

Fugro, Ward County North Dakota Survey Report

Prepared by Professional Mapping and Surveying, LLC

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Job# 17-4291

1. GENERAL INFORMATION

- a. Project Coordinate System
 - i. Horizontal: NAD83(2011)
 - ii. Vertical: NAVD88
- b. Coordinate Projection
 - i. UTM ZONE 14 North
- c. Units: Meters

2. SURVEY TECHNIQUES

- a. Equipment
 - i. Trimble GPS
 1. R8 GNSS Model 2, R8 GNSS Model 3
 - ii. Topcon
 1. Hiper Lite+ GNSS
- b. Field Methodology
 - i. Static GPS/GNSS was utilized and included observations of one to ten second intervals (epochs) with a ten-degree mask. Observation durations ranged from 30 minutes to 8 hours dependent on baseline length.

3. CONTROL NETWORKS

- a. A Primary Network including Static baseline observations introduced, processed and a network adjustment utilizing OPUS Projects resulted in the Primary Control. OPUS Projects provides the ties to the NSRS. This Primary Network includes eight NGS CORS stations and nineteen project specific Primary Control Points. (three of which are private constant operating stations). Detailed results of the OPUS Projects Network are located below in Item 7, page 6.
- b. A second Primary Control Network including static baseline observations including the nineteen OPUS Projects resulting values and introducing an additional sixteen Primary Control Points. All 35 points are included in baseline processing and network adjustment using Trimble Business Center software. The results provide coordinate values for 32 total onsite ground control points. This process includes: Post processing of the GPS vectors. Qualitative analysis of vectors was used to eliminate poor quality vectors from the data set. New or redundant vectors were used to replace these rejected vectors. Horizontal adjustment of the vector network was completed using a free and minimally constrained schema holding specific OPUS Projects Primary Control fixed. Vertical adjustment of the vector network held specific OPUS Projects Primary Control fixed. Detailed results of the second Primary Control Network are located below in Item 8, page 30. Photos of the ground control locations were provided digitally to the client.
- c. Upon completion of the Primary Networks the LiDAR check points included similar static field applications, processing and network adjustments discussed in items 2 and 3 above provided multiple secondary network results. These secondary networks included established Primary Control and checkpoints. The results of these secondary networks are located below in Item 9, page 33.
- d. The LiDAR check points are classified per information provided by the client in *Table 3. Land cover classes*. Specific classifications for this county include NVA (primarily urban); VVA (tall grass); and VVA (wooded). Classifications are listed in below in Item 6, page 3. Photos of the check points were provided to the client digitally.

4. SUMMARY

- a. LiDAR Ground Control Points and LiDAR Check Points inclusive of this report have an estimated accuracy of the adjusted coordinates of ± 0.03 with respect to the NAD1983(2011) and NAVD 1988 Datums.

5. LiDAR GROUND CONTROL COORDINATES.

17-4291 Ward County Control NAD83(2011) UTM Zone 14N Zone Meters NAVD88 Ellipsoid Heights (Meters)

pt#	Northing	Easting	Ellipsoid height	UTM ZONE
2117	5395025.780	260609.224	627.763	14N
8	5372625.404	285062.982	612.712	14N
12	5354833.164	281745.829	656.170	14N
17	5337270.290	289088.489	629.631	14N
18	5337528.567	303516.817	653.496	14N
19	5337045.645	322840.072	545.192	14N
22	5321171.220	282999.421	618.452	14N
23	5320331.254	292193.211	620.723	14N
24	5320692.085	308135.342	622.896	14N
25	5321631.616	320987.516	628.439	14N
26	5321240.538	334446.884	569.240	14N
28	5305976.092	285256.426	635.696	14N
29	5304529.872	297451.074	641.120	14N
30	5304134.732	309604.746	606.695	14N
31	5303805.249	323681.357	636.945	14N
32	5301746.170	344484.433	631.169	14N
1411	5354541.159	313435.062	483.799	14N
1611	5355521.598	349127.967	450.629	14N
2011	5337963.109	340579.207	480.851	14N
2111	5335241.495	350712.371	471.411	14N
6118	5382039.327	262541.681	680.331	14N
7118	5381351.225	277793.103	609.702	14N
3_ke	5395513.530	268189.549	592.108	14N
a001	5354368.768	329852.528	478.107	14N
a002	5367020.598	342803.028	448.093	14N
a004	5320784.077	349847.002	499.575	14N
a005	5396322.179	281150.467	564.082	14N
a006	5410643.964	271713.489	560.864	14N
a007	5394620.109	290719.357	543.019	14N
a008	5370285.613	316349.207	506.538	14N
NDBR	5355128.766	297542.054	617.769	14N
NDKE	5395693.742	273964.893	581.410	14N
NDMX	5299617.859	328216.028	633.081	14N
WA13	5355012.686	297846.371	498.095	14N
WA9	5369295.547	299067.139	611.888	14N

6. LiDAR Check Points

NAD83 (2011) UTM ZONE 14 NORTH (METERS NAVD 88 METERS)

Point ID	Northing	Easting	Ellipsoid Height	Classification
8A	5366483.405	288024.172	630.425	NVA
3	5395513.530	268189.549	592.108	NVA
10A	5370335.977	309398.299	467.273	VVA (wooded)
10B	5366869.659	321881.474	495.184	NVA
11A	5360349.715	342644.615	457.697	NVA
11B	5368857.570	334835.096	468.113	NVA
11C	5367685.332	348611.612	441.584	VVA (tall grass)
12A	5359630.400	282792.541	654.892	NVA
12B	5351768.171	287993.789	652.044	NVA
14A	5360270.200	309137.102	491.928	VVA (wooded)
14B	5358869.124	318716.532	517.150	VVA (tall grass)
14C	5349825.921	319849.042	466.138	NVA
14D	5351013.043	309621.009	564.599	NVA
15A	5349741.995	336091.274	477.572	VVA (tall grass)
15B	5360145.761	334571.718	475.113	NVA
15C	5360315.789	324884.919	493.139	NVA
15D	5350152.291	323203.535	504.360	VVA (tall grass)
16A	5348278.350	345673.686	459.202	VVA (tall grass)
16B	5356882.333	342693.106	461.649	NVA
17A	5330724.570	291767.015	624.401	VVA (tall grass)
17B	5333225.372	284111.844	630.480	NVA
17C	5340681.102	282990.468	633.591	VVA (tall grass)
17D	5342964.603	294070.740	645.971	NVA
18A	5342923.010	311082.562	586.117	VVA (tall grass)
18B	5341825.626	297276.433	642.974	NVA
18C	5331911.850	301844.387	633.720	VVA (tall grass)
18D	5333331.531	309833.690	643.145	NVA
19A	5345327.770	322992.628	465.943	VVA (tall grass)
19B	5337927.412	315362.750	584.036	NVA
19C	5331308.723	321077.157	579.287	NVA
19D	5332953.319	332329.706	517.538	VVA (wooded)
1A	5407635.161	267850.563	573.432	NVA
1B	5410488.808	276766.446	554.811	NVA
20A	5344013.034	337614.839	480.660	NVA
20B	5338597.847	350276.017	461.675	VVA (tall grass)
20C	5329063.454	340469.200	474.434	VVA (wooded)
20D	5335655.069	336478.129	500.906	NVA
21A	5334678.404	348511.618	471.843	VVA (tall grass)
21B	5328453.867	347214.893	444.138	NVA

21V	5330350.525	353201.271	473.013	NVA
22A	5327733.644	285542.902	623.495	VVA (tall grass)
22B	5316216.290	285638.730	616.969	NVA
23A	5317354.574	299269.099	622.886	NVA
23B	5326495.249	298360.074	633.225	VVA (tall grass)
23C	5327465.726	291460.521	619.351	VVA (tall grass)
23D	5315961.770	292846.775	612.576	NVA
24A	5321718.776	312998.877	625.138	VVA (tall grass)
24B	5325322.952	306343.883	616.573	NVA
24C	5322190.902	304010.362	629.765	NVA
24D	5313266.135	307934.187	635.073	VVA (tall grass)
25A	5327910.278	325799.384	574.134	VVA (tall grass)
25B	5325029.625	314425.208	637.317	VVA (tall grass)
25C	5318014.940	314500.106	620.568	NVA
25D	5316177.566	325631.219	637.068	NVA
26A	5321438.837	326622.828	635.691	VVA (tall grass)
26B	5329325.400	333872.126	528.912	NVA
26C	5321072.865	340860.051	534.324	VVA (tall grass)
26D	5315660.422	335215.765	615.619	NVA
27A	5328249.427	349956.799	442.872	VVA (wooded)
27B	5317716.308	343354.786	544.373	NVA
27C	5314252.117	350128.357	535.266	NVA
27V	5320619.632	356333.535	481.248	NVA
28A	5312928.268	287196.374	623.732	VVA (tall grass)
28B	5303190.014	289753.096	641.239	NVA
29A	5311078.135	293910.371	633.402	VVA (tall grass)
29B	5307740.464	303964.625	629.367	VVA (tall grass)
29C	5301208.602	300648.109	640.548	NVA
29D	5301356.449	296686.073	645.325	NVA
2A	5397826.182	263513.970	597.822	NVA
2B	5390097.100	262119.259	651.886	NVA
30A	5310474.094	312619.937	615.756	VVA (tall grass)
30B	5303889.397	317240.528	617.823	NVA
30C	5300355.687	309101.356	621.258	NVA
31A	5307847.297	320604.097	624.441	VVA (tall grass)
31B	5310142.646	328761.883	656.789	NVA
31C	5303546.391	330339.895	629.742	NVA
32A	5302309.708	339712.488	625.890	VVA (tall grass)
32B	5304630.609	349266.417	632.286	NVA
3A	5395878.531	265129.523	598.110	NVA
3C	5396081.308	274380.672	575.812	VVA (tall grass)
3D	5389012.158	271299.073	605.255	NVA
4A	5402258.116	281075.222	555.467	VVA (tall grass)
4B	5397218.823	285340.057	556.584	VVA (tall grass)

4C	5389196.330	284055.559	569.610	NVA
4D	5397558.941	276636.509	572.714	NVA
5A	5388689.253	290503.940	555.706	NVA
5B	5398742.243	288608.100	542.348	VVA (tall grass)
6A	5385738.536	269441.895	635.580	NVA
6B	5380686.300	269322.157	685.244	NVA
7B	5386344.790	274984.779	602.057	VVA (tall grass)
7C	5384698.151	283882.576	576.201	NVA
8B	5370090.156	278537.018	668.604	VVA (tall grass)
8C	5376410.922	281958.485	614.053	NVA
8D	5377706.126	290118.725	566.886	VVA (tall grass)
WA13A	5358138.597	291653.847	640.446	NVA (low grass)
WA13B	5348267.786	295072.714	675.098	VVA (tall grass)
WA13C	5349630.569	303874.897	593.240	NVA
WA13D	5357637.809	305005.174	570.207	NVA
WA9A	5367430.027	306596.275	537.848	VVA (tall grass)
WA9B	5367894.391	293880.045	584.027	NVA
WA9C	5362906.705	297544.176	582.666	NVA

7. OPUS PROJECTS PRIMARY CONTROL NETWORK RESULTS.

NGS OPUS-PROJECTS NETWORK ADJUSTMENT REPORT

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All coordinate accuracies reported here are 1 times the formal uncertainties from the solution. For additional information:
geodesy.noaa.gov/OPUS/Using_OPUS-Projects.html#accuracy

These positions were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

SUBMITTED BY: rld

SOLUTION FILE NAME: network-ward final 10aug17.sum

SOLUTION SOFTWARE: GPSCOM(1504.22)

SOLUTION DATE: 2017-08-11T00:37:08 UTC

STANDARD ERROR OF UNIT WEIGHT: 0.659

TOTAL NUMBER OF OBSERVATIONS: 2513793

TOTAL NUMBER OF MARKS: 27

NUMBER OF CONSTRAINED MARKS: 8

START TIME: 2017-04-21T00:00:00 GPS

STOP TIME: 2017-04-28T23:59:30 GPS

FREQUENCY: L1 -> ION-FREE (L6)

OBSERVATION INTERVAL: 30 s

ELEVATION CUTOFF: 15 deg

TROPO INTERVAL: 1800 s [STEP-OFFSET PARAMETERIZATION]

DD CORRELATIONS: ON

INCLUDED SOLUTION RMS SOFTWARE RUN DATE

1) 2017-111 A-WARD	1.5 cm	GPSCOM(1504.23)	2017-05-01T21:54 UTC
2) 2017-111 A	1.5 cm	GPSCOM(1504.23)	2017-05-01T21:50 UTC
3) 2017-115 A	1.1 cm	GPSCOM(1504.22)	2017-08-10T23:53 UTC
4) 2017-115 B	1.1 cm	GPSCOM(1504.22)	2017-08-10T23:56 UTC

5) 2017-115 1.2 cm GPSCOM(1504.22) 2017-08-11T00:02 UTC
6) 2017-115 t 1.1 cm GPSCOM(1504.22) 2017-08-11T00:06 UTC
7) 2017-116 A 1.2 cm GPSCOM(1504.22) 2017-08-11T00:02 UTC
8) 2017-116 f 1.2 cm GPSCOM(1504.22) 2017-08-11T00:06 UTC
9) 2017-116 t 1.1 cm GPSCOM(1504.22) 2017-08-10T17:47 UTC
10) 2017-117 2117 1.3 cm GPSCOM(1504.22) 2017-08-10T22:44 UTC
11) 2017-117 A05 1.3 cm GPSCOM(1504.22) 2017-08-11T00:30 UTC
12) 2017-117 f 1.3 cm GPSCOM(1504.22) 2017-08-11T00:10 UTC
13) 2017-117 r 1.3 cm GPSCOM(1504.22) 2017-08-10T22:40 UTC
14) 2017-117 t 1.3 cm GPSCOM(1504.22) 2017-08-10T17:44 UTC
15) 2017-118 a007 f 1.4 cm GPSCOM(1504.22) 2017-08-11T00:30 UTC
16) 2017-118 f 1.4 cm GPSCOM(1504.22) 2017-08-11T00:14 UTC
17) 2017-118 r 1.4 cm GPSCOM(1504.22) 2017-08-10T17:35 UTC
18) 2017-118 t 1.4 cm GPSCOM(1504.22) 2017-08-10T17:45 UTC

