

Ground Control Point Survey Report

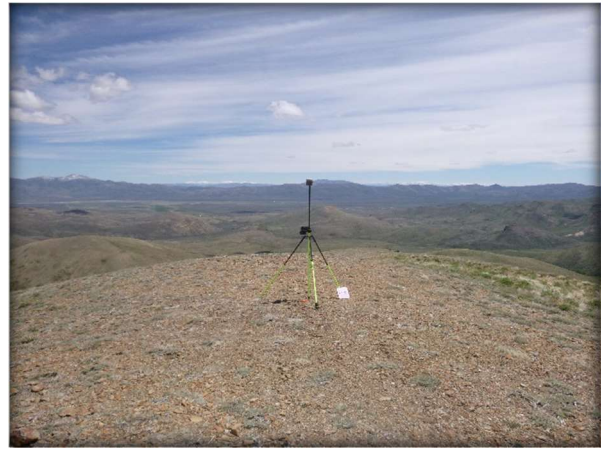
NV NORTHWEST ELKO 2020 D20 Lidar Project

USGS Contract: G16PC00020

Task Order Number: 140G0220F0313

Prepared for:

United States Geological Survey (USGS)



Prepared By:

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	Including: a) Point Documentation Report & Photos of Survey Points	
	b) Final Coordinate List in Excel Format	
	c) NGS Data Sheets for Project Controls	

1. INTRODUCTION

1.1 *Project Summary*

Dewberry Engineers Inc. is under contract to the United States Geological Survey to provide 157 Ground Control Points in the State of Nevada. Under the above referenced USGS Task Order, Dewberry is tasked to complete the quality assurance of LiDAR products. As part of this work Dewberry staff will complete Ground Control Point surveys that will be used to evaluate vertical and horizontal accuracy. The ground survey was conducted from November 2020 thru August, 2021.

Existing NGS Control Points were located and surveyed to check the accuracy of the RTK/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 Ground Control 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 11 North, NAD83 (2011) in meters. Final Vertical elevations are referenced to NAVD88 in meters using Geoid model 2018B (Geoid18B).

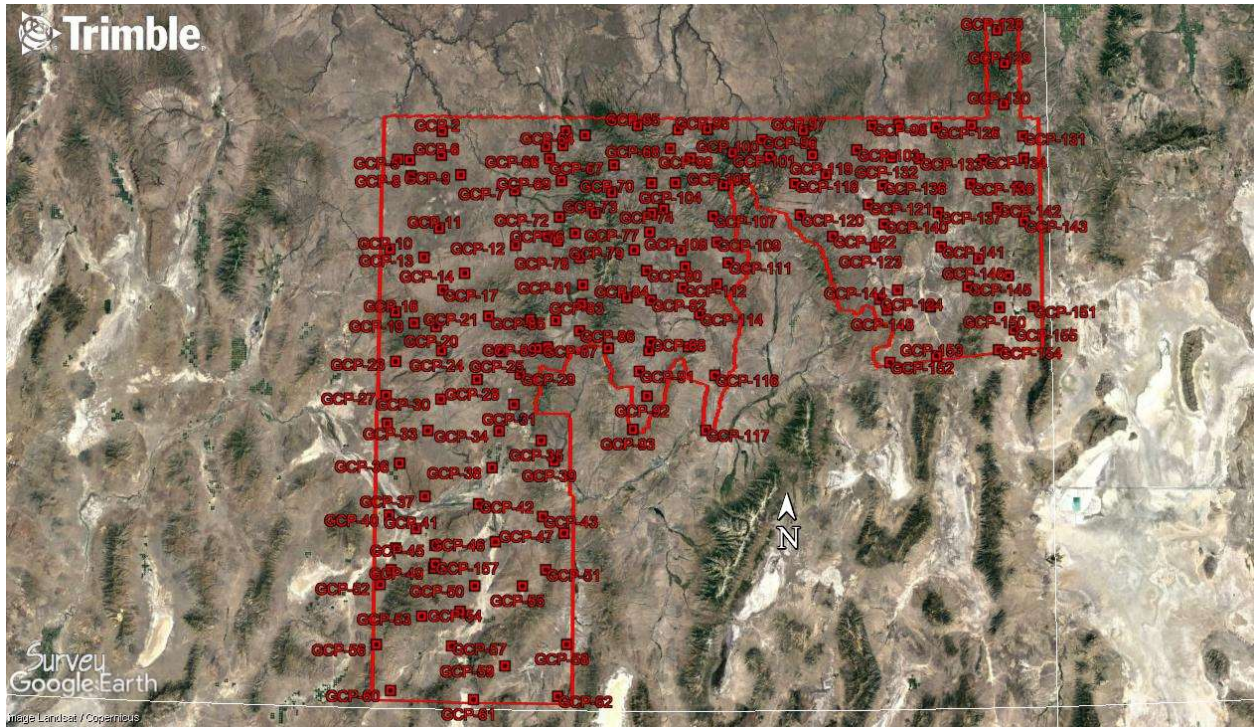
1.2 *Points of Contact*

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 two meter fixed height pole with a Trimble TSC3 Data Collector to collect GPS raw data were used to perform the field surveys.

2.2 *Survey Point Detail*

The 157 Ground Control 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 Ground Control Point locations are detailed on the “Control Point Documentation Report” sheets attached to this report.

