OPUS-RS solution : 018772_14_240_A0.14O OP1409696341600

opus <opus@ngs.noaa.gov>

Tue 9/2/2014 4:27 PM

To:John Freetly <John.Freetly@neciusa.com>;

FILE: 018772_14_240_A0.14O OP1409696341600

NGS OPUS-RS SOLUTION REPORT
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All computed coordinate accuracies are listed as 1-sigma RMS values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: john.freetly@neciusa.com DATE: September 02, 2014
RINEX FILE: 0187240o.14o TIME: 22:27:30 UTC

SOFTWARE: rsgps 1.37 RS53.prl 1.99.2 START: 2014/08/28 14:40:15
EPHEMERIS: igr18074.eph [rapid] STOP: 2014/08/28 16:17:15
NAV FILE: brdc2400.14n OBS USED: 10500 / 10619 : 99%
ANT NAME: CHCX90D-OPUS NONE QUALITY IND. 39.53/ 67.63
ARP HEIGHT: 1.8000 NORMALIZED RMS: 0.239

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2014.65656)

X:	-1344920.041(m)	0.006(m)	-1344920.901(m)	0.006(m)
Y:	-4277632.992(m)	0.005(m)	-4277631.740(m)	0.005(m)
Z:	4522015.764(m)	0.010(m)	4522015.724(m)	0.010(m)
LAT:	45 26 1.45089	0.005(m)	45 26 1.47159	0.005(m)
E LON:	252 32 47.25415	0.005(m)	252 32 47.19914	0.005(m)
W LON:	107 27 12.74585	0.005(m)	107 27 12.80086	0.005(m)
EL HGT:	998.698(m)	0.010(m)	998.012(m)	0.010(m)
ORTHO HGT:	1013.137(m)	0.014(m)	[NAVD88 (Computed using GEOID12A)]	

	UTM COORDINATES (Zone 13)	STATE PLANE COORDINATES SPC (2500 MT)
Northing (Y) [meters]	5034063.188	133653.635
Easting (X) [meters]	308088.819	760079.350
Convergence [degrees]	-1.74853031	1.49699372
Point Scale	1.00005284	0.99976734
Combined Factor	0.99989628	0.99961083

US NATIONAL GRID DESIGNATOR: 13TCL0808834063(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DI3062	BIL5 BILLINGS 5 CORS ARP	N455816.237	W1075947.298	73194.4
DM7161	WYSH SHERIDAN CORS ARP	N444801.769	W1070035.715	78569.7
DL7728	P051 BILLINGSAPMT2005 CORS ARP	N454823.741	W1083246.070	94768.9
DJ8992	P033 TENSLEEPTRWY2005 CORS ARP	N435710.415	W1072315.121	164669.5
DL7758	P722 YNPBASSRCHMT2005 CORS ARP	N452725.985	W1093415.586	165699.5
DI3425	P052 LRRNCHJRDNMT2006 CORS ARP	N472229.026	W1070107.185	218355.6
DM7133	MTLW LEWISTOWN CORS ARP	N470314.929	W1092633.764	236606.0

NEAREST NGS PUBLISHED CONTROL POINT

Information on nearest mark is not available due to database connectivity issues or has restrictions on when or how it can be published.

OPUS-RS Extended Output, Level 2

FINAL COORDINATES (ITRF at epoch of observations)

bil5	-1372156.895	-4223945.785	4563650.225
wysh	-1326396.426	-4335757.881	4472504.198
p051	-1416839.101	-4223178.947	4551064.080
p033	-1374663.816	-4389900.542	4405280.428
p722	-1501537.051	-4223566.593	4524171.120
p052	-1266648.343	-4138194.573	4670709.502
mtlw	-1449333.484	-4105829.826	4646773.499
0187	-1344920.901	-4277631.740	4522015.724

Covariance matrix of the stations:

1 1.1190E-07 2.0670E-07 -1.8820E-07 5.8290E-09 -3.5810E-08 3.1040E-08 4.5470E-09 -3.5230E-08 3.2440E-08 4.5230E-09 -3.8760E-08 3.2330E-08 2.6410E-09 -3.7680E-08 3.4360E-08 8.3350E-09 -2.7770E-08 2.7190E-08 5.1010E-09 -3.1350E-08 3.0760E-08 2.2770E-08 5.6670E-09 -5.0020E-09

2 2.0670E-07 6.7360E-07 -6.1750E-07 -3.5590E-08 -9.7690E-08 1.0960E-07 -3.4850E-08 -8.7450E-08 1.0260E-07 -3.7950E-08 -1.0290E-07 1.1190E-07 -3.6650E-08 -8.7930E-08 1.0220E-07 -2.9640E-08 -7.8570E-08 9.7330E-08 -3.2100E-08 -7.6120E-08 9.4030E-08 5.1080E-09 3.7800E-08 -1.4750E-08