BASELINE	LENGTH	RMS	OBS	OMITTED	FIXED	IN SOLUTION(S)
ndmb-a008	12.347 km	1.2 cm	1487	4.8%	100.0%	16
a002-1611	13.126 km	1.1 cm	1910	5.0%	100.0%	4
a004-2111	14.486 km	1.1 cm	1670	1.2%	100.0%	8
a001-1411	16.420 km	0.9 cm	2992	3.0%	100.0%	3
a003-2011	17.815 km	1.1 cm	3011	4.1%	100.0%	7
a006-2117	19.160 km	1.0 cm	1412	4.2%	100.0%	12
ndbr-ndmb	31.684 km	1.8 cm	25300	5.2%	99.4%	1, 2
bsmk-p802	32.822 km	1.0 cm	164793	1.4%	100.0%	1, 2, 3,...
ndke-ndbr	46.916 km	1.6 cm	26712	0.7%	100.0%	1, 2
a007-ndmb	47.184 km	1.5 cm	1666	0.7%	100.0%	15
7118-ndmb	52.356 km	1.7 cm	2263	9.1%	100.0%	18
a008-6118	55.073 km	1.0 cm	1442	4.2%	100.0%	16
ndmb-ndke	61.698 km	1.8 cm	25804	2.8%	99.3%	1, 2
p802-ndst	63.135 km	1.2 cm	168404	1.3%	100.0%	1, 2, 3,...
ndmx-ndbr	63.426 km	1.4 cm	26390	2.0%	100.0%	1, 2
ndmb-ndmx	65.570 km	1.7 cm	25586	3.7%	99.3%	1, 2
6118-ndmb	67.195 km	1.6 cm	1396	7.8%	97.0%	17

ndst-bsmk	68.809 km	1.3 cm	164057	0.9%	97.8%	1, 2, 3,...
mtrc-ndgr	102.869 km	1.5 cm	197692	3.9%	99.6%	1, 2, 10,...
bsmk-ndmx	117.541 km	1.2 cm	26584	1.2%	100.0%	1, 2
2117-ndgr	124.041 km	1.3 cm	4665	5.5%	100.0%	10, 12, 13
6118-ndgr	126.847 km	1.3 cm	2820	6.5%	94.7%	16, 17
3_ke-ndgr	131.612 km	1.2 cm	2852	6.8%	100.0%	14
bsmk-a004	134.424 km	1.1 cm	2575	0.2%	100.0%	8
ndgr-a006	135.807 km	1.1 cm	1436	5.2%	100.0%	12
bsmk-a003	137.060 km	1.2 cm	3022	3.4%	100.0%	7
ndke-ndgr	137.383 km	1.5 cm	26126	2.4%	100.0%	1, 2
7118-ndgr	142.073 km	1.4 cm	2275	7.7%	100.0%	18
nddi-mtrc	142.289 km	1.4 cm	201574	1.7%	98.4%	1, 2, 10,...
a005-ndgr	144.563 km	1.4 cm	2853	2.8%	100.0%	11
nddi-bsmk	147.129 km	1.1 cm	328621	1.4%	99.9%	1, 2, 3,...
bsmk-2111	148.770 km	1.0 cm	1651	1.6%	100.0%	9
ndmx-ndst	150.559 km	1.4 cm	26438	1.0%	100.0%	1, 2
ndmx-nddi	151.467 km	1.2 cm	26168	2.1%	100.0%	1, 2
a007-ndgr	154.147 km	1.3 cm	1612	2.9%	100.0%	15
ndst-a004	154.471 km	1.4 cm	2528	1.9%	100.0%	8
ndst-a003	163.383 km	1.4 cm	3046	2.3%	100.0%	7
p802-nddi	166.129 km	0.9 cm	166491	1.6%	100.0%	1, 2, 3,...
2111-ndst	166.576 km	1.3 cm	3316	1.1%	100.0%	8, 9
1611-ndmu	166.738 km	1.1 cm	1934	3.0%	100.0%	4
bsmk-1611	169.114 km	1.1 cm	1818	4.0%	100.0%	4
bsmk-a001	170.458 km	1.1 cm	6184	0.7%	100.0%	3, 5
ndmu-2111	170.631 km	1.2 cm	3250	2.8%	100.0%	8, 9
a003-nddi	170.890 km	1.2 cm	2970	4.6%	100.0%	7
ndmu-a002	170.979 km	1.1 cm	4326	1.2%	100.0%	4, 6
2011-ndst	173.969 km	1.2 cm	3432	1.7%	100.0%	7
bsmk-1411	174.408 km	1.1 cm	3116	3.2%	100.0%	3
ndbr-nddi	176.488 km	1.5 cm	26090	2.2%	100.0%	1, 2
ndmu-2011	179.435 km	1.2 cm	3371	3.0%	100.0%	7
bsmk-a002	181.124 km	1.0 cm	1976	5.7%	100.0%	6
bsmk-ndmb	181.499 km	1.6 cm	55029	2.9%	100.0%	15, 16, 17, 18

a004-nddi	181.700 km	1.1 cm	2538	1.4%	100.0%	8
1411-ndgr	181.873 km	1.3 cm	3084	3.0%	100.0%	3
nddi-1411	183.980 km	1.2 cm	3101	3.6%	100.0%	3
1611-ndst	185.343 km	1.3 cm	1989	0.2%	100.0%	4
ndmu-a001	185.852 km	1.2 cm	6052	1.8%	100.0%	3, 5
ndmu-ndmb	186.304 km	1.6 cm	13769	3.3%	99.3%	16
2011-nddi	187.265 km	1.1 cm	3383	3.0%	100.0%	7
bsmk-a008	188.880 km	1.1 cm	1530	1.1%	100.0%	16
nddi-6118	188.914 km	1.0 cm	2810	6.9%	100.0%	16,17
2111-nddi	192.284 km	1.1 cm	3256	2.5%	100.0%	8, 9
nddi-7118	192.687 km	1.3 cm	2331	5.4%	100.0%	18
nddi-a001	193.144 km	1.2 cm	3045	2.0%	100.0%	5
a001-ndst	193.558 km	1.2 cm	6164	0.6%	100.0%	3, 5
a008-ndmu	196.858 km	1.1 cm	1532	0.5%	100.0%	16
a001-ndgr	197.910 km	1.3 cm	3009	2.0%	100.0%	5
a002-ndst	198.452 km	1.3 cm	2153	1.7%	100.0%	6
a008-nddi	198.921 km	1.1 cm	1528	0.7%	100.0%	16
ndmb-nddi	200.644 km	1.6 cm	40461	4.4%	100.0%	15,17,18
nddi-2117	201.049 km	1.1 cm	4872	0.7%	100.0%	10,12,13
nddi-3_ke	203.384 km	1.1 cm	2878	6.3%	100.0%	14
ndst-ndmb	204.008 km	1.8 cm	36068	3.3%	98.4%	1, 2
nddi-ndke	205.151 km	1.4 cm	26228	1.5%	100.0%	1, 2
1611-nddi	206.088 km	1.2 cm	1962	1.3%	100.0%	4
nddi-a005	207.935 km	1.3 cm	2870	2.9%	100.0%	11
a002-ndgr	208.382 km	1.3 cm	4156	4.5%	100.0%	4, 6
nddi-a007	209.599 km	1.0 cm	1588	4.8%	100.0%	15
nddi-a002	211.041 km	1.1 cm	4330	0.9%	100.0%	4, 6
ndgr-nddi	212.610 km	1.3 cm	270972	3.3%	99.3%	1, 2, 3,...
ndst-ndmu	217.615 km	1.3 cm	128859	1.4%	100.0%	3, 4, 5,...
bsmk-a005	224.300 km	1.3 cm	2907	1.5%	100.0%	11
bsmk-3_ke	228.513 km	1.1 cm	2859	6.9%	100.0%	14
a005-ndmu	231.096 km	1.3 cm	2836	3.1%	100.0%	11
bsmk-2117	231.267 km	1.0 cm	4890	0.6%	100.0%	10,12,13
bsmk-a006	241.072 km	1.0 cm	1448	4.1%	100.0%	12

a006-ndmu 241.305 km 1.1 cm 1431 5.1% 100.0% 12
 3_ke-ndmu 244.031 km 1.2 cm 2887 4.8% 100.0% 14
 2117-ndmu 251.599 km 1.1 cm 3222 1.5% 100.0% 10,13
 ndmu-bsmk 253.318 km 1.2 cm 110659 1.2% 100.0% 10,11,12,...

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UNCONSTRAINED MARKS

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MARK: 1411 (1411 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3141)

X: -848480.417 m 0.000 m -848481.329 m 0.000 m
 Y: -4164258.997 m 0.001 m -4164257.749 m 0.001 m
 Z: 4740714.804 m 0.001 m 4740714.779 m 0.001 m
 LAT: 48 18 59.44836 0.000 m 48 18 59.47299 0.000 m
 E LON: 258 29 00.43755 0.000 m 258 29 00.38207 0.000 m
 W LON: 101 30 59.56245 0.000 m 101 30 59.61793 0.000 m
 EL HGT: 483.799 m 0.002 m 483.088 m 0.002 m
 ORTHO HGT: 503.712 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y) 5354541.159 m 146870.279 m
 EASTING (X) 313435.062 m 524611.556 m
 CONVERGENCE -1.87997043 deg -0.75644518 deg
 POINT SCALE 1.00002767 0.99994401
 COMBINED FACTOR 0.99995185 0.99986820

US NATIONAL GRID DESIGNATOR: 14ULU1343554541 (NAD 83)

+++++

MARK: 1611 (1611 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3146)

X: -813214.068 m 0.000 m -813214.979 m 0.000 m

Y: -4169714.830 m 0.001 m -4169713.579 m 0.001 m

Z: 4742046.073 m 0.001 m 4742046.049 m 0.001 m

LAT: 48 20 05.47201 0.000 m 48 20 05.49696 0.000 m

E LON: 258 57 51.14442 0.000 m 258 57 51.08936 0.000 m

W LON: 101 02 08.85558 0.000 m 101 02 08.91064 0.000 m

EL HGT: 450.629 m 0.001 m 449.911 m 0.001 m

ORTHO HGT: 471.473 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y) 5355521.598 m 148550.044 m

EASTING (X) 349127.967 m 560278.163 m

CONVERGENCE -1.52110987 deg -0.39870163 deg

POINT SCALE 0.99987968 0.99994536

COMBINED FACTOR 0.99980907 0.99987474

US NATIONAL GRID DESIGNATOR: 14ULU4912755521 (NAD 83)

+++++

MARK: 2011 (2011 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3168)

X: -823689.192 m 0.000 m -823690.103 m 0.000 m

Y: -4181206.371 m 0.001 m -4181205.120 m 0.001 m

Z: 4730225.162 m 0.001 m 4730225.135 m 0.001 m

LAT: 48 10 29.62449 0.000 m 48 10 29.64929 0.000 m

E LON: 258 51 19.98144 0.000 m 258 51 19.92647 0.000 m

W LON: 101 08 40.01856 0.000 m 101 08 40.07353 0.000 m

EL HGT: 480.851 m 0.002 m 480.130 m 0.002 m

ORTHO HGT: 501.473 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y) 5337963.109 m 130826.928 m

EASTING (X) 340579.207 m 552074.071 m

CONVERGENCE -1.59834413 deg -0.47955648 deg

POINT SCALE 0.99991228 0.99993708

COMBINED FACTOR 0.99983693 0.99986173

US NATIONAL GRID DESIGNATOR: 14ULU4057937963 (NAD 83)

+++++

MARK: 2111 (2111 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3173)

X: -814023.580 m 0.000 m -814024.491 m 0.000 m

Y: -4184950.188 m 0.001 m -4184948.935 m 0.001 m

Z: 4728585.631 m 0.001 m 4728585.604 m 0.001 m

LAT: 48 09 10.38972 0.000 m 48 09 10.41459 0.000 m

E LON: 258 59 33.80034 0.000 m 258 59 33.74552 0.000 m

W LON: 101 00 26.19966 0.000 m 101 00 26.25448 0.000 m

EL HGT: 471.411 m 0.001 m 470.687 m 0.001 m

ORTHO HGT: 492.292 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y) 5335241.495 m 128303.509 m

EASTING (X) 350712.371 m 562258.876 m

CONVERGENCE -1.49555143 deg -0.37748227 deg

POINT SCALE 0.99987385 0.99993655

COMBINED FACTOR 0.99979998 0.99986268

US NATIONAL GRID DESIGNATOR: 14ULU5071235241 (NAD 83)

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MARK: 2117 (2117 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3200)

X:	-895715.377 m	0.000 m	-895716.290 m	0.000 m
Y:	-4124984.674 m	0.001 m	-4124983.432 m	0.001 m
Z:	4766313.491 m	0.001 m	4766313.470 m	0.001 m
LAT:	48 39 44.51038	0.000 m	48 39 44.53472	0.000 m
E LON:	257 44 55.53945	0.000 m	257 44 55.48296	0.000 m
W LON:	102 15 04.46055	0.000 m	102 15 04.51704	0.000 m
EL HGT:	627.763 m	0.001 m	627.074 m	0.001 m
ORTHO HGT:	646.839 m	0.007 m	(H = h - N WHERE N = GEOID12B HGT)	