2.3 *Network Design*

The GPS survey performed by Dewberry Engineers Inc. office located in Lanham, MD was tied to a Real Time Network operated by Trimble. The network is a series of “real-time” continuously operating, high precision GPS reference stations. All of the reference stations have been linked together using Trimble GPSNet software, creating a Virtual Reference Station System (VRS).

The Trimble NetR5 Reference Station is a multi-channel, multi-frequency GNSS (Global Navigation Satellite System) receiver designed for use as a stand-alone reference station or as part of a GNSS infrastructure solution. Trimble R-Track technology in the NetR5 receiver supports the modernized GPS L2C and L5 signals as well as GLONASS L1/L2 signals.

2.4 Field Survey Procedures and Analysis

Dewberry 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. All re-observations matched the initially derived station positions within the allowable tolerance of $\pm 5\text{cm}$ or within the 95% confidence level. Each occupation which utilized the VRS network was occupied for approximately three (3) minutes in duration and measured to 180 epochs.

Each occupation which utilized OPUS (if used) was occupied between 20 and 30 minutes.

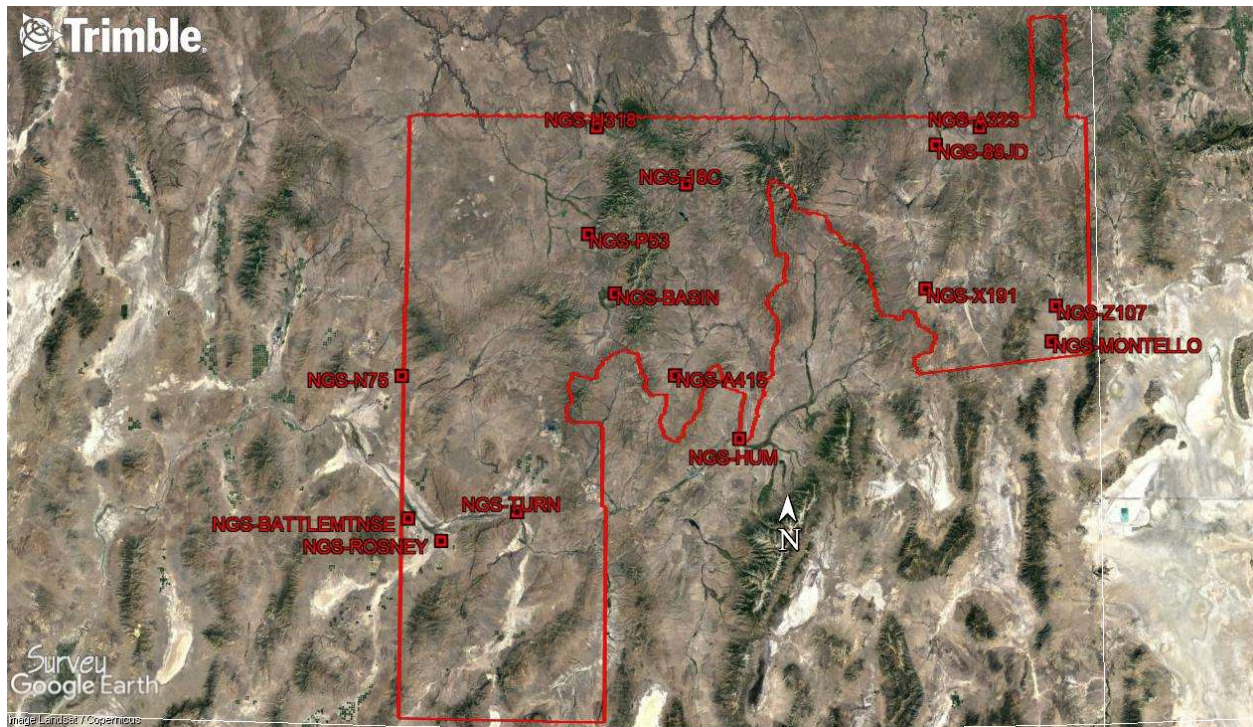
Field GPS observations are detailed on the “Control Point Documentation Reports” submitted as part of this report.

Fourteen (16) existing NGS monument listed in the NSRS database were located for the Louisiana area as an additional QA/QC method to check the horizontal and vertical accuracy of the VRS network as well as being the primary project control monuments. The results are as follows:

PT. #	Observed Values			Data Sheet Values			ΔX	ΔY	ΔZ
	NORTHING	EASTING	ELEVS.	NORTHING	EASTING	ELEVS.			
A415	4556755.625	597201.610	1792.336	N/A	N/A	1792.357	N/A	N/A	-0.021
H318	4645922.608	567335.240	1634.992	4645922.566	567335.260	1634.963	0.042	-0.020	0.029
P53	4607311.130	564856.911	1746.832	N/A	N/A	1746.782	N/A	N/A	0.050
MONTELLO	4571311.519	734211.165	1497.041	4571311.524	734211.178	1497.083	-0.005	-0.013	-0.042
TURN	4506576.055	540732.445	1414.283	4506576.036	540732.436	1414.314	0.019	0.009	-0.031
X191	4589595.160	687675.677	1742.776	N/A	N/A	1742.753	N/A	N/A	0.023
Z107	4584253.152	735571.218	1501.732	N/A	N/A	1501.691	N/A	N/A	0.041
88JD	4641753.604	690674.869	1591.494	4641753.579	690674.872	1591.500	0.025	-0.003	-0.006
A323	4648524.639	706689.172	1830.667	N/A	N/A	1830.620	N/A	N/A	0.047
N75	4555041.052	498118.947	1420.862	4555041.019	498118.969	1420.889	0.033	-0.022	-0.027
18C	4625754.835	600114.196	2001.672	N/A	N/A	2001.699	N/A	N/A	-0.027

The above results indicate that the VRS network is providing positional values within the 5cm parameters for this survey.