3 -1.8820E-07 -6.1750E-07 6.9470E-07 3.1370E-08 1.0300E-07 -9.2700E-08 3.1270E-08 1.0250E-07 -9.1460E-08 3.1270E-08 1.0260E-07 -9.2700E-08 3.1180E-08 1.0230E-07 -9.1160E-08 3.1720E-08 1.0420E-07 -9.2660E-08 3.1470E-08 1.0310E-07 -9.1200E-08 -3.7810E-09 -1.6920E-08 3.5460E-08

4 5.8290E-09 -3.5590E-08 3.1370E-08 1.1050E-07 2.1300E-07 -1.8680E-07 4.5220E-09 -3.6970E-08 3.2420E-08 4.8770E-09 -4.1340E-08 3.0720E-08 2.0720E-09 -3.9330E-08 3.3990E-08 9.5850E-09 -2.8230E-08 2.7560E-08 5.2600E-09 -3.1220E-08 3.0480E-08 2.1130E-08 -1.7620E-09 -4.1450E-10

5 -3.5810E-08 -9.7690E-08 1.0300E-07 2.1300E-07 7.6480E-07 -6.5370E-07 -3.2520E-08 -9.9410E-08 1.0620E-07 -3.4980E-08 -8.3490E-08 1.2290E-07 -2.6830E-08 -1.0360E-07 1.1390E-07 -4.7820E-08 -1.1290E-07 9.7250E-08 -3.6010E-08 -1.2520E-07 1.1080E-07 -6.2090E-09 1.1670E-08 1.2100E-08

6 3.1040E-08 1.0960E-07 -9.2700E-08 -1.8680E-07 -6.5370E-07 6.9500E-07 3.1830E-08 1.0950E-07 -9.2360E-08 3.0770E-08 1.1110E-07 -8.9100E-08 3.3130E-08 1.0910E-07 -9.1180E-08 2.9060E-08 1.0800E-07 -9.4790E-08