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 13) SPC (3301 ND N)

NORTHING (Y)	5393570.083 m	186296.678 m
EASTING (X)	702396.937 m	471007.633 m
CONVERGENCE	2.06455034 deg	-1.30315547 deg
POINT SCALE	1.00010330	0.99998670
COMBINED FACTOR	1.00000492	0.99988833

US NATIONAL GRID DESIGNATOR: 13UGP0239693570 (NAD 83)

+++++

MARK: 3_ke (3_ke 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3196)

X:	-888201.410 m	0.000 m	-888202.324 m	0.000 m
Y:	-4125966.650 m	0.001 m	-4125965.407 m	0.001 m
Z:	4766818.455 m	0.001 m	4766818.434 m	0.001 m
LAT:	48 40 10.57200	0.000 m	48 40 10.59640	0.000 m

E LON: 257 51 04.58513 0.000 m 257 51 04.52870 0.000 m
 W LON: 102 08 55.41487 0.000 m 102 08 55.47130 0.000 m
 EL HGT: 592.108 m 0.002 m 591.417 m 0.002 m
 ORTHO HGT: 611.438 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 13) SPC (3301 ND N)
 NORTHING (Y) 5394651.830 m 186934.807 m
 EASTING (X) 709914.291 m 478574.536 m
 CONVERGENCE 2.14183872 deg -1.22687235 deg
 POINT SCALE 1.00014139 0.99998799
 COMBINED FACTOR 1.00004859 0.99998520

US NATIONAL GRID DESIGNATOR: 13UGP0991494651 (NAD 83)

+++++

MARK: 6118 (6118 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3226)
 X: -895347.966 m 0.000 m -895348.879 m 0.000 m
 Y: -4134994.536 m 0.001 m -4134993.293 m 0.001 m
 Z: 4757829.079 m 0.001 m 4757829.057 m 0.001 m
 LAT: 48 32 47.24500 0.000 m 48 32 47.26931 0.000 m
 E LON: 257 46 56.59905 0.000 m 257 46 56.54271 0.000 m
 W LON: 102 13 03.40095 0.000 m 102 13 03.45729 0.000 m
 EL HGT: 680.331 m 0.002 m 679.638 m 0.002 m
 ORTHO HGT: 699.200 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 13) SPC (3301 ND N)
 NORTHING (Y) 5380777.829 m 173355.280 m
 EASTING (X) 705342.419 m 473196.662 m
 CONVERGENCE 2.08610501 deg -1.27813200 deg

POINT SCALE 1.00011808 0.99996831
COMBINED FACTOR 1.00001146 0.99986170

US NATIONAL GRID DESIGNATOR: 13UGP0534280777 (NAD 83)

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MARK: 7118 (7118 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3222)
X: -880423.952 m 0.000 m -880424.865 m 0.000 m
Y: -4138200.708 m 0.001 m -4138199.464 m 0.001 m
Z: 4757732.375 m 0.002 m 4757732.352 m 0.002 m
LAT: 48 32 45.10486 0.000 m 48 32 45.12928 0.000 m
E LON: 257 59 20.78950 0.000 m 257 59 20.73333 0.000 m
W LON: 102 00 39.21050 0.000 m 102 00 39.26667 0.000 m
EL HGT: 609.702 m 0.002 m 609.005 m 0.002 m
ORTHO HGT: 629.031 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y) 5381351.225 m 172969.231 m
EASTING (X) 277793.103 m 488454.426 m
CONVERGENCE -2.25753951 deg -1.12430506 deg
POINT SCALE 1.00020668 0.99996823
COMBINED FACTOR 1.00011112 0.99987269

US NATIONAL GRID DESIGNATOR: 14UKU7779381351 (NAD 83)

+++++

MARK: a001 (a001 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3141)

X: -832337.095 m 0.000 m -832338.007 m 0.000 m
 Y: -4167250.873 m 0.001 m -4167249.623 m 0.001 m
 Z: 4740938.403 m 0.001 m 4740938.378 m 0.001 m
 LAT: 48 19 10.54037 0.000 m 48 19 10.56514 0.000 m
 E LON: 258 42 17.22050 0.000 m 258 42 17.16521 0.000 m
 W LON: 101 17 42.77950 0.000 m 101 17 42.83479 0.000 m
 EL HGT: 478.107 m 0.001 m 477.392 m 0.001 m
 ORTHO HGT: 498.574 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y) 5354368.768 m 147019.735 m
 EASTING (X) 329852.528 m 541028.476 m
 CONVERGENCE -1.71462751 deg -0.59174718 deg
 POINT SCALE 0.99995571 0.99994423
 COMBINED FACTOR 0.99988079 0.99986931

US NATIONAL GRID DESIGNATOR: 14ULU2985254368 (NAD 83)

+++++

MARK: a002 (a002 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3146)
 X: -818098.769 m 0.000 m -818099.681 m 0.000 m
 Y: -4160128.663 m 0.001 m -4160127.414 m 0.001 m
 Z: 4749565.283 m 0.001 m 4749565.260 m 0.001 m
 LAT: 48 26 12.09199 0.000 m 48 26 12.11691 0.000 m
 E LON: 258 52 28.62784 0.000 m 258 52 28.57260 0.000 m
 W LON: 101 07 31.37216 0.000 m 101 07 31.42740 0.000 m
 EL HGT: 448.093 m 0.001 m 447.379 m 0.001 m
 ORTHO HGT: 469.033 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y)	5367020.598 m	159923.445 m
EASTING (X)	342803.028 m	553728.535 m
CONVERGENCE	-1.59058326 deg	-0.46536701 deg
POINT SCALE	0.99990361	0.99995470
COMBINED FACTOR	0.99983339	0.99988448

US NATIONAL GRID DESIGNATOR: 14ULU4280367020 (NAD 83)

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MARK: a003 (a003 1)

REF FRAME:	NAD_83(2011) (2010.0000)	IGS08 (2017.3168)
X:	-831688.182 m 0.000 m	-831689.092 m 0.000 m
Y:	-4192501.561 m 0.001 m	-4192500.308 m 0.001 m
Z:	4719009.433 m 0.001 m	4719009.405 m 0.001 m
LAT:	48 01 22.75545 0.000 m	48 01 22.78015 0.000 m
E LON:	258 46 46.59992 0.000 m	258 46 46.54507 0.000 m
W LON:	101 13 13.40008 0.000 m	101 13 13.45493 0.000 m
EL HGT:	569.242 m 0.002 m	568.518 m 0.002 m
ORTHO HGT:	589.554 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)	

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y)	5321240.533 m	113987.798 m
EASTING (X)	334446.885 m	546268.810 m
CONVERGENCE	-1.65103952 deg	-0.53606545 deg
POINT SCALE	0.99993678	0.99993642
COMBINED FACTOR	0.99984758	0.99984722

US NATIONAL GRID DESIGNATOR: 14ULU3444621240 (NAD 83)

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MARK: a004 (a004 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3173)

X: -816563.547 m 0.000 m -816564.458 m 0.000 m

Y: -4195451.271 m 0.001 m -4195450.017 m 0.001 m

Z: 4718935.421 m 0.001 m 4718935.393 m 0.001 m

LAT: 48 01 21.67986 0.000 m 48 01 21.70468 0.000 m

E LON: 258 59 10.23922 0.000 m 258 59 10.18452 0.000 m

W LON: 101 00 49.76078 0.000 m 101 00 49.81548 0.000 m

EL HGT: 499.575 m 0.001 m 498.848 m 0.001 m

ORTHO HGT: 520.407 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y) 5320784.077 m 113831.097 m

EASTING (X) 349847.002 m 561675.356 m

CONVERGENCE -1.49737352 deg -0.38235244 deg

POINT SCALE 0.99987704 0.99993643

COMBINED FACTOR 0.99979876 0.99985814

US NATIONAL GRID DESIGNATOR: 14ULU4984720784 (NAD 83)

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MARK: a005 (a005 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3196)

X: -875357.983 m 0.000 m -875358.897 m 0.000 m

Y: -4127672.238 m 0.001 m -4127670.995 m 0.001 m

Z: 4767674.256 m 0.001 m 4767674.235 m 0.001 m

LAT: 48 40 53.55668 0.000 m 48 40 53.58119 0.000 m

E LON: 258 01 35.91067 0.000 m 258 01 35.85438 0.000 m

W LON: 101 58 24.08933 0.000 m 101 58 24.14562 0.000 m

EL HGT: 564.082 m 0.002 m 563.388 m 0.002 m
ORTHO HGT: 583.836 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 13) SPC (3301 ND N)

NORTHING (Y) 5396476.530 m 188000.487 m
EASTING (X) 722770.937 m 491513.796 m
CONVERGENCE 2.27409388 deg -1.09637501 deg
POINT SCALE 1.00020974 0.99999014
COMBINED FACTOR 1.00012133 0.99990175

US NATIONAL GRID DESIGNATOR: 13UGP2277096476 (NAD 83)

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MARK: a006 (a006 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3200)

X: -882952.321 m 0.000 m -882953.235 m 0.000 m
Y: -4115340.805 m 0.001 m -4115339.564 m 0.001 m
Z: 4776858.894 m 0.002 m 4776858.874 m 0.002 m
LAT: 48 48 24.53290 0.000 m 48 48 24.55738 0.000 m
E LON: 257 53 26.47259 0.000 m 257 53 26.41603 0.000 m
W LON: 102 06 33.52741 0.000 m 102 06 33.58397 0.000 m
EL HGT: 560.864 m 0.002 m 560.176 m 0.002 m
ORTHO HGT: 580.567 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 13) SPC (3301 ND N)

NORTHING (Y) 5410011.016 m 202128.624 m
EASTING (X) 712236.781 m 481795.709 m
CONVERGENCE 2.17603002 deg -1.19754369 deg
POINT SCALE 1.00015342 1.00001540
COMBINED FACTOR 1.00006552 0.99992751

US NATIONAL GRID DESIGNATOR: 13UGQ1223610011 (NAD 83)

+++++

MARK: a007 (a007 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3222)

X: -866143.201 m 0.001 m -866144.114 m 0.001 m

Y: -4130626.574 m 0.002 m -4130625.330 m 0.002 m

Z: 4766776.275 m 0.002 m 4766776.253 m 0.002 m

LAT: 48 40 10.31133 0.000 m 48 40 10.33590 0.000 m

E LON: 258 09 26.41750 0.000 m 258 09 26.36134 0.000 m

W LON: 101 50 33.58250 0.000 m 101 50 33.63866 0.000 m

EL HGT: 543.019 m 0.003 m 542.322 m 0.003 m

ORTHO HGT: 563.043 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y) 5394620.109 m 186488.881 m

EASTING (X) 290719.357 m 501112.904 m

CONVERGENCE -2.13536257 deg -0.99911950 deg

POINT SCALE 1.00013812 0.99998798

COMBINED FACTOR 1.00005301 0.99990289

US NATIONAL GRID DESIGNATOR: 14UKU9071994620 (NAD 83)

+++++

MARK: a008 (a008 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3226)

X: -843772.639 m 0.000 m -843773.552 m 0.000 m

Y: -4153152.810 m 0.001 m -4153151.563 m 0.001 m

Z: 4751245.662 m 0.001 m 4751245.638 m 0.001 m
 LAT: 48 27 31.96704 0.000 m 48 27 31.99174 0.000 m
 E LON: 258 30 57.03399 0.000 m 258 30 56.97836 0.000 m
 W LON: 101 29 02.96601 0.000 m 101 29 03.02164 0.000 m
 EL HGT: 506.538 m 0.002 m 505.830 m 0.002 m
 ORTHO HGT: 526.769 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y) 5370285.613 m 162667.816 m
 EASTING (X) 316349.207 m 527215.688 m
 CONVERGENCE -1.85985894 deg -0.73234427 deg
 POINT SCALE 1.00001440 0.99995715
 COMBINED FACTOR 0.99993502 0.99987777

US NATIONAL GRID DESIGNATOR: 14ULU1634970285 (NAD 83)

+++++

MARK: ndbr (ndbr 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3029)

X: -864069.770 m 0.000 m -864070.682 m 0.000 m
 Y: -4161109.892 m 0.000 m -4161108.645 m 0.000 m
 Z: 4740843.893 m 0.000 m 4740843.868 m 0.000 m
 LAT: 48 19 00.86182 0.000 m 48 19 00.88632 0.000 m
 E LON: 258 16 08.53572 0.000 m 258 16 08.48008 0.000 m
 W LON: 101 43 51.46428 0.000 m 101 43 51.51992 0.000 m
 EL HGT: 617.769 m 0.000 m 617.061 m 0.000 m
 ORTHO HGT: 637.132 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y) 5355128.766 m 147146.007 m

EASTING (X) 297542.054 m 508712.006 m
CONVERGENCE -2.04026598 deg -0.91600017 deg
POINT SCALE 1.00010365 0.99994404
COMBINED FACTOR 1.00000683 0.99984723

US NATIONAL GRID DESIGNATOR: 14UKU9754255128 (NAD 83)