NGS Monuments



2.5 Adjustment

The survey data was collected using Virtual Reference Stations (VRS) methodology within a Virtual Reference System (VRS).

The system is designed to provide a true Network RTK performance, the RTKNet software enables high-accuracy positioning in real time across a geographic region. The RTKNet software package uses real-time data streams from the Trimble RTX network user and generates correction models for high-accuracy RTK GPS corrections throughout the network. 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

After field data is collected the information is downloaded from the data collectors into the office software. The Software program used is called Trimble Business Center.

Downloaded data is run through the TBC program to obtain the following reports; points report, point comparison report and a point detail report. The reports are reviewed for point accuracy and precision.

After review of the point data an “ASCII” or “txt” file which is the industry standard is created. Point files are loaded into our CADD program (Carlson Survey 2019) to make a visual check of the point data (Pt. #, Coordinates, Elev. and Description). The data can now be imported into the final product.

3. FINAL COORDINATES/ELEVATIONS

POINT ID	NORTHING (m)	EASTING (m)	ELEV. (m)
UTM 11 North, NAD83 (2011), NAVD 88, Meters, Geoid 18			
GCP			
GCP-1	4633160.777	504913.149	1617.095
GCP-2	4643903.618	521385.219	1600.211
GCP-3	4638792.2	560468.885	1650.807
GCP-4	4639271.755	566722.424	1656.373
GCP-5	4633044.375	509424.516	1615.714
GCP-6	4635019.189	521241.116	1611.069
GCP-7	4622110.353	549021.196	1516.264
GCP-8	4627128.502	510021.879	1609.046
GCP-9	4627735.432	528614.076	1607.632
GCP-10	4599534.897	502556.447	1578.816
GCP-11	4607693.644	520986.947	1647.668
GCP-12	4601777.577	549667.39	1614.425
GCP-13	4596720.701	515418.697	1655.826
GCP-14	4591039.896	530757.778	1691.126
GCP-15	4605235.444	561347.628	1682.322
GCP-16	4576109.933	505163.17	2141.433
GCP-17	4584639.757	522709.188	1731.035
GCP-18	4573107.468	556103.666	2353.528
GCP-19	4572160.717	512188.511	1865.594
GCP-20	4570982.937	520448.408	2014.488
GCP-21	4575187.399	540046.287	1696.795
GCP-22	4574130.611	555734.47	2371.478
GCP-23	4557777.648	505457.999	1434.54
GCP-24	4562025.255	522674.623	1576.324
GCP-25	4562014.025	545092.334	1699.268
GCP-26	4563457.725	558536.965	1939.056
GCP-27	4545051.687	502045.011	1420.542
GCP-28	4551571.892	536092.518	1808.658
GCP-29	4553820.493	552206.469	1905.165
GCP-30	4544014.054	522617.723	1523.188
GCP-31	4542469.045	550067.033	1658.55
GCP-32	4534597.297	502595.712	1416.834
GCP-33	4532233.887	517956.754	1512.982
GCP-34	4532511.382	544664.585	1518.054
GCP-35	4529225.276	560454.484	1733.353
GCP-36	4519848.435	507484.458	1414.55
GCP-37	4507693.251	517229.901	2093.403
GCP-38	4518795.934	542177.667	1422.658

GCP-39	4521645.393	565405.324	1574.353
GCP-40	4500477.581	503858.268	1378.624
GCP-41	4495538.904	514026.94	1380.789
GCP-42	4505173.168	537414.253	1414.515
GCP-43	4500879.977	561487.712	1860.301
GCP-44	4488201.188	506482.897	1387.457
GCP-45	4489523.388	521281.39	1503.642
GCP-46	4491169.681	543872.842	1442.813
GCP-47	4494806.442	569530.904	1488.709
GCP-48	4480015.122	504918.93	1437.941
GCP-49	4481054.721	521142.693	1651.967
GCP-50	4474604.724	536389.089	1461.245
GCP-51	4481059.936	562928.378	1617.904
GCP-52	4474451.57	500866.535	1517.057
GCP-53	4462965.021	516706.801	1861.369
GCP-54	4464953.07	531036.003	1515.222
GCP-55	4474860.954	554254.574	1520.613
GCP-56	4451957.905	499759.077	1775.169
GCP-57	4451926.774	527988.315	1466.974
GCP-58	4453324.816	571203.98	1618.204
GCP-59	4444912.377	548165.363	1782.945
GCP-60	4434831.354	505329.269	1564.659
GCP-61	4432108.027	536574.689	1743.724
GCP-62	4433857.299	568097.85	1772.887
GCP-63	4644653.187	567717.106	1637.135
GCP-64	4643192.683	575002.508	1650.765
GCP-65	4647079.821	594571.69	2112.515
GCP-66	4634251.565	561863.44	1628.096
GCP-67	4632215.921	585967.926	1710.456
GCP-68	4638732.216	606948.634	1818.213
GCP-69	4626146.946	566417.588	1701.437
GCP-70	4622060.914	585362.043	1805.842
GCP-71	4625747.873	600136.028	1999.756
GCP-72	4612555.572	565911.97	1679.01
GCP-73	4614244.221	579204.608	2014.142
GCP-74	4614536.076	600406.39	1917.364
GCP-75	4603667.846	565437.202	1793.963
GCP-76	4606549.448	571897.257	1844.12
GCP-77	4607464.864	599717.132	1907.088
GCP-78	4597314.297	573723.257	1961.397
GCP-79	4600701.054	594083.395	1981.354
GCP-80	4593074.261	598860.14	1871.842
GCP-81	4587372.199	575081.097	1769.818

