	712883.740	350.035	4555718.08	712883.718	350.094	0.057	0.022	-0.059
POTTEROLSEN	4527484.873	584650.955	547.864	4527484.83	584650.947	547.96	0.047	0.008	-0.096
Q133RESET	4612554.784	661619.992	464.200			464.25			-0.050
Q305	4582070.553	699776.624	390.982			391.093			-0.111
R134	4585535.252	642336.115	432.502	4585535.19	642336.063	432.504	0.060	0.052	-0.002
RAIL	4587639.333	638557.305	438.247	4587639.21	638557.323	438.348	0.119	-0.018	-0.101
RAILRM1	4587623.847	638606.753	438.347			438.359			-0.012
ROGERSWESTBASE	4593258.549	668417.994	406.184	4593258.5	668417.977	406.2	0.054	0.017	-0.016
SKULLLAZMK	4563597.730	670875.336	502.005	4563597.67	670875.316	502.00	0.060	0.020	0.005
T81	4564170.261	694650.626	375.480			375.503			-0.023
T299RESET	4564778.080	718278.443	368.643			368.74			-0.097
T332	4558704.937	569350.199	532.308	4558704.9	569350.225	532.337	0.038	-0.026	-0.029
V216	4687228.191	551197.902	589.585	4687228.11	551197.876	589.619	0.077	0.026	-0.034
V298	4558050.733	708071.531	342.287			342.308			-0.021
W211	4559548.405	592872.192	502.678			502.718			-0.040
W217	4701065.405	523424.545	608.389	4701065.34	523424.346	608.382	0.065	0.199	0.007
W309	4600912.792	595190.372	503.877			503.934			-0.057
W313	4608885.332	590200.076	516.914			516.91			0.004
X312	4624596.014	568104.740	614.079			614.071			0.008
Y221 RESET	4689190.007	589592.904	545.975	4689189.96	589592.911	545.96	0.051	-0.007	0.015
Y297	4567602.129	701214.826	372.268	4567602.08	701214.799	372.306	0.047	0.027	-0.038
Y326RESET	4573461.698	612295.956	474.346			474.36			-0.014

The above results indicate that the RTX network is providing positional values within the 5cm parameters for this survey. Crustal movement is consistent in this area and generally to the North.

NGS Monuments



2.5 Adjustment

The survey data was collected using RTX methodology. RTX is a satellite-based network using CORS stations as control.

The system is designed to provide a true Network RTX performance enables high-accuracy positioning in real time globally. The RTX satellite sends corrections to the roving receiver in real time. Therefore, corrections were applied to the points as they were being collected, thus negating the need for a post process adjustment.

2.6 Data Processing Procedures

Field data is collected the information is downloaded from the data collectors into the office software. RTX data is collected in ITRF(2014) The Software program used is called Trimble Business Center version 5.32.

Downloaded data is exported in decimal degrees to 9 places from TBC program to obtain an import for NGS program called HTDP. Horizontal Time Dependent Positioning converts the data to NAD83(2011). The points are then imported back to TBC with the coordinate system required for the project. UTM zone 14 was used for this project and a current geoid model 18 to derive elevations.

The point data is then reviewed to verify the conversion by comparing NGS published values to collected values. Once this is verified, the coordinates for NVA, VVA, and Calibration points are delivered to mapping for further checking.

Calibration coordinates are listed below:

3. *FINAL COORDINATES/ELEVATIONS*

PT #	UTM ZONE 14 NORTH		NAVD88	CODE	NOTE
	NORTHING	EASTING	ELEVATION		
			GEOID 18		
3001	4526851.048	596998.512	533.926	LIPT	CAL
3002A	4588684.443	680616.188	394.451	LIPT	CAL
3003	4580440.313	698986.596	389.551	LIPT	CAL
3004	4620154.119	675787.485	444.213	LIPT	CAL
3005	4574227.836	611227.870	473.626	LIPT	CAL
3006	4563945.588	684227.954	414.814	LIPT	CAL
3007	4534026.493	584293.926	552.192	LIPT	CAL
3008	4592547.386	666830.157	408.996	LIPT	CAL
3009	4540971.478	569926.008	540.597	LIPT	CAL
3010	4547871.434	601674.120	532.164	LIPT	CAL
3011	4505944.223	597598.600	526.043	LIPT	CAL
3012	4571665.157	670142.272	459.454	LIPT	CAL
3013	4558086.996	708007.064	343.644	LIPT	CAL
3014	4545220.994	720976.004	333.537	LIPT	CAL
3015	4560281.888	621535.573	506.418	LIPT	CAL
3016	4583454.111	610661.116	477.667	LIPT	CAL
3017A	4583754.503	627554.013	451.618	LIPT	CAL
3018	4591806.596	695850.036	376.889	LIPT	CAL
3019	4567846.294	591648.802	499.663	LIPT	CAL