+++++

MARK: ndke (ndke 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3029)
X: -882500.390 m 0.000 m -882501.303 m 0.000 m
Y: -4126863.572 m 0.000 m -4126862.330 m 0.000 m
Z: 4767084.751 m 0.000 m 4767084.730 m 0.000 m
LAT: 48 40 24.01894 0.000 m 48 40 24.04338 0.000 m
E LON: 257 55 46.21355 0.000 m 257 55 46.15721 0.000 m
W LON: 102 04 13.78645 0.000 m 102 04 13.84279 0.000 m
EL HGT: 581.412 m 0.000 m 580.720 m 0.000 m
ORTHO HGT: 600.930 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y) 5395693.742 m 187229.646 m
EASTING (X) 273964.890 m 484343.683 m
CONVERGENCE -2.30678167 deg -1.16865871 deg
POINT SCALE 1.00022774 0.99998866
COMBINED FACTOR 1.00013661 0.99989755

US NATIONAL GRID DESIGNATOR: 14UKU7396495693 (NAD 83)

+++++

MARK: ndmx (ndmx 1)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3029)

X: -840344.164 m 0.000 m -840345.074 m 0.000 m

Y: -4207320.187 m 0.000 m -4207318.933 m 0.000 m

Z: 4704449.349 m 0.000 m 4704449.319 m 0.000 m

LAT: 47 49 37.03328 0.000 m 47 49 37.05785 0.000 m

E LON: 258 42 17.03622 0.000 m 258 42 16.98151 0.000 m

W LON: 101 17 42.96378 0.000 m 101 17 43.01849 0.000 m

EL HGT: 633.081 m 0.000 m 632.353 m 0.000 m

ORTHO HGT: 653.144 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y) 5299617.859 m 92248.443 m

EASTING (X) 328216.028 m 540458.948 m

CONVERGENCE -1.70148393 deg -0.59178527 deg

POINT SCALE 0.99996263 0.99994591

COMBINED FACTOR 0.99986342 0.99984670

US NATIONAL GRID DESIGNATOR: 14TLT2821699617 (NAD 83)

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CONSTRAINED MARKS

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MARK: bsmk (bsmk a 3)

CONSTRAIN: 3-D TIGHT

ADJUST X: 0.000m (0.000m) Y: 0.000m (0.000m) Z: -0.000m (0.000m)

ADJUST N: 0.000m (0.000m) E: -0.000m (0.000m) H: -0.000m (0.000m)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3152)

X: -820591.516 m 0.000 m -820592.420 m 0.000 m

Y: -4294898.731 m 0.000 m -4294897.453 m 0.000 m

Z: 4628582.368 m 0.000 m 4628582.313 m 0.000 m
 LAT: 46 49 16.02778 0.000 m 46 49 16.05221 0.000 m
 E LON: 259 10 59.95850 0.000 m 259 10 59.90530 0.000 m
 W LON: 100 49 00.04150 0.000 m 100 49 00.09470 0.000 m
 EL HGT: 551.986 m 0.000 m 551.203 m 0.000 m
 ORTHO HGT: 573.497 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3302 ND S)

NORTHING (Y) 5186888.268 m 128373.768 m
 EASTING (X) 361427.156 m 575836.072 m
 CONVERGENCE -1.32496956 deg -0.23097956 deg
 POINT SCALE 0.99983602 0.99993588
 COMBINED FACTOR 0.99974952 0.99984937

US NATIONAL GRID DESIGNATOR: 14TLS6142786888 (NAD 83)

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MARK: mtrc (mtrc a 1)

CONSTRAIN: 3-D TIGHT

ADJUST X: 0.000m (0.000m) Y: -0.000m (0.000m) Z: -0.000m (0.000m)
 ADJUST N: -0.000m (0.000m) E: 0.000m (0.000m) H: -0.000m (0.000m)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3171)

X: -1053423.774 m 0.000 m -1053424.684 m 0.000 m
 Y: -4168936.558 m 0.000 m -4168935.315 m 0.000 m
 Z: 4695717.825 m 0.000 m 4695717.793 m 0.000 m
 LAT: 47 42 38.17629 0.000 m 47 42 38.19912 0.000 m
 E LON: 255 49 08.79460 0.000 m 255 49 08.73766 0.000 m
 W LON: 104 10 51.20540 0.000 m 104 10 51.26234 0.000 m
 EL HGT: 584.674 m 0.000 m 583.989 m 0.000 m
 ORTHO HGT: 601.963 m 0.009 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 13) SPC (2500 MT)

NORTHING (Y)	5284460.843 m	398075.640 m
EASTING (X)	561442.637 m	998635.938 m
CONVERGENCE	0.60595982 deg	3.89095104 deg
POINT SCALE	0.99964639	0.99946689
COMBINED FACTOR	0.99955479	0.99937531

US NATIONAL GRID DESIGNATOR: 13TEN6144284460 (NAD 83)

+++++

MARK: nddi (nddi a 1)

CONSTRAIN: 3-D TIGHT

ADJUST X: 0.000m (0.000m) Y: -0.000m (0.000m) Z: 0.000m (0.000m)

ADJUST N: -0.000m (0.000m) E: 0.000m (0.000m) H: 0.000m (0.000m)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3152)

X: -963423.107 m 0.000 m -963424.013 m 0.000 m

Y: -4259952.121 m 0.000 m -4259950.863 m 0.000 m

Z: 4633571.894 m 0.000 m 4633571.855 m 0.000 m

LAT: 46 53 05.85137 0.000 m 46 53 05.87477 0.000 m

E LON: 257 15 23.29120 0.000 m 257 15 23.23637 0.000 m

W LON: 102 44 36.70880 0.000 m 102 44 36.76363 0.000 m

EL HGT: 737.880 m 0.000 m 737.149 m 0.000 m

ORTHO HGT: 755.195 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 13) SPC (3302 ND S)

NORTHING (Y)	5194851.905 m	137863.150 m
EASTING (X)	671914.416 m	429034.312 m
CONVERGENCE	1.64758592 deg	-1.63639191 deg
POINT SCALE	0.99996326	0.99993624
COMBINED FACTOR	0.99984761	0.99982060

US NATIONAL GRID DESIGNATOR: 13TFM7191494851 (NAD 83)

MARK: ndgr (ndgr a 1)

CONSTRAIN: 3-D TIGHT

ADJUST X: -0.000m (0.000m) Y: 0.000m (0.000m) Z: -0.000m (0.000m)

ADJUST N: -0.000m (0.000m) E: -0.000m (0.000m) H: -0.000m (0.000m)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3160)

X: -1017237.899 m 0.000 m -1017238.813 m 0.000 m

Y: -4100304.668 m 0.000 m -4100303.434 m 0.000 m

Z: 4763262.048 m 0.000 m 4763262.026 m 0.000 m

LAT: 48 37 14.47287 0.000 m 48 37 14.49615 0.000 m

E LON: 256 04 00.79799 0.000 m 256 04 00.74018 0.000 m

W LON: 103 55 59.20201 0.000 m 103 55 59.25982 0.000 m

EL HGT: 642.769 m 0.000 m 642.106 m 0.000 m

ORTHO HGT: 661.414 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 13) SPC (3301 ND N)

NORTHING (Y) 5385840.046 m 185836.897 m

EASTING (X) 578625.185 m 346980.050 m

CONVERGENCE 0.80058023 deg -2.55469307 deg

POINT SCALE 0.99967595 0.99997962

COMBINED FACTOR 0.99957526 0.99987890

US NATIONAL GRID DESIGNATOR: 13UEP7862585840 (NAD 83)

MARK: ndmb (ndmb a 3)

CONSTRAIN: 3-D TIGHT

ADJUST X: -0.000m (0.000m) Y: -0.000m (0.000m) Z: 0.000m (0.000m)
ADJUST N: 0.000m (0.000m) E: -0.000m (0.000m) H: 0.001m (0.000m)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3127)

X:	-833302.771 m	0.000 m	-833303.681 m	0.000 m
Y:	-4158876.457 m	0.000 m	-4158875.194 m	0.000 m
Z:	4748073.472 m	0.000 m	4748073.426 m	0.000 m
LAT:	48 24 58.09727	0.000 m	48 24 58.12195	0.000 m
E LON:	258 40 11.40468	0.000 m	258 40 11.34924	0.000 m
W LON:	101 19 48.59532	0.000 m	101 19 48.65076	0.000 m
EL HGT:	481.473 m	0.000 m	480.735 m	0.000 m
ORTHO HGT:	501.997 m	0.007 m	(H = h - N WHERE N = GEOID12B HGT)	

UTM COORDINATES STATE PLANE COORDINATES

	UTM (Zone 14)	SPC (3301 ND N)
NORTHING (Y)	5365176.985 m	157781.312 m
EASTING (X)	327588.230 m	538552.583 m
CONVERGENCE	-1.74335602 deg	-0.61775378 deg
POINT SCALE	0.99996523	0.99995256
COMBINED FACTOR	0.99988978	0.99987711

US NATIONAL GRID DESIGNATOR: 14ULU2758865176 (NAD 83)

+++++

MARK: ndmu (ndmu a 1)

CONSTRAIN: 3-D TIGHT

ADJUST X: -0.000m (0.000m) Y: -0.000m (0.000m) Z: 0.000m (0.000m)
ADJUST N: 0.000m (0.000m) E: 0.000m (0.000m) H: 0.000m (0.000m)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3173)

X:	-648281.325 m	0.000 m	-648282.237 m	0.000 m
Y:	-4170571.646 m	0.000 m	-4170570.390 m	0.000 m
Z:	4766502.629 m	0.000 m	4766502.608 m	0.000 m

LAT: 48 39 59.69097 0.000 m 48 39 59.71729 0.000 m
 E LON: 261 09 52.36961 0.000 m 261 09 52.31615 0.000 m
 W LON: 98 50 07.63039 0.000 m 98 50 07.68385 0.000 m
 EL HGT: 467.148 m 0.000 m 466.406 m 0.000 m
 ORTHO HGT: 491.061 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3301 ND N)

NORTHING (Y) 5390405.294 m 186623.847 m
 EASTING (X) 512115.519 m 722597.717 m
 CONVERGENCE 0.12355513 deg 1.23864511 deg
 POINT SCALE 0.99960180 0.99998745
 COMBINED FACTOR 0.99952862 0.99991425

US NATIONAL GRID DESIGNATOR: 14UNU1211590405 (NAD 83)

+++++

MARK: ndst (ndst a 1)

CONSTRAIN: 3-D TIGHT

ADJUST X: -0.000m (0.000m) Y: 0.000m (0.000m) Z: -0.000m (0.000m)

ADJUST N: 0.000m (0.000m) E: -0.000m (0.000m) H: -0.000m (0.000m)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3119)

X: -752558.386 m 0.000 m -752559.291 m 0.000 m
 Y: -4304965.293 m 0.000 m -4304964.023 m 0.000 m
 Z: 4630779.649 m 0.000 m 4630779.609 m 0.000 m
 LAT: 46 50 59.95948 0.000 m 46 50 59.98447 0.000 m
 E LON: 260 05 03.19899 0.000 m 260 05 03.14658 0.000 m
 W LON: 99 54 56.80101 0.000 m 99 54 56.85342 0.000 m
 EL HGT: 554.120 m 0.000 m 553.342 m 0.000 m
 ORTHO HGT: 576.510 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3302 ND S)

NORTHING (Y)	5188901.204 m	131699.938 m
EASTING (X)	430183.008 m	644554.527 m
CONVERGENCE	-0.66814703 deg	0.42612132 deg
POINT SCALE	0.99965991	0.99993589
COMBINED FACTOR	0.99957309	0.99984904

US NATIONAL GRID DESIGNATOR: 14TMS3018388901 (NAD 83)

+++++

MARK: p802 (p802 a 1)

CONSTRAIN: 3-D TIGHT

ADJUST X: 0.000m (0.000m) Y: -0.000m (0.000m) Z: -0.000m (0.000m)

ADJUST N: -0.000m (0.000m) E: 0.000m (0.000m) H: -0.000m (0.000m)

REF FRAME: NAD_83(2011) (2010.0000) IGS08 (2017.3122)

X: -810031.973 m 0.000 m -810032.877 m 0.000 m

Y: -4318613.245 m 0.000 m -4318611.976 m 0.000 m

Z: 4608497.470 m 0.000 m 4608497.427 m 0.000 m

LAT: 46 33 27.16147 0.000 m 46 33 27.18593 0.000 m

E LON: 259 22 35.76886 0.000 m 259 22 35.71618 0.000 m

W LON: 100 37 24.23114 0.000 m 100 37 24.28382 0.000 m

EL HGT: 573.157 m 0.000 m 572.382 m 0.000 m

ORTHO HGT: 594.744 m 0.007 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 14) SPC (3302 ND S)

NORTHING (Y) 5157277.683 m 99034.110 m

EASTING (X) 375566.003 m 590538.184 m

CONVERGENCE -1.17884328 deg -0.09000402 deg

POINT SCALE 0.99979032 0.99994749

COMBINED FACTOR 0.99970050 0.99985766

US NATIONAL GRID DESIGNATOR: 14TLS7556657277 (NAD 83)

8. SECOND PRIMARY NETWORK RESULTS

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 1.00

Chi Square Test (95 %): Passed

Precision Confidence Level: 95%

Degrees of Freedom: 130

Post Processed Vector Statistics

Reference Factor: 1.00

Redundancy Number: 130.00

A Priori Scalar: 0.62

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)
12	5354833.164	0.003	281745.829	0.003
17	5337270.290	0.003	289088.489	0.003
18	5337528.567	0.003	303516.817	0.003
19	5337045.645	0.003	322840.072	0.003
22	5321171.220	0.003	282999.421	0.003
23	5320331.254	0.003	292193.211	0.003
24	5320692.085	0.003	308135.342	0.003
25	5321631.616	0.003	320987.516	0.003
26	5321240.538	0.004	334446.884	0.003