3.1640E-08 1.0570E-07 -9.1830E-08 5.9230E-10 7.8270E-09 1.6750E-08
7 4.5470E-09 -3.4850E-08 3.1270E-08 4.5220E-09 -3.2520E-08 3.1830E-08 1.1750E-07 2.1430E-07 -1.9510E-07
4.3300E-09 -3.4280E-08 3.5110E-08 4.1470E-09 -3.9470E-08 3.6440E-08 4.0410E-09 -3.3530E-08 2.7000E-08
3.8700E-09 -3.9780E-08 3.3630E-08 1.8620E-08 -1.0960E-09 2.6770E-09
8 -3.5230E-08 -8.7450E-08 1.0250E-07 -3.6970E-08 -9.9410E-08 1.0950E-07 2.1430E-07 6.7460E-07 -6.1520E-07
-3.9590E-08 -1.0490E-07 1.1130E-07 -3.8540E-08 -8.7770E-08 1.0130E-07 -3.0250E-08 -7.7930E-08 9.7540E-08
-3.3330E-08 -7.4370E-08 9.3010E-08 -1.9180E-09 1.8620E-08 2.7990E-09
9 3.2440E-08 1.0260E-07 -9.1460E-08 3.2420E-08 1.0620E-07 -9.2360E-08 -1.9510E-07 -6.1520E-07 6.8850E-07
3.3080E-08 1.0660E-07 -9.0830E-08 3.3970E-08 1.0130E-07 -8.9210E-08 3.0600E-08 1.0100E-07 -9.3020E-08
3.2360E-08 9.7570E-08 -8.8830E-08 2.4390E-09 2.0840E-09 1.6550E-08
10 4.5230E-09 -3.7950E-08 3.1270E-08 4.8770E-09 -3.4980E-08 3.0770E-08 4.3300E-09 -3.9590E-08 3.3080E-
08 1.1730E-07 2.3490E-07 -1.9340E-07 3.8290E-09 -4.2710E-08 3.6540E-08 4.1620E-09 -3.6610E-08 2.7370E-08
3.5520E-09 -4.3000E-08 3.4240E-08 1.8890E-08 -3.5360E-09 1.7970E-09
11 -3.8760E-08 -1.0290E-07 1.0260E-07 -4.1340E-08 -8.3490E-08 1.1110E-07 -3.4280E-08 -1.0490E-07 1.0660E-07
2.3490E-07 8.0880E-07 -6.4810E-07 -2.6510E-08 -1.0970E-07 1.1600E-07 -5.5200E-08 -1.2490E-07 9.7330E-08
-3.9510E-08 -1.4080E-07 1.1490E-07 -1.0040E-08 7.3410E-09 1.3840E-08
12 3.2330E-08 1.1190E-07 -9.2700E-08 3.0720E-08 1.2290E-07 -8.9100E-08 3.5110E-08 1.1130E-07 -9.0830E-08
-1.9340E-07 -6.4810E-07 6.8360E-07 3.9880E-08 1.0910E-07 -8.5930E-08 2.3130E-08 1.0040E-07 -9.6110E-08
3.2500E-08 9.1620E-08 -8.5700E-08 -1.1990E-11 1.0690E-08 2.1540E-08
13 2.6410E-09 -3.6650E-08 3.1180E-08 2.0720E-09 -2.6830E-08 3.3130E-08 4.1470E-09 -3.8540E-08 3.3970E-08
3.8290E-09 -2.6510E-08 3.9880E-08 1.3250E-07 2.2610E-07 -2.0290E-07 -3.6270E-09 -4.3650E-08 2.6610E-08
1.5650E-09 -5.4510E-08 3.8550E-08 1.5280E-08 -2.4250E-09 6.2330E-09
14 -3.7680E-08 -8.7930E-08 1.0230E-07 -3.9330E-08 -1.0360E-07 1.0910E-07 -3.9470E-08 -8.7770E-08 1.0130E-07
-4.2710E-08 -1.0970E-07 1.0910E-07 2.2610E-07 6.7560E-07 -6.0980E-07 -3.0350E-08 -7.5220E-08 9.7840E-08
-3.5430E-08 -6.8800E-08 9.0100E-08 -3.8130E-09 1.7650E-08 1.2280E-09
15 3.4360E-08 1.0220E-07 -9.1160E-08 3.3990E-08 1.1390E-07 -9.1180E-08 3.6440E-08 1.0130E-07 -8.9210E-08
3.6540E-08 1.1600E-07 -8.5930E-08 -2.0290E-07 -6.0980E-07 6.7700E-07 2.6900E-08 9.2770E-08 -9.3610E-08
3.3660E-08 8.3780E-08 -8.3000E-08 3.0420E-09 2.6060E-09 2.0080E-08
16 8.3350E-09 -2.9640E-08 3.1720E-08 9.5850E-09 -4.7820E-08 2.9060E-08 4.0410E-09 -3.0250E-08 3.0600E-
08 4.1620E-09 -5.5200E-08 2.3130E-08 -3.6270E-09 -3.0350E-08 2.6900E-08 1.1130E-07 1.9350E-07 -1.6200E-07
8.9070E-09 3.9270E-10 2.0240E-08 2.6050E-08 2.1720E-09 -5.9350E-09
17 -2.7770E-08 -7.8570E-08 1.0420E-07 -2.8230E-08 -1.1290E-07 1.0800E-07 -3.3530E-08 -7.7930E-08 1.0100E-07
-3.6610E-08 -1.2490E-07 1.0040E-07 -4.3650E-08 -7.5220E-08 9.2770E-08 1.9350E-07 6.4070E-07 -5.8620E-07
-2.4470E-08 -2.7790E-08 7.9520E-08 9.1790E-09 2.4650E-08 -4.5120E-09
18 2.7190E-08 9.7330E-08 -9.2660E-08 2.7560E-08 9.7250E-08 -9.4790E-08 2.7000E-08 9.7540E-08 -9.3020E-
08 2.7370E-08 9.7330E-08 -9.6110E-08 2.6610E-08 9.7840E-08 -9.3610E-08 -1.6200E-07 -5.8620E-07 7.0530E-07
2.7300E-08 9.9350E-08 -9.2550E-08 -1.7160E-09 -2.5900E-09 1.2440E-08
19 5.1010E-09 -3.2100E-08 3.1470E-08 5.2600E-09 -3.6010E-08 3.1640E-08 3.8700E-09 -3.3330E-08 3.2360E-08
3.5520E-09 -3.9510E-08 3.2500E-08 1.5650E-09 -3.5430E-08 3.3660E-08 8.9070E-09 -2.4470E-08 2.7300E-08
1.1490E-07 2.0060E-07 -1.8860E-07 1.9980E-08 4.2170E-10 1.0520E-09
20 -3.1350E-08 -7.6120E-08 1.0310E-07 -3.1220E-08 -1.2520E-07 1.0570E-07 -3.9780E-08 -7.4370E-08 9.7570E-08
-4.3000E-08 -1.4080E-07 9.1620E-08 -5.4510E-08 -6.8800E-08 8.3780E-08 3.9270E-10 -2.7790E-08 9.9350E-08
2.0060E-07 6.5630E-07 -5.8160E-07 7.9170E-09 2.5130E-08 -1.1060E-08
21 3.0760E-08 9.4030E-08 -9.1200E-08 3.0480E-08 1.1080E-07 -9.1830E-08 3.3630E-08 9.3010E-08 -8.8830E-08
3.4240E-08 1.1490E-07 -8.5700E-08 3.8550E-08 9.0100E-08 -8.3000E-08 2.0240E-08 7.9520E-08 -9.2550E-08
-1.8860E-07 -5.8160E-07 6.7570E-07 -7.5840E-10 -3.6110E-09 2.0160E-08
22 2.2770E-08 5.1080E-09 -3.7810E-09 2.1130E-08 -6.2090E-09 5.9230E-10 1.8620E-08 -1.9180E-09 2.4390E-09
1.8890E-08 -1.0040E-08 -1.1990E-11 1.5280E-08 -3.8130E-09 3.0420E-09 2.6050E-08 9.1790E-09 -1.7160E-09
1.9980E-08 7.9170E-09 -7.5840E-10 1.0850E-06 2.5370E-06 -2.2770E-06
23 5.6670E-09 3.7800E-08 -1.6920E-08 -1.7620E-09 1.1670E-08 7.8270E-09 -1.0960E-09 1.8620E-08 2.0840E-09
-3.5360E-09 7.3410E-09 1.0690E-08 -2.4250E-09 1.7650E-08 2.6060E-09 2.1720E-09 2.4650E-08 -2.5900E-09