3020	4507144.074	562164.194	571.399	LIPT	CAL
3021	4568498.780	577166.370	528.618	LIPT	CAL
3022	4547333.548	698308.420	365.282	LIPT	CAL
3023	4518516.299	571714.400	559.708	LIPT	CAL
3024	4601504.238	627952.741	508.539	LIPT	CAL
3025	4569205.951	700851.258	373.291	LIPT	CAL
3026	4619760.401	659829.694	474.472	LIPT	CAL
3027	4549108.477	670864.180	449.476	LIPT	CAL
3028	4612452.888	608463.745	536.576	LIPT	CAL
3029	4612269.984	684063.767	418.364	LIPT	CAL
3030	4596627.997	649047.219	450.855	LIPT	CAL
3031	4548717.378	652033.890	462.713	LIPT	CAL
3032	4577431.864	634933.085	449.995	LIPT	CAL
3033	4606119.861	661763.665	472.312	LIPT	CAL
3034	4560332.114	570808.265	532.999	LIPT	CAL
3035	4536106.694	561950.920	552.095	LIPT	CAL
3036	4561593.983	646470.848	476.635	LIPT	CAL
3037	4614981.528	694621.670	381.348	LIPT	CAL
3038	4601618.185	710771.462	367.596	LIPT	CAL
3039	4589019.385	721601.825	351.638	LIPT	CAL
3040	4623125.806	707830.809	399.766	LIPT	CAL
3041	4576124.739	715431.851	390.812	LIPT	CAL
3042	4620354.540	602021.719	559.930	LIPT	CAL
3043	4548507.588	632307.164	502.286	LIPT	CAL
3044	4592478.662	618530.745	462.675	LIPT	CAL
3045	4565084.106	562714.329	533.199	LIPT	CAL
3046	4619388.382	637297.364	499.851	LIPT	CAL
3047	4597893.519	600240.383	510.829	LIPT	CAL

3048	4678752.249	553790.853	566.361	LIPT	CAL
3049	4701624.413	547455.445	592.777	LIPT	CAL
3050	4649130.213	593377.123	568.032	LIPT	CAL
3051	4598715.236	560703.212	612.098	LIPT	CAL
3052	4707218.420	504001.692	639.924	LIPT	CAL
3053A	4673174.612	592976.623	535.896	LIPT	CAL
3054	4655256.955	578076.098	584.061	LIPT	CAL
3055	4614885.468	562115.988	610.784	LIPT	CAL
3056	4661190.773	494274.819	710.260	LIPT	CAL
3057	4702980.069	513660.431	619.556	LIPT	CAL
3058	4661284.340	528828.330	629.938	LIPT	CAL
3059	4638336.848	569535.179	593.941	LIPT	CAL
3060	4672572.346	527944.193	626.083	LIPT	CAL
3061	4715788.407	488281.879	655.432	LIPT	CAL
3062	4695684.667	591073.777	510.434	LIPT	CAL
3063	4690295.441	528689.468	614.324	LIPT	CAL
3064	4668833.984	567687.866	546.147	LIPT	CAL
3065	4706080.080	483100.320	679.987	LIPT	CAL
3066	4682819.234	486980.223	708.269	LIPT	CAL
3067C	4648623.664	559848.924	629.799	LIPT	CAL
3068	4689435.960	594395.020	536.714	LIPT	CAL
3069A	4689323.033	503011.523	673.376	LIPT	CAL
3070	4682641.387	580138.195	590.613	LIPT	CAL
3071	4687171.849	544887.075	579.936	LIPT	CAL
3072	4667916.706	556173.626	604.592	LIPT	CAL
3073	4664453.497	514331.289	668.876	LIPT	CAL
3074	4600461.023	572211.995	535.739	LIPT	CAL
3075	4741499.885	543398.455	427.090	LIPT	CAL

3076	4756155.024	482458.301	626.958	LIPT	CAL
3077	4759896.928	522418.417	556.992	LIPT	CAL
3078	4746327.514	481393.142	584.619	LIPT	CAL
3079	4748234.438	521035.985	519.168	LIPT	CAL
3080	4753163.474	543168.773	468.389	LIPT	CAL