28	5305976.092	0.003	285256.426	0.003
29	5304529.872	0.003	297451.074	0.003
30	5304134.732	0.003	309604.746	0.003
31	5303805.249	0.004	323681.357	0.004
32	5301746.170	0.004	344484.433	0.004
8	5372625.404	0.003	285062.982	0.003

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
12	N48°18'32.38746"	W101°56'36.97271"	656.170	0.006	
17	N48°09'13.21777"	W101°50'09.45848"	629.631	0.005	
18	N48°09'38.21079"	W101°38'32.26372"	653.496	0.005	
19	N48°09'43.02419"	W101°22'56.93532"	545.192	0.004	
22	N48°00'25.07963"	W101°54'34.38668"	618.452	0.005	
23	N48°00'08.90244"	W101°47'09.70309"	620.723	0.005	
24	N48°00'38.51701"	W101°34'21.68079"	622.896	0.005	
25	N48°01'22.34578"	W101°24'03.27791"	628.439	0.005	
26	N48°01'22.75560"	W101°13'13.40013"	569.240	0.005	
28	N47°52'16.27031"	W101°52'18.30555"	635.696	0.007	
29	N47°51'43.73984"	W101°42'29.48321"	641.120	0.005	
30	N47°51'44.33380"	W101°32'44.46850"	606.695	0.008	
31	N47°51'48.13404"	W101°21'27.03919"	636.945	0.008	
32	N47°51'00.82683"	W101°04'43.75161"	631.169	0.010	
8	N48°28'11.98460"	W101°54'28.89734"	612.712	0.004	
NDBR	N48°19'00.86181"	W101°43'51.46426"	617.769		NEh
NDKE	N48°40'24.01894"	W102°04'13.78635"	581.410	0.003	
NDMX	N47°49'37.03327"	W101°17'42.96378"	633.081		NEh
WA13	N48°18'57.45694"	W101°43'36.50362"	611.888	0.004	
WA9	N48°26'40.92732"	W101°43'01.87165"	498.095	0.005	

Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
12	-879648.634	0.003	-4158540.806	0.005	4740287.618	0.005	0.007	
17	-874473.142	0.003	-4172777.818	0.004	4728761.808	0.004	0.006	
18	-860250.928	0.003	-4175162.050	0.004	4729294.605	0.004	0.006	
19	-841273.332	0.003	-4178840.583	0.004	4729313.093	0.004	0.006	
22	-882335.513	0.003	-4183521.550	0.004	4717854.296	0.004	0.007	

23	-873390.435	0.003	-4185779.076	0.004	4717521.649	0.004	0.007	
24	-857662.659	0.003	-4188337.466	0.004	4718135.287	0.004	0.007	
25	-844903.559	0.003	-4189907.122	0.004	4719045.008	0.004	0.006	
26	-831688.723	0.004	-4192500.286	0.005	4719009.465	0.005	0.007	
28	-881883.768	0.003	-4195084.117	0.005	4707752.114	0.006	0.009	
29	-870056.468	0.003	-4198317.743	0.004	4707082.044	0.004	0.006	
30	-858138.235	0.003	-4200732.574	0.006	4707068.824	0.006	0.009	
31	-844324.143	0.004	-4203462.826	0.007	4707170.009	0.007	0.010	
32	-824075.723	0.004	-4208579.414	0.008	4706185.247	0.008	0.012	
8	-874298.108	0.003	-4145959.239	0.004	4752144.881	0.004	0.006	
WA13	-863783.669	0.003	-4161244.369	0.003	4740769.590	0.003	0.005	
WA9	-860896.059	0.003	-4150835.379	0.004	4750193.653	0.004	0.007	

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
12	0.004	0.004	3°
17	0.004	0.004	165°
18	0.004	0.004	169°
19	0.004	0.004	162°
22	0.004	0.004	177°
23	0.004	0.004	4°
24	0.004	0.003	169°
25	0.004	0.004	163°
26	0.005	0.004	179°
28	0.004	0.004	179°
29	0.004	0.003	172°
30	0.004	0.004	168°
31	0.005	0.005	164°
32	0.006	0.005	160°
8	0.004	0.004	172°
WA13	0.003	0.003	180°
WA9	0.004	0.004	171°

9. SECONDARY NETWORKS (LiDAR CHECK POINTS) RESULTS.

Project File Data		Coordinate System	
Name:	D:\17-4291 Ward\Ward day111.vce	Name:	World wide/UTM
Size:	161 KB	Datum:	NAD 1983 (2011)
Modified:	11/6/2017 9:15:15 AM (UTC:-7)	Zone:	14 North
Time zone:	Mountain Standard Time	Geoid:	
Reference number:		Vertical datum:	
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 1.00

Chi Square Test (95%): Passed

Precision Confidence Level: 95%

Degrees of Freedom: 199

Post Processed Vector Statistics

Reference Factor: 1.00

Redundancy Number: 199.00

A Priori Scalar: 0.69

Control Point Constraints

Point ID	Type	North σ (Meter)	East σ (Meter)	Height σ (Meter)	Elevation σ (Meter)
NDBR	Grid	Fixed	Fixed		
NDBR	Local			Fixed	
NDMX	Grid	Fixed	Fixed		
NDMX	Local			Fixed	

Fixed = 0.000001(Meter)

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)	Elevation (Meter)	Elevation Error (Meter)	Constraint
12	5354833.163	0.003	281745.829	0.003	?	?	
12A	5359630.400	0.003	282792.541	0.003	?	?	
12B	5351768.171	0.004	287993.789	0.004	?	?	
8	5372625.403	0.003	285062.983	0.003	?	?	
8A	5366483.405	0.003	288024.172	0.003	?	?	
8B	5370090.156	0.004	278537.018	0.003	?	?	
8C	5376410.922	0.004	281958.485	0.003	?	?	
8D	5377706.126	0.004	290118.725	0.004	?	?	
NDBR	5355128.766	?	297542.054	?	?	?	NEh
NDKE	5395693.738	0.003	273964.894	0.003	?	?	
NDMX	5299617.859	?	328216.028	?	?	?	NEh
WA13	5355012.685	0.002	297846.371	0.002	?	?	
WA13A	5358138.597	0.003	291653.847	0.003	?	?	
WA13B	5348267.786	0.003	295072.714	0.003	?	?	
WA13C	5349630.569	0.003	303874.897	0.003	?	?	
WA13D	5357637.809	0.005	305005.174	0.005	?	?	
WA9	5369295.546	0.003	299067.140	0.003	?	?	
WA9A	5367430.027	0.003	306596.275	0.003	?	?	
WA9B	5367894.391	0.003	293880.045	0.003	?	?	
WA9C	5362906.705	0.003	297544.176	0.003	?	?	

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
12	N48°18'32.38741"	W101°56'36.97271"	656.159	0.004	
12A	N48°21'08.85378"	W101°55'55.11994"	654.892	0.004	
12B	N48°17'00.89085"	W101°51'28.47200"	652.044	0.006	
8	N48°28'11.98454"	W101°54'28.89725"	612.707	0.003	
8A	N48°24'56.92803"	W101°51'53.66816"	630.425	0.005	
8B	N48°26'41.83848"	W101°59'41.48225"	668.604	0.005	
8C	N48°30'10.57773"	W101°57'07.00985"	614.053	0.005	
8D	N48°31'02.47767"	W101°50'32.15634"	566.886	0.005	

NDBR	N48°19'00.86181"	W101°43'51.46426"	617.769	?	NEh
NDKE	N48°40'24.01883"	W102°04'13.78629"	581.414	0.003	
NDMX	N47°49'37.03327"	W101°17'42.96378"	633.081	?	NEh
WA13	N48°18'57.45690"	W101°43'36.50361"	611.887	0.003	
WA13A	N48°20'31.34229"	W101°48'42.40153"	640.446	0.004	
WA13B	N48°15'16.04202"	W101°45'39.25367"	675.098	0.004	
WA13C	N48°16'10.15967"	W101°38'35.09234"	593.240	0.005	
WA13D	N48°20'30.48205"	W101°37'53.63453"	570.207	0.008	
WA9	N48°26'40.92727"	W101°43'01.87160"	498.090	0.004	
WA9A	N48°25'49.05985"	W101°36'52.64131"	537.848	0.005	
WA9B	N48°25'49.56494"	W101°47'11.60318"	584.027	0.004	
WA9C	N48°23'12.48836"	W101°44'04.82639"	582.666	0.005	

Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
12	-879648.633	0.003	-4158540.800	0.004	4740287.609	0.004	0.006	
12A	-878058.158	0.003	-4155185.842	0.004	4743500.070	0.004	0.006	
12B	-873860.963	0.004	-4161914.276	0.005	4738404.180	0.005	0.008	
8	-874298.106	0.003	-4145959.237	0.003	4752144.876	0.003	0.005	
8A	-872107.201	0.003	-4151040.137	0.004	4748160.949	0.004	0.007	
8B	-881020.987	0.004	-4146704.572	0.004	4750339.920	0.004	0.007	
8C	-876908.019	0.003	-4142604.900	0.004	4754574.079	0.004	0.007	
8D	-868723.336	0.004	-4143069.977	0.005	4755600.902	0.005	0.008	
NDBR	-864070.311	?	-4161108.626	?	4740843.928	?	?	NEh
NDKE	-882500.929	0.003	-4126862.314	0.003	4767084.790	0.003	0.006	
NDMX	-840344.705	?	-4207318.915	?	4704449.377	?	?	NEh
WA13	-863783.668	0.002	-4161244.369	0.003	4740769.588	0.003	0.005	
WA13A	-869514.422	0.003	-4157856.845	0.004	4742719.136	0.004	0.006	
WA13B	-867309.149	0.003	-4165769.186	0.004	4736265.481	0.004	0.006	
WA13C	-858478.114	0.003	-4166268.757	0.004	4737317.313	0.004	0.006	
WA13D	-856426.975	0.005	-4160544.883	0.007	4742648.995	0.007	0.011	
WA9	-860896.057	0.003	-4150835.377	0.003	4750193.648	0.003	0.005	
WA9A	-853711.028	0.003	-4153569.933	0.004	4749160.410	0.005	0.007	
WA9B	-866175.126	0.003	-4151007.980	0.004	4749205.313	0.004	0.007	
WA9C	-863153.837	0.003	-4155342.901	0.004	4745983.278	0.004	0.007	

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
12	0.004	0.003	9°
12A	0.004	0.004	13°

12B		0.005	0.004	22°
8		0.003	0.003	3°
8A		0.004	0.004	9°
8B		0.005	0.004	173°
8C		0.005	0.004	178°
8D		0.005	0.005	12°
NDKE		0.004	0.004	6°
WA13		0.003	0.003	12°
WA13A		0.004	0.004	4°
WA13B		0.004	0.004	16°
WA13C		0.004	0.004	24°
WA13D		0.007	0.006	161°
WA9		0.003	0.003	3°
WA9A		0.004	0.004	17°
WA9B		0.004	0.004	178°
WA9C		0.004	0.004	174°

Project File Data		Coordinate System	
Name:	D:\17-4291 Ward\Ward day112.vce	Name:	World wide/UTM
Size:	185 KB	Datum:	NAD 1983 (2011)
Modified:	11/6/2017 9:37:47 AM (UTC:-7)	Zone:	14 North
Time zone:	Mountain Standard Time	Geoid:	
Reference number:		Vertical datum:	
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2
Network Reference Factor: 1.00
Chi Square Test (95%): Passed
Precision Confidence Level: 95%
Degrees of Freedom: 247

Post Processed Vector Statistics

Reference Factor: 1.00
Redundancy Number: 247.00
A Priori Scalar: 1.07

Control Point Constraints

Point ID	Type	North σ (Meter)	East σ (Meter)	Height σ (Meter)	Elevation σ (Meter)
17	Grid	Fixed	Fixed		
17	Local			Fixed	
23	Grid	Fixed	Fixed		
23	Local			Fixed	

Fixed = 0.000001(Meter)

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)	Elevation (Meter)	Elevation Error (Meter)	Constraint
17	5337270.290	?	289088.489	?	?	?	NEh
17A	5330724.570	0.005	291767.015	0.005	?	?	
17B	5333225.372	0.005	284111.845	0.005	?	?	
17C	5340681.102	0.006	282990.468	0.006	?	?	
17D	5342964.603	0.006	294070.740	0.005	?	?	
18	5337528.568	0.005	303516.816	0.005	?	?	
18A	5342923.010	0.008	311082.562	0.008	?	?	
18B	5341825.626	0.006	297276.433	0.006	?	?	
18C	5331911.850	0.006	301844.388	0.006	?	?	
18D	5333331.531	0.007	309833.691	0.007	?	?	
22	5321171.218	0.005	282999.421	0.005	?	?	
22A	5327733.644	0.005	285542.902	0.005	?	?	
22B	5316216.290	0.006	285638.730	0.005	?	?	
23	5320331.254	?	292193.211	?	?	?	NEh
23A	5317354.574	0.006	299269.099	0.005	?	?	
23B	5326495.249	0.005	298360.074	0.005	?	?	
23C	5327465.726	0.006	291460.521	0.005	?	?	
23D	5315961.770	0.009	292846.775	0.008	?	?	
NDBR	5355128.767	0.008	297542.051	0.007	?	?	
NDKE	5395693.745	0.019	273964.883	0.018	?	?	
NDMB	5365176.987	0.014	327588.227	0.014	?	?	
NDMX	5299617.862	0.013	328216.032	0.013	?	?	

