

## **Fugro, Williams County North Dakota Survey Report**

Prepared by Professional Mapping and Surveying, LLC

Randy Deibert North Dakota Professional Land Surveyor LS-9913

Job# 17-4291

### 1. GENERAL INFORMATION

- a. Project Coordinate System
  - i. Horizontal: NAD83(2011)
  - ii. Vertical: NAVD88
- b. Coordinate Projection
  - i. UTM ZONE 13 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 multiple NGS CORS stations and project specific Primary Control Points including private constant operating stations. Detailed results of the OPUS Projects Network are located below in Item 7, page 6.
- b. Upon completion of the Primary Network the LiDAR control and 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 8, page 14. Photos of all control and check points were digitally provided to the client.
- c. 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  $\pm 0.03$  with respect to the NAD1983(2011) and NAVD 1988 Datums.

5. LiDAR GROUND CONTROL COORDINATES.

17-4291 Williams County Control NAD83(2011) UTM Zone 13 N Zone Meters NAVD88 Ellipsoid Heights (Meters)

17-4291 Fugro Williams County Control  
 NAD 83 (2011) OPUS UTM Zone 13 North Meters  
 NAVD

88	Meters				
Point #	Latitude	Longitude	Ellipsoid Height	Northing	Easting
1	48d37'16.95403"	-103d55'49.44194"	633.205	5385919.451	578823.907
2	48d26'37.83282"	-103d56'55.23204"	706.349	5366167.183	577748.510
3	48d15'21.44512"	-103d55'15.24490"	691.745	5345312.222	580096.393
4	48d06'40.77791"	-103d56'58.56611"	675.248	5329207.462	578185.795
5	47d59'10.61640"	-103d56'50.64934"	553.967	5315311.608	578539.393
6	48d31'03.85570"	-103d48'07.49453"	671.390	5374540.059	588460.773
7	48d17'55.45346"	-103d47'55.28741"	698.151	5350201.869	589092.932
8	48d04'29.66078"	-103d47'54.67803"	547.666	5325323.934	589494.369
9	48d38'01.26261"	-103d42'12.26635"	644.722	5387546.754	595528.563
10	48°23'15.29653"	-103°38'20.36176"	571.736	5360274.689	600761.382
11	48d10'59.04065"	-103d40'07.29987"	622.651	5337504.561	598956.581
12	48d38'01.13048"	-103d27'40.63788"	653.395	5387873.984	613366.660
13	48d32'48.12085"	-103d28'04.38960"	643.090	5378199.826	613074.448
14	48d25'50.93420"	-103d27'40.65203"	664.515	5365328.904	613820.167
15	48°14'47.61815"	-103°28'27.90454"	609.665	5344829.981	613256.750
16	48d08'24.40981"	-103d28'18.50641"	650.683	5333002.783	613685.823
17	48d01'27.95982"	-103d28'54.12173"	553.843	5320131.089	613203.448
18	48d34'29.28978"	-103d16'35.62639"	679.770	5381624.168	627123.698
19	48d18'48.62074"	-103d15'34.03115"	722.832	5352610.048	629046.111
20	48d12'43.61695"	-103d15'32.79380"	683.789	5341341.623	629327.173
21	48d05'36.66455"	-103d15'46.96728"	577.354	5328153.646	629332.470
22	48d31'54.89637"	-103d03'49.24782"	687.551	5377233.469	642946.413
23	48d23'29.98073"	-103d03'28.11208"	697.285	5361655.590	643775.501
24	48d13'34.73583"	-103d02'19.45953"	576.768	5343314.296	645657.083
25	48d37'08.19166"	-102d54'07.63458"	700.305	5387221.018	654607.012
26	48d28'26.56787"	-102d54'37.31854"	735.786	5371099.591	654439.791
27	48d17'05.46266"	-102d54'54.09900"	699.207	5350062.084	654667.598
28	48d10'10.11021"	-102d54'51.31259"	676.242	5337240.555	655073.303

## 6. LiDAR Check Points

NAD83 (2011) UTM ZONE 13 NORTH (METERS NAVD 88 METERS)

17-4291 Fugro Williams County Control Check Points

NAD 83 (2011) OPUS UTM Zone 13 North Meters

NAVD

88 Geoid 12B

### LEGEND

NVA 1 Bare earth  
 NVA 2 Short grass  
 VVA 3 Tall grass  
 VVA 5 Tall brush/ Trees

Point ID	Northing	Easting	Ellipsoid Height	orthometric height	Classification
5A	5314218.939	580172.677	552.764	570.785	NVA 1
5B	5316637.047	574092.993	571.263	589.285	VVA 3
8B	5319653.385	584747.975	552.632	570.746	NVA 1
17A	5320121.321	612087.308	555.556	573.652	VVA 3
17B	5323147.35	610950.589	568.386	586.488	VVA 5
17E	5324053.314	619626.537	562.722	580.832	VVA 5
8A	5324558.946	590603.997	547.806	565.968	VVA 5
5C	5325061.138	573455.697	686.508	704.617	NVA 1
4D	5325244.455	581040.584	589.001	607.168	VVA 3
17C	5326453.034	608754.068	626.548	644.673	NVA 1
17D	5326534.63	615166.565	661.284	679.381	NVA 1
21C	5326751.952	623129.539	649.329	667.442	VVA 3
4A	5329168.18	576292.162	698.205	716.39	NVA 1
8C	5329396.835	592456.916	618.391	636.584	VVA 3
21A	5329716.12	630100.913	572.281	590.44	NVA 1
8D	5331239.717	587803.03	652.729	670.95	NVA 1
16C	5332545.365	613487.518	647.563	665.688	VVA 3
11A	5332648.378	598071.831	564.694	582.907	NVA 1
4C	5335038.89	572099.766	620.761	639.003	VVA 3
21B	5335500.181	629093.446	627.428	645.571	NVA 1
28A	5336096.296	659249.445	549.926	568.06	NVA 1
16B	5336735.845	619792.573	681.973	700.098	NVA 1
4B	5337499.201	582885.61	655.249	673.546	NVA 1
24A	5337640.098	643817.484	555.017	573.211	NVA 1
11D	5338416.352	603358.373	547.425	565.668	VVA 3
28C	5338494.494	650909.586	616.192	634.369	VVA 3

16A	5338646.643	608538.8	635.155	653.362	NVA 1
3E	5340414.64	577381.604	700.794	719.107	VVA 3
11B	5340633.314	591928.061	656.405	674.682	NVA 1
20C	5341303.811	626457.404	668.360	686.512	VVA 3
24D	5341790.418	638136.672	609.906	628.084	VVA 3
11C	5342847.36	602265.213	572.679	590.952	VVA 3
28B	5343810.394	654419.649	605.745	623.926	VVA 5
20A	5343872.807	634812.243	709.871	728.028	NVA 1
3A	5345332.38	581876.628	701.513	719.862	NVA 1
24B	5346633.645	650661.618	693.769	711.973	NVA 1
15C	5346645.202	613173.135	655.694	673.929	NVA 1
7D	5347094.368	594055.46	674.519	692.826	VVA 3
20B	5347779.637	629153.363	704.450	722.618	NVA 1
15A	5348355.831	606712.216	556.311	574.609	VVA 3
3D	5348437.409	572759.164	717.194	735.526	NVA 1
3C	5348697.163	570730.653	748.118	766.436	VVA 3
15D	5349021.772	617981.108	630.343	648.574	NVA 1
24C	5349640.727	641404.493	640.201	658.433	NVA 1
27A	5350141.863	660325.162	706.273	724.45	NVA 1
7A	5350311.186	590704.812	691.052	709.396	NVA 1
15B	5352252.924	613118.503	668.385	686.649	VVA 3
27C	5352281.65	649878.123	695.079	713.328	VVA 3
19A	5352563.686	627412.57	712.583	730.777	NVA 1
19D	5352703.064	636971.553	683.550	701.769	NVA 1
19B	5354104.774	622678.506	671.845	690.068	VVA 3
3B	5354897.51	576900.31	716.478	734.865	VVA 3
7C	5356027.843	597022.221	614.754	633.137	VVA 3
7B	5357480.994	585754.46	692.775	711.179	NVA 1
27B	5357578.35	656056.814	686.534	704.792	NVA 1
14B	5358846.835	613000.912	622.447	640.753	VVA 3
2D	5359930.048	577167.923	722.517	740.929	NVA 1
10C	5360259.567	601518.675	572.910	591.315	NVA 1
19C	5360338.04	630813.836	701.017	719.265	VVA 3
23D	5361010.051	637744.301	684.462	702.743	NVA 1
23A	5361343.3	645290.626	693.962	712.276	VVA 3
10B	5363598.534	590617.764	658.968	677.407	VVA 3
26C	5364664.293	655741.324	687.329	705.639	VVA 3
23B	5364778.22	649936.923	708.495	726.83	VVA 3
14C	5365192.543	607393.264	627.244	645.625	NVA 1
14A	5365509.764	622915.181	697.319	715.608	NVA 1
2C	5366147.094	572801.268	710.417	728.864	VVA 3
2A	5366332.833	576950.521	678.985	697.45	NVA 1
14E	5366909.473	612960.503	643.317	661.666	NVA 1
23C	5369056.877	637046.612	686.222	704.55	NVA 1

6E	5369650.211	584011.77	715.007	733.503	NVA 1
6F	5369746.261	589612.388	665.907	684.402	NVA 1
10A	5369883.162	598449.693	578.410	596.889	NVA 1
14D	5372552.935	612886.411	640.815	659.205	VVA 3
2B	5372772.565	574246.999	631.947	650.478	VVA 3
26A	5373255.314	654582.664	732.744	751.1	NVA 1
18D	5373630.519	626333.519	656.281	674.634	NVA 2
22D	5373872.928	636386.754	719.233	737.593	NVA 1
26B	5374117.544	647630.844	700.330	718.71	NVA 1
22A	5374232.958	643316.919	692.722	711.101	NVA 1
6A	5375079.718	590303.036	659.051	677.599	NVA1
6D	5376012.106	580762.29	643.357	661.927	VVA 3
6B	5376379.319	600758.791	584.996	603.507	NVA 2
13C	5376704.975	619301.908	653.145	671.545	VVA 2
13A	5378108.675	607994.088	626.371	644.837	NVA 1
1C	5378389.463	574254.453	626.946	645.533	NVA 1
6C	5379403.705	593444.901	636.951	655.525	VVA 3
25C	5380745.976	653974.412	693.307	711.705	NVA 1
1B	5380960.755	584094.667	666.461	685.063	VVA 3
18B	5381869.224	633480.34	706.453	724.887	VVA 3
22C	5381881.755	638281.392	682.941	701.379	VVA 3
13B	5381913.759	612921.721	628.297	646.776	NVA 1
18C	5382100.061	625490.709	684.092	702.528	VVA 3
22B	5382185.491	647882.775	702.002	720.425	VVA 3
1D	5384018.005	574178.24	592.584	611.213	VVA 3
12C9	5384484.532	603059.323	607.592	626.144	VVA 3
1A	5385757.192	586983.526	678.682	697.307	NVA 1
9A	5385940.478	594952.424	622.850	641.45	NVA 1
18A	5386565.004	628575.931	691.746	710.238	NVA 1
25A	5387142.128	652676.168	688.887	707.324	NVA 1
12B	5387861.387	614160.704	662.699	681.231	VVA 3
25B	5388145.356	647711.95	666.668	685.132	VVA 3

## 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](http://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-17-4291 Williams1final 4-8-17.sum  
SOLUTION SOFTWARE: GPSCOM(1504.23)  
SOLUTION DATE: 2017-04-08T16:56:01 UTC  
STANDARD ERROR OF UNIT WEIGHT: 0.711  
TOTAL NUMBER OF OBSERVATIONS: 369375  
TOTAL NUMBER OF MARKS: 9  
NUMBER OF CONSTRAINED MARKS: 6

START TIME: 2017-04-05T00:00:00 GPS  
STOP TIME: 2017-04-05T23:59:30 GPS

FREQUENCY: L1 -> ION-FREE (L6)  
 OBSERVATION INTERVAL: 30 s  
 ELEVATION CUTOFF: 10 deg  
 TROPO INTERVAL: 1800 s [STEP-OFFSET PARAMETERIZATION]  
 DD CORRELATIONS: ON