GCP-82	4582130.924	600628.995	1818.526
GCP-83	4580239.404	574763.342	1744.902
GCP-84	4582883.238	591589.824	1950.386
GCP-85	4573940.812	565217.503	1866.909
GCP-86	4570260.551	574172.219	1796.924
GCP-87	4563977.65	584982.18	1938.938
GCP-88	4566599.397	600725.892	1798.787
GCP-89	4564074.954	562291.554	1836.204
GCP-90	4563377.992	600218.498	1789.354
GCP-91	4555574.378	596734.423	1794.675
GCP-92	4546432.08	599725.045	1899.12
GCP-93	4533948.354	594678.534	1939.715
GCP-94	4645855.213	609736.249	1494.452
GCP-95	4646127.849	620684.365	2008.441
GCP-96	4642663.722	641171.414	2254.023
GCP-97	4646404.716	656708.871	2328.211
GCP-98	4648771.503	682503.242	1744.255
GCP-99	4635284.896	614581.698	1612.351
GCP-100	4637505.928	630268.084	1877.977
GCP-101	4636290.789	644021.166	2621.492
GCP-102	4637255.589	660195.153	1963.21
GCP-103	4639527.406	676806.998	1990.508
GCP-104	4625961.416	609052.791	2264.802
GCP-105	4625398.063	627052.898	2439.466
GCP-106	4616126.961	604853.374	1925.026
GCP-107	4613793.183	623423.587	1862.439
GCP-108	4600854.687	611534.579	1963.053
GCP-109	4604099.414	624925.195	1866.381
GCP-110	4594754.747	613213.051	1957.229
GCP-111	4596540.653	629314.322	1875.173
GCP-112	4586927.326	612439.049	1887.74
GCP-113	4588592.14	625226.941	1903.315
GCP-114	4577170.932	618918.765	1714.712
GCP-115	4565032.11	614925.889	1923.603
GCP-116	4554616.288	625008.138	1636.346
GCP-117	4534080.103	621934.247	1585.11
GCP-118	4626560.856	653781.237	1931.125
GCP-119	4630074.061	665399.64	1769.244
GCP-120	4614853.407	656023.148	1844.466
GCP-121	4619219.21	681523.969	1665.648
GCP-122	4607049.658	668228.237	1906.48
GCP-123	4603348.593	684358.877	1759.578
GCP-124	4583988.804	686273.757	1783.021

GCP-125	4649447.943	692659.103	1607.713
GCP-126	4648544.787	706681.08	1828.952
GCP-127	4649616.03	720003.044	1819.552
GCP-128	4685708.958	729243.997	1857.443
GCP-129	4673035.844	732123.751	2287.781
GCP-130	4657863.871	732115.307	2089.481
GCP-131	4646128.304	739536.031	1598.987
GCP-132	4637000.359	689890.035	1632.452
GCP-133	4636672.668	700399.923	1637.388
GCP-134	4636898.271	724754.932	1688.656
GCP-135	4637768.575	740036.313	1602.761
GCP-136	4626559.056	686795.684	1630.377
GCP-137	4616738.438	707877.676	1741.197
GCP-138	4627791.781	720053.533	1793.561
GCP-139	4627074.521	737931.008	1756.693
GCP-140	4612047.322	687521.136	1796.543
GCP-141	4603905.005	709149.422	1617.044
GCP-142	4618930.309	730261.018	1892.42
GCP-143	4614122.968	740295.026	1967.454
GCP-144	4587487.89	692981.431	1701.874
GCP-145	4589318.314	719479.931	1676.486
GCP-146	4599673.772	723368.377	1569.606
GCP-147	4593671.981	734750.023	1528.794
GCP-148	4580000.922	689224.763	1768.314
GCP-149	4581396.576	705399.486	1721.12
GCP-150	4581702.181	731592.177	1624.514
GCP-151	4582272.998	744451.162	1460.523
GCP-152	4560435.594	690488.52	1855.035
GCP-153	4563074.008	708014.321	1863.408
GCP-154	4565831.059	731442.097	1542.904
GCP-155	4573442.231	737250.75	1474.416
GCP-156	4481067.136	521155.146	1651.426
GCP-157	4482588.567	521488.472	1580.966