PT#	UTM ZONE 14 NORTH		NAVD88	CODE	NOTE
	NORTHING	EASTING	ELEVATION		
			GEOID 18		
3005B	4575990.338	614074.717	469.406	LIPT	CAL
3006B	4555751.553	679546.105	422.481	LIPT	CAL
3012B	4576499.374	672187.031	448.352	LIPT	CAL
3015B	4564411.485	627125.268	502.889	LIPT	CAL
3025B	4566834.417	709324.792	369.599	LIPT	CAL
3028B	4617425.396	616662.452	514.059	LIPT	CAL
3028D	4617425.388	616662.448	514.063	LIPT	CAL
3032B	4587693.551	638553.299	439.386	LIPT	CAL
3032D	4587693.559	638553.292	439.401	LIPT	CAL
3033B	4607131.972	671294.867	423.291	LIPT	CAL
3034B	4560217.759	561221.938	552.122	LIPT	CAL
3037B	4612350.000	696876.835	379.156	LIPT	CAL
3044B	4596476.725	614768.070	527.550	LIPT	CAL
3044D	4596476.739	614768.061	527.586	LIPT	CAL
3048B	4679172.213	554363.284	564.339	LIPT	CAL
3054B	4648819.072	575888.599	585.170	LIPT	CAL

3061B	4717350.003	495947.923	647.891	LIPT	CAL
3063B	4686908.497	528698.356	620.245	LIPT	CAL
3076B	4755059.248	496928.735	588.323	LIPT	CAL
3069B	4672444.708	501711.836	684.711	LIPT	CAL
3070B	4687829.109	584700.508	566.997	LIPT	CAL

4. GPS OBSERVATIONS

Point #	START	END	PDOP	HZ PRECISION	VERT PRECISION
3001	11/17/2020 9:31	11/17/2020 9:34	1.542	0.011	0.030
3002A	11/3/2020 9:28	11/3/2020 9:29	1.695	0.015	0.028
3002C	11/4/2020 11:05	11/4/2020 11:06	1.507	0.016	0.036
3003	11/11/2020 10:05	11/11/2020 10:09	1.411	0.013	0.032
3003A	11/12/2020 14:32	11/12/2020 14:33	1.320	0.014	0.034
3004	11/13/2020 11:07	11/13/2020 11:11	1.688	0.011	0.024
3005	10/30/2020 8:49	10/30/2020 8:50	1.650	0.015	0.031
3005A	10/30/2020 16:04	10/30/2020 16:04	1.726	0.015	0.044
3006	11/4/2020 13:45	11/4/2020 13:46	1.231	0.011	0.027
3006C	11/6/2020 7:31	11/6/2020 7:31	2.056	0.017	0.044
3007	11/18/2020 11:42	11/18/2020 11:46	1.559	0.012	0.031
3007A	11/19/2020 6:59	11/19/2020 7:02	1.910	0.016	0.050
3008	11/2/2020 15:28	11/2/2020 15:30	1.628	0.012	0.026

3008A	11/3/2020 7:49	11/3/2020 7:49	1.431	0.019	0.047
3009	11/18/2020 13:40	11/18/2020 13:43	2.194	0.011	0.029
3009A	11/19/2020 9:11	11/19/2020 9:15	1.393	0.010	0.026
3010	11/16/2020 13:03	11/16/2020 13:06	1.414	0.012	0.031
3010A	11/17/2020 8:01	11/17/2020 8:02	1.560	0.015	0.034
3011	11/17/2020 11:10	11/17/2020 11:13	1.412	0.013	0.026
3012	11/2/2020 11:39	11/2/2020 11:40	1.478	0.014	0.028
3012C	11/4/2020 11:40	11/4/2020 11:41	1.394	0.025	0.042
3013	11/5/2020 15:04	11/5/2020 15:07	1.582	0.011	0.030
3013A	11/6/2020 8:37	11/6/2020 8:38	1.342	0.014	0.035
3014	11/5/2020 12:42	11/5/2020 12:45	1.524	0.010	0.032
3015	11/16/2020 9:40	11/16/2020 9:43	1.804	0.019	0.044
3016	10/30/2020 10:39	10/30/2020 10:40	1.846	0.015	0.030
3016A	10/30/2020 15:32	10/30/2020 15:32	1.559	0.020	0.053
3017A	10/30/2020 16:44	10/30/2020 16:45	1.821	0.017	0.038
3017C	10/31/2020 8:38	10/31/2020 8:38	1.634	0.015	0.029