INCLUDED SOLUTION	RMS	SOFTWARE	RUN DATE
1) 2017-095 17-4291 use	1.7 cm	GPSCOM(1504.23)	2017-04-08T16:50 UTC

BASELINE	LENGTH	RMS	OBS	OMITTED	FIXED IN SOLUTION(S)
ndwi-ndti	56.347 km	1.5 cm	21203	4.6%	98.9% 1
ndwi-ndgr	57.662 km	1.6 cm	20600	7.7%	98.4% 1
mtrc-ndwi	64.873 km	1.6 cm	20738	6.9%	100.0% 1
mtrc-p055	76.215 km	1.4 cm	20360	6.6%	97.7% 1
ndti-ndgr	76.742 km	1.7 cm	20747	6.9%	95.4% 1
ndgr-mtrc	102.869 km	1.8 cm	20237	9.2%	98.5% 1
ndmb-ndti	119.877 km	1.9 cm	20387	7.6%	94.9% 1
nddi-mtrc	142.289 km	1.6 cm	20622	6.3%	100.0% 1
nddi-bsmk	147.129 km	1.5 cm	20027	6.7%	98.9% 1
p055-nddi	149.906 km	1.3 cm	20666	3.7%	100.0% 1
ndwi-nddi	154.955 km	1.5 cm	21114	3.5%	99.4% 1
nddi-ndti	169.169 km	1.8 cm	20959	4.3%	98.6% 1
p055-p052	178.988 km	0.9 cm	20968	1.9%	100.0% 1
bsmk-ndmb	181.499 km	1.9 cm	19220	10.9%	99.6% 1
ndgr-ndmb	193.632 km	2.0 cm	19459	12.0%	99.7% 1
ndmb-nddi	200.644 km	1.9 cm	20276	6.9%	97.9% 1
p052-mtrc	216.875 km	1.4 cm	20716	5.1%	99.3% 1
ndgr-p052	268.713 km	1.4 cm	21076	2.7%	99.0% 1

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UNCONSTRAINED MARKS

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MARK: ndgr (ndgr 1)

REF FRAME: NAD\_83(2011) (2010.0000) IGS08 (2017.2589)

X: -1017237.901 m 0.000 m -1017238.813 m 0.000 m

Y: -4100304.671 m 0.000 m -4100303.436 m 0.000 m

Z: 4763262.054 m 0.000 m 4763262.032 m 0.000 m

LAT: 48 37 14.47291 0.000 m 48 37 14.49621 0.000 m

E LON: 256 04 00.79793 0.000 m 256 04 00.74019 0.000 m

W LON: 103 55 59.20207 0.000 m 103 55 59.25981 0.000 m

EL HGT: 642.776 m 0.000 m 642.112 m 0.000 m

ORTHO HGT: 661.421 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) 5385840.047 m 185836.899 m

EASTING (X) 578625.183 m 346980.049 m

CONVERGENCE 0.80058021 deg -2.55469309 deg

POINT SCALE 0.99967595 0.99997962

COMBINED FACTOR 0.99957526 0.99987890

US NATIONAL GRID DESIGNATOR: 13UEP7862585840 (NAD 83)

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MARK: ndti (ndti 1)

REF FRAME: NAD\_83(2011) (2010.0000) IGS08 (2017.2589)

X: -950795.904 m 0.000 m -950796.816 m 0.000 m

Y: -4135110.522 m 0.000 m -4135109.280 m 0.000 m

Z: 4747032.282 m 0.000 m 4747032.258 m 0.000 m

LAT: 48 24 00.04043 0.000 m 48 24 00.06426 0.000 m

E LON: 257 03 03.29007 0.000 m 257 03 03.23334 0.000 m

W LON: 102 56 56.70993 0.000 m 102 56 56.76666 0.000 m



EL HGT: 681.151 m 0.000 m 680.465 m 0.000 m  
ORTHO HGT: 699.473 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) 5362793.419 m 158540.579 m  
EASTING (X) 651798.734 m 418692.874 m  
CONVERGENCE 1.53396111 deg -1.82244677 deg  
POINT SCALE 0.99988312 0.99995097  
COMBINED FACTOR 0.99977639 0.99984423

US NATIONAL GRID DESIGNATOR: 13UFP5179862793 (NAD 83)

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MARK: ndwi (ndwi 1)

REF FRAME: NAD\_83(2011) (2010.0000) IGS08 (2017.2589)

X: -1003214.527 m 0.000 m -1003215.438 m 0.000 m  
Y: -4144029.240 m 0.000 m -4144027.999 m 0.000 m  
Z: 4728384.508 m 0.000 m 4728384.482 m 0.000 m  
LAT: 48 08 57.63152 0.000 m 48 08 57.65488 0.000 m  
E LON: 256 23 28.57442 0.000 m 256 23 28.51745 0.000 m  
W LON: 103 36 31.42558 0.000 m 103 36 31.48255 0.000 m  
EL HGT: 554.380 m 0.000 m 553.698 m 0.000 m  
ORTHO HGT: 572.590 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) 5333835.144 m 132453.966 m  
EASTING (X) 603481.550 m 368757.850 m  
CONVERGENCE 1.03643009 deg -2.31330934 deg  
POINT SCALE 0.99973158 0.99993648  
COMBINED FACTOR 0.99964472 0.99984961

US NATIONAL GRID DESIGNATOR: 13UFP0348133835 (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 (2017.2589)

X: -820591.516 m 0.000 m -820592.419 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 59.90534 0.000 m

W LON: 100 49 00.04150 0.000 m 100 49 00.09466 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 (2017.2589)

X: -1053423.775 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 38.19913 0.000 m

E LON: 255 49 08.79455 0.000 m 255 49 08.73769 0.000 m

W LON: 104 10 51.20545 0.000 m 104 10 51.26231 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 398075.639 m

EASTING (X) 561442.637 m 998635.937 m

CONVERGENCE 0.60595981 deg 3.89095103 deg

POINT SCALE 0.99964639 0.99946689

COMBINED FACTOR 0.99955479 0.99937531

US NATIONAL GRID DESIGNATOR: 13TEN6144284460 (NAD 83)

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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 (2017.2589)

X: -963423.107 m 0.000 m -963424.012 m 0.000 m  
 Y: -4259952.121 m 0.000 m -4259950.863 m 0.000 m  
 Z: 4633571.895 m 0.000 m 4633571.855 m 0.000 m  
 LAT: 46 53 05.85139 0.000 m 46 53 05.87478 0.000 m  
 E LON: 257 15 23.29120 0.000 m 257 15 23.23641 0.000 m  
 W LON: 102 44 36.70880 0.000 m 102 44 36.76359 0.000 m  
 EL HGT: 737.881 m 0.000 m 737.149 m 0.000 m  
 ORTHO HGT: 755.196 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) 5194851.906 m 137863.151 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: 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 (2017.2589)

X: -833302.771 m 0.000 m -833303.680 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 11.34928 0.000 m  
 W LON: 101 19 48.59532 0.000 m 101 19 48.65072 0.000 m  
 EL HGT: 481.473 m 0.000 m 480.736 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: p052 (p052 a 2)

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 (2017.2589)

X: -1266647.470 m 0.000 m -1266648.379 m 0.000 m

Y: -4138195.805 m 0.000 m -4138194.564 m 0.000 m

Z: 4670709.517 m 0.000 m 4670709.478 m 0.000 m

LAT: 47 22 29.02690 0.000 m 47 22 29.04799 0.000 m

E LON: 252 58 52.81464 0.000 m 252 58 52.75592 0.000 m

W LON: 107 01 07.18536 0.000 m 107 01 07.24408 0.000 m

EL HGT: 859.275 m 0.000 m 858.623 m 0.000 m

ORTHO HGT: 874.551 m 0.009 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 13) SPC (2500 MT)

NORTHING (Y) 5248783.509 m 350179.102 m  
EASTING (X) 347608.895 m 787255.658 m  
CONVERGENCE -1.48561337 deg 1.81510874 deg

POINT SCALE 0.99988540 0.99941258  
COMBINED FACTOR 0.99975075 0.99927799

US NATIONAL GRID DESIGNATOR: 13TCN4760848783 (NAD 83)

+++++

MARK: p055 (p055 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 (2017.2589)

X: -1102409.917 m 0.000 m -1102410.816 m 0.000 m

Y: -4206590.342 m 0.000 m -4206589.085 m 0.000 m

Z: 4651093.531 m 0.000 m 4651093.481 m 0.000 m

LAT: 47 07 00.14492 0.000 m 47 07 00.16726 0.000 m

E LON: 255 18 53.60553 0.000 m 255 18 53.54917 0.000 m

W LON: 104 41 06.39447 0.000 m 104 41 06.45083 0.000 m

EL HGT: 668.446 m 0.000 m 667.736 m 0.000 m

ORTHO HGT: 684.867 m 0.009 m (H = h - N WHERE N = GEOID12B HGT)

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 13) SPC (2500 MT)

NORTHING (Y) 5218181.558 m 329764.854 m

EASTING (X) 523887.538 m 964951.845 m

CONVERGENCE 0.23073432 deg 3.52211259 deg

POINT SCALE 0.99960701 0.99939428

COMBINED FACTOR 0.99950228 0.99928958

US NATIONAL GRID DESIGNATOR: 13TEN2388718181 (NAD 83)

8. SECONDARY NETWORKS 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: 235

Post Processed Vector Statistics

Reference Factor: 1.00

Redundancy Number: 235.00

A Priori Scalar: 1.07

Control Point Constraints

Point ID	Type	North $\sigma$ (Meter)	East $\sigma$ (Meter)	Height $\sigma$ (Meter)	Elevation $\sigma$ (Meter)
<a href="#">NDGR</a>	Grid	Fixed	Fixed		
<a href="#">NDGR</a>	Local			Fixed	
<a href="#">NDWI</a>	Grid	Fixed	Fixed		
<a href="#">NDWI</a>	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
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<a href="#">1</a>	5385919.451	0.005	578823.907	0.004	?	?	
<a href="#">17</a>	5320131.089	0.006	613203.448	0.006	?	?	
<a href="#">19</a>	5352610.048	0.007	629046.111	0.006	?	?	
<a href="#">2</a>	5366167.183	0.005	577748.510	0.005	?	?	
<a href="#">21</a>	5328153.646	0.008	629332.470	0.007	?	?	
<a href="#">22</a>	5377233.469	0.006	642946.413	0.006	?	?	
<a href="#">23</a>	5361655.590	0.006	643775.501	0.006	?	?	
<a href="#">24</a>	5343314.296	0.008	645657.083	0.008	?	?	
<a href="#">25</a>	5387221.018	0.010	654607.012	0.009	?	?	
<a href="#">26</a>	5371099.591	0.011	654439.791	0.010	?	?	
<a href="#">27</a>	5350062.084	0.008	654667.598	0.008	?	?	
<a href="#">28</a>	5337240.555	0.007	655073.303	0.007	?	?	
<a href="#">3</a>	5345312.222	0.006	580096.393	0.005	?	?	
<a href="#">4</a>	5329207.462	0.013	578185.795	0.015	?	?	
<a href="#">5</a>	5315311.608	0.008	578539.393	0.008	?	?	
<a href="#">6</a>	5374540.059	0.006	588460.773	0.005	?	?	
<a href="#">7</a>	5350201.869	0.005	589092.932	0.005	?	?	
<a href="#">MTRC</a>	5284460.847	0.006	561442.634	0.006	?	?	
<a href="#">NDDI</a>	5194851.909	0.013	671914.414	0.013	?	?	
<a href="#">NDGR</a>	5385840.047	?	578625.183	?	?	?	NEh
<a href="#">NDTI</a>	5362793.420	0.005	651798.734	0.005	?	?	
<a href="#">NDWI</a>	5333835.144	?	603481.550	?	?	?	NEh

#### Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
<a href="#">1</a>	N48°37'16.95403"	W103°55'49.44194"	633.205	0.006	
<a href="#">17</a>	N48°01'27.95982"	W103°28'54.12173"	553.843	0.009	
<a href="#">19</a>	N48°18'48.62074"	W103°15'34.03115"	722.832	0.010	
<a href="#">2</a>	N48°26'37.83282"	W103°56'55.23204"	706.349	0.010	
<a href="#">21</a>	N48°05'36.66455"	W103°15'46.96728"	577.354	0.014	
<a href="#">22</a>	N48°31'54.89637"	W103°03'49.24782"	687.551	0.009	
<a href="#">23</a>	N48°23'29.98073"	W103°03'28.11208"	697.285	0.008	
<a href="#">24</a>	N48°13'34.73583"	W103°02'19.45953"	576.768	0.013	
<a href="#">25</a>	N48°37'08.19166"	W102°54'07.63458"	700.305	0.025	
<a href="#">26</a>	N48°28'26.56787"	W102°54'37.31854"	735.786	0.023	
<a href="#">27</a>	N48°17'05.46266"	W102°54'54.09900"	699.207	0.015	
<a href="#">28</a>	N48°10'10.11021"	W102°54'51.31259"	676.242	0.011	
<a href="#">3</a>	N48°15'21.44512"	W103°55'15.24490"	691.745	0.009	
<a href="#">4</a>	N48°06'40.77791"	W103°56'58.56611"	675.248	0.023	
<a href="#">5</a>	N47°59'10.61640"	W103°56'50.64934"	553.967	0.018	
<a href="#">6</a>	N48°31'03.85570"	W103°48'07.49453"	671.390	0.010	
<a href="#">7</a>	N48°17'55.45346"	W103°47'55.28741"	698.151	0.009	
<a href="#">MTRC</a>	N47°42'38.17641"	W104°10'51.20556"	584.660	0.004	
<a href="#">NDDI</a>	N46°53'05.85150"	W102°44'36.70893"	737.860	0.005	



<a href="#">NDGR</a>	N48°37'14.47290"	W103°55'59.20209"	642.776	?	NEh
<a href="#">NDTI</a>	N48°24'00.04046"	W102°56'56.70992"	681.150	0.004	
<a href="#">NDWI</a>	N48°08'57.63153"	W103°36'31.42557"	554.380	?	NEh

#### Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
<a href="#">1</a>	-1017029.054	0.004	-4100289.584	0.005	4763305.590	0.005	0.008	
<a href="#">17</a>	-996434.696	0.006	-4156293.230	0.008	4719105.546	0.008	0.013	
<a href="#">19</a>	-974837.243	0.006	-4136922.700	0.008	4740670.923	0.009	0.014	
<a href="#">2</a>	-1021914.823	0.005	-4114370.496	0.008	4750286.091	0.008	0.012	
<a href="#">21</a>	-979258.699	0.007	-4154518.940	0.011	4724257.620	0.011	0.017	
<a href="#">22</a>	-956583.841	0.006	-4122506.836	0.007	4756763.789	0.007	0.012	
<a href="#">23</a>	-958800.696	0.006	-4133984.454	0.007	4746427.821	0.007	0.011	
<a href="#">24</a>	-960504.432	0.008	-4147602.106	0.011	4734107.936	0.011	0.017	
<a href="#">25</a>	-943337.096	0.010	-4118121.984	0.018	4763176.990	0.019	0.028	
<a href="#">26</a>	-946633.432	0.010	-4129781.345	0.018	4752535.703	0.018	0.027	
<a href="#">27</a>	-950479.504	0.008	-4145011.773	0.011	4738533.369	0.012	0.019	
<a href="#">28</a>	-952558.673	0.007	-4154336.581	0.009	4729968.797	0.010	0.015	
<a href="#">3</a>	-1023674.084	0.006	-4130010.209	0.008	4736389.042	0.008	0.012	
<a href="#">4</a>	-1028629.759	0.013	-4141119.653	0.022	4725653.036	0.017	0.030	
<a href="#">5</a>	-1030943.902	0.008	-4151117.074	0.013	4716267.222	0.014	0.021	
<a href="#">6</a>	-1009911.224	0.006	-4110973.699	0.008	4755707.400	0.008	0.013	
<a href="#">7</a>	-1014016.650	0.005	-4128740.034	0.007	4739560.049	0.007	0.011	
<a href="#">MTRC</a>	-1053424.317	0.006	-4168935.285	0.006	4695717.861	0.005	0.010	
<a href="#">NDDI</a>	-963423.646	0.013	-4259950.830	0.010	4633571.909	0.009	0.019	
<a href="#">NDGR</a>	-1017238.445	?	-4100303.417	?	4763262.104	?	?	NEh
<a href="#">NDTI</a>	-950796.446	0.005	-4135109.260	0.005	4747032.324	0.004	0.008	
<a href="#">NDWI</a>	-1003215.069	?	-4144027.980	?	4728384.552	?	?	NEh

#### Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
<a href="#">1</a>	0.006	0.005	179°
<a href="#">17</a>	0.008	0.008	177°
<a href="#">19</a>	0.008	0.008	174°
<a href="#">2</a>	0.007	0.006	175°
<a href="#">21</a>	0.010	0.009	169°
<a href="#">22</a>	0.007	0.007	17°
<a href="#">23</a>	0.007	0.007	13°
<a href="#">24</a>	0.010	0.009	176°
<a href="#">25</a>	0.013	0.011	11°

<a href="#">26</a>		0.014	0.012	6°
<a href="#">27</a>		0.010	0.009	179°
<a href="#">28</a>		0.009	0.009	168°
<a href="#">3</a>		0.007	0.007	175°
<a href="#">4</a>		0.020	0.015	117°
<a href="#">5</a>		0.010	0.010	169°
<a href="#">6</a>		0.007	0.007	176°
<a href="#">7</a>		0.007	0.006	6°
<a href="#">MTRC</a>		0.008	0.008	166°
<a href="#">NDDI</a>		0.016	0.016	145°
<a href="#">NDTI</a>		0.006	0.006	73°

### 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: 40

##### Post Processed Vector Statistics

Reference Factor: 1.00

Redundancy Number: 40.00

A Priori Scalar: 0.76

#### Control Point Constraints

Point ID	Type	North $\sigma$ (Meter)	East $\sigma$ (Meter)	Height $\sigma$ (Meter)	Elevation $\sigma$ (Meter)
<a href="#">NDGR</a>	Grid	Fixed	Fixed		

<a href="#">NDGR</a>	Local			Fixed	
<a href="#">NDWI</a>	Grid	Fixed	Fixed		
<a href="#">NDWI</a>	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
<a href="#">11</a>	5337504.561	0.004	598956.581	0.004	?	?	
<a href="#">12</a>	5387873.984	0.004	613366.660	0.004	?	?	
<a href="#">18</a>	5381624.168	0.004	627123.698	0.004	?	?	
<a href="#">8</a>	5325323.934	0.004	589494.369	0.004	?	?	
<a href="#">9</a>	5387546.754	0.004	595528.563	0.004	?	?	
<a href="#">NDGR</a>	5385840.047	?	578625.183	?	?	?	NEh
<a href="#">NDTI</a>	5362793.425	0.005	651798.735	0.005	?	?	
<a href="#">NDWI</a>	5333835.144	?	603481.550	?	?	?	NEh

#### Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
<a href="#">11</a>	N48°10'59.04065"	W103°40'07.29987"	622.651	0.005	
<a href="#">12</a>	N48°38'01.13048"	W103°27'40.63788"	653.395	0.007	
<a href="#">18</a>	N48°34'29.28978"	W103°16'35.62639"	679.770	0.006	
<a href="#">8</a>	N48°04'29.66078"	W103°47'54.67803"	547.666	0.008	
<a href="#">9</a>	N48°38'01.26261"	W103°42'12.26635"	644.722	0.009	
<a href="#">NDGR</a>	N48°37'14.47290"	W103°55'59.20209"	642.776	?	NEh
<a href="#">NDTI</a>	N48°24'00.04061"	W102°56'56.70984"	681.155	0.004	
<a href="#">NDWI</a>	N48°08'57.63153"	W103°36'31.42557"	554.380	?	NEh

#### Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
<a href="#">11</a>	-1006902.058	0.004	-4140304.843	0.005	4730936.780	0.005	0.008	
<a href="#">12</a>	-983188.692	0.004	-4107496.012	0.006	4764222.759	0.006	0.009	
<a href="#">18</a>	-971072.192	0.004	-4115439.578	0.005	4759915.062	0.005	0.009	
<a href="#">8</a>	-1018405.308	0.004	-4146662.100	0.006	4722852.890	0.006	0.010	
<a href="#">9</a>	-1000535.134	0.004	-4103296.076	0.006	4764218.949	0.007	0.011	
<a href="#">NDGR</a>	-1017238.445	?	-4100303.417	?	4763262.104	?	?	NEh
<a href="#">NDTI</a>	-950796.444	0.005	-4135109.260	0.005	4747032.331	0.004	0.008	

<a href="#">NDWI</a>	-1003215.069	?	-4144027.980	?	4728384.552	?	?	NEh
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### Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
<a href="#">11</a>	0.005	0.005	13°
<a href="#">12</a>	0.006	0.005	7°
<a href="#">18</a>	0.006	0.005	7°
<a href="#">8</a>	0.006	0.005	16°
<a href="#">9</a>	0.006	0.005	10°
<a href="#">NDTI</a>	0.006	0.006	144°

### Network Adjustment Report

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#### 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

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#### 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: 241

##### Post Processed Vector Statistics

Reference Factor: 1.00

Redundancy Number: 241.00

A Priori Scalar: 0.94

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#### Control Point Constraints

Point ID	Type	North $\sigma$ (Meter)	East $\sigma$ (Meter)	Height $\sigma$ (Meter)	Elevation $\sigma$ (Meter)
<a href="#">NDGR</a>	Grid	Fixed	Fixed		
<a href="#">NDGR</a>	Local			Fixed	
<a href="#">NDWI</a>	Grid	Fixed	Fixed		
<a href="#">NDWI</a>	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
<a href="#">13</a>	5378199.826	0.003	613074.448	0.003	?	?	
<a href="#">13A</a>	5378108.675	0.003	607994.088	0.003	?	?	
<a href="#">13B</a>	5381913.759	0.004	612921.721	0.004	?	?	
<a href="#">13C</a>	5376704.975	0.005	619301.908	0.004	?	?	
<a href="#">14</a>	5365328.904	0.004	613820.167	0.004	?	?	
<a href="#">14A</a>	5365509.764	0.004	622915.181	0.004	?	?	
<a href="#">14B</a>	5358846.835	0.004	613000.912	0.003	?	?	
<a href="#">14C</a>	5365192.543	0.003	607393.264	0.003	?	?	
<a href="#">14D</a>	5372552.935	0.003	612886.411	0.003	?	?	
<a href="#">14E</a>	5366909.473	0.004	612960.503	0.004	?	?	
<a href="#">16</a>	5333002.783	0.003	613685.823	0.003	?	?	
<a href="#">16A</a>	5338646.643	0.004	608538.800	0.004	?	?	
<a href="#">16B</a>	5336735.845	0.004	619792.573	0.004	?	?	
<a href="#">16C</a>	5332545.365	0.004	613487.518	0.004	?	?	
<a href="#">20</a>	5341341.623	0.004	629327.173	0.003	?	?	
<a href="#">20A</a>	5343872.807	0.005	634812.243	0.005	?	?	
<a href="#">20B</a>	5347779.637	0.004	629153.363	0.004	?	?	
<a href="#">20C</a>	5341303.811	0.004	626457.404	0.004	?	?	
<a href="#">NDGR</a>	5385840.047	?	578625.183	?	?	?	NEh
<a href="#">NDTI</a>	5362793.423	0.004	651798.731	0.004	?	?	
<a href="#">NDWI</a>	5333835.144	?	603481.550	?	?	?	NEh

#### Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
<a href="#">13</a>	N48°32'48.12085"	W103°28'04.38960"	643.090	0.005	
<a href="#">13A</a>	N48°32'48.39296"	W103°32'12.20122"	626.371	0.005	
<a href="#">13B</a>	N48°34'48.45891"	W103°28'08.20792"	628.297	0.005	
<a href="#">13C</a>	N48°31'55.57378"	W103°23'02.28665"	653.145	0.005	
<a href="#">14</a>	N48°25'50.93420"	W103°27'40.65203"	664.515	0.006	
<a href="#">14A</a>	N48°25'50.63543"	W103°20'18.01567"	697.319	0.007	
<a href="#">14B</a>	N48°22'21.60129"	W103°28'26.79034"	622.447	0.007	