4.2170E-10 2.5130E-08 -3.6110E-09 2.5370E-06 8.3100E-06 -7.6990E-06
24 -5.0020E-09 -1.4750E-08 3.5460E-08 -4.1450E-10 1.2100E-08 1.6750E-08 2.6770E-09 2.7990E-09 1.6550E-08
1.7970E-09 1.3840E-08 2.1540E-08 6.2330E-09 1.2280E-09 2.0080E-08 -5.9350E-09 -4.5120E-09 1.2440E-08
1.0520E-09 -1.1060E-08 2.0160E-08 -2.2770E-06 -7.6990E-06 8.1280E-06

Covariance Matrix for the xyz OPUS Rover Position (meters^2).

0.0000010850	0.0000025370	-0.0000022770
0.0000025370	0.0000083100	-0.0000076990
-0.0000022770	-0.0000076990	0.0000081280

Covariance Matrix for the enu OPUS Position (meters^2).

0.0000002832	0.0000001059	0.0000000879
0.0000001059	0.0000005969	-0.0000005595
0.0000000879	-0.0000005595	0.0000166430

Horizontal network accuracy = 0.00167 meters.
Vertical network accuracy = 0.00800 meters.

Vectors

To	From	X	Y	Z
bil5	0187	-27235.994	53685.955	41634.502
wysh	0187	18524.475	-58126.141	-49511.526
p051	0187	-71918.200	54452.793	29048.357
p033	0187	-29742.915	-112268.802	-116735.295
p722	0187	-156616.149	54065.147	2155.396
p052	0187	78272.558	139437.167	148693.779
mtlw	0187	-104412.582	171801.914	124757.775

Covariance matrix of the 7 vectors

1 1.1514E-06 2.7329E-06 -2.4564E-06 1.0469E-06 2.5017E-06 -2.2416E-06 1.0482E-06 2.4980E-06 -2.2420E-06
1.0479E-06 2.5026E-06 -2.2397E-06 1.0496E-06 2.4975E-06 -2.2407E-06 1.0445E-06 2.4944E-06 -2.2431E-06
1.0474E-06 2.4921E-06 -2.2405E-06

2 2.7329E-06 8.9080E-06 -8.2848E-06 2.4981E-06 8.1628E-06 -7.5825E-06 2.4981E-06 8.1661E-06 -7.5837E-06
2.4975E-06 8.1620E-06 -7.5830E-06 2.4977E-06 8.1666E-06 -7.5847E-06 2.5001E-06 8.1690E-06 -7.5843E-06
2.4994E-06 8.1710E-06 -7.5866E-06

3 -2.4564E-06 -8.2848E-06 8.7518E-06 -2.2414E-06 -7.5912E-06 7.9831E-06 -2.2446E-06 -7.5824E-06 7.9845E-06
-2.2437E-06 -7.5933E-06 7.9783E-06 -2.2483E-06 -7.5810E-06 7.9813E-06 -2.2356E-06 -7.5734E-06 7.9874E-06
-2.2428E-06 -7.5679E-06 7.9812E-06