3018	11/11/2020 14:35	11/11/2020 14:38	1.366	0.011	0.031
3018A	11/12/2020 7:27	11/12/2020 7:27	1.455	0.016	0.038
3019	10/30/2020 12:14	10/30/2020 12:15	1.386	0.015	0.037
3020	11/17/2020 12:57	11/17/2020 13:00	1.363	0.013	0.030
3020A	11/18/2020 8:21	11/18/2020 8:30	1.507	0.011	0.021
3021	11/19/2020 12:05	11/19/2020 12:10	1.686	0.011	0.037
3022	11/5/2020 11:49	11/5/2020 11:52	1.506	0.011	0.028
3022A	11/6/2020 8:21	11/6/2020 8:21	1.271	0.014	0.038
3023	11/17/2020 14:06	11/17/2020 14:10	1.405	0.011	0.034
3023C	11/19/2020 8:05	11/19/2020 8:09	1.568	0.016	0.030
3024	10/28/2020 11:09	10/28/2020 11:10	1.821	0.014	0.030
3024A	10/28/2020 16:00	10/28/2020 16:01	2.212	0.014	0.034
3025	11/6/2020 10:34	11/6/2020 10:38	1.369	0.011	0.026
3025A	11/11/2020 10:27	11/11/2020 10:27	1.398	0.017	0.034
3026	11/3/2020 13:15	11/3/2020 13:17	1.540	0.014	0.037
3027	11/14/2020 11:24	11/14/2020 11:27	1.380	0.012	0.026

3027A	11/14/2020 16:28	11/14/2020 16:29	1.505	0.015	0.030
3028	10/29/2020 8:07	10/29/2020 8:07	1.640	0.016	0.034
3028C	10/31/2020 12:24	10/31/2020 12:25	1.456	0.016	0.035
3029	11/13/2020 10:06	11/13/2020 10:10	1.434	0.010	0.025
3030	11/4/2020 7:02	11/4/2020 7:05	1.659	0.013	0.026
3031	11/14/2020 11:52	11/14/2020 11:55	1.428	0.011	0.041
3031A	11/14/2020 16:44	11/14/2020 16:45	1.677	0.015	0.029
3032	10/27/2020 10:24	10/27/2020 10:25	1.628	0.015	0.038
3032A	10/27/2020 15:57	10/27/2020 15:58	1.649	0.018	0.047
3033	11/3/2020 15:06	11/3/2020 15:07	1.417	0.014	0.028
3033A	11/4/2020 7:46	11/4/2020 7:47	1.493	0.016	0.034
3034	11/18/2020 16:02	11/18/2020 16:05	1.412	0.012	0.027
3034A	11/19/2020 10:49	11/19/2020 10:53	1.497	0.014	0.035
3035	11/18/2020 13:22	11/18/2020 13:26	1.369	0.011	0.029
3035A	11/19/2020 8:54	11/19/2020 9:00	1.371	0.009	0.025
3036	11/14/2020 9:24	11/14/2020 9:27	1.490	0.011	0.032

3036A	11/14/2020 15:28	11/14/2020 15:29	2.673	0.018	0.045
3037	11/12/2020 12:03	11/12/2020 12:07	1.665	0.014	0.031
3037A	11/13/2020 16:11	11/13/2020 16:12	1.703	0.015	0.037
3038	11/12/2020 8:30	11/12/2020 8:33	1.683	0.018	0.038
3038A	11/13/2020 13:05	11/13/2020 13:06	1.368	0.013	0.040
3039	11/11/2020 13:47	11/11/2020 13:50	1.316	0.010	0.026
3040	11/12/2020 11:01	11/12/2020 11:04	1.371	0.011	0.025
3040A	11/13/2020 15:23	11/13/2020 15:24	2.482	0.014	0.037
3041	11/6/2020 12:57	11/6/2020 13:00	1.386	0.010	0.030
3042	10/29/2020 9:45	10/29/2020 9:46	1.467	0.014	0.044
3042A	10/29/2020 15:28	10/29/2020 15:28	1.331	0.015	0.040
3043	11/14/2020 13:46	11/14/2020 13:50	1.556	0.010	0.026
3043A	11/16/2020 7:56	11/16/2020 7:57	1.604	0.014	0.028
3044	10/28/2020 12:09	10/28/2020 12:10	1.532	0.015	0.033
3045	11/19/2020 12:39	11/19/2020 12:43	1.568	0.013	0.029
3046	10/28/2020 8:40	10/28/2020 8:41	1.585	0.015	0.030