4. GPS OBSERVATIONS

POINT ID	OBSERV. DATE	JULIAN DATE	TIME OF DAY (AST)	RE-OBSERV. DATE	RE-OBSERV. TIME
GCP-1	8/9/2021	221	14:32	N/A	N/A
GCP-2	8/9/2021	221	7:39	N/A	N/A
GCP-3	7/26/2021	206	14:09	N/A	N/A
GCP-4	7/26/2021	206	15:23	N/A	N/A
GCP-5	8/8/2021	220	16:52	8/9/2021	12:42
GCP-6	8/9/2021	221	9:06	N/A	N/A
GCP-7	7/29/2021	210	12:59	N/A	N/A
GCP-8	8/9/2021	221	13:40	N/A	N/A
GCP-9	8/9/2021	221	10:53	N/A	N/A
GCP-10	8/2/2021	214	15:18	N/A	N/A
GCP-11	8/3/2021	215	11:27	N/A	N/A
GCP-12	2/1/2021	32	15:42	N/A	N/A
GCP-13	8/2/2021	214	17:31	N/A	N/A
GCP-14	8/2/2021	214	18:37	8/3/2021	7:37
GCP-15	7/29/2021	210	15:09	N/A	N/A
GCP-16	7/31/2021	212	16:23	N/A	N/A
GCP-17	8/3/2021	215	8:37	N/A	N/A
GCP-18	5/26/2021	146	13:10	N/A	N/A
GCP-19	7/31/2021	212	17:50	N/A	N/A
GCP-20	7/30/2021	211	14:11	N/A	N/A
GCP-21	5/29/2021	149	16:35	N/A	N/A
GCP-22	5/26/2021	146	12:06	N/A	N/A
GCP-23	1/28/2021	28	15:50	N/A	N/A
GCP-24	1/30/2021	30	14:54	N/A	N/A
GCP-25	1/27/2021	27	15:45	N/A	N/A
GCP-26	1/25/2021	25	15:25	1/30/2021	11:30
GCP-27	1/27/2021	27	16:27	1/28/2021	15:11
GCP-28	1/28/2021	28	14:57	N/A	N/A
GCP-29	1/27/2021	27	13:24	N/A	N/A
GCP-30	1/28/2021	28	13:02	N/A	N/A
GCP-31	1/14/2021	14	15:16	1/29/2021	12:27
GCP-32	1/27/2021	27	15:48	1/28/2021	14:38
GCP-33	1/28/2021	28	11:09	N/A	N/A
GCP-34	1/14/2021	14	14:29	1/29/2021	11:31
GCP-35	1/24/2021	24	12:03	1/29/2021	14:53
GCP-36	1/26/2021	26	16:51	1/27/2021	17:22
GCP-37	2/3/2021	34	17:01	N/A	N/A
GCP-38	1/14/2021	14	13:50	1/29/2021	10:55
GCP-39	1/24/2021	24	11:44	1/29/2021	14:38

GCP-40	11/4/2020	309	16:49	1/26/2021	14:10
GCP-41	1/29/2021	29	9:51	N/A	N/A
GCP-42	11/4/2020	309	14:33	1/14/2021	12:52
GCP-43	11/4/2020	309	13:31	1/24/2021	14:40
GCP-44	1/26/2021	26	9:45	1/27/2021	12:08
GCP-45	1/24/2021	24	16:39	1/25/2021	10:31
GCP-46	11/5/2020	310	15:22	1/24/2021	15:18
GCP-47	1/9/2021	9	12:11	1/9/2021	18:14
GCP-48	1/26/2021	26	10:30	1/27/2021	12:39
GCP-49	1/27/2021	27	11:06	N/A	N/A
GCP-50	11/5/2020	310	16:07	1/25/2021	12:28
GCP-51	1/30/2021	30	16:03	N/A	N/A
GCP-52	1/26/2021	26	11:46	1/27/2021	13:22
GCP-53	5/24/2021	205	13:29	N/A	N/A
GCP-54	11/5/2020	310	16:49	1/25/2021	13:17
GCP-55	1/30/2021	30	14:47	2/2/2021	16:49
GCP-56	5/24/2021	205	17:19	N/A	N/A
GCP-57	1/25/2021	25	13:56	2/2/2021	12:13
GCP-58	1/9/2021	9	14:11	N/A	N/A
GCP-59	1/10/2021	10	16:30	N/A	N/A
GCP-60	5/24/2021	204	15:20	N/A	N/A
GCP-61	1/25/2021	25	15:06	2/2/2021	13:13
GCP-62	1/10/2021	10	13:44	N/A	N/A
GCP-63	1/13/2021	13	13:55	N/A	N/A
GCP-64	1/13/2021	13	11:42	N/A	N/A
GCP-65	7/28/2021	209	14:16	N/A	N/A
GCP-66	1/12/2021	12	15:28	1/13/2021	14:46
GCP-67	1/11/2021	11	14:27	1/12/2021	16:20
GCP-68	5/28/2021	147	19:30	N/A	N/A
GCP-69	1/12/2021	12	14:25	1/13/2021	15:24
GCP-70	1/11/2021	11	13:07	N/A	N/A
GCP-71	5/21/2021	186	14:48	N/A	N/A
GCP-72	1/12/2021	12	13:41	1/13/2021	15:58
GCP-73	5/21/2021	141	12:59	N/A	N/A
GCP-74	1/11/2021	11	11:51	1/12/2021	17:14
GCP-75	1/12/2021	12	13:13	1/13/2021	16:31
GCP-76	5/21/2021	141	12:19	N/A	N/A
GCP-77	1/11/2021	11	11:26	1/13/2021	10:24
GCP-78	1/12/2021	12	12:11	1/13/2021	17:13
GCP-79	1/13/2021	13	13:43	N/A	N/A
GCP-80	1/11/2021	11	10:33	1/11/2021	15:31
GCP-81	1/12/2021	12	11:41	1/13/2021	17:26
GCP-82	1/11/2021	11	9:56	1/11/2021	16:54