4 1.0469E-06 2.4981E-06 -2.2414E-06 1.1532E-06 2.7580E-06 -2.4640E-06 1.0498E-06 2.5037E-06 -2.2466E-06
1.0499E-06 2.5075E-06 -2.2459E-06 1.0507E-06 2.5032E-06 -2.2456E-06 1.0474E-06 2.5014E-06 -2.2473E-06
1.0491E-06 2.4996E-06 -2.2453E-06

5 2.5017E-06 8.1628E-06 -7.5912E-06 2.7580E-06 9.0515E-06 -8.3726E-06 2.5118E-06 8.1803E-06 -7.6070E-06
2.5118E-06 8.2075E-06 -7.5989E-06 2.5188E-06 8.1771E-06 -7.5998E-06 2.4932E-06 8.1608E-06 -7.6113E-06
2.5068E-06 8.1480E-06 -7.5967E-06

6 -2.2416E-06 -7.5825E-06 7.9831E-06 -2.4640E-06 -8.3726E-06 8.7895E-06 -2.2484E-06 -7.6001E-06 8.0023E-
06 -2.2486E-06 -7.6096E-06 8.0006E-06 -2.2507E-06 -7.5990E-06 8.0000E-06 -2.2426E-06 -7.5943E-06 8.0040E-06
-2.2470E-06 -7.5901E-06 7.9993E-06

7 1.0482E-06 2.4981E-06 -2.2446E-06 1.0498E-06 2.5118E-06 -2.2484E-06 1.1653E-06 2.7543E-06 -2.4772E-06
1.0518E-06 2.5139E-06 -2.2446E-06 1.0552E-06 2.5024E-06 -2.2463E-06 1.0444E-06 2.4954E-06 -2.2510E-06
1.0503E-06 2.4904E-06 -2.2453E-06

8 2.4980E-06 8.1661E-06 -7.5824E-06 2.5037E-06 8.1803E-06 -7.6001E-06 2.7543E-06 8.9474E-06 -8.3191E-06 2.5029E-06 8.1791E-06 -7.6012E-06 2.5028E-06 8.1860E-06 -7.6031E-06 2.5065E-06 8.1888E-06 -7.6017E-06 2.5052E-06 8.1919E-06 -7.6052E-06

9 -2.2420E-06 -7.5837E-06 7.9845E-06 -2.2466E-06 -7.6070E-06 8.0023E-06 -2.4772E-06 -8.3191E-06 8.7834E-06 -2.2482E-06 -7.6083E-06 7.9991E-06 -2.2517E-06 -7.6010E-06 8.0022E-06 -2.2429E-06 -7.5956E-06 8.0060E-06 -2.2481E-06 -7.5925E-06 8.0025E-06

10 1.0479E-06 2.4975E-06 -2.2437E-06 1.0499E-06 2.5118E-06 -2.2486E-06 1.0518E-06 2.5029E-06 -2.2482E-06 1.1645E-06 2.7855E-06 -2.4722E-06 1.0547E-06 2.5016E-06 -2.2453E-06 1.0442E-06 2.4947E-06 -2.2497E-06 1.0497E-06 2.4896E-06 -2.2438E-06

11 2.5026E-06 8.1620E-06 -7.5933E-06 2.5075E-06 8.2075E-06 -7.6096E-06 2.5139E-06 8.1791E-06 -7.6083E-06 2.7855E-06 9.1041E-06 -8.3716E-06 2.5230E-06 8.1753E-06 -7.5994E-06 2.4897E-06 8.1531E-06 -7.6129E-06 2.5071E-06 8.1367E-06 -7.5943E-06

12 -2.2397E-06 -7.5830E-06 7.9783E-06 -2.2459E-06 -7.5989E-06 8.0006E-06 -2.2446E-06 -7.6012E-06 7.9991E-06 -2.4722E-06 -8.3716E-06 8.7685E-06 -2.2433E-06 -7.6018E-06 8.0005E-06 -2.2479E-06 -7.6048E-06 7.9979E-06 -2.2455E-06 -7.6070E-06 8.0006E-06

13 1.0496E-06 2.4977E-06 -2.2483E-06 1.0507E-06 2.5188E-06 -2.2507E-06 1.0552E-06 2.5028E-06 -2.2517E-06 1.0547E-06 2.5230E-06 -2.2433E-06 1.1869E-06 2.7693E-06 -2.4892E-06 1.0400E-06 2.4866E-06 -2.2549E-06 1.0513E-06 2.4770E-06 -2.2439E-06

14 2.4975E-06 8.1666E-06 -7.5810E-06 2.5032E-06 8.1771E-06 -7.5990E-06 2.5024E-06 8.1860E-06 -7.6010E-06 2.5016E-06 8.1753E-06 -7.6018E-06 2.7693E-06 8.9503E-06 -8.3126E-06 2.5083E-06 8.1925E-06 -7.5998E-06 2.5050E-06 8.1984E-06 -7.6065E-06