3046C	10/31/2020 11:02	10/31/2020 11:02	1.287	0.015	0.045
3047	10/29/2020 13:31	10/29/2020 13:31	1.284	0.014	0.030
3048	11/12/2020 7:48	11/12/2020 7:55	1.919	0.027	0.043
3048C	11/16/2020 5:48	11/16/2020 5:51	1.620	0.014	0.041
3049	11/7/2020 7:40	11/7/2020 7:42	1.471	0.013	0.042
3049A	11/9/2020 15:28	11/9/2020 15:31	2.241	0.016	0.031
3050	11/5/2020 8:53	11/5/2020 9:00	1.616	0.010	0.034
3050C	11/19/2020 15:39	11/19/2020 15:39	1.640	0.015	0.043
3051	11/18/2020 10:57	11/18/2020 11:01	1.393	0.012	0.029
3051A	11/19/2020 7:57	11/19/2020 8:00	1.391	0.014	0.030
3052	10/27/2020 9:34	10/27/2020 9:40	1.500	0.009	0.036
3052A	10/27/2020 17:26	10/27/2020 17:32	1.974	0.009	0.034
3053A	11/11/2020 14:03	11/11/2020 14:06	1.543	0.012	0.029
3053C	11/16/2020 9:09	11/16/2020 9:12	1.496	0.011	0.036
3054	11/11/2020 11:12	11/11/2020 11:18	1.683	0.009	0.028
3055	11/18/2020 9:22	11/18/2020 9:26	1.623	0.012	0.033

3055A	11/18/2020 14:22	11/18/2020 14:22	1.560	0.015	0.032
3056	10/29/2020 9:53	10/29/2020 10:00	1.259	0.008	0.024
3056A	10/30/2020 14:15	10/30/2020 14:16	1.421	0.012	0.039
3057	10/29/2020 15:06	10/29/2020 15:11	1.423	0.023	0.044
3057A	10/30/2020 7:01	10/30/2020 7:05	2.000	0.015	0.044
3058	11/17/2020 7:14	11/17/2020 7:17	1.337	0.011	0.045
3058C	11/18/2020 15:21	11/18/2020 15:21	1.566	0.015	0.042
3059	11/20/2020 10:05	11/20/2020 10:09	1.733	0.011	0.032
3060	11/2/2020 9:21	11/2/2020 9:25	1.554	0.011	0.028
3060A	11/18/2020 15:49	11/18/2020 15:49	1.564	0.015	0.043
3061	10/27/2020 13:36	10/27/2020 13:40	1.451	0.018	0.032
3061E	11/17/2020 16:56	11/17/2020 16:56	2.026	0.014	0.043
3062	11/4/2020 7:49	11/4/2020 7:56	1.516	0.020	0.045
3063	10/30/2020 10:40	10/30/2020 10:44	1.546	0.030	0.054
3063A	11/17/2020 6:30	11/17/2020 6:31	1.804	0.022	0.041
3064	11/12/2020 13:11	11/12/2020 13:15	1.428	0.010	0.028

3064A	11/16/2020 8:02	11/16/2020 8:03	1.743	0.017	0.032
3065	10/27/2020 14:42	10/27/2020 14:46	1.347	0.009	0.037
3066	10/28/2020 11:12	10/28/2020 11:16	1.470	0.010	0.026
3066D	11/17/2020 15:18	11/17/2020 15:18	1.664	0.016	0.042
3067C	11/19/2020 14:10	11/19/2020 14:11	1.622	0.016	0.040
3067E	11/20/2020 8:51	11/20/2020 8:51	1.630	0.015	0.037
3068	11/4/2020 9:44	11/4/2020 9:48	1.309	0.012	0.026
3068C	11/16/2020 16:06	11/16/2020 16:08	1.813	0.015	0.042
3069A	10/29/2020 8:16	10/29/2020 8:17	1.411	0.026	0.044
3069C	11/9/2020 12:27	11/9/2020 12:33	1.492	0.028	0.034
3070	11/6/2020 8:41	11/6/2020 8:45	1.601	0.012	0.033
3070C	11/11/2020 14:58	11/11/2020 15:00	1.439	0.025	0.042
3071	11/16/2020 11:44	11/16/2020 11:47	1.422	0.015	0.026
3071A	11/16/2020 18:05	11/16/2020 18:09	1.620	0.010	0.032
3072	11/12/2020 10:00	11/12/2020 10:04	1.486	0.013	0.033
3072A	11/16/2020 6:14	11/16/2020 6:15	1.579	0.020	0.043