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
17	N48°09'13.21776"	W101°50'09.45849"	629.631	?	NEh
17A	N48°05'44.63781"	W101°47'48.45073"	624.402	0.007	
17B	N48°06'56.36384"	W101°54'02.66425"	630.488	0.008	
17C	N48°10'56.16233"	W101°55'10.51530"	633.585	0.007	
17D	N48°12'23.31175"	W101°46'18.51534"	645.970	0.006	
18	N48°09'38.21083"	W101°38'32.26377"	653.487	0.005	
18A	N48°12'41.01293"	W101°32'35.00400"	586.118	0.007	
18B	N48°11'50.17794"	W101°43'41.40613"	642.983	0.008	
18C	N48°06'34.61875"	W101°39'43.73479"	633.714	0.007	
18D	N48°07'29.32258"	W101°33'20.02075"	643.145	0.006	
22	N48°00'25.07955"	W101°54'34.38667"	618.450	0.006	
22A	N48°04'00.45586"	W101°52'43.60572"	623.495	0.007	
22B	N47°57'47.99715"	W101°52'18.25462"	616.970	0.007	
23	N48°00'08.90244"	W101°47'09.70309"	620.723	?	NEh
23A	N47°58'40.73282"	W101°41'23.57566"	622.886	0.007	
23B	N48°03'35.43820"	W101°42'22.85493"	633.225	0.007	
23C	N48°03'58.85118"	W101°47'57.52610"	619.351	0.008	
23D	N47°57'48.30480"	W101°46'30.61180"	612.576	0.011	
NDBR	N48°19'00.86185"	W101°43'51.46439"	617.776	0.004	
NDKE	N48°40'24.01904"	W102°04'13.78682"	581.427	0.005	
NDMB	N48°24'58.09733"	W101°19'48.59551"	481.468	0.005	
NDMX	N47°49'37.03338"	W101°17'42.96361"	633.076	0.005	

Project File Data	Coordinate System
Name: D:\17-4291 Ward\Ward day113.vce	Name: World wide/UTM
Size: 82 KB	Datum: NAD 1983 (2011)
Modified: 11/6/2017 9:52:38 AM (UTC:-7)	Zone: 14 North
Time zone: Mountain Standard Time	Geoid:
Reference number:	Vertical datum:
Description:	
Comment 1:	
Comment 2:	
Comment 3:	

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 1.00

Chi Square Test (95%): Passed

Precision Confidence Level: 95%

Degrees of Freedom: 37

Post Processed Vector Statistics

Reference Factor: 1.00

Redundancy Number: 37.00

A Priori Scalar: 0.80

Control Point Constraints

Point ID	Type	North σ (Meter)	East σ (Meter)	Height σ (Meter)	Elevation σ (Meter)
19	Grid	Fixed	Fixed		
19	Local			Fixed	
25	Grid	Fixed	Fixed		
25	Local			Fixed	

Fixed = 0.000001(Meter)

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)	Elevation (Meter)	Elevation Error (Meter)	Constraint
19	5337045.645	?	322840.072	?	?	?	NEh
19A	5345327.770	0.006	322992.628	0.006	?	?	
19B	5337927.412	0.005	315362.750	0.005	?	?	
19C	5331308.723	0.005	321077.157	0.005	?	?	
19D	5332953.319	0.007	332329.706	0.006	?	?	
25	5321631.616	?	320987.516	?	?	?	NEh
25A	5327910.278	0.005	325799.384	0.005	?	?	
25B	5325029.625	0.005	314425.208	0.005	?	?	

25C	5318014.940	0.006	314500.106	0.006	?	?	
25D	5316177.566	0.006	325631.219	0.006	?	?	

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
19	N48°09'43.02420"	W101°22'56.93533"	545.192	?	NEh
19A	N48°14'11.19268"	W101°23'01.98877"	465.943	0.007	
19B	N48°10'03.89826"	W101°28'59.97127"	584.036	0.007	
19C	N48°06'35.59710"	W101°24'13.53162"	579.287	0.008	
19D	N48°07'39.84525"	W101°15'12.08595"	517.538	0.011	
25	N48°01'22.34578"	W101°24'03.27792"	628.439	?	NEh
25A	N48°04'50.32816"	W101°20'20.35074"	574.134	0.008	
25B	N48°03'05.56168"	W101°29'25.12268"	637.317	0.007	
25C	N47°59'18.65053"	W101°29'10.58013"	620.568	0.008	
25D	N47°58'30.46047"	W101°20'11.28349"	637.068	0.008	

Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
19	-841273.333	?	-4178840.583	?	4729313.094	?	?	NEh
19A	-840146.419	0.006	-4172714.488	0.007	4734775.426	0.007	0.011	
19B	-848536.503	0.005	-4176908.021	0.006	4729772.108	0.006	0.010	
19C	-843682.092	0.005	-4182776.732	0.007	4725474.731	0.007	0.010	
19D	-832403.001	0.007	-4183487.372	0.010	4726753.647	0.009	0.015	
25	-844903.560	?	-4189907.122	?	4719045.008	?	?	NEh
25A	-839428.101	0.005	-4186097.325	0.007	4723299.100	0.007	0.011	
25B	-850969.167	0.005	-4186266.270	0.006	4721183.450	0.006	0.010	
25C	-851709.356	0.006	-4191421.369	0.007	4716482.789	0.007	0.011	
25D	-840967.188	0.005	-4194729.049	0.007	4715498.662	0.007	0.011	

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
19A	0.008	0.007	0°
19B	0.007	0.006	162°
19C	0.006	0.006	1°
19D	0.009	0.008	4°
25A	0.006	0.006	9°
25B	0.007	0.006	167°

25C	0.008	0.007	176°
25D	0.007	0.007	177°

Project File Data		Coordinate System	
Name:	D:\17-4291 Ward\Ward day 114.vce	Name:	World wide/UTM
Size:	99 KB	Datum:	NAD 1983 (2011)
Modified:	11/6/2017 10:09:26 AM (UTC:-7)	Zone:	14 North
Time zone:	Mountain Standard Time	Geoid:	
Reference number:		Vertical datum:	
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 1.00

Chi Square Test (95%): Passed

Precision Confidence Level: 95%

Degrees of Freedom: 52

Post Processed Vector Statistics

Reference Factor: 1.00

Redundancy Number: 52.00

A Priori Scalar: 0.51

Control Point Constraints

Point ID	Type	North σ (Meter)	East σ (Meter)	Height σ (Meter)	Elevation σ (Meter)
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24	Grid	Fixed	Fixed		
24	Local			Fixed	
28	Grid	Fixed	Fixed		
28	Local			Fixed	

Fixed = 0.000001(Meter)

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)	Elevation (Meter)	Elevation Error (Meter)	Constraint
24	5320692.085	?	308135.342	?	?	?	NEh
24A	5321718.776	0.004	312998.877	0.004	?	?	
24B	5325322.952	0.003	306343.883	0.003	?	?	
24C	5322190.902	0.003	304010.362	0.003	?	?	
24D	5313266.135	0.004	307934.187	0.003	?	?	
28	5305976.092	?	285256.426	?	?	?	NEh
28A	5312928.268	0.003	287196.374	0.003	?	?	
28B	5303190.014	0.004	289753.096	0.004	?	?	
29	5304529.871	0.003	297451.071	0.003	?	?	
29A	5311078.135	0.004	293910.371	0.004	?	?	
29B	5307740.464	0.004	303964.625	0.004	?	?	
29C	5301208.602	0.005	300648.109	0.005	?	?	
29D	5301356.449	0.005	296686.073	0.004	?	?	
30	5304134.730	0.004	309604.745	0.004	?	?	
30A	5310474.094	0.004	312619.937	0.004	?	?	
30B	5303889.397	0.005	317240.528	0.005	?	?	
30C	5300355.687	0.005	309101.356	0.005	?	?	

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
24	N48°00'38.51700"	W101°34'21.68079"	622.896	?	NEh
24A	N48°01'16.92861"	W101°30'28.75648"	625.138	0.006	
24B	N48°03'06.41013"	W101°35'55.60209"	616.573	0.004	
24C	N48°01'22.50687"	W101°37'43.05331"	629.765	0.004	
24D	N47°56'38.01593"	W101°34'19.43091"	635.073	0.004	
28	N47°52'16.27030"	W101°52'18.30557"	635.696	?	NEh
28A	N47°56'03.50006"	W101°50'57.37588"	623.732	0.006	
28B	N47°50'51.49149"	W101°48'37.22046"	641.239	0.005	
29	N47°51'43.73980"	W101°42'29.48330"	641.121	0.004	
29A	N47°55'11.54225"	W101°45'30.96240"	633.402	0.005	
29B	N47°53'34.89722"	W101°37'21.55006"	629.367	0.006	
29C	N47°49'59.87760"	W101°39'50.26230"	640.548	0.006	

29D	N47°50'00.19629"	W101°43'00.89530"	645.325	0.006	
30	N47°51'44.33371"	W101°32'44.46856"	606.687	0.003	
30A	N47°55'12.66330"	W101°30'29.38665"	615.756	0.005	
30B	N47°51'44.37753"	W101°26'36.90796"	617.823	0.005	
30C	N47°49'41.51147"	W101°33'02.67268"	621.258	0.004	

Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
24	-857662.659	?	-4188337.466	?	4718135.286	?	?	NEh
24A	-852756.779	0.004	-4188440.539	0.005	4718930.635	0.005	0.008	
24B	-858885.943	0.003	-4184615.125	0.004	4721185.541	0.004	0.006	
24C	-861548.578	0.003	-4186513.318	0.004	4719049.323	0.004	0.006	
24D	-858725.673	0.003	-4193761.382	0.004	4713171.262	0.004	0.007	
28	-881883.768	?	-4195084.117	?	4707752.113	?	?	NEh
28A	-879166.671	0.003	-4190324.902	0.005	4712448.603	0.005	0.007	
28B	-877784.943	0.004	-4197931.251	0.005	4705999.205	0.005	0.007	
29	-870056.470	0.003	-4198317.744	0.003	4707082.043	0.003	0.005	
29A	-872778.491	0.004	-4192883.594	0.005	4711380.364	0.004	0.007	
29B	-863273.168	0.004	-4197109.797	0.005	4709376.231	0.005	0.009	
29C	-867296.191	0.005	-4201317.024	0.006	4704928.621	0.006	0.009	
29D	-871177.910	0.004	-4200509.658	0.005	4704938.770	0.005	0.009	
30	-858138.236	0.004	-4200732.571	0.004	4707068.816	0.004	0.006	
30A	-854435.782	0.004	-4196621.635	0.004	4711390.472	0.004	0.007	
30B	-850652.519	0.005	-4202261.427	0.005	4707077.981	0.005	0.008	
30C	-859074.085	0.005	-4203421.899	0.005	4704533.482	0.005	0.008	

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
24A	0.005	0.005	1°
24B	0.004	0.004	3°
24C	0.004	0.004	6°
24D	0.005	0.004	22°
28A	0.004	0.004	161°
28B	0.005	0.004	175°
29	0.004	0.003	17°
29A	0.005	0.005	175°
29B	0.006	0.005	13°
29C	0.006	0.006	9°
29D	0.006	0.006	170°
30	0.005	0.005	114°

30A	0.005	0.005	5°
30B	0.006	0.006	63°
30C	0.006	0.006	107°

Project File Data		Coordinate System	
Name:	D:\17-4291 Ward\Ward day 115.vce	Name:	World wide/UTM
Size:	74 KB	Datum:	NAD 1983 (2011)
Modified:	11/6/2017 10:34:28 AM (UTC:-7)	Zone:	14 North
Time zone:	Mountain Standard Time	Geoid:	
Reference number:		Vertical datum:	
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 0.99

Chi Square Test (95%): Passed

Precision Confidence Level: 95%

Degrees of Freedom: 22

Post Processed Vector Statistics

Reference Factor: 0.99

Redundancy Number: 22.00

A Priori Scalar: 0.31

Control Point Constraints

Point ID	Type	North σ (Meter)	East σ (Meter)	Height σ (Meter)	Elevation σ (Meter)
11	Grid	Fixed	Fixed		
11	Local			Fixed	
16	Grid	Fixed	Fixed		
16	Local			Fixed	

Fixed = 0.000001(Meter)

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)	Elevation (Meter)	Elevation Error (Meter)	Constraint
11	5367020.598	?	342803.028	?	?	?	NEh
11A	5360349.715	0.002	342644.615	0.002	?	?	
11B	5368857.570	0.003	334835.096	0.002	?	?	
11C	5367685.332	0.002	348611.612	0.002	?	?	
16	5355521.598	?	349127.967	?	?	?	NEh
16A	5348278.350	0.002	345673.686	0.002	?	?	
16B	5356882.333	0.002	342693.106	0.002	?	?	