15 -2.2407E-06 -7.5847E-06 7.9813E-06 -2.2456E-06 -7.5998E-06 8.0000E-06 -2.2463E-06 -7.6031E-06 8.0022E-06 -2.2453E-06 -7.5994E-06 8.0005E-06 -2.4892E-06 -8.3126E-06 8.7648E-06 -2.2472E-06 -7.6043E-06 8.0019E-06 -2.2474E-06 -7.6068E-06 8.0048E-06

16 1.0445E-06 2.5001E-06 -2.2356E-06 1.0474E-06 2.4932E-06 -2.2426E-06 1.0444E-06 2.5065E-06 -2.2429E-06 1.0442E-06 2.4897E-06 -2.2479E-06 1.0400E-06 2.5083E-06 -2.2472E-06 1.1442E-06 2.7191E-06 -2.4313E-06 1.0479E-06 2.5273E-06 -2.2501E-06

17 2.4944E-06 8.1690E-06 -7.5734E-06 2.5014E-06 8.1608E-06 -7.5943E-06 2.4954E-06 8.1888E-06 -7.5956E-06 2.4947E-06 8.1531E-06 -7.6048E-06 2.4866E-06 8.1925E-06 -7.6043E-06 2.7191E-06 8.9014E-06 -8.2781E-06 2.5029E-06 8.2324E-06 -7.6114E-06

18 -2.2431E-06 -7.5843E-06 7.9874E-06 -2.2473E-06 -7.6113E-06 8.0040E-06 -2.2510E-06 -7.6017E-06 8.0060E-06 -2.2497E-06 -7.6129E-06 7.9979E-06 -2.2549E-06 -7.5998E-06 8.0019E-06 -2.4313E-06 -8.2781E-06 8.8084E-06 -2.2490E-06 -7.5860E-06 8.0029E-06

19 1.0474E-06 2.4994E-06 -2.2428E-06 1.0491E-06 2.5068E-06 -2.2470E-06 1.0503E-06 2.5052E-06 -2.2481E-06 1.0497E-06 2.5071E-06 -2.2455E-06 1.0513E-06 2.5050E-06 -2.2474E-06 1.0479E-06 2.5029E-06 -2.2490E-06 1.1599E-06 2.7293E-06 -2.4659E-06

20 2.4921E-06 8.1710E-06 -7.5679E-06 2.4996E-06 8.1480E-06 -7.5901E-06 2.4904E-06 8.1919E-06 -7.5925E-06 2.4896E-06 8.1367E-06 -7.6070E-06 2.4770E-06 8.1984E-06 -7.6068E-06 2.5273E-06 8.2324E-06 -7.5860E-06 2.7293E-06 8.9160E-06 -8.2659E-06

21 -2.2405E-06 -7.5866E-06 7.9812E-06 -2.2453E-06 -7.5967E-06 7.9993E-06 -2.2453E-06 -7.6052E-06 8.0025E-06 -2.2438E-06 -7.5943E-06 8.0006E-06 -2.2439E-06 -7.6065E-06 8.0048E-06 -2.2501E-06 -7.6114E-06 8.0029E-06 -2.4659E-06 -8.2659E-06 8.7634E-06

Correlation matrix of the 7 vectors

1 1.0000E+00 8.5336E-01 -7.7383E-01 9.0856E-01 7.7495E-01 -7.0463E-01 9.0492E-01 7.7829E-01 -7.0501E-01 9.0495E-01 7.7298E-01 -7.0488E-01 8.9784E-01 7.7799E-01 -7.0535E-01 9.1004E-01 7.7916E-01 -7.0436E-01 9.0629E-01 7.7780E-01 -7.0534E-01

2 8.5336E-01 1.0000E+00 -9.3831E-01 7.7939E-01 9.0906E-01 -8.5692E-01 7.7538E-01 9.1470E-01 -8.5736E-01 7.7542E-01 9.0633E-01 -8.5801E-01 7.6812E-01 9.1460E-01 -8.5837E-01 7.8309E-01 9.1738E-01 -8.5621E-01 7.7754E-01 9.1685E-01 -8.5866E-01

3 -7.7383E-01 -9.3831E-01 1.0000E+00 -7.0553E-01 -8.5291E-01 9.1021E-01 -7.0289E-01 -8.5686E-01 9.1069E-01

-7.0283E-01 -8.5068E-01 9.1075E-01 -6.9757E-01 -8.5656E-01 9.1128E-01 -7.0646E-01 -8.5805E-01 9.0973E-01 -7.0392E-01 -8.5673E-01 9.1135E-01