3073	10/31/2020 10:29	10/31/2020 10:31	1.620	0.014	0.032
3074	11/18/2020 12:59	11/18/2020 13:04	1.338	0.009	0.023
3074A	11/19/2020 8:43	11/19/2020 8:45	1.344	0.015	0.035
3075	11/13/2020 7:27	11/13/2020 7:30	1.294	0.013	0.033
3076	11/13/2020 14:38	11/13/2020 14:42	1.321	0.010	0.026
3076A	11/14/2020 8:48	11/14/2020 8:50	1.529	0.021	0.045
3077	11/13/2020 10:14	11/13/2020 10:17	1.324	0.011	0.024
3077A	11/20/2020 15:20	11/20/2020 15:21	1.515	0.012	0.042
3078	11/14/2020 9:25	11/14/2020 9:29	1.482	0.011	0.035
3079	11/13/2020 6:13	11/13/2020 6:16	1.481	0.011	0.026
3080	11/14/2020 12:47	11/14/2020 12:51	1.404	0.010	0.030

5. POINT COMPARISON

PT #	UTM ZONE 14 NORTH		NAVD88	CODE	NOTE	DIFFERENCES		
	NORTHING	EASTING	ELEVATION			NORTHING	EASTING	ELEVATION
			GEOID 18					
3001	4526851.048	596998.512	533.926	LIPT	CAL	N/A	N/A	N/A
3002A	4588684.443	680616.188	394.451	LIPT	CAL	-0.016	-0.017	0.001
3002C	4588684.459	680616.205	394.45	LIPT	CAL			
3003	4580440.313	698986.596	389.551	LIPT	CAL	-0.011	0.003	0.015
3003A	4580440.324	698986.593	389.536	LIPT	CAL			
3004	4620154.119	675787.485	444.213	LIPT	CAL	N/A	N/A	N/A
3005	4574227.836	611227.87	473.626	LIPT	CAL	0.009	-0.004	-0.030
3005A	4574227.827	611227.874	473.656	LIPT	CAL			
3006	4563945.588	684227.954	414.814	LIPT	CAL	-0.015	-0.002	-0.003
3006C	4563945.603	684227.956	414.817	LIPT	CAL			
3007	4534026.493	584293.926	552.192	LIPT	CAL	-0.001	-0.001	-0.018
3007A	4534026.494	584293.927	552.21	LIPT	CAL			
3008	4592547.386	666830.157	408.996	LIPT	CAL	0.020	-0.003	-0.007
3008A	4592547.366	666830.16	409.003	LIPT	CAL			
3009	4540971.478	569926.008	540.597	LIPT	CAL	-0.019	-0.023	-0.048
3009A	4540971.497	569926.031	540.645	LIPT	CAL			
3010	4547871.434	601674.12	532.164	LIPT	CAL	0.020	-0.030	-0.006
3010A	4547871.414	601674.15	532.17	LIPT	CAL			
3011	4505944.223	597598.6	526.043	LIPT	CAL	N/A	N/A	N/A
3012	4571665.157	670142.272	459.454	LIPT	CAL	0.000	0.000	-0.016
3012C	4571665.157	670142.272	459.47	LIPT	CAL			