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
11	N48°26'12.09199"	W101°07'31.37217"	448.093	?	NEh
11A	N48°22'36.04478"	W101°07'30.07317"	457.697	0.003	
11B	N48°27'04.19936"	W101°14'01.51009"	468.113	0.003	
11C	N48°26'38.73120"	W101°02'49.70261"	441.584	0.003	
16	N48°20'05.47201"	W101°02'08.85556"	450.629	?	NEh
16A	N48°16'08.02848"	W101°04'47.00554"	459.202	0.003	
16B	N48°20'43.86459"	W101°07'23.05038"	461.649	0.003	

Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
11	-818099.310	?	-4160127.395	?	4749565.316	?	?	NEh
11A	-819037.394	0.002	-4165036.201	0.003	4745142.152	0.003	0.004	
11B	-825734.419	0.002	-4157404.168	0.003	4750648.056	0.002	0.004	
11C	-812298.776	0.002	-4160632.109	0.002	4750106.359	0.002	0.004	
16	-813214.608	?	-4169713.561	?	4742046.104	?	?	NEh
16A	-817464.963	0.002	-4174468.817	0.003	4737173.460	0.002	0.004	
16B	-819395.702	0.002	-4167607.786	0.002	4742842.651	0.002	0.004	

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
11A	0.003	0.003	9°
11B	0.003	0.003	177°
11C	0.003	0.002	23°
16A	0.003	0.003	14°
16B	0.003	0.002	21°

Project File Data		Coordinate System	
Name:	D:\17-4291 Ward\Ward day 115A.vce	Name:	World wide/UTM
Size:	83 KB	Datum:	NAD 1983 (2011)
Modified:	11/6/2017 10:25:44 AM (UTC:-7)	Zone:	14 North
Time zone:	Mountain Standard Time	Geoid:	
Reference number:		Vertical datum:	
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 1.00

Chi Square Test (95%): Passed
Precision Confidence Level: 95%
Degrees of Freedom: 37

Post Processed Vector Statistics

Reference Factor: 1.00
Redundancy Number: 37.00
A Priori Scalar: 0.87

Control Point Constraints

Point ID	Type	North σ (Meter)	East σ (Meter)	Height σ (Meter)	Elevation σ (Meter)
14	Grid	Fixed	Fixed		
14	Local			Fixed	
15	Grid	Fixed	Fixed		
15	Local			Fixed	

Fixed = 0.000001(Meter)

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)	Elevation (Meter)	Elevation Error (Meter)	Constraint
14	5354541.159	?	313435.062	?	?	?	NEh
14A	5360270.200	0.006	309137.102	0.006	?	?	
14B	5358869.124	0.006	318716.532	0.005	?	?	
14C	5349825.921	0.005	319849.042	0.005	?	?	
14D	5351013.043	0.006	309621.009	0.006	?	?	
15	5354368.768	?	329852.528	?	?	?	NEh
15A	5349741.995	0.006	336091.274	0.006	?	?	
15B	5360145.761	0.006	334571.718	0.006	?	?	
15C	5360315.789	0.005	324884.919	0.005	?	?	
15D	5350152.291	0.006	323203.535	0.005	?	?	

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
14	N48°18'59.44836"	W101°30'59.56243"	483.799	?	NEh
14A	N48°22'00.19535"	W101°34'37.39905"	491.928	0.007	
14B	N48°21'25.02446"	W101°26'50.04554"	517.150	0.010	
14C	N48°16'33.56297"	W101°25'41.15450"	466.138	0.007	
14D	N48°17'01.20186"	W101°33'58.85353"	564.599	0.007	
15	N48°19'10.54036"	W101°17'42.77951"	478.107	?	NEh
15A	N48°16'46.73247"	W101°12'33.58230"	477.572	0.007	

15B	N48°22'22.01130"	W101°14'01.95785"	475.113	0.010	
15C	N48°22'18.10546"	W101°21'52.71120"	493.139	0.007	
15D	N48°16'47.52786"	W101°22'59.02928"	504.360	0.007	

Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
14	-848480.958	?	-4164257.730	?	4740714.838	?	?	NEh
14A	-852042.302	0.006	-4159278.047	0.006	4744432.096	0.006	0.011	
14B	-842780.526	0.005	-4162010.157	0.008	4743729.081	0.008	0.012	
14C	-842715.945	0.005	-4168848.799	0.006	4737703.627	0.006	0.010	
14D	-852657.920	0.006	-4166243.144	0.006	4738345.299	0.006	0.011	
15	-832337.636	?	-4167249.606	?	4740938.436	?	?	NEh
15A	-826734.551	0.006	-4171745.730	0.007	4737982.897	0.006	0.011	
15B	-827014.492	0.006	-4163801.772	0.008	4744867.216	0.009	0.013	
15C	-836535.411	0.005	-4162003.612	0.006	4744800.542	0.006	0.010	
15D	-839380.421	0.005	-4169219.189	0.006	4738019.244	0.006	0.010	

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
14A	0.008	0.007	2°
14B	0.007	0.006	172°
14C	0.007	0.006	157°
14D	0.007	0.007	166°
15A	0.008	0.007	2°
15B	0.008	0.007	172°
15C	0.007	0.007	156°
15D	0.007	0.006	168°

Project File Data	Coordinate System
Name: D:\17-4291 Ward\Ward day 116.vce	Name: World wide/UTM
Size: 109 KB	Datum: NAD 1983 (2011)
Modified: 11/6/2017 11:15:35 AM (UTC:-7)	Zone: 14 North
Time zone: Mountain Standard Time	Geoid:
Reference number:	Vertical datum:
Description:	
Comment 1:	
Comment 2:	
Comment 3:	

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 0.99

Chi Square Test (95%): Passed

Precision Confidence Level: 95%

Degrees of Freedom: 64

Post Processed Vector Statistics

Reference Factor: 0.99

Redundancy Number: 64.00

A Priori Scalar: 0.43

Control Point Constraints

Point ID	Type	North σ (Meter)	East σ (Meter)	Height σ (Meter)	Elevation σ (Meter)
21	Grid	Fixed	Fixed		
21	Local			Fixed	
26	Grid	Fixed	Fixed		
26	Local			Fixed	

Fixed = 0.000001(Meter)

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)	Elevation (Meter)	Elevation Error (Meter)	Constraint
20	5337963.119	0.005	340579.195	0.005	?	?	
20A	5344013.034	0.007	337614.839	0.006	?	?	

20B	5338597.847	0.007	350276.017	0.007	?	?	
20C	5329063.454	0.004	340469.200	0.004	?	?	
20D	5335655.069	0.005	336478.129	0.004	?	?	
21	5335241.495	?	350712.371	?	?	?	NEh
21A	5334678.404	0.003	348511.618	0.003	?	?	
21B	5328453.867	0.005	347214.893	0.004	?	?	
26	5321240.538	?	334446.884	?	?	?	NEh
26A	5321438.837	0.004	326622.828	0.003	?	?	
26B	5329325.400	0.004	333872.126	0.003	?	?	
26C	5321072.865	0.003	340860.051	0.003	?	?	
26D	5315660.422	0.003	335215.765	0.003	?	?	
27	5320784.076	0.005	349847.014	0.004	?	?	
27A	5328249.427	0.003	349956.799	0.003	?	?	
27B	5317716.308	0.006	343354.786	0.006	?	?	
27C	5314252.117	0.007	350128.357	0.007	?	?	

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
20	N48°10'29.62479"	W101°08'40.01915"	480.849	0.003	
20A	N48°13'42.72913"	W101°11'11.79488"	480.660	0.003	
20B	N48°10'58.66183"	W101°00'51.56245"	461.675	0.005	
20C	N48°05'41.47531"	W101°08'33.34286"	474.434	0.004	
20D	N48°09'11.17325"	W101°11'55.27039"	500.906	0.004	
21	N48°09'10.38973"	W101°00'26.19966"	471.411	?	NEh
21A	N48°08'50.28976"	W101°02'11.93527"	471.843	0.004	
21B	N48°05'27.69502"	W101°03'06.62368"	444.138	0.006	
26	N48°01'22.75559"	W101°13'13.40012"	569.240	?	NEh
26A	N48°01'21.70195"	W101°19'31.14275"	635.691	0.003	
26B	N48°05'43.88490"	W101°13'52.43379"	528.912	0.005	
26C	N48°01'23.19566"	W101°08'03.75611"	534.324	0.004	
26D	N47°58'22.86641"	W101°12'28.59150"	615.619	0.004	
27	N48°01'21.67984"	W101°00'49.76022"	499.575	0.004	
27A	N48°05'23.42258"	W101°00'53.88927"	442.872	0.004	
27B	N47°59'36.77024"	W101°05'58.97415"	544.373	0.004	
27C	N47°57'50.47830"	W101°00'27.97468"	535.266	0.006	

Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
20	-823689.743	0.005	-4181205.090	0.004	4730225.197	0.004	0.008	
20A	-825903.444	0.006	-4176235.405	0.006	4734200.736	0.005	0.010	

20B	-814061.364	0.007	-4182396.357	0.006	4730808.992	0.006	0.011	
20C	-824834.552	0.004	-4187731.121	0.004	4724280.263	0.004	0.007	
20D	-828000.574	0.005	-4182207.771	0.004	4728623.780	0.004	0.008	
21	-814024.121	?	-4184948.917	?	4728585.661	?	?	NEh
21A	-816257.898	0.003	-4184985.297	0.003	4728171.747	0.003	0.005	
21B	-818257.086	0.004	-4189323.438	0.006	4723973.407	0.005	0.009	
26	-831688.723	?	-4192500.286	?	4719009.464	?	?	NEh
26A	-839378.732	0.003	-4191037.449	0.004	4719037.097	0.004	0.006	
26B	-831308.267	0.003	-4186431.450	0.004	4724370.520	0.004	0.007	
26C	-825387.558	0.003	-4193711.259	0.003	4718992.598	0.003	0.006	
26D	-831586.564	0.003	-4196761.787	0.003	4715325.689	0.004	0.006	
27	-816564.076	0.004	-4195450.002	0.004	4718935.449	0.004	0.007	
27A	-815579.629	0.003	-4189944.704	0.004	4723884.314	0.004	0.006	
27B	-823322.050	0.006	-4196614.014	0.005	4716800.749	0.005	0.009	
27C	-817051.118	0.007	-4200318.052	0.007	4714596.176	0.007	0.012	

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
20	0.007	0.006	23°
20A	0.009	0.008	9°
20B	0.009	0.008	44°
20C	0.005	0.005	29°
20D	0.006	0.006	9°
21A	0.003	0.003	10°
21B	0.006	0.005	18°
26A	0.004	0.004	170°
26B	0.004	0.004	3°
26C	0.004	0.004	129°
26D	0.004	0.004	178°
27	0.006	0.005	13°
27A	0.004	0.004	12°
27B	0.008	0.007	24°
27C	0.009	0.008	18°

Project File Data		Coordinate System	
Name:	D:\17-4291 Ward\Ward day 117.vce	Name:	World wide/UTM
Size:	79 KB	Datum:	NAD 1983 (2011)
Modified:	11/6/2017 11:49:01 AM (UTC:-7)	Zone:	14 North
Time zone:	Mountain Standard Time	Geoid:	
Reference number:		Vertical datum:	
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 0.99

Chi Square Test (95%): Passed

Precision Confidence Level: 95%

Degrees of Freedom: 30

Post Processed Vector Statistics

Reference Factor: 0.99

Redundancy Number: 30.00

A Priori Scalar: 0.36

Control Point Constraints

Point ID	Type	North σ (Meter)	East σ (Meter)	Height σ (Meter)	Elevation σ (Meter)
3	Grid	Fixed	Fixed		
3	Local			Fixed	

Fixed = 0.000001(Meter)

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)	Elevation (Meter)	Elevation Error (Meter)	Constraint
3	5395513.530	?	268189.549	?	?	?	NEh
3A	5395878.531	0.002	265129.523	0.002	?	?	
3C	5396081.308	0.002	274380.672	0.002	?	?	
3D	5389012.158	0.002	271299.073	0.002	?	?	

4	5396322.185	0.002	281150.468	0.002	?	?	
4A	5402258.116	0.002	281075.222	0.002	?	?	
4B	5397218.823	0.003	285340.057	0.002	?	?	
4C	5389196.330	0.002	284055.559	0.002	?	?	
4D	5397558.941	0.002	276636.509	0.002	?	?	

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
3	N48°40'10.57198"	W102°08'55.41484"	592.108	?	NEh
3A	N48°40'18.26013"	W102°11'25.55400"	598.110	0.003	
3C	N48°40'37.09385"	W102°03'54.24489"	575.812	0.003	
3D	N48°36'44.45237"	W102°06'10.67915"	605.255	0.003	
4	N48°40'53.55686"	W101°58'24.08933"	564.084	0.002	
4A	N48°44'05.44260"	W101°58'39.09507"	555.467	0.003	
4B	N48°41'27.79327"	W101°55'01.12943"	556.584	0.004	
4C	N48°37'06.72116"	W101°55'48.82040"	569.610	0.003	
4D	N48°41'27.80037"	W102°02'06.95604"	572.714	0.003	

Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
3	-888201.951	?	-4125965.389	?	4766818.495	?	?	NEh
3A	-891168.163	0.002	-4125147.324	0.002	4766979.849	0.002	0.004	
3C	-882045.772	0.002	-4126645.650	0.003	4767347.304	0.003	0.004	
3D	-885910.331	0.002	-4131355.094	0.003	4762620.835	0.003	0.005	
4	-875358.524	0.002	-4127670.973	0.002	4767674.301	0.002	0.003	
4A	-874733.308	0.002	-4123244.726	0.003	4771579.598	0.003	0.004	
4B	-871131.502	0.002	-4127748.174	0.003	4768366.910	0.004	0.005	
4C	-873339.308	0.002	-4133479.146	0.003	4763048.891	0.003	0.005	
4D	-879653.422	0.002	-4125951.212	0.003	4768379.172	0.003	0.005	

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
3A	0.003	0.003	2°
3C	0.003	0.003	170°
3D	0.003	0.003	171°
4	0.002	0.002	176°
4A	0.003	0.003	2°

4B	0.003	0.003	11°
4C	0.003	0.003	174°
4D	0.003	0.003	164°

Project File Data		Coordinate System	
Name:	D:\17-4291 Ward\Ward day 117A.vce	Name:	World wide/UTM
Size:	70 KB	Datum:	NAD 1983 (2011)
Modified:	11/6/2017 11:36:49 AM (UTC:-7)	Zone:	14 North
Time zone:	Mountain Standard Time	Geoid:	
Reference number:		Vertical datum:	
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 1.01

Chi Square Test (95%): Passed

Precision Confidence Level: 95%

Degrees of Freedom: 18

Post Processed Vector Statistics

Reference Factor: 1.01

Redundancy Number: 18.00

A Priori Scalar: 0.51

Control Point Constraints

Point ID	Type	North σ (Meter)	East σ (Meter)	Height σ (Meter)	Elevation σ (Meter)
1	Grid	Fixed	Fixed		
1	Local			Fixed	

Fixed = 0.000001(Meter)

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)	Elevation (Meter)	Elevation Error (Meter)	Constraint
1	5410643.964	?	271713.489	?	?	?	NEh
1A	5407635.161	0.003	267850.563	0.003	?	?	
1B	5410488.808	0.003	276766.446	0.003	?	?	
2	5395025.776	0.003	260609.227	0.003	?	?	
2A	5397826.182	0.003	263513.970	0.003	?	?	
2B	5390097.100	0.003	262119.259	0.003	?	?	