<a href="#">14C</a>	N48°25'50.58295"	W103°32'53.45180"	627.244	0.006	
<a href="#">14D</a>	N48°29'45.42256"	W103°28'19.06125"	640.815	0.005	
<a href="#">14E</a>	N48°26'42.66373"	W103°28'20.94002"	643.317	0.007	
<a href="#">16</a>	N48°08'24.40981"	W103°28'18.50641"	650.683	0.005	
<a href="#">16A</a>	N48°11'30.38531"	W103°32'22.30926"	635.155	0.007	
<a href="#">16B</a>	N48°10'21.23806"	W103°23'19.32205"	681.973	0.007	
<a href="#">16C</a>	N48°08'09.72719"	W103°28'28.53815"	647.563	0.006	
<a href="#">20</a>	N48°12'43.61695"	W103°15'32.79380"	683.789	0.005	
<a href="#">20A</a>	N48°14'01.44791"	W103°11'04.22457"	709.871	0.007	
<a href="#">20B</a>	N48°16'12.16582"	W103°15'34.14411"	704.450	0.006	
<a href="#">20C</a>	N48°12'44.47488"	W103°17'51.83922"	668.360	0.006	
<a href="#">NDGR</a>	N48°37'14.47290"	W103°55'59.20209"	642.776	?	NEh
<a href="#">NDTI</a>	N48°24'00.04054"	W102°56'56.71006"	681.161	0.004	
<a href="#">NDWI</a>	N48°08'57.63153"	W103°36'31.42557"	554.380	?	NEh

#### Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
<a href="#">13</a>	-985349.127	0.003	-4114428.929	0.004	4757819.126	0.004	0.007	
<a href="#">13A</a>	-990287.527	0.003	-4113225.252	0.004	4757812.161	0.004	0.007	
<a href="#">13B</a>	-984773.872	0.004	-4111690.836	0.005	4760268.258	0.004	0.007	
<a href="#">13C</a>	-979605.063	0.004	-4117057.646	0.005	4756751.868	0.005	0.008	
<a href="#">14</a>	-987125.488	0.004	-4123941.643	0.005	4749293.605	0.005	0.008	
<a href="#">14A</a>	-978280.013	0.004	-4126078.375	0.005	4749312.023	0.006	0.009	
<a href="#">14B</a>	-989168.200	0.003	-4128396.315	0.005	4744968.944	0.005	0.008	
<a href="#">14C</a>	-993374.402	0.003	-4122423.781	0.005	4749258.522	0.005	0.008	
<a href="#">14D</a>	-986626.534	0.003	-4118469.466	0.004	4754079.207	0.005	0.007	
<a href="#">14E</a>	-987649.117	0.004	-4122572.289	0.005	4750337.916	0.006	0.009	
<a href="#">16</a>	-993502.104	0.003	-4147219.383	0.004	4727771.537	0.005	0.007	
<a href="#">16A</a>	-997398.856	0.004	-4141870.716	0.006	4731591.624	0.006	0.009	
<a href="#">16B</a>	-986867.871	0.004	-4146060.973	0.006	4730202.317	0.006	0.009	
<a href="#">16C</a>	-993782.027	0.004	-4147497.518	0.005	4727466.544	0.005	0.008	
<a href="#">20</a>	-976736.197	0.003	-4145092.692	0.004	4733135.626	0.004	0.007	
<a href="#">20A</a>	-970933.219	0.005	-4144632.168	0.006	4734756.876	0.006	0.009	
<a href="#">20B</a>	-975664.263	0.004	-4140422.180	0.005	4737441.566	0.005	0.008	
<a href="#">20C</a>	-979523.319	0.004	-4144404.086	0.005	4733141.782	0.005	0.008	
<a href="#">NDGR</a>	-1017238.445	?	-4100303.417	?	4763262.104	?	?	NEh
<a href="#">NDTI</a>	-950796.450	0.004	-4135109.265	0.004	4747032.334	0.004	0.007	
<a href="#">NDWI</a>	-1003215.069	?	-4144027.980	?	4728384.552	?	?	NEh

#### Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
<a href="#">13</a>	0.004	0.004	11°
<a href="#">13A</a>	0.004	0.004	10°
<a href="#">13B</a>	0.005	0.005	4°
<a href="#">13C</a>	0.006	0.005	22°
<a href="#">14</a>	0.005	0.005	3°
<a href="#">14A</a>	0.005	0.005	2°
<a href="#">14B</a>	0.004	0.004	2°
<a href="#">14C</a>	0.004	0.004	2°
<a href="#">14D</a>	0.004	0.004	180°
<a href="#">14E</a>	0.005	0.005	2°
<a href="#">16</a>	0.004	0.004	177°
<a href="#">16A</a>	0.005	0.004	178°
<a href="#">16B</a>	0.005	0.005	174°
<a href="#">16C</a>	0.005	0.005	168°
<a href="#">20</a>	0.005	0.004	170°
<a href="#">20A</a>	0.006	0.006	4°
<a href="#">20B</a>	0.005	0.005	171°
<a href="#">20C</a>	0.005	0.005	180°
<a href="#">NDTI</a>	0.005	0.005	127°

### 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: 100

##### Post Processed Vector Statistics

Reference Factor: 1.00  
 Redundancy Number: 100.00  
 A Priori Scalar: 0.78

**Control Point Constraints**

Point ID	Type	North $\sigma$ (Meter)	East $\sigma$ (Meter)	Height $\sigma$ (Meter)	Elevation $\sigma$ (Meter)
<a href="#">NDGR</a>	Grid	Fixed	Fixed		
<a href="#">NDGR</a>	Local			Fixed	
<a href="#">NDWI</a>	Grid	Fixed	Fixed		
<a href="#">NDWI</a>	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
<a href="#">10</a>	5360274.689	0.003	600761.382	0.003	?	?	
<a href="#">10A</a>	5369883.162	0.003	598449.693	0.003	?	?	
<a href="#">10B</a>	5363598.534	0.003	590617.764	0.003	?	?	
<a href="#">10C</a>	5360259.567	0.003	601518.675	0.003	?	?	
<a href="#">15</a>	5344829.981	0.003	613256.750	0.003	?	?	
<a href="#">15A</a>	5348355.831	0.003	606712.216	0.003	?	?	
<a href="#">15B</a>	5352252.924	0.003	613118.503	0.003	?	?	
<a href="#">15C</a>	5346645.202	0.003	613173.135	0.003	?	?	
<a href="#">15D</a>	5349021.772	0.004	617981.108	0.004	?	?	
<a href="#">NDGR</a>	5385840.047	?	578625.183	?	?	?	NEh
<a href="#">NDWI</a>	5333835.144	?	603481.550	?	?	?	NEh

**Adjusted Geodetic Coordinates**

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
<a href="#">10</a>	N48°23'15.29653"	W103°38'20.36176"	571.736	0.004	
<a href="#">10A</a>	N48°28'27.72059"	W103°40'04.61246"	578.410	0.006	
<a href="#">10B</a>	N48°25'08.46385"	W103°46'30.89966"	658.968	0.005	
<a href="#">10C</a>	N48°23'14.36974"	W103°37'43.56162"	572.910	0.004	
<a href="#">15</a>	N48°14'47.61815"	W103°28'27.90454"	609.665	0.004	
<a href="#">15A</a>	N48°16'45.86718"	W103°33'41.95545"	556.311	0.006	
<a href="#">15B</a>	N48°18'48.03822"	W103°28'27.45256"	668.385	0.004	
<a href="#">15C</a>	N48°15'46.44324"	W103°28'30.20999"	655.694	0.004	
<a href="#">15D</a>	N48°17'00.22870"	W103°24'34.68892"	630.343	0.006	
<a href="#">NDGR</a>	N48°37'14.47290"	W103°55'59.20209"	642.776	?	NEh



<a href="#">NDWI</a>	N48°08'57.63153"	W103°36'31.42557"	554.380	?	NEh
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#### Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
<a href="#">10</a>	-1000744.103	0.003	-4124294.921	0.003	4746032.724	0.004	0.006	
<a href="#">10A</a>	-1001123.341	0.003	-4116776.773	0.005	4752441.494	0.005	0.007	
<a href="#">10B</a>	-1009940.919	0.003	-4119420.384	0.004	4748418.825	0.004	0.006	
<a href="#">10C</a>	-1000013.490	0.003	-4124494.960	0.003	4746014.590	0.004	0.006	
<a href="#">15</a>	-991628.697	0.003	-4138566.805	0.003	4735632.014	0.004	0.006	
<a href="#">15A</a>	-997281.283	0.003	-4134367.941	0.004	4738023.893	0.005	0.007	
<a href="#">15B</a>	-990337.076	0.003	-4133216.183	0.004	4740618.296	0.004	0.006	
<a href="#">15C</a>	-991366.166	0.003	-4137267.054	0.004	4736876.248	0.004	0.006	
<a href="#">15D</a>	-986243.012	0.004	-4136725.204	0.005	4738374.379	0.005	0.008	
<a href="#">NDGR</a>	-1017238.445	?	-4100303.417	?	4763262.104	?	?	NEh
<a href="#">NDWI</a>	-1003215.069	?	-4144027.980	?	4728384.552	?	?	NEh

#### Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
<a href="#">10</a>	0.003	0.003	13°
<a href="#">10A</a>	0.004	0.004	7°
<a href="#">10B</a>	0.004	0.003	14°
<a href="#">10C</a>	0.004	0.004	17°
<a href="#">15</a>	0.004	0.004	3°
<a href="#">15A</a>	0.004	0.004	8°
<a href="#">15B</a>	0.004	0.004	17°
<a href="#">15C</a>	0.004	0.004	9°
<a href="#">15D</a>	0.005	0.005	0°

#### 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: 153

**Post Processed Vector Statistics**

Reference Factor: 1.00

Redundancy Number: 153.00

A Priori Scalar: 1.38

**Control Point Constraints**

Point ID	Type	North $\sigma$ (Meter)	East $\sigma$ (Meter)	Height $\sigma$ (Meter)	Elevation $\sigma$ (Meter)
<a href="#">NDGR</a>	Local	Fixed	Fixed	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
<a href="#">24</a>	5343314.303	0.006	645657.085	0.006	?	?	
<a href="#">24A</a>	5337640.098	0.006	643817.484	0.006	?	?	
<a href="#">24B</a>	5346633.645	0.010	650661.618	0.009	?	?	
<a href="#">24C</a>	5349640.727	0.008	641404.493	0.008	?	?	
<a href="#">24D</a>	5341790.418	0.008	638136.672	0.007	?	?	
<a href="#">27</a>	5350062.087	0.006	654667.600	0.006	?	?	
<a href="#">27A</a>	5350141.863	0.006	660325.162	0.006	?	?	
<a href="#">27B</a>	5357578.350	0.009	656056.814	0.008	?	?	
<a href="#">27C</a>	5352281.650	0.007	649878.123	0.007	?	?	
<a href="#">3</a>	5345312.222	0.005	580096.397	0.005	?	?	
<a href="#">3A</a>	5345332.379	0.005	581876.631	0.005	?	?	
<a href="#">3B</a>	5354897.507	0.008	576900.312	0.007	?	?	
<a href="#">3C</a>	5348697.161	0.008	570730.656	0.008	?	?	
<a href="#">3D</a>	5348437.409	0.007	572759.168	0.007	?	?	
<a href="#">3E</a>	5340414.639	0.008	577381.608	0.008	?	?	