3013	4558086.996	708007.064	343.644	LIPT	CAL	-0.03	-0.005	-0.006
3013A	4558087.026	708007.069	343.65	LIPT	CAL			
3014	4545220.994	720976.004	333.537	LIPT	CAL	N/A	N/A	N/A
3015	4560281.888	621535.573	506.418	LIPT	CAL	N/A	N/A	N/A
3016	4583454.111	610661.116	477.667	LIPT	CAL	0.014	-0.005	0.008
3016A	4583454.097	610661.121	477.659	LIPT	CAL			
3017A	4583754.503	627554.013	451.618	LIPT	CAL	0.030	0.004	0.042
3017C	4583754.473	627554.009	451.576	LIPT	CAL			
3018	4591806.596	695850.036	376.889	LIPT	CAL	-0.018	0.009	0.008
3018A	4591806.614	695850.027	376.881	LIPT	CAL			
3019	4567846.294	591648.802	499.663	LIPT	CAL	N/A	N/A	N/A
3020	4507144.074	562164.194	571.399	LIPT	CAL	-0.040	0.018	0.046
3020A	4507144.114	562164.176	571.353	LIPT	CAL			
3021	4568498.78	577166.37	528.618	LIPT	CAL	N/A	N/A	N/A
3022	4547333.548	698308.42	365.282	LIPT	CAL	0.014	0.003	-0.005
3022A	4547333.534	698308.417	365.287	LIPT	CAL			
3023	4518516.299	571714.4	559.708	LIPT	CAL	0.003	-0.032	-0.007
3023C	4518516.296	571714.432	559.715	LIPT	CAL			
3024	4601504.238	627952.741	508.539	LIPT	CAL	-0.002	-0.019	0.027
3024A	4601504.24	627952.76	508.512	LIPT	CAL			
3025	4569205.951	700851.258	373.291	LIPT	CAL	-0.002	-0.019	0.027
3025A	4569205.943	700851.278	373.302	LIPT	CAL			
3026	4619760.401	659829.694	474.472	LIPT	CAL	N/A	N/A	N/A
3027	4549108.477	670864.18	449.476	LIPT	CAL	-0.004	-0.030	-0.029
3027A	4549108.481	670864.21	449.505	LIPT	CAL			
3028	4612452.888	608463.745	536.576	LIPT	CAL	-0.037	-0.004	0.034
3028C	4612452.925	608463.749	536.542	LIPT	CAL			
3029	4612269.984	684063.767	418.364	LIPT	CAL	N/A	N/A	N/A
3030	4596627.997	649047.219	450.855	LIPT	CAL	N/A	N/A	N/A

3031	4548717.378	652033.89	462.713	LIPT	CAL	0.008	-0.016	-0.041
3031A	4548717.37	652033.906	462.754	LIPT	CAL			
3032	4577431.864	634933.085	449.995	LIPT	CAL	-0.029	0.000	0.003
3032A	4577431.893	634933.085	449.992	LIPT	CAL			
3033	4606119.861	661763.665	472.312	LIPT	CAL	0.015	-0.035	-0.020
3033A	4606119.846	661763.7	472.332	LIPT	CAL			
3034	4560332.114	570808.265	532.999	LIPT	CAL	-0.023	-0.022	-0.002
3034A	4560332.137	570808.287	533.001	LIPT	CAL			
3035	4536106.694	561950.92	552.095	LIPT	CAL	0.018	-0.004	-0.045
3035A	4536106.676	561950.924	552.14	LIPT	CAL			
3036	4561593.983	646470.848	476.635	LIPT	CAL	-0.051	0.015	-0.030
3036A	4561594.034	646470.833	476.665	LIPT	CAL			
3037	4614981.528	694621.67	381.348	LIPT	CAL	0.030	-0.006	0.021
3037A	4614981.498	694621.676	381.327	LIPT	CAL			
3038	4601618.185	710771.462	367.596	LIPT	CAL	0.017	0.031	0.007
3038A	4601618.168	710771.431	367.589	LIPT	CAL			
3039	4589019.385	721601.825	351.638	LIPT	CAL	N/A	N/A	N/A
3040	4623125.806	707830.809	399.766	LIPT	CAL	0.018	0.000	-0.029
3040A	4623125.788	707830.809	399.795	LIPT	CAL			
3041	4576124.739	715431.851	390.812	LIPT	CAL	N/A	N/A	N/A
3042	4620354.54	602021.719	559.93	LIPT	CAL	-0.031	-0.011	-0.021
3042A	4620354.571	602021.73	559.951	LIPT	CAL			
3043	4548507.588	632307.164	502.286	LIPT	CAL	-0.014	-0.010	-0.036
3043A	4548507.602	632307.174	502.322	LIPT	CAL			
3044	4592478.662	618530.745	462.675	LIPT	CAL	N/A	N/A	N/A
3045	4565084.106	562714.329	533.199	LIPT	CAL	N/A	N/A	N/A
3046	4619388.382	637297.364	499.851	LIPT	CAL	-0.021	-0.009	-0.010
3046C	4619388.403	637297.373	499.861	LIPT	CAL			
3047	4597893.519	600240.383	510.829	LIPT	CAL	N/A	N/A	N/A