GCP-83	1/12/2021	12	9:58	1/13/2021	17:37
GCP-84	1/11/2021	11	15:59	N/A	N/A
GCP-85	1/25/2021	25	12:33	1/26/2021	13:43
GCP-86	1/10/2021	10	16:35	2/1/2021	12:37
GCP-87	1/9/2021	9	16:23	1/9/2021	17:04
GCP-88	1/9/2021	9	13:49	1/11/2021	17:14
GCP-89	1/25/2021	25	14:40	1/28/2021	11:24
GCP-90	11/5/2020	310	12:17	1/9/2021	13:30
GCP-91	11/5/2020	310	13:01	1/9/2021	12:44
GCP-92	11/5/2020	310	10:46	1/9/2021	12:14
GCP-93	11/5/2020	310	9:54	N/A	N/A
GCP-94	5/28/2021	148	18:07	5/31/2021	17:07
GCP-95	5/31/2021	151	17:51	N/A	N/A
GCP-96	7/24/2021	205	12:25	N/A	N/A
GCP-97	7/22/2021	203	18:19	N/A	N/A
GCP-98	1/22/2021	22	12:08	1/22/2021	17:46
GCP-99	5/31/2021	151	15:47	N/A	N/A
GCP-100	7/24/2021	205	16:32	7/25/2021	12:28
GCP-101	7/24/2021	205	13:26	N/A	N/A
GCP-102	7/22/2021	203	13:20	N/A	N/A
GCP-103	1/22/2021	22	13:17	1/22/2021	16:47
GCP-104	5/28/2021	148	15:22	5/31/2021	19:55
GCP-105	7/25/2021	206	14:13	N/A	N/A
GCP-106	5/21/2021	141	16:18	5/28/2021	14:20
GCP-107	1/15/2021	15	15:22	N/A	N/A
GCP-108	1/13/2021	13	16:26	N/A	N/A
GCP-109	1/15/2021	15	14:16	N/A	N/A
GCP-110	1/24/2021	24	14:55	N/A	N/A
GCP-111	1/15/2021	15	12:26	N/A	N/A
GCP-112	1/24/2021	24	16:13	N/A	N/A
GCP-113	1/11/2021	11	16:30	N/A	N/A
GCP-114	1/11/2021	11	14:05	N/A	N/A
GCP-115	1/12/2021	12	16:35	N/A	N/A
GCP-116	11/4/2020	309	11:20	1/10/2021	14:09
GCP-117	11/4/2021	309	10:25	1/10/2021	8:53
GCP-118	7/22/2021	203	15:00	N/A	N/A
GCP-119	1/20/2021	20	13:20	N/A	N/A
GCP-120	1/20/2021	20	11:43	1/20/2021	15:49
GCP-121	1/15/2021	15	14:08	1/16/2021	12:36
GCP-122	1/18/2021	18	15:14	N/A	N/A
GCP-123	1/15/2021	15	13:15	1/16/2021	11:30
GCP-124	1/15/2021	15	11:26	1/15/2021	17:03
GCP-125	1/22/2021	22	10:14	1/23/2021	9:00

GCP-126	1/21/2021	21	14:31	1/22/2021	13:14
GCP-127	1/22/2021	22	15:00	N/A	N/A
GCP-128	7/19/2021	200	12:30	7/21/2021	13:19
GCP-129	7/19/2021	200	13:39	7/21/2021	14:19
GCP-130	7/19/2021	200	15:58	N/A	N/A
GCP-131	7/20/2021	201	11:22	N/A	N/A
GCP-132	1/15/2021	15	15:21	1/16/2021	14:21
GCP-133	1/21/2021	21	13:15	1/22/2021	11:26
GCP-134	1/17/2021	17	13:03	1/19/2021	15:00
GCP-135	7/20/2021	201	12:28	N/A	N/A
GCP-136	1/15/2021	15	14:26	1/16/2021	12:49
GCP-137	1/19/2021	19	13:26	N/A	N/A
GCP-138	1/17/2021	17	12:22	1/19/2021	14:27
GCP-139	1/21/2021	21	14:56	N/A	N/A
GCP-140	1/16/2021	16	14:52	1/21/2021	10:49
GCP-141	1/17/2021	17	10:34	1/17/2021	16:11
GCP-142	1/18/2021	18	14:05	N/A	N/A
GCP-143	1/21/2021	21	12:05	N/A	N/A
GCP-144	1/16/2021	16	15:41	1/17/2021	16:50
GCP-145	1/19/2021	19	12:22	N/A	N/A
GCP-146	1/17/2021	17	14:52	1/19/2021	11:17
GCP-147	1/18/2021	18	12:18	1/18/2021	16:34
GCP-148	1/20/2021	20	11:45	1/20/2021	16:42
GCP-149	1/20/2021	20	14:37	N/A	N/A
GCP-150	1/16/2021	16	16:53	N/A	N/A
GCP-151	1/16/2021	16	14:41	1/17/2021	17:34
GCP-152	1/17/2021	17	11:21	N/A	N/A
GCP-153	1/17/2021	17	15:13	N/A	N/A
GCP-154	1/16/2021	16	12:56	1/17/2021	16:20
GCP-155	1/16/2021	16	13:56	1/17/2021	17:04
GCP-156	7/27/2021	208	12:12	N/A	N/A
GCP-157	7/27/2021	208	12:30	N/A	N/A