<a href="#">4A</a>	5329168.184	0.006	576292.163	0.006	?	?	
<a href="#">4B</a>	5337499.201	0.008	582885.613	0.007	?	?	
<a href="#">4C</a>	5335038.891	0.011	572099.767	0.010	?	?	
<a href="#">4D</a>	5325244.464	0.010	581040.585	0.010	?	?	
<a href="#">NDGR</a>	5385840.046	?	578625.185	?	?	?	LLh

#### Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
<a href="#">24</a>	N48°13'34.73604"	W103°02'19.45947"	576.775	0.010	
<a href="#">24A</a>	N48°10'32.57187"	W103°03'55.50052"	555.017	0.011	
<a href="#">24B</a>	N48°15'17.96904"	W102°58'12.77548"	693.769	0.015	
<a href="#">24C</a>	N48°17'02.98980"	W103°05'37.86767"	640.201	0.014	
<a href="#">24D</a>	N48°12'51.46217"	W103°08'25.58445"	609.906	0.013	
<a href="#">27</a>	N48°17'05.46273"	W102°54'54.09889"	699.245	0.011	
<a href="#">27A</a>	N48°17'02.97756"	W102°50'19.63208"	706.273	0.012	
<a href="#">27B</a>	N48°21'07.50808"	W102°53'36.71548"	686.534	0.012	
<a href="#">27C</a>	N48°18'21.45324"	W102°58'43.53970"	695.079	0.013	
<a href="#">3</a>	N48°15'21.44512"	W103°55'15.24472"	691.762	0.008	
<a href="#">3A</a>	N48°15'21.27867"	W103°53'48.90400"	701.513	0.008	
<a href="#">3B</a>	N48°20'33.26971"	W103°57'43.94440"	716.478	0.010	
<a href="#">3C</a>	N48°17'15.07580"	W104°02'47.38397"	748.108	0.012	
<a href="#">3D</a>	N48°17'05.83625"	W104°01'09.11452"	717.197	0.012	
<a href="#">3E</a>	N48°12'44.06039"	W103°57'30.11250"	700.799	0.011	
<a href="#">4A</a>	N48°06'40.33282"	W103°58'30.16097"	698.196	0.010	
<a href="#">4B</a>	N48°11'07.14869"	W103°53'05.49059"	655.242	0.012	
<a href="#">4C</a>	N48°09'52.21105"	W104°01'49.31510"	620.748	0.015	
<a href="#">4D</a>	N48°04'31.15730"	W103°54'43.22892"	588.995	0.015	
<a href="#">NDGR</a>	N48°37'14.47287"	W103°55'59.20201"	642.770	?	LLh

#### Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
<a href="#">24</a>	-960504.430	0.006	-4147602.105	0.008	4734107.945	0.008	0.013	
<a href="#">24A</a>	-963380.569	0.006	-4151226.606	0.009	4730341.183	0.009	0.014	
<a href="#">24B</a>	-955026.971	0.009	-4146505.706	0.012	4736319.053	0.013	0.020	
<a href="#">24C</a>	-963415.788	0.008	-4142042.366	0.011	4738438.493	0.012	0.018	
<a href="#">24D</a>	-968096.644	0.008	-4146882.875	0.011	4733242.023	0.010	0.017	
<a href="#">27</a>	-950479.507	0.006	-4145011.797	0.009	4738533.399	0.009	0.014	
<a href="#">27A</a>	-944976.868	0.006	-4146333.316	0.009	4738487.559	0.010	0.014	
<a href="#">27B</a>	-947676.411	0.008	-4139916.369	0.010	4743496.094	0.010	0.017	
<a href="#">27C</a>	-954695.437	0.007	-4142241.469	0.010	4740092.016	0.011	0.017	

<a href="#">3</a>	-1023674.083	0.005	-4130010.220	0.007	4736389.055	0.007	0.011	
<a href="#">3A</a>	-1021947.686	0.005	-4130448.386	0.007	4736392.907	0.007	0.011	
<a href="#">3B</a>	-1024919.874	0.007	-4122307.591	0.009	4742815.529	0.009	0.015	
<a href="#">3C</a>	-1032098.019	0.008	-4125251.403	0.010	4738767.480	0.010	0.016	
<a href="#">3D</a>	-1030179.164	0.007	-4125929.410	0.009	4738554.483	0.010	0.015	
<a href="#">3E</a>	-1027250.466	0.008	-4132865.007	0.010	4733157.441	0.010	0.016	
<a href="#">4A</a>	-1030474.754	0.006	-4140687.268	0.009	4725660.939	0.009	0.014	
<a href="#">4B</a>	-1022475.719	0.007	-4136316.457	0.010	4731128.062	0.010	0.016	
<a href="#">4C</a>	-1033389.512	0.010	-4135357.678	0.013	4729558.685	0.014	0.021	
<a href="#">4D</a>	-1026615.015	0.010	-4144630.222	0.013	4722914.527	0.013	0.021	
<a href="#">NDGR</a>	-1017238.443	?	-4100303.414	?	4763262.099	?	?	LLh

### Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
<a href="#">24</a>	0.008	0.007	171°
<a href="#">24A</a>	0.008	0.007	170°
<a href="#">24B</a>	0.012	0.011	170°
<a href="#">24C</a>	0.011	0.010	8°
<a href="#">24D</a>	0.010	0.009	174°
<a href="#">27</a>	0.008	0.007	2°
<a href="#">27A</a>	0.008	0.008	1°
<a href="#">27B</a>	0.011	0.009	13°
<a href="#">27C</a>	0.009	0.009	14°
<a href="#">3</a>	0.007	0.006	179°
<a href="#">3A</a>	0.007	0.006	180°
<a href="#">3B</a>	0.010	0.008	180°
<a href="#">3C</a>	0.010	0.009	180°
<a href="#">3D</a>	0.009	0.008	16°
<a href="#">3E</a>	0.011	0.010	169°
<a href="#">4A</a>	0.008	0.007	6°
<a href="#">4B</a>	0.010	0.009	179°
<a href="#">4C</a>	0.014	0.012	18°
<a href="#">4D</a>	0.013	0.012	9°

### 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: 202

**Post Processed Vector Statistics**

Reference Factor: 1.00  
Redundancy Number: 202.00  
A Priori Scalar: 1.23

**Control Point Constraints**

Point ID	Type	North $\sigma$ (Meter)	East $\sigma$ (Meter)	Height $\sigma$ (Meter)	Elevation $\sigma$ (Meter)
<a href="#">NDGR</a>	Grid	Fixed	Fixed		
<a href="#">NDGR</a>	Local			Fixed	
<a href="#">NDWI</a>	Grid	Fixed	Fixed		
<a href="#">NDWI</a>	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
<a href="#">17A</a>	5320121.321	0.008	612087.308	0.008	?	?	
<a href="#">17B</a>	5323147.350	0.012	610950.589	0.011	?	?	
<a href="#">17C</a>	5326453.034	0.009	608754.068	0.008	?	?	
<a href="#">17D</a>	5326534.630	0.009	615166.565	0.009	?	?	
<a href="#">17E</a>	5324053.314	0.010	619626.537	0.009	?	?	
<a href="#">24</a>	5343314.301	0.009	645657.082	0.009	?	?	
<a href="#">27</a>	5350062.086	0.009	654667.597	0.009	?	?	
<a href="#">28A</a>	5336096.296	0.010	659249.445	0.010	?	?	
<a href="#">28B</a>	5343810.394	0.011	654419.649	0.010	?	?	
<a href="#">28C</a>	5338494.494	0.010	650909.586	0.010	?	?	
<a href="#">3</a>	5345312.223	0.006	580096.394	0.006	?	?	
<a href="#">3A</a>	5345332.380	0.006	581876.628	0.006	?	?	

<a href="#">3B</a>	5354897.510	0.007	576900.310	0.006	?	?	
<a href="#">3C</a>	5348697.163	0.008	570730.653	0.007	?	?	
<a href="#">3D</a>	5348437.409	0.007	572759.164	0.007	?	?	
<a href="#">3E</a>	5340414.640	0.008	577381.604	0.007	?	?	
<a href="#">4A</a>	5329168.180	0.007	576292.162	0.007	?	?	
<a href="#">4B</a>	5337499.201	0.008	582885.610	0.008	?	?	
<a href="#">4C</a>	5335038.890	0.009	572099.766	0.008	?	?	
<a href="#">4D</a>	5325244.455	0.009	581040.584	0.009	?	?	
<a href="#">MTRC</a>	5284460.846	0.009	561442.634	0.009	?	?	
<a href="#">NDGR</a>	5385840.047	?	578625.183	?	?	?	NEh
<a href="#">NDTI</a>	5362793.420	0.007	651798.734	0.007	?	?	
<a href="#">NDWI</a>	5333835.144	?	603481.550	?	?	?	NEh

#### Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
<a href="#">17A</a>	N48°01'28.35215"	W103°29'48.00297"	555.556	0.009	
<a href="#">17B</a>	N48°03'07.04553"	W103°30'40.04586"	568.386	0.016	
<a href="#">17C</a>	N48°04'55.44144"	W103°32'23.09490"	626.548	0.011	
<a href="#">17D</a>	N48°04'54.02888"	W103°27'13.16510"	661.284	0.010	
<a href="#">17E</a>	N48°03'30.73519"	W103°23'40.16847"	562.722	0.011	
<a href="#">24</a>	N48°13'34.73600"	W103°02'19.45958"	576.780	0.010	
<a href="#">27</a>	N48°17'05.46272"	W102°54'54.09903"	699.230	0.012	
<a href="#">28A</a>	N48°09'29.35738"	W102°51'30.78987"	549.926	0.013	
<a href="#">28B</a>	N48°13'43.33184"	W102°55'14.33687"	605.745	0.015	
<a href="#">28C</a>	N48°10'54.30653"	W102°58'11.18481"	616.192	0.012	
<a href="#">3</a>	N48°15'21.44516"	W103°55'15.24486"	691.761	0.007	
<a href="#">3A</a>	N48°15'21.27868"	W103°53'48.90414"	701.513	0.007	
<a href="#">3B</a>	N48°20'33.26980"	W103°57'43.94452"	716.478	0.009	
<a href="#">3C</a>	N48°17'15.07585"	W104°02'47.38414"	748.118	0.010	
<a href="#">3D</a>	N48°17'05.83627"	W104°01'09.11470"	717.194	0.011	
<a href="#">3E</a>	N48°12'44.06042"	W103°57'30.11270"	700.794	0.009	
<a href="#">4A</a>	N48°06'40.33271"	W103°58'30.16106"	698.205	0.009	
<a href="#">4B</a>	N48°11'07.14870"	W103°53'05.49078"	655.249	0.010	
<a href="#">4C</a>	N48°09'52.21099"	W104°01'49.31513"	620.761	0.012	
<a href="#">4D</a>	N48°04'31.15700"	W103°54'43.22895"	589.001	0.012	
<a href="#">MTRC</a>	N47°42'38.17641"	W104°10'51.20557"	584.661	0.005	
<a href="#">NDGR</a>	N48°37'14.47290"	W103°55'59.20209"	642.776	?	NEh
<a href="#">NDTI</a>	N48°24'00.04047"	W102°56'56.70992"	681.147	0.005	
<a href="#">NDWI</a>	N48°08'57.63153"	W103°36'31.42557"	554.380	?	NEh

#### Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
<a href="#">17A</a>	-997518.549	0.008	-4156025.149	0.008	4719114.924	0.008	0.014	
<a href="#">17B</a>	-998039.513	0.011	-4153577.532	0.015	4721162.832	0.013	0.023	
<a href="#">17C</a>	-999540.433	0.009	-4150694.529	0.011	4723443.633	0.010	0.017	
<a href="#">17D</a>	-993315.499	0.009	-4152245.880	0.010	4723440.330	0.010	0.016	
<a href="#">17E</a>	-989455.370	0.009	-4155067.406	0.010	4721647.734	0.010	0.017	
<a href="#">24</a>	-960504.434	0.009	-4147602.110	0.010	4734107.948	0.009	0.016	
<a href="#">27</a>	-950479.508	0.009	-4145011.787	0.011	4738533.388	0.011	0.018	
<a href="#">28A</a>	-948709.515	0.010	-4156092.915	0.011	4729035.023	0.011	0.019	
<a href="#">28B</a>	-951914.004	0.010	-4149398.739	0.013	4734306.437	0.013	0.021	
<a href="#">28C</a>	-956346.490	0.010	-4152381.163	0.011	4730834.457	0.012	0.019	
<a href="#">3</a>	-1023674.086	0.006	-4130010.219	0.006	4736389.055	0.006	0.011	
<a href="#">3A</a>	-1021947.689	0.006	-4130448.385	0.007	4736392.907	0.007	0.011	
<a href="#">3B</a>	-1024919.876	0.006	-4122307.588	0.008	4742815.531	0.008	0.013	
<a href="#">3C</a>	-1032098.024	0.007	-4125251.408	0.009	4738767.489	0.009	0.015	
<a href="#">3D</a>	-1030179.168	0.007	-4125929.407	0.009	4738554.482	0.010	0.015	
<a href="#">3E</a>	-1027250.469	0.007	-4132865.003	0.009	4733157.438	0.008	0.014	
<a href="#">4A</a>	-1030474.758	0.007	-4140687.276	0.008	4725660.944	0.008	0.013	
<a href="#">4B</a>	-1022475.723	0.008	-4136316.460	0.009	4731128.067	0.009	0.015	
<a href="#">4C</a>	-1033389.515	0.009	-4135357.687	0.010	4729558.694	0.011	0.017	
<a href="#">4D</a>	-1026615.018	0.009	-4144630.233	0.011	4722914.525	0.011	0.018	
<a href="#">MTRC</a>	-1053424.317	0.009	-4168935.285	0.008	4695717.861	0.007	0.013	
<a href="#">NDGR</a>	-1017238.445	?	-4100303.417	?	4763262.104	?	?	NEh
<a href="#">NDTI</a>	-950796.445	0.007	-4135109.258	0.006	4747032.322	0.006	0.011	
<a href="#">NDWI</a>	-1003215.069	?	-4144027.980	?	4728384.552	?	?	NEh

#### Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
<a href="#">17A</a>	0.010	0.010	4°
<a href="#">17B</a>	0.015	0.014	164°
<a href="#">17C</a>	0.011	0.010	176°
<a href="#">17D</a>	0.012	0.010	22°
<a href="#">17E</a>	0.012	0.011	26°
<a href="#">24</a>	0.011	0.011	20°
<a href="#">27</a>	0.012	0.011	17°
<a href="#">28A</a>	0.012	0.012	47°
<a href="#">28B</a>	0.014	0.013	14°
<a href="#">28C</a>	0.013	0.013	20°
<a href="#">3</a>	0.007	0.007	172°
<a href="#">3A</a>	0.007	0.007	172°
<a href="#">3B</a>	0.009	0.008	178°
<a href="#">3C</a>	0.009	0.009	167°
<a href="#">3D</a>	0.009	0.009	20°

<a href="#">3E</a>		0.010	0.009	165°
<a href="#">4A</a>		0.009	0.009	0°
<a href="#">4B</a>		0.010	0.009	2°
<a href="#">4C</a>		0.012	0.010	18°
<a href="#">4D</a>		0.012	0.011	8°
<a href="#">MTRC</a>		0.011	0.011	143°
<a href="#">NDTI</a>		0.009	0.008	54°

## Network Adjustment Report

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### 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: 232

#### Post Processed Vector Statistics

Reference Factor: 1.00

Redundancy Number: 232.00

A Priori Scalar: 0.89

### Control Point Constraints

Point ID	Type	North $\sigma$ (Meter)	East $\sigma$ (Meter)	Height $\sigma$ (Meter)	Elevation $\sigma$ (Meter)
<a href="#">NDGR</a>	Grid	Fixed	Fixed		
<a href="#">NDGR</a>	Local			Fixed	
<a href="#">NDWI</a>	Grid	Fixed	Fixed		
<a href="#">NDWI</a>	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
<a href="#">11</a>	5337504.560	0.003	598956.582	0.003	?	?	
<a href="#">11A</a>	5332648.378	0.004	598071.831	0.004	?	?	
<a href="#">11B</a>	5340633.314	0.004	591928.061	0.003	?	?	
<a href="#">11C</a>	5342847.360	0.003	602265.213	0.003	?	?	
<a href="#">11D</a>	5338416.352	0.005	603358.373	0.004	?	?	
<a href="#">12</a>	5387873.988	0.004	613366.660	0.004	?	?	
<a href="#">12B</a>	5387861.387	0.004	614160.704	0.004	?	?	
<a href="#">12C9</a>	5384484.532	0.003	603059.323	0.003	?	?	
<a href="#">18</a>	5381624.170	0.004	627123.700	0.003	?	?	
<a href="#">18A</a>	5386565.004	0.005	628575.931	0.004	?	?	
<a href="#">18B</a>	5381869.224	0.004	633480.340	0.004	?	?	
<a href="#">18C</a>	5382100.061	0.004	625490.709	0.004	?	?	
<a href="#">18D</a>	5373630.519	0.004	626333.519	0.004	?	?	
<a href="#">8</a>	5325323.937	0.004	589494.369	0.003	?	?	
<a href="#">8A</a>	5324558.946	0.004	590603.997	0.004	?	?	
<a href="#">8B</a>	5319653.385	0.004	584747.975	0.004	?	?	
<a href="#">8C</a>	5329396.835	0.004	592456.916	0.003	?	?	
<a href="#">8D</a>	5331239.717	0.004	587803.030	0.004	?	?	
<a href="#">9</a>	5387546.754	0.004	595528.562	0.004	?	?	
<a href="#">9A</a>	5385940.478	0.005	594952.424	0.004	?	?	
<a href="#">NDGR</a>	5385840.047	?	578625.183	?	?	?	NEh
<a href="#">NDWI</a>	5333835.144	?	603481.550	?	?	?	NEh

**Adjusted Geodetic Coordinates**

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
<a href="#">11</a>	N48°10'59.04061"	W103°40'07.29984"	622.654	0.005	
<a href="#">11A</a>	N48°08'22.28964"	W103°40'54.16989"	564.694	0.007	
<a href="#">11B</a>	N48°12'44.15529"	W103°45'45.18266"	656.405	0.007	
<a href="#">11C</a>	N48°13'50.15039"	W103°37'22.46591"	572.679	0.006	
<a href="#">11D</a>	N48°11'26.04027"	W103°36'33.37570"	547.425	0.006	
<a href="#">12</a>	N48°38'01.13061"	W103°27'40.63785"	653.403	0.007	
<a href="#">12B</a>	N48°38'00.20260"	W103°27'01.86626"	662.699	0.007	
<a href="#">12C9</a>	N48°36'17.81293"	W103°36'07.14619"	607.592	0.005	
<a href="#">18</a>	N48°34'29.28986"	W103°16'35.62627"	679.777	0.005	
<a href="#">18A</a>	N48°37'08.16526"	W103°15'19.27640"	691.746	0.007	
<a href="#">18B</a>	N48°34'32.46387"	W103°11'25.25964"	706.453	0.006	
<a href="#">18C</a>	N48°34'45.88054"	W103°17'54.77176"	684.092	0.006	
<a href="#">18D</a>	N48°30'11.09185"	W103°17'22.89966"	656.281	0.006	

<a href="#">8</a>	N48°04'29.66087"	W103°47'54.67800"	547.662	0.005	
<a href="#">8A</a>	N48°04'04.32466"	W103°47'01.64524"	547.806	0.006	
<a href="#">8B</a>	N48°01'28.36504"	W103°51'48.06948"	552.632	0.007	
<a href="#">8C</a>	N48°06'40.02664"	W103°45'28.35475"	618.391	0.006	
<a href="#">8D</a>	N48°07'42.07477"	W103°49'12.02090"	652.729	0.006	
<a href="#">9</a>	N48°38'01.26259"	W103°42'12.26639"	644.727	0.007	
<a href="#">9A</a>	N48°37'09.57031"	W103°42'41.73457"	622.850	0.008	
<a href="#">NDGR</a>	N48°37'14.47290"	W103°55'59.20209"	642.776	?	NEh
<a href="#">NDWI</a>	N48°08'57.63153"	W103°36'31.42557"	554.380	?	NEh

#### Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
<a href="#">11</a>	-1006902.058	0.003	-4140304.846	0.004	4730936.781	0.004	0.007	
<a href="#">11A</a>	-1008686.959	0.004	-4143543.447	0.005	4727663.792	0.006	0.008	
<a href="#">11B</a>	-1013112.468	0.003	-4136320.733	0.005	4733126.292	0.006	0.008	
<a href="#">11C</a>	-1002657.058	0.003	-4137245.951	0.005	4734422.088	0.005	0.008	
<a href="#">11D</a>	-1002449.400	0.005	-4140694.002	0.005	4731436.756	0.005	0.009	
<a href="#">12</a>	-983188.691	0.004	-4107496.014	0.005	4764222.767	0.006	0.009	
<a href="#">12B</a>	-982423.022	0.004	-4107707.652	0.006	4764210.797	0.006	0.009	
<a href="#">12C9</a>	-993828.272	0.003	-4107367.570	0.004	4762078.458	0.005	0.007	
<a href="#">18</a>	-971072.190	0.003	-4115439.581	0.004	4759915.069	0.005	0.007	
<a href="#">18A</a>	-968706.467	0.004	-4112223.092	0.006	4763170.031	0.006	0.009	
<a href="#">18B</a>	-964865.840	0.004	-4116841.693	0.005	4759999.947	0.005	0.009	
<a href="#">18C</a>	-972563.501	0.004	-4114695.435	0.005	4760257.400	0.005	0.008	
<a href="#">18D</a>	-973385.878	0.004	-4121019.216	0.005	4754616.237	0.006	0.009	
<a href="#">8</a>	-1018405.306	0.003	-4146662.095	0.004	4722852.889	0.005	0.007	
<a href="#">8A</a>	-1017477.873	0.004	-4147489.376	0.005	4722330.048	0.005	0.008	
<a href="#">8B</a>	-1024095.399	0.004	-4149553.918	0.005	4719113.019	0.005	0.009	
<a href="#">8C</a>	-1014761.925	0.004	-4144518.407	0.005	4725595.213	0.005	0.008	
<a href="#">8D</a>	-1018920.093	0.004	-4142052.136	0.005	4726900.297	0.005	0.008	
<a href="#">9</a>	-1000535.135	0.004	-4103296.079	0.005	4764218.952	0.006	0.009	
<a href="#">9A</a>	-1001401.969	0.005	-4104303.245	0.006	4763147.033	0.007	0.010	
<a href="#">NDGR</a>	-1017238.445	?	-4100303.417	?	4763262.104	?	?	NEh
<a href="#">NDWI</a>	-1003215.069	?	-4144027.980	?	4728384.552	?	?	NEh

#### Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
<a href="#">11</a>	0.004	0.004	11°
<a href="#">11A</a>	0.005	0.004	3°
<a href="#">11B</a>	0.004	0.004	8°

<a href="#">11C</a>		0.004	0.004	7°
<a href="#">11D</a>		0.006	0.006	176°
<a href="#">12</a>		0.005	0.005	12°
<a href="#">12B</a>		0.005	0.005	14°
<a href="#">12C9</a>		0.004	0.004	13°
<a href="#">18</a>		0.004	0.004	11°
<a href="#">18A</a>		0.006	0.005	7°
<a href="#">18B</a>		0.005	0.005	4°
<a href="#">18C</a>		0.005	0.005	8°
<a href="#">18D</a>		0.005	0.005	11°
<a href="#">8</a>		0.005	0.004	16°
<a href="#">8A</a>		0.005	0.005	17°
<a href="#">8B</a>		0.005	0.005	5°
<a href="#">8C</a>		0.005	0.004	12°
<a href="#">8D</a>		0.006	0.005	20°
<a href="#">9</a>		0.005	0.005	16°
<a href="#">9A</a>		0.007	0.005	18°

### 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: 196

##### Post Processed Vector Statistics

Reference Factor: 1.00

Redundancy Number: 196.00

A Priori Scalar: 1.49

### Control Point Constraints

Point ID	Type	North $\sigma$ (Meter)	East $\sigma$ (Meter)	Height $\sigma$ (Meter)	Elevation $\sigma$ (Meter)
<a href="#">21</a>	Local	Fixed	Fixed	Fixed	
<a href="#">NDGR</a>	Grid	Fixed	Fixed		
<a href="#">NDGR</a>	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
<a href="#">1</a>	5385919.451	0.005	578823.907	0.005	?	?	
<a href="#">19</a>	5352610.045	0.008	629046.110	0.007	?	?	
<a href="#">19A</a>	5352563.686	0.008	627412.570	0.007	?	?	
<a href="#">19B</a>	5354104.774	0.009	622678.506	0.008	?	?	
<a href="#">19C</a>	5360338.040	0.009	630813.836	0.009	?	?	
<a href="#">19D</a>	5352703.064	0.010	636971.553	0.011	?	?	
<a href="#">1A</a>	5385757.192	0.007	586983.526	0.006	?	?	
<a href="#">1B</a>	5380960.755	0.007	584094.667	0.006	?	?	
<a href="#">1C</a>	5378389.463	0.007	574254.453	0.007	?	?	
<a href="#">1D</a>	5384018.005	0.007	574178.240	0.007	?	?	
<a href="#">21</a>	5328153.646	?	629332.470	?	?	?	LLh
<a href="#">21A</a>	5329716.120	0.007	630100.913	0.006	?	?	
<a href="#">21B</a>	5335500.181	0.007	629093.446	0.007	?	?	
<a href="#">21C</a>	5326751.952	0.008	623129.539	0.007	?	?	
<a href="#">6</a>	5374540.064	0.005	588460.771	0.005	?	?	
<a href="#">6A</a>	5375079.718	0.005	590303.036	0.005	?	?	
<a href="#">6B</a>	5376379.319	0.007	600758.791	0.006	?	?	
<a href="#">6C</a>	5379403.705	0.007	593444.901	0.007	?	?	
<a href="#">6D</a>	5376012.106	0.009	580762.290	0.009	?	?	
<a href="#">6E</a>	5369650.211	0.009	584011.770	0.008	?	?	
<a href="#">6F</a>	5369746.261	0.009	589612.388	0.008	?	?	
<a href="#">NDGR</a>	5385840.047	?	578625.183	?	?	?	NEh

### Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
<a href="#">1</a>	N48°37'16.95403"	W103°55'49.44196"	633.214	0.007	
<a href="#">19</a>	N48°18'48.62065"	W103°15'34.03119"	722.811	0.009	
<a href="#">19A</a>	N48°18'48.31235"	W103°16'53.36252"	712.583	0.009	