3048	4678752.249	553790.853	566.361	LIPT	CAL	0.007	-0.012	-0.035
3048C	4678752.242	553790.865	566.396	LIPT	CAL			
3049	4701624.413	547455.445	592.777	LIPT	CAL	0.026	0.010	0.014
3049A	4701624.387	547455.435	592.763	LIPT	CAL			
3050	4649130.213	593377.123	568.032	LIPT	CAL	0.023	-0.006	-0.006
3050C	4649130.19	593377.129	568.038	LIPT	CAL			
3051	4598715.236	560703.212	612.098	LIPT	CAL	N/A	N/A	N/A
3052	4707218.42	504001.692	639.924	LIPT	CAL	0.000	0.022	-0.023
3052A	4707218.42	504001.67	639.947	LIPT	CAL			
3053A	4673174.612	592976.623	535.896	LIPT	CAL	-0.012	-0.016	0.012
3053C	4673174.624	592976.639	535.884	LIPT	CAL			
3054	4655256.955	578076.098	584.061	LIPT	CAL	N/A	N/A	N/A
3055	4614885.468	562115.988	610.784	LIPT	CAL	-0.007	0.003	-0.018
3055A	4614885.475	562115.985	610.802	LIPT	CAL			
3056	4661190.773	494274.819	710.26	LIPT	CAL	-0.009	-0.011	-0.048
3056A	4661190.782	494274.83	710.308	LIPT	CAL			
3057	4702980.069	513660.431	619.556	LIPT	CAL	-0.020	-0.004	0.002
3057A	4702980.089	513660.435	619.554	LIPT	CAL			
3058	4661284.34	528828.33	629.938	LIPT	CAL	-0.006	-0.003	0.031
3058C	4661284.346	528828.333	629.907	LIPT	CAL			
3059	4638336.848	569535.179	593.941	LIPT	CAL	N/A	N/A	N/A
3060	4672572.346	527944.193	626.083	LIPT	CAL	-0.014	-0.018	0.014
3060A	4672572.36	527944.211	626.069	LIPT	CAL			
3061	4715788.407	488281.879	655.432	LIPT	CAL	-0.013	-0.010	0.005
3061E	4715788.42	488281.889	655.427	LIPT	CAL			
3062	4695684.667	591073.777	510.434	LIPT	CAL	N/A	N/A	N/A
3063	4690295.441	528689.468	614.324	LIPT	CAL	-0.006	-0.003	-0.001
3063A	4690295.447	528689.471	614.325	LIPT	CAL			
3064	4668833.984	567687.866	546.147	LIPT	CAL	-0.012	0.010	0.001

3064A	4668833.996	567687.856	546.146	LIPT	CAL			
3065	4706080.08	483100.32	679.987	LIPT	CAL	N/A	N/A	N/A
3066	4682819.234	486980.223	708.269	LIPT	CAL	-0.010	0.004	-0.006
3066D	4682819.244	486980.219	708.275	LIPT	CAL			
3067C	4648623.664	559848.924	629.799	LIPT	CAL	0.007	0.008	0.040
3067E	4648623.657	559848.916	629.759	LIPT	CAL			
3068	4689435.96	594395.02	536.714	LIPT	CAL	-0.005	0.027	-0.001
3068C	4689435.965	594394.993	536.715	LIPT	CAL			
3069A	4689323.033	503011.523	673.376	LIPT	CAL	0.005	0.013	0.004
3069C	4689323.028	503011.51	673.372	LIPT	CAL			
3070	4682641.387	580138.195	590.613	LIPT	CAL	-0.015	-0.008	0.032
3070C	4682641.402	580138.203	590.581	LIPT	CAL			
3071	4687171.849	544887.075	579.936	LIPT	CAL	0.016	0.009	-0.031
3071A	4687171.833	544887.066	579.967	LIPT	CAL			
3072	4667916.706	556173.626	604.592	LIPT	CAL	-0.008	0.016	0.006
3072A	4667916.714	556173.61	604.586	LIPT	CAL			
3073	4664453.497	514331.289	668.876	LIPT	CAL	N/A	N/A	N/A
3074	4600461.023	572211.995	535.739	LIPT	CAL	-0.002	0.006	-0.015
3074A	4600461.025	572211.989	535.754	LIPT	CAL			
3075	4741499.885	543398.455	427.09	LIPT	CAL	N/A	N/A	N/A
3076	4756155.024	482458.301	626.958	LIPT	CAL	0.000	-0.002	0.007
3076A	4756155.024	482458.303	626.951	LIPT	CAL			
3077	4759896.928	522418.417	556.992	LIPT	CAL	0.019	-0.008	0.025
3077A	4759896.909	522418.425	556.967	LIPT	CAL			
3078	4746327.514	481393.142	584.619	LIPT	CAL	N/A	N/A	N/A
3079	4748234.438	521035.985	519.168	LIPT	CAL	N/A	N/A	N/A
3080	4753163.474	543168.773	468.389	LIPT	CAL	N/A	N/A	N/A