4 9.0856E-01 7.7939E-01 -7.0553E-01 1.0000E+00 8.5363E-01 -7.7392E-01 9.0557E-01 7.7943E-01 -7.0589E-01 9.0593E-01 7.7385E-01 -7.0625E-01 8.9803E-01 7.7916E-01 -7.0633E-01 9.1181E-01 7.8070E-01 -7.0511E-01 9.0711E-01 7.7952E-01 -7.0630E-01

5 7.7495E-01 9.0906E-01 -8.5291E-01 8.5363E-01 1.0000E+00 -9.3869E-01 7.7341E-01 9.0900E-01 -8.5314E-01 7.7365E-01 9.0413E-01 -8.5296E-01 7.6846E-01 9.0849E-01 -8.5324E-01 7.7473E-01 9.0917E-01 -8.5241E-01 7.7364E-01 9.0700E-01 -8.5296E-01

6 -7.0463E-01 -8.5692E-01 9.1021E-01 -7.7392E-01 -9.3869E-01 1.0000E+00 -7.0257E-01 -8.5702E-01 9.1076E-01 -7.0285E-01 -8.5067E-01 9.1133E-01 -6.9682E-01 -8.5675E-01 9.1146E-01 -7.0716E-01 -8.5857E-01 9.0966E-01 -7.0373E-01 -8.5739E-01 9.1145E-01

7 9.0492E-01 7.7538E-01 -7.0289E-01 9.0557E-01 7.7341E-01 -7.0257E-01 1.0000E+00 8.5301E-01 -7.7432E-01 9.0294E-01 7.7181E-01 -7.0219E-01 8.9728E-01 7.7488E-01 -7.0288E-01 9.0447E-01 7.7481E-01 -7.0260E-01 9.0338E-01 7.7263E-01 -7.0263E-01

8 7.7829E-01 9.1470E-01 -8.5686E-01 7.7943E-01 9.0900E-01 -8.5702E-01 8.5301E-01 1.0000E+00 -9.3842E-01 7.7538E-01 9.0624E-01 -8.5817E-01 7.6801E-01 9.1475E-01 -8.5856E-01 7.8337E-01 9.1758E-01 -8.5627E-01 7.7763E-01 9.1717E-01 -8.5887E-01

9 -7.0501E-01 -8.5736E-01 9.1069E-01 -7.0589E-01 -8.5314E-01 9.1076E-01 -7.7432E-01 -9.3842E-01 1.0000E+00 -7.0295E-01 -8.5082E-01 9.1148E-01 -6.9737E-01 -8.5728E-01 9.1202E-01 -7.0750E-01 -8.5901E-01 9.1020E-01 -7.0432E-01 -8.5796E-01 9.1213E-01

10 9.0495E-01 7.7542E-01 -7.0283E-01 9.0593E-01 7.7365E-01 -7.0285E-01 9.0294E-01 7.7538E-01 -7.0295E-01 1.0000E+00 8.5547E-01 -7.7365E-01 8.9707E-01 7.7488E-01 -7.0280E-01 9.0462E-01 7.7486E-01 -7.0243E-01 9.0316E-01 7.7263E-01 -7.0238E-01

11 7.7298E-01 9.0633E-01 -8.5068E-01 7.7385E-01 9.0413E-01 -8.5067E-01 7.7181E-01 9.0624E-01 -8.5082E-01 8.5547E-01 1.0000E+00 -9.3697E-01 7.6750E-01 9.0566E-01 -8.5073E-01 7.7139E-01 9.0568E-01 -8.5013E-01 7.7150E-01 9.0312E-01 -8.5023E-01

12 -7.0488E-01 -8.5801E-01 9.1075E-01 -7.0625E-01 -8.5296E-01 9.1133E-01 -7.0219E-01 -8.5817E-01 9.1148E-01 -7.7365E-01 -9.3697E-01 1.0000E+00 -6.9537E-01 -8.5810E-01 9.1260E-01 -7.0969E-01 -8.6078E-01 9.1005E-01 -7.0411E-01 -8.6033E-01 9.1269E-01

13 8.9784E-01 7.6812E-01 -6.9757E-01 8.9803E-01 7.6846E-01 -6.9682E-01 8.9728E-01 7.6801E-01 -6.9737E-01 8.9707E-01 7.6750E-01 -6.9537E-01 1.0000E+00 8.4966E-01 -7.7174E-01 8.9245E-01 7.6500E-01 -6.9737E-01 8.9598E-01 7.6142E-01 -6.9576E-01