5. POINT COMPARISON

Point ID	Point CK	Delta North (M)	Delta East (M)	Vertical Difference (M)
GCP-01	GCP-01 CK	N/A	N/A	N/A
GCP-02	GCP-02 CK	N/A	N/A	N/A
GCP-03	GCP-03 CK	N/A	N/A	N/A
GCP-04	GCP-04 CK	N/A	N/A	N/A
GCP-05	GCP-05 CK	-0.012	0.006	-0.012
GCP-06	GCP-06 CK	N/A	N/A	N/A
GCP-07	GCP-07 CK	N/A	N/A	N/A
GCP-08	GCP-08 CK	N/A	N/A	N/A
GCP-09	GCP-09 CK	N/A	N/A	N/A
GCP-10	GCP-10 CK	N/A	N/A	N/A
GCP-11	GCP-11 CK	N/A	N/A	N/A
GCP-12	GCP-12 CK	N/A	N/A	N/A
GCP-13	GCP-13 CK	N/A	N/A	N/A
GCP-14	GCP-14 CK	-0.002	-0.008	0.005
GCP-15	GCP-15 CK	N/A	N/A	N/A
GCP-16	GCP-16 CK	N/A	N/A	N/A
GCP-17	GCP-17 CK	N/A	N/A	N/A
GCP-18	GCP-18 CK	N/A	N/A	N/A
GCP-19	GCP-19 CK	N/A	N/A	N/A
GCP-20	GCP-20 CK	N/A	N/A	N/A
GCP-21	GCP-21 CK	N/A	N/A	N/A
GCP-22	GCP-22 CK	N/A	N/A	N/A
GCP-23	GCP-23 CK	N/A	N/A	N/A
GCP-24	GCP-24 CK	N/A	N/A	N/A
GCP-25	GCP-25 CK	N/A	N/A	N/A
GCP-26	GCP-26 CK	-0.003	-0.002	0.010
GCP-27	GCP-27 CK	0.019	0.023	-0.022
GCP-28	GCP-28 CK	N/A	N/A	N/A
GCP-29	GCP-29 CK	N/A	N/A	N/A
GCP-30	GCP-30 CK	0.002	-0.009	-0.003
GCP-31	GCP-31 CK	0.023	-0.006	-0.021
GCP-32	GCP-32 CK	0.033	-0.009	-0.018
GCP-33	GCP-33 CK	-0.002	-0.016	0.017
GCP-34	GCP-34 CK	-0.020	-0.005	-0.029
GCP-35	GCP-35 CK	0.008	0.010	0.005
GCP-36	GCP-36 CK	0.010	0.004	-0.027
GCP-37	GCP-37 CK	N/A	N/A	N/A
GCP-38	GCP-38 CK	0.033	0.019	-0.007
GCP-39	GCP-39 CK	0.009	0.002	-0.041
GCP-40	GCP-40 CK	-0.030	-0.013	-0.022

GCP-41	GCP-41 CK	N/A	N/A	N/A
GCP-42	GCP-42 CK	0.010	-0.004	-0.008
GCP-43	GCP-43 CK	-0.025	-0.031	-0.008
GCP-44	GCP-44 CK	0.013	-0.024	0.029
GCP-45	GCP-45 CK	-0.003	0.009	-0.011
GCP-46	GCP-46 CK	-0.041	0.009	0.003
GCP-47	GCP-47 CK	-0.006	-0.005	0.018
GCP-48	GCP-48 CK	0.001	-0.019	0.032
GCP-49	GCP-49 CK	-0.003	-0.003	0.029
GCP-50	GCP-50 CK	-0.024	0.007	-0.044
GCP-51	GCP-51 CK	N/A	N/A	N/A
GCP-52	GCP-52 CK	-0.009	-0.003	0.023
GCP-53	GCP-53 CK	N/A	N/A	N/A
GCP-54	GCP-54 CK	0.008	-0.001	-0.015
GCP-55	GCP-55 CK	-0.006	0.015	0.018
GCP-56	GCP-56 CK	N/A	N/A	N/A
GCP-57	GCP-57 CK	-0.009	-0.015	0.022
GCP-58	GCP-58 CK	N/A	N/A	N/A
GCP-59	GCP-59 CK	N/A	N/A	N/A
GCP-60	GCP-60 CK	N/A	N/A	N/A
GCP-61	GCP-61 CK	0.017	0.016	0.003
GCP-62	GCP-62 CK	N/A	N/A	N/A
GCP-63	GCP-63 CK	N/A	N/A	N/A
GCP-64	GCP-64 CK	N/A	N/A	N/A
GCP-65	GCP-65 CK	N/A	N/A	N/A
GCP-66	GCP-66 CK	-0.009	-0.002	0.019
GCP-67	GCP-67 CK	-0.011	0.030	0.044
GCP-68	GCP-68 CK	N/A	N/A	N/A
GCP-69	GCP-69 CK	-0.025	0.021	0.042
GCP-70	GCP-70 CK	0.010	-0.016	0.028
GCP-71	GCP-71 CK	N/A	N/A	N/A
GCP-72	GCP-72 CK	-0.011	-0.007	-0.033
GCP-73	GCP-73 CK	N/A	N/A	N/A
GCP-74	GCP-74 CK	0.004	-0.013	-0.003
GCP-75	GCP-75 CK	0.009	0.000	-0.044
GCP-76	GCP-76 CK	N/A	N/A	N/A
GCP-77	GCP-77 CK	-0.025	0.010	-0.018
GCP-78	GCP-78 CK	-0.010	0.004	-0.008
GCP-79	GCP-79 CK	N/A	N/A	N/A
GCP-80	GCP-80 CK	-0.002	0.012	0.005
GCP-81	GCP-81 CK	0.025	-0.014	-0.016
GCP-82	GCP-82 CK	0.009	-0.021	-0.027
GCP-83	GCP-83 CK	0.010	-0.013	-0.021