<a href="#">19B</a>	N48°19'41.57449"	W103°20'41.51366"	671.845	0.010	
<a href="#">19C</a>	N48°22'57.48768"	W103°13'59.59525"	701.017	0.015	
<a href="#">19D</a>	N48°18'45.63075"	W103°09'09.29618"	683.550	0.013	
<a href="#">1A</a>	N48°37'07.80720"	W103°49'11.05008"	678.682	0.010	
<a href="#">1B</a>	N48°34'33.92026"	W103°51'35.63145"	666.461	0.010	
<a href="#">1C</a>	N48°33'15.13421"	W103°59'37.46802"	626.946	0.013	
<a href="#">1D</a>	N48°36'17.42788"	W103°59'37.56953"	592.584	0.012	
<a href="#">2I</a>	N48°05'36.66455"	W103°15'46.96728"	577.354	?	LLh
<a href="#">21A</a>	N48°06'26.68527"	W103°15'08.11720"	572.281	0.008	
<a href="#">21B</a>	N48°09'34.67789"	W103°15'50.50615"	627.428	0.010	
<a href="#">21C</a>	N48°04'55.70711"	W103°20'48.19208"	649.329	0.010	
<a href="#">6</a>	N48°31'03.85589"	W103°48'07.49464"	671.395	0.007	
<a href="#">6A</a>	N48°31'20.38541"	W103°46'37.28374"	659.051	0.007	
<a href="#">6B</a>	N48°31'56.73528"	W103°38'06.52640"	584.996	0.009	
<a href="#">6C</a>	N48°33'38.73591"	W103°44'00.64873"	636.951	0.010	
<a href="#">6D</a>	N48°31'55.25725"	W103°54'21.69811"	643.357	0.012	
<a href="#">6E</a>	N48°28'27.71915"	W103°51'47.88149"	715.007	0.011	
<a href="#">6F</a>	N48°28'28.04553"	W103°47'15.06919"	665.907	0.011	
<a href="#">NDGR</a>	N48°37'14.47290"	W103°55'59.20209"	642.776	?	NEh

#### Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
<a href="#">1</a>	-1017029.056	0.005	-4100289.589	0.006	4763305.597	0.006	0.010	
<a href="#">19</a>	-974837.241	0.007	-4136922.688	0.009	4740670.905	0.009	0.014	
<a href="#">19A</a>	-976428.339	0.007	-4136547.754	0.009	4740656.934	0.009	0.014	
<a href="#">19B</a>	-980713.320	0.008	-4134243.144	0.010	4741720.589	0.009	0.016	
<a href="#">19C</a>	-971624.809	0.009	-4131762.651	0.012	4745764.017	0.013	0.020	
<a href="#">19D</a>	-967128.914	0.011	-4138775.543	0.012	4740580.159	0.011	0.019	
<a href="#">1A</a>	-1009165.448	0.006	-4102481.361	0.008	4763152.919	0.009	0.014	
<a href="#">1B</a>	-1012893.101	0.006	-4105227.184	0.008	4759999.731	0.009	0.014	
<a href="#">1C</a>	-1022915.101	0.007	-4104595.039	0.010	4758359.436	0.011	0.016	
<a href="#">1D</a>	-1021890.459	0.007	-4100474.909	0.010	4762059.335	0.010	0.016	
<a href="#">2I</a>	-979258.699	?	-4154518.939	?	4724257.620	?	?	LLh
<a href="#">21A</a>	-978211.761	0.006	-4153580.581	0.007	4725285.714	0.007	0.012	
<a href="#">21B</a>	-978081.562	0.007	-4149206.122	0.008	4729202.396	0.009	0.014	
<a href="#">21C</a>	-985553.263	0.007	-4154047.267	0.009	4723466.066	0.009	0.015	
<a href="#">6</a>	-1009911.226	0.005	-4110973.697	0.006	4755707.408	0.006	0.010	
<a href="#">6A</a>	-1008020.123	0.005	-4111035.498	0.006	4756036.382	0.006	0.010	
<a href="#">6B</a>	-997627.300	0.006	-4112653.647	0.008	4756724.563	0.008	0.013	
<a href="#">6C</a>	-1004134.060	0.007	-4108674.092	0.009	4758849.510	0.008	0.014	
<a href="#">6D</a>	-1017077.258	0.009	-4107961.883	0.010	4756738.061	0.011	0.018	
<a href="#">6E</a>	-1015175.538	0.009	-4113427.431	0.010	4752543.730	0.010	0.017	
<a href="#">6F</a>	-1009724.546	0.008	-4114727.591	0.010	4752513.655	0.010	0.017	
<a href="#">NDGR</a>	-1017238.445	?	-4100303.417	?	4763262.104	?	?	NEh

### Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
<a href="#">1</a>	0.007	0.006	171°
<a href="#">19</a>	0.010	0.009	159°
<a href="#">19A</a>	0.010	0.009	159°
<a href="#">19B</a>	0.011	0.010	174°
<a href="#">19C</a>	0.012	0.011	174°
<a href="#">19D</a>	0.014	0.012	112°
<a href="#">1A</a>	0.009	0.008	178°
<a href="#">1B</a>	0.009	0.008	175°
<a href="#">1C</a>	0.009	0.008	139°
<a href="#">1D</a>	0.009	0.009	127°
<a href="#">21A</a>	0.008	0.008	171°
<a href="#">21B</a>	0.009	0.009	1°
<a href="#">21C</a>	0.010	0.009	2°
<a href="#">6</a>	0.007	0.006	175°
<a href="#">6A</a>	0.007	0.006	175°
<a href="#">6B</a>	0.008	0.008	6°
<a href="#">6C</a>	0.009	0.008	5°
<a href="#">6D</a>	0.012	0.011	21°
<a href="#">6E</a>	0.011	0.010	165°
<a href="#">6F</a>	0.011	0.010	149°

### 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:** 194

**Post Processed Vector Statistics**

**Reference Factor:** 1.00  
**Redundancy Number:** 194.00  
**A Priori Scalar:** 0.70

**Control Point Constraints**

Point ID	Type	North $\sigma$ (Meter)	East $\sigma$ (Meter)	Height $\sigma$ (Meter)	Elevation $\sigma$ (Meter)
<a href="#">17</a>	Local	Fixed	Fixed	Fixed	
<a href="#">28</a>	Local	Fixed	Fixed	Fixed	
<a href="#">NDGR</a>	Grid	Fixed	Fixed		
<a href="#">NDGR</a>	Local			Fixed	
<a href="#">NDWI</a>	Grid	Fixed	Fixed		
<a href="#">NDWI</a>	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
<a href="#">17</a>	5320131.089	?	613203.448	?	?	?	LLh
<a href="#">17A</a>	5320121.320	0.003	612087.306	0.002	?	?	
<a href="#">17B</a>	5323147.351	0.004	610950.585	0.003	?	?	
<a href="#">17C</a>	5326453.033	0.003	608754.069	0.003	?	?	
<a href="#">17D</a>	5326534.630	0.003	615166.564	0.003	?	?	
<a href="#">17E</a>	5324053.310	0.004	619626.533	0.004	?	?	
<a href="#">2</a>	5366167.186	0.003	577748.509	0.003	?	?	
<a href="#">28</a>	5337240.555	?	655073.303	?	?	?	LLh
<a href="#">28A</a>	5336096.297	0.003	659249.444	0.003	?	?	
<a href="#">28B</a>	5343810.396	0.004	654419.648	0.004	?	?	
<a href="#">28C</a>	5338494.495	0.004	650909.585	0.003	?	?	
<a href="#">2A</a>	5366332.833	0.003	576950.521	0.003	?	?	
<a href="#">2B</a>	5372772.565	0.004	574246.999	0.004	?	?	
<a href="#">2C</a>	5366147.094	0.004	572801.268	0.003	?	?	
<a href="#">2D</a>	5359930.048	0.004	577167.923	0.003	?	?	
<a href="#">7</a>	5350201.871	0.002	589092.932	0.002	?	?	
<a href="#">7A</a>	5350311.186	0.002	590704.812	0.002	?	?	
<a href="#">7B</a>	5357480.994	0.003	585754.460	0.003	?	?	
<a href="#">7C</a>	5356027.843	0.003	597022.221	0.003	?	?	
<a href="#">7D</a>	5347094.368	0.003	594055.460	0.003	?	?	

<a href="#">NDGR</a>	5385840.047	?	578625.183	?	?	?	NEh
<a href="#">NDWI</a>	5333835.144	?	603481.550	?	?	?	NEh

#### Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
<a href="#">17</a>	N48°01'27.95982"	W103°28'54.12173"	553.843	?	LLh
<a href="#">17A</a>	N48°01'28.35212"	W103°29'48.00303"	555.550	0.003	
<a href="#">17B</a>	N48°03'07.04559"	W103°30'40.04607"	568.372	0.006	
<a href="#">17C</a>	N48°04'55.44140"	W103°32'23.09487"	626.533	0.005	
<a href="#">17D</a>	N48°04'54.02891"	W103°27'13.16513"	661.269	0.004	
<a href="#">17E</a>	N48°03'30.73507"	W103°23'40.16866"	562.727	0.005	
<a href="#">2</a>	N48°26'37.83292"	W103°56'55.23213"	706.353	0.006	
<a href="#">28</a>	N48°10'10.11021"	W102°54'51.31259"	676.242	?	LLh
<a href="#">28A</a>	N48°09'29.35740"	W102°51'30.78992"	549.932	0.006	
<a href="#">28B</a>	N48°13'43.33191"	W102°55'14.33691"	605.751	0.007	
<a href="#">28C</a>	N48°10'54.30659"	W102°58'11.18486"	616.199	0.005	
<a href="#">2A</a>	N48°26'43.54991"	W103°57'33.96157"	678.985	0.006	
<a href="#">2B</a>	N48°30'13.25166"	W103°59'41.43346"	631.947	0.006	
<a href="#">2C</a>	N48°26'39.31226"	W104°00'56.03625"	710.417	0.007	
<a href="#">2D</a>	N48°23'16.11820"	W103°57'27.62116"	722.517	0.007	
<a href="#">7</a>	N48°17'55.45352"	W103°47'55.28740"	698.154	0.003	
<a href="#">7A</a>	N48°17'58.16866"	W103°46'36.97799"	691.052	0.003	
<a href="#">7B</a>	N48°21'52.82244"	W103°50'31.97388"	692.775	0.005	
<a href="#">7C</a>	N48°20'59.89731"	W103°41'25.65990"	614.754	0.004	
<a href="#">7D</a>	N48°16'12.24566"	W103°43'56.94874"	674.519	0.004	
<a href="#">NDGR</a>	N48°37'14.47290"	W103°55'59.20209"	642.776	?	NEh
<a href="#">NDWI</a>	N48°08'57.63153"	W103°36'31.42557"	554.380	?	NEh

#### Adjusted ECEF Coordinates

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
<a href="#">17</a>	-996434.696	?	-4156293.230	?	4719105.546	?	?	LLh
<a href="#">17A</a>	-997518.549	0.002	-4156025.146	0.003	4719114.919	0.003	0.005	
<a href="#">17B</a>	-998039.514	0.003	-4153577.522	0.005	4721162.823	0.005	0.008	
<a href="#">17C</a>	-999540.430	0.003	-4150694.521	0.004	4723443.621	0.004	0.006	
<a href="#">17D</a>	-993315.497	0.003	-4152245.869	0.004	4723440.319	0.004	0.006	
<a href="#">17E</a>	-989455.375	0.004	-4155067.411	0.005	4721647.735	0.005	0.008	
<a href="#">2</a>	-1021914.825	0.003	-4114370.496	0.004	4750286.096	0.005	0.007	
<a href="#">28</a>	-952558.673	?	-4154336.581	?	4729968.797	?	?	LLh
<a href="#">28A</a>	-948709.517	0.003	-4156092.918	0.005	4729035.028	0.005	0.007	
<a href="#">28B</a>	-951914.005	0.004	-4149398.741	0.006	4734306.443	0.006	0.009	