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
1	N48°48'24.53291"	W102°06'33.52741"	560.864	?	NEh
1A	N48°46'42.09085"	W102°09'36.52068"	573.432	0.005	
1B	N48°48'26.12079"	W102°02'25.83178"	554.811	0.005	
2	N48°39'44.51025"	W102°15'04.46035"	627.765	0.004	
2A	N48°41'19.04335"	W102°12'48.43758"	597.822	0.005	
2B	N48°37'07.21869"	W102°13'40.56960"	651.886	0.005	

Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
1	-882952.863	?	-4115339.544	?	4776858.936	?	?	NEh
1A	-887106.827	0.003	-4116890.209	0.004	4774783.485	0.004	0.007	
1B	-878001.738	0.003	-4116356.880	0.004	4776886.688	0.004	0.007	
2	-895715.916	0.003	-4124983.418	0.004	4766313.531	0.004	0.006	
2A	-892527.315	0.003	-4123410.359	0.004	4768219.447	0.004	0.007	
2B	-894814.009	0.003	-4128927.397	0.004	4763120.786	0.004	0.007	

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
1A	0.004	0.004	5°
1B	0.004	0.004	6°
2	0.003	0.003	4°
2A	0.004	0.004	7°
2B	0.004	0.004	6°

Name:	D:\17-4291 Ward\Ward day 118.vce	Coordinate System	
Size:	69 KB	Name:	World wide/UTM
Modified:	11/6/2017 12:06:11 PM (UTC:-7)	Datum:	NAD 1983 (2011)
Time zone:	Mountain Standard Time	Zone:	14 North
Reference number:		Geoid:	
Description:		Vertical datum:	
Comment 1:			
Comment 2:			
Comment 3:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 1.00

Chi Square Test (95%): Passed

Precision Confidence Level: 95%

Degrees of Freedom: 18

Post Processed Vector Statistics

Reference Factor: 1.00

Redundancy Number: 18.00

A Priori Scalar: 1.16

Control Point Constraints

Point ID	Type	North σ (Meter)	East σ (Meter)	Height σ (Meter)	Elevation σ (Meter)
6	Grid	Fixed	Fixed		
6	Local			Fixed	
Fixed = 0.000001(Meter)					

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)	Elevation (Meter)	Elevation Error (Meter)	Constraint
10	5370285.617	0.006	316349.209	0.006	?	?	
10A	5370335.977	0.008	309398.299	0.008	?	?	
10B	5366869.659	0.008	321881.474	0.008	?	?	
6	5382039.327	?	262541.687	?	?	?	NEh
6A	5385738.536	0.008	269441.895	0.008	?	?	
6B	5380686.300	0.008	269322.157	0.007	?	?	

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
10	N48°27'31.96715"	W101°29'02.96591"	506.513	0.011	
10A	N48°27'26.15540"	W101°34'41.17632"	467.273	0.013	
10B	N48°25'47.15657"	W101°24'28.59158"	495.184	0.013	
6	N48°32'47.24501"	W102°13'03.40069"	680.331	?	NEh
6A	N48°34'56.13677"	W102°07'34.71042"	635.580	0.012	
6B	N48°32'12.59669"	W102°07'30.46786"	685.244	0.012	

Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
10	-843773.175	0.006	-4153151.526	0.009	4751245.681	0.009	0.014	
10A	-850603.668	0.007	-4151868.564	0.011	4751097.252	0.011	0.017	
10B	-838725.618	0.008	-4156637.821	0.011	4749089.479	0.011	0.017	
6	-895348.503	?	-4134993.275	?	4757829.119	?	?	NEh
6A	-888124.807	0.007	-4133467.307	0.010	4760430.626	0.011	0.016	
6B	-888842.206	0.007	-4137220.532	0.010	4757124.134	0.010	0.016	

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
10	0.008	0.008	3°
10A	0.010	0.009	19°
10B	0.010	0.010	175°
6A	0.010	0.009	13°
6B	0.010	0.009	177°

Project File Data		Coordinate System	
Name:	D:\17-4291 Ward\Ward day 118A.vce	Name:	World wide/UTM
Size:	73 KB	Datum:	NAD 1983 (2011)
Modified:	11/6/2017 12:00:51 PM (UTC:-7)	Zone:	14 North
Time zone:	Mountain Standard Time	Geoid:	
Reference number:		Vertical datum:	
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 1.00

Chi Square Test (95%): Passed

Precision Confidence Level: 95%

Degrees of Freedom: 30

Post Processed Vector Statistics

Reference Factor: 1.00

Redundancy Number: 30.00

A Priori Scalar: 0.37

Control Point Constraints

Point ID	Type	North σ (Meter)	East σ (Meter)	Height σ (Meter)	Elevation σ (Meter)
5	Grid	Fixed	Fixed		
5	Local			Fixed	

Fixed = 0.000001(Meter)

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)	Elevation (Meter)	Elevation Error (Meter)	Constraint
5	5394620.109	?	290719.357	?	?	?	NEh
5A	5388689.253	0.002	290503.940	0.002	?	?	
5B	5398742.243	0.002	288608.100	0.002	?	?	
7	5381351.223	0.002	277793.106	0.002	?	?	
7B	5386344.790	0.002	274984.779	0.002	?	?	
7C	5384698.151	0.003	283882.576	0.003	?	?	

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
5	N48°40'10.31132"	W101°50'33.58252"	543.019	?	NEh
5A	N48°36'58.21018"	W101°50'33.30775"	555.706	0.004	
5B	N48°42'21.08363"	W101°52'24.27517"	542.348	0.004	
7	N48°32'45.10479"	W102°00'39.21035"	609.694	0.003	
7B	N48°35'22.99723"	W102°03'05.72048"	602.057	0.003	
7C	N48°34'41.01683"	W101°55'48.83383"	576.201	0.005	

Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
5	-866143.743	?	-4130625.311	?	4766776.314	?	?	NEh
5A	-867054.115	0.002	-4134994.289	0.003	4762864.643	0.003	0.005	
5B	-867735.902	0.002	-4127189.937	0.003	4769442.796	0.003	0.005	
7	-880424.490	0.002	-4138199.442	0.003	4757732.407	0.003	0.004	
7B	-882599.036	0.002	-4133991.728	0.002	4760954.382	0.003	0.004	
7C	-874038.419	0.003	-4136786.683	0.004	4760077.084	0.004	0.006	

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
5A	0.003	0.003	15°
5B	0.003	0.003	1°
7	0.002	0.002	0°
7B	0.002	0.002	14°
7C	0.004	0.004	169°

Project File Data		Coordinate System	
Name:	D:\17-4291 Ward\ward day 118C.vce	Name:	World wide/UTM
Size:	77 KB	Datum:	NAD 1983 (2011)
Modified:	11/15/2017 3:21:51 PM (UTC:-7)	Zone:	14 North
Time zone:	Mountain Standard Time	Geoid:	
Reference number:		Vertical datum:	
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 1.00

Chi Square Test (95%): Passed

Precision Confidence Level: 95%
 Degrees of Freedom: 28
 Post Processed Vector Statistics
 Reference Factor: 1.00
 Redundancy Number: 28.00
 A Priori Scalar: 0.54

Control Point Constraints

Point ID	Type	North σ (Meter)	East σ (Meter)	Height σ (Meter)	Elevation σ (Meter)
10	Grid	Fixed	Fixed		
10	Local			Fixed	
6	Grid	Fixed	Fixed		
6	Local			Fixed	

Fixed = 0.000001(Meter)

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)	Elevation (Meter)	Elevation Error (Meter)	Constraint
10	5370285.613	?	316349.207	?	?	?	NEh
21V	5330350.525	0.009	353201.271	0.008	?	?	
27V	5320619.632	0.010	356333.535	0.009	?	?	
5	5394620.100	0.008	290719.364	0.007	?	?	
6	5382039.327	?	262541.681	?	?	?	NEh
7B	5386344.781	0.009	274984.784	0.009	?	?	
BSMK	5186888.266	0.017	361427.151	0.016	?	?	
NDMU	5390405.276	0.018	512115.529	0.018	?	?	

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
10	N48°27'31.96703"	W101°29'02.96600"	506.538	?	NEh
21V	N48°06'34.15536"	W100°58'19.73338"	473.013	0.020	
27V	N48°01'21.72673"	W100°55'36.56397"	481.248	0.021	
5	N48°40'10.31104"	W101°50'33.58218"	543.078	0.023	
6	N48°32'47.24500"	W102°13'03.40098"	680.331	?	NEh
7B	N48°35'22.99696"	W102°03'05.72021"	602.119	0.024	
BSMK	N46°49'16.02773"	W100°49'00.04173"	551.981	0.015	
NDMU	N48°39'59.69039"	W98°50'07.62987"	467.178	0.015	

Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
10	-843773.180	?	-4153151.544	?	4751245.697	?	?	NEh
21V	-812142.278	0.009	-4188976.351	0.016	4725365.880	0.016	0.024	
27V	-810190.160	0.009	-4196671.957	0.016	4718922.793	0.016	0.024	
5	-866143.746	0.007	-4130625.357	0.017	4766776.352	0.017	0.025	
6	-895348.508	?	-4134993.274	?	4757829.119	?	?	NEh
7B	-882599.040	0.009	-4133991.775	0.018	4760954.423	0.018	0.027	
BSMK	-820592.059	0.016	-4294897.445	0.016	4628582.380	0.016	0.028	
NDMU	-648281.859	0.018	-4170570.405	0.017	4766502.664	0.016	0.029	

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
21V	0.011	0.010	167°
27V	0.012	0.011	167°
5	0.010	0.009	165°
7B	0.011	0.011	170°
BSMK	0.021	0.020	21°
NDMU	0.023	0.022	150°

Project File Data		Coordinate System	
Name:	D:\17-4291 Ward\Ward day 119.vce	Name:	World wide/UTM
Size:	69 KB	Datum:	NAD 1983 (2011)
Modified:	11/6/2017 12:16:25 PM (UTC:-7)	Zone:	14 North
Time zone:	Mountain Standard Time	Geoid:	
Reference number:		Vertical datum:	
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.003 m

Centering Error: 0.003 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m
Scale on Linear Error [S]: 1.960
Three-Dimensional
Propagated Linear Error [E]: U.S.
Constant Term [C]: 0.000 m
Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2
Network Reference Factor: 1.00
Chi Square Test (95%): Passed
Precision Confidence Level: 95%
Degrees of Freedom: 24
Post Processed Vector Statistics
Reference Factor: 1.00
Redundancy Number: 24.00
A Priori Scalar: 0.63

Control Point Constraints

Point ID	Type	North σ (Meter)	East σ (Meter)	Height σ (Meter)	Elevation σ (Meter)
31	Grid	Fixed	Fixed		
31	Local			Fixed	

Fixed = 0.000001(Meter)

Adjusted Grid Coordinates

Point ID	Northing (Meter)	Northing Error (Meter)	Easting (Meter)	Easting Error (Meter)	Elevation (Meter)	Elevation Error (Meter)	Constraint
31	5303805.249	?	323681.357	?	?	?	NEh
31A	5307847.297	0.004	320604.097	0.004	?	?	
31B	5310142.646	0.004	328761.883	0.004	?	?	
31C	5303546.391	0.005	330339.895	0.005	?	?	
32	5301746.171	0.003	344484.433	0.003	?	?	
32A	5302309.708	0.004	339712.488	0.004	?	?	
32B	5304630.609	0.004	349266.417	0.004	?	?	

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
31	N47°51'48.13405"	W101°21'27.03918"	636.945	?	NEh
31A	N47°53'55.87637"	W101°24'01.07283"	624.441	0.006	

31B	N47°55'18.18862"	W101°17'31.74610"	656.789	0.008	
31C	N47°51'46.21090"	W101°16'06.43183"	629.742	0.007	
32	N47°51'00.82687"	W101°04'43.75161"	631.165	0.005	
32A	N47°51'14.84694"	W101°08'33.97628"	625.890	0.006	
32B	N47°52'38.29945"	W101°00'57.40240"	632.286	0.007	

Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
31	-844324.142	?	-4203462.826	?	4707170.009	?	?	NEh
31A	-846882.777	0.004	-4199953.854	0.005	4709807.057	0.005	0.008	
31B	-838588.607	0.004	-4199715.858	0.006	4711535.302	0.007	0.010	
31C	-837797.141	0.005	-4204808.582	0.006	4707124.813	0.006	0.010	
32	-824075.722	0.003	-4208579.411	0.004	4706185.244	0.004	0.007	
32A	-828709.927	0.004	-4207338.493	0.005	4706471.936	0.005	0.008	
32B	-819030.372	0.004	-4207290.418	0.005	4708205.998	0.006	0.009	

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
31A	0.005	0.005	177°
31B	0.005	0.005	5°
31C	0.006	0.006	8°
32	0.004	0.004	1°
32A	0.005	0.005	176°
32B	0.005	0.005	10°