GCP-84	GCP-84 CK	N/A	N/A	N/A
GCP-85	GCP-85 CK	0.013	-0.001	0.035
GCP-86	GCP-86 CK	0.013	0.017	0.030
GCP-87	GCP-87 CK	-0.007	0.005	0.014
GCP-88	GCP-88 CK	-0.007	-0.001	0.037
GCP-89	GCP-89 CK	0.030	-0.024	0.024
GCP-90	GCP-90 CK	-0.018	-0.026	-0.032
GCP-91	GCP-91 CK	-0.042	-0.004	-0.012
GCP-92	GCP-92 CK	-0.020	0.003	-0.019
GCP-93	GCP-93 CK	N/A	N/A	N/A
GCP-94	GCP-94 CK	-0.012	0.001	-0.002
GCP-95	GCP-95 CK	N/A	N/A	N/A
GCP-96	GCP-96 CK	N/A	N/A	N/A
GCP-97	GCP-97 CK	N/A	N/A	N/A
GCP-98	GCP-98 CK	-0.003	-0.007	-0.001
GCP-99	GCP-99 CK	N/A	N/A	N/A
GCP-100	GCP-100 CK	-0.003	-0.013	-0.027
GCP-101	GCP-101 CK	N/A	N/A	N/A
GCP-102	GCP-102 CK	N/A	N/A	N/A
GCP-103	GCP-103 CK	-0.007	0.010	0.026
GCP-104	GCP-104 CK	-0.011	-0.003	0.010
GCP-105	GCP-105 CK	N/A	N/A	N/A
GCP-106	GCP-106 CK	-0.004	0.015	0.035
GCP-107	GCP-107 CK	N/A	N/A	N/A
GCP-108	GCP-108 CK	N/A	N/A	N/A
GCP-109	GCP-109 CK	N/A	N/A	N/A
GCP-110	GCP-110 CK	N/A	N/A	N/A
GCP-111	GCP-111 CK	N/A	N/A	N/A
GCP-112	GCP-112 CK	N/A	N/A	N/A
GCP-113	GCP-113 CK	N/A	N/A	N/A
GCP-114	GCP-114 CK	N/A	N/A	N/A
GCP-115	GCP-115 CK	N/A	N/A	N/A
GCP-116	GCP-116 CK	-0.014	0.019	0.011
GCP-117	GCP-117 CK	-0.011	0.025	-0.047
GCP-118	GCP-118 CK	N/A	N/A	N/A
GCP-119	GCP-119 CK	-0.009	-0.028	-0.002
GCP-120	GCP-120 CK	0.001	-0.002	0.021
GCP-121	GCP-121 CK	-0.015	-0.022	0.014
GCP-122	GCP-122 CK	N/A	N/A	N/A
GCP-123	GCP-123 CK	0.008	-0.009	0.033
GCP-124	GCP-124 CK	-0.011	-0.006	0.024
GCP-125	GCP-125 CK	-0.017	0.004	0.039
GCP-126	GCP-126 CK	0.016	-0.008	0.017

GCP-127	GCP-127 CK	N/A	N/A	N/A
GCP-128	GCP-128 CK	-0.022	-0.005	0.003
GCP-129	GCP-129 CK	0.008	-0.001	-0.003
GCP-130	GCP-130 CK	N/A	N/A	N/A
GCP-131	GCP-131 CK	N/A	N/A	N/A
GCP-132	GCP-132 CK	-0.001	0.002	0.035
GCP-133	GCP-133 CK	-0.009	-0.023	-0.002
GCP-134	GCP-134 CK	-0.003	-0.008	0.001
GCP-135	GCP-135 CK	N/A	N/A	N/A
GCP-136	GCP-136 CK	0.015	0.008	-0.017
GCP-137	GCP-137 CK	N/A	N/A	N/A
GCP-138	GCP-138 CK	0.000	0.010	0.037
GCP-139	GCP-139 CK	N/A	N/A	N/A
GCP-140	GCP-140 CK	-0.017	-0.004	-0.001
GCP-141	GCP-141 CK	0.020	-0.019	-0.033
GCP-142	GCP-142 CK	N/A	N/A	N/A
GCP-143	GCP-143 CK	N/A	N/A	N/A
GCP-144	GCP-144 CK	-0.013	0.025	0.031
GCP-145	GCP-145 CK	N/A	N/A	N/A
GCP-146	GCP-146 CK	-0.005	0.016	0.000
GCP-147	GCP-147 CK	-0.004	0.006	0.029
GCP-148	GCP-148 CK	-0.001	0.005	0.024
GCP-149	GCP-149 CK	N/A	N/A	N/A
GCP-150	GCP-150 CK	N/A	N/A	N/A
GCP-151	GCP-151 CK	0.008	-0.010	-0.003
GCP-152	GCP-152 CK	N/A	N/A	N/A
GCP-153	GCP-153 CK	N/A	N/A	N/A
GCP-154	GCP-154 CK	-0.015	0.014	0.005
GCP-155	GCP-155 CK	-0.002	0.000	0.002
GCP-156	GCP-156 CK	N/A	N/A	N/A
GCP-157	GCP-157 CK	N/A	N/A	N/A