<a href="#">28C</a>	-956346.492	0.003	-4152381.166	0.004	4730834.463	0.005	0.007	
<a href="#">2A</a>	-1022651.084	0.003	-4114032.669	0.004	4750382.769	0.005	0.007	
<a href="#">2B</a>	-1024012.952	0.004	-4108663.684	0.005	4754642.223	0.005	0.008	
<a href="#">2C</a>	-1026709.827	0.003	-4113144.094	0.005	4750319.453	0.006	0.008	
<a href="#">2D</a>	-1023687.706	0.003	-4118743.707	0.005	4746162.315	0.006	0.008	
<a href="#">7</a>	-1014016.650	0.002	-4128740.035	0.003	4739560.052	0.003	0.005	
<a href="#">7A</a>	-1012433.042	0.002	-4129059.304	0.003	4739610.546	0.003	0.005	
<a href="#">7B</a>	-1015841.354	0.003	-4122646.631	0.004	4744430.906	0.004	0.007	
<a href="#">7C</a>	-1005195.436	0.003	-4126459.430	0.004	4743286.219	0.004	0.006	
<a href="#">7D</a>	-1009806.438	0.003	-4132205.520	0.004	4737420.873	0.004	0.006	
<a href="#">NDGR</a>	-1017238.445	?	-4100303.417	?	4763262.104	?	?	NEh
<a href="#">NDWI</a>	-1003215.069	?	-4144027.980	?	4728384.552	?	?	NEh

### Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
<a href="#">17A</a>	0.003	0.003	7°
<a href="#">17B</a>	0.005	0.004	161°
<a href="#">17C</a>	0.004	0.004	3°
<a href="#">17D</a>	0.004	0.004	17°
<a href="#">17E</a>	0.005	0.005	19°
<a href="#">2</a>	0.004	0.003	175°
<a href="#">28A</a>	0.004	0.004	164°
<a href="#">28B</a>	0.005	0.005	16°
<a href="#">28C</a>	0.004	0.004	2°
<a href="#">2A</a>	0.004	0.003	175°
<a href="#">2B</a>	0.005	0.005	0°
<a href="#">2C</a>	0.004	0.004	5°
<a href="#">2D</a>	0.004	0.004	3°
<a href="#">7</a>	0.003	0.003	8°
<a href="#">7A</a>	0.003	0.003	8°
<a href="#">7B</a>	0.004	0.004	5°
<a href="#">7C</a>	0.004	0.004	1°
<a href="#">7D</a>	0.004	0.004	17°

### 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: 298

**Post Processed Vector Statistics**

Reference Factor: 1.00  
Redundancy Number: 298.00  
A Priori Scalar: 0.68

**Control Point Constraints**

Point ID	Type	North $\sigma$ (Meter)	East $\sigma$ (Meter)	Height $\sigma$ (Meter)	Elevation $\sigma$ (Meter)
<a href="#">NDGR</a>	Grid	Fixed	Fixed		
<a href="#">NDGR</a>	Local			Fixed	
<a href="#">NDWI</a>	Grid	Fixed	Fixed		
<a href="#">NDWI</a>	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
<a href="#">22</a>	5377233.469	0.003	642946.414	0.003	?	?	
<a href="#">22A</a>	5374232.958	0.003	643316.919	0.003	?	?	
<a href="#">22B</a>	5382185.491	0.004	647882.775	0.003	?	?	
<a href="#">22C</a>	5381881.755	0.003	638281.392	0.003	?	?	
<a href="#">22D</a>	5373872.928	0.003	636386.754	0.003	?	?	
<a href="#">23</a>	5361655.590	0.003	643775.501	0.003	?	?	
<a href="#">23A</a>	5361343.300	0.003	645290.626	0.003	?	?	
<a href="#">23B</a>	5364778.220	0.004	649936.923	0.003	?	?	
<a href="#">23C</a>	5369056.877	0.003	637046.612	0.003	?	?	
<a href="#">23D</a>	5361010.051	0.003	637744.301	0.003	?	?	
<a href="#">25</a>	5387221.021	0.005	654607.013	0.005	?	?	
<a href="#">25A</a>	5387142.128	0.005	652676.168	0.005	?	?	

<a href="#">25B</a>	5388145.356	0.006	647711.950	0.005	?	?	
<a href="#">25C</a>	5380745.976	0.006	653974.412	0.006	?	?	
<a href="#">26</a>	5371099.592	0.007	654439.789	0.006	?	?	
<a href="#">26A</a>	5373255.314	0.007	654582.664	0.007	?	?	
<a href="#">26B</a>	5374117.544	0.008	647630.844	0.008	?	?	
<a href="#">26C</a>	5364664.293	0.008	655741.324	0.008	?	?	
<a href="#">5</a>	5315311.609	0.005	578539.391	0.004	?	?	
<a href="#">5A</a>	5314218.939	0.005	580172.677	0.004	?	?	
<a href="#">5B</a>	5316637.047	0.006	574092.993	0.005	?	?	
<a href="#">5C</a>	5325061.138	0.005	573455.697	0.005	?	?	
<a href="#">MTRC</a>	5284460.845	0.004	561442.633	0.004	?	?	
<a href="#">NDGR</a>	5385840.047	?	578625.183	?	?	?	NEh
<a href="#">NDTI</a>	5362793.419	0.003	651798.733	0.003	?	?	
<a href="#">NDWI</a>	5333835.144	?	603481.550	?	?	?	NEh

#### Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (Meter)	Height Error (Meter)	Constraint
<a href="#">22</a>	N48°31'54.89636"	W103°03'49.24778"	687.541	0.003	
<a href="#">22A</a>	N48°30'17.47059"	W103°03'34.90234"	692.722	0.003	
<a href="#">22B</a>	N48°34'31.06041"	W102°59'42.34553"	702.002	0.004	
<a href="#">22C</a>	N48°34'29.12153"	W103°07'31.04943"	682.941	0.004	
<a href="#">22D</a>	N48°30'11.37098"	W103°09'12.90654"	719.233	0.004	
<a href="#">23</a>	N48°23'29.98071"	W103°03'28.11208"	697.280	0.003	
<a href="#">23A</a>	N48°23'18.62229"	W103°02'14.86422"	693.962	0.003	
<a href="#">23B</a>	N48°25'05.88689"	W102°58'24.65360"	708.495	0.004	
<a href="#">23C</a>	N48°27'34.95763"	W103°08'46.44946"	686.222	0.005	
<a href="#">23D</a>	N48°23'13.93050"	W103°08'22.01056"	684.462	0.004	
<a href="#">25</a>	N48°37'08.19175"	W102°54'07.63451"	700.290	0.010	
<a href="#">25A</a>	N48°37'07.34525"	W102°55'41.99378"	688.887	0.010	
<a href="#">25B</a>	N48°37'44.10629"	W102°59'43.04477"	666.668	0.010	
<a href="#">25C</a>	N48°33'39.18850"	W102°54'47.15312"	693.307	0.011	
<a href="#">26</a>	N48°28'26.56790"	W102°54'37.31860"	735.788	0.013	
<a href="#">26A</a>	N48°29'36.21260"	W102°54'27.49357"	732.744	0.014	
<a href="#">26B</a>	N48°30'10.13851"	W103°00'04.92493"	700.330	0.014	
<a href="#">26C</a>	N48°24'57.13099"	W102°53'42.58092"	687.329	0.015	
<a href="#">5</a>	N47°59'10.61644"	W103°56'50.64942"	553.971	0.008	
<a href="#">5A</a>	N47°58'34.50154"	W103°55'32.59553"	552.764	0.008	
<a href="#">5B</a>	N47°59'55.45087"	W104°00'24.32016"	571.263	0.010	
<a href="#">5C</a>	N48°04'28.52871"	W104°00'49.86825"	686.508	0.009	
<a href="#">MTRC</a>	N47°42'38.17637"	W104°10'51.20562"	584.658	0.004	
<a href="#">NDGR</a>	N48°37'14.47290"	W103°55'59.20209"	642.776	?	NEh
<a href="#">NDTI</a>	N48°24'00.04042"	W102°56'56.70994"	681.147	0.002	
<a href="#">NDWI</a>	N48°08'57.63153"	W103°36'31.42557"	554.380	?	NEh

**Adjusted ECEF Coordinates**

Point ID	X (Meter)	X Error (Meter)	Y (Meter)	Y Error (Meter)	Z (Meter)	Z Error (Meter)	3D Error (Meter)	Constraint
<a href="#">22</a>	-956583.839	0.003	-4122506.831	0.003	4756763.782	0.003	0.005	
<a href="#">22A</a>	-956807.401	0.003	-4124773.152	0.003	4754774.092	0.003	0.005	
<a href="#">22B</a>	-950837.438	0.003	-4120134.680	0.004	4759967.922	0.004	0.006	
<a href="#">22C</a>	-960204.662	0.003	-4117994.877	0.004	4759914.000	0.004	0.006	
<a href="#">22D</a>	-963601.457	0.003	-4123354.242	0.004	4754669.101	0.004	0.006	
<a href="#">23</a>	-958800.695	0.003	-4133984.451	0.003	4746427.816	0.003	0.005	
<a href="#">23A</a>	-957391.277	0.003	-4134578.113	0.003	4746192.331	0.003	0.005	
<a href="#">23B</a>	-952221.955	0.003	-4133238.701	0.004	4748403.034	0.004	0.006	
<a href="#">23C</a>	-963890.420	0.003	-4126979.564	0.004	4751441.462	0.004	0.007	
<a href="#">23D</a>	-964772.406	0.003	-4132966.815	0.003	4746088.978	0.004	0.006	
<a href="#">25</a>	-943337.093	0.005	-4118121.974	0.008	4763176.981	0.008	0.012	
<a href="#">25A</a>	-945223.601	0.005	-4117701.774	0.008	4763151.138	0.008	0.012	
<a href="#">25B</a>	-949840.168	0.006	-4115749.667	0.008	4763885.132	0.008	0.012	
<a href="#">25C</a>	-945207.204	0.006	-4122656.675	0.009	4758901.007	0.009	0.014	
<a href="#">26</a>	-946633.434	0.007	-4129781.346	0.010	4752535.705	0.010	0.016	
<a href="#">26A</a>	-946076.410	0.007	-4128254.207	0.011	4753959.504	0.011	0.017	
<a href="#">26B</a>	-952647.190	0.008	-4125915.257	0.011	4754629.714	0.012	0.018	
<a href="#">26C</a>	-946610.766	0.008	-4134720.550	0.012	4748207.680	0.012	0.019	
<a href="#">5</a>	-1030943.905	0.005	-4151117.076	0.006	4716267.226	0.007	0.010	
<a href="#">5A</a>	-1029572.241	0.005	-4152310.528	0.007	4715519.613	0.007	0.011	
<a href="#">5B</a>	-1034997.248	0.006	-4149059.665	0.008	4717206.880	0.008	0.012	
<a href="#">5C</a>	-1034010.952	0.005	-4142920.679	0.007	4722932.827	0.007	0.011	
<a href="#">MTRC</a>	-1053424.318	0.004	-4168935.284	0.004	4695717.858	0.004	0.006	
<a href="#">NDGR</a>	-1017238.445	?	-4100303.417	?	4763262.104	?	?	NEh
<a href="#">NDTI</a>	-950796.446	0.003	-4135109.259	0.003	4747032.321	0.003	0.005	
<a href="#">NDWI</a>	-1003215.069	?	-4144027.980	?	4728384.552	?	?	NEh

**Error Ellipse Components**

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
<a href="#">22</a>	0.004	0.004	1°
<a href="#">22A</a>	0.004	0.004	0°
<a href="#">22B</a>	0.005	0.004	176°
<a href="#">22C</a>	0.004	0.004	8°
<a href="#">22D</a>	0.004	0.004	174°
<a href="#">23</a>	0.004	0.003	170°
<a href="#">23A</a>	0.004	0.004	174°
<a href="#">23B</a>	0.005	0.004	173°
<a href="#">23C</a>	0.004	0.004	13°
<a href="#">23D</a>	0.004	0.004	166°

<a href="#">25</a>	0.007	0.006	25°
<a href="#">25A</a>	0.007	0.006	25°
<a href="#">25B</a>	0.007	0.007	11°
<a href="#">25C</a>	0.008	0.007	30°
<a href="#">26</a>	0.008	0.008	37°
<a href="#">26A</a>	0.009	0.008	37°
<a href="#">26B</a>	0.010	0.009	6°
<a href="#">26C</a>	0.010	0.009	50°
<a href="#">5</a>	0.006	0.005	17°
<a href="#">5A</a>	0.006	0.006	19°
<a href="#">5B</a>	0.007	0.007	2°
<a href="#">5C</a>	0.006	0.006	24°
<a href="#">MTRC</a>	0.005	0.005	32°
<a href="#">NDTI</a>	0.004	0.004	139°

8.