14 7.7799E-01 9.1460E-01 -8.5656E-01 7.7916E-01 9.0849E-01 -8.5675E-01 7.7488E-01 9.1475E-01 -8.5728E-01 7.7488E-01 9.0566E-01 -8.5810E-01 8.4966E-01 1.0000E+00 -9.3853E-01 7.8381E-01 9.1784E-01 -8.5592E-01 7.7744E-01 9.1775E-01 -8.5888E-01

15 -7.0535E-01 -8.5837E-01 9.1128E-01 -7.0633E-01 -8.5324E-01 9.1146E-01 -7.0288E-01 -8.5856E-01 9.1202E-01 -7.0280E-01 -8.5073E-01 9.1260E-01 -7.7174E-01 -9.3853E-01 1.0000E+00 -7.0961E-01 -8.6091E-01 9.1069E-01 -7.0485E-01 -8.6048E-01 9.1336E-01

16 9.1004E-01 7.8309E-01 -7.0646E-01 9.1181E-01 7.7473E-01 -7.0716E-01 9.0447E-01 7.8337E-01 -7.0750E-01 9.0462E-01 7.7139E-01 -7.0969E-01 8.9245E-01 7.8381E-01 -7.0961E-01 1.0000E+00 8.5203E-01 -7.6586E-01 9.0958E-01 7.9126E-01 -7.1057E-01

17 7.7916E-01 9.1738E-01 -8.5805E-01 7.8070E-01 9.0917E-01 -8.5857E-01 7.7481E-01 9.1758E-01 -8.5901E-01 7.7486E-01 9.0568E-01 -8.6078E-01 7.6500E-01 9.1784E-01 -8.6091E-01 8.5203E-01 1.0000E+00 -9.3487E-01 7.7894E-01 9.2409E-01 -8.6178E-01

18 -7.0436E-01 -8.5621E-01 9.0973E-01 -7.0511E-01 -8.5241E-01 9.0966E-01 -7.0260E-01 -8.5627E-01 9.1020E-01 -7.0243E-01 -8.5013E-01 9.1005E-01 -6.9737E-01 -8.5592E-01 9.1069E-01 -7.6586E-01 -9.3487E-01 1.0000E+00 -7.0361E-01 -8.5601E-01 9.1088E-01

19 9.0629E-01 7.7754E-01 -7.0392E-01 9.0711E-01 7.7364E-01 -7.0373E-01 9.0338E-01 7.7763E-01 -7.0432E-01 9.0316E-01 7.7150E-01 -7.0411E-01 8.9598E-01 7.7744E-01 -7.0485E-01 9.0958E-01 7.7894E-01 -7.0361E-01 1.0000E+00 8.4867E-01 -7.7343E-01

20 7.7780E-01 9.1685E-01 -8.5673E-01 7.7952E-01 9.0700E-01 -8.5739E-01 7.7263E-01 9.1717E-01 -8.5796E-01

7.7263E-01 9.0312E-01 -8.6033E-01 7.6142E-01 9.1775E-01 -8.6048E-01 7.9126E-01 9.2409E-01 -8.5601E-01 8.4867E-01 1.0000E+00 -9.3513E-01
21 -7.0534E-01 -8.5866E-01 9.1135E-01 -7.0630E-01 -8.5296E-01 9.1145E-01 -7.0263E-01 -8.5887E-01 9.1213E-01 -7.0238E-01 -8.5023E-01 9.1269E-01 -6.9576E-01 -8.5888E-01 9.1336E-01 -7.1057E-01 -8.6178E-01 9.1088E-01 -7.7343E-01 -9.3513E-01 1.0000E+00

G-FILE for the vectors

Axx2014 8282014 828
B201408281400201408281600 7 rsgps 1.37IGS
lant_info.003 NGS
C00080001 -272359940 10 536859552 29 416345017 29
C00080002 185244752 10 -581261409 30 -495115259 29
C00080003 -719181998 10 544527931 29 290483566 29
C00080004 -297429148 10-1122688016 30-1167352953 29
C00080005-1566161494 10 540651469 29 21553961 29
C00080006 782725578 10 1394371672 29 1486937786 29
C00080007-1044125824 10 1718019135 29 1247577750 29
D 1 2 8533595 1 3 -7738349 1 4 9085562 1 5 7749539 1 6 -7046295
D 1 7 9049182 1 8 7782928 1 9 -7050146 1 10 9049518 1 11 7729816
D 1 12 -7048758 1 13 8978424 1 14 7779921 1 15 -7053461 1 16 9100350
D 1 17 7791634 1 18 -7043564 1 19 9062936 1 20 7778000 1 21 -7053417
D 2 3 -9383077 2 4 7793878 2 5 9090585 2 6 -8569173 2 7 7753805
D 2 8 9147001 2 9 -8573569 2 10 7754219 2 11 9063279 2 12 -8580055
D 2 13 7681217 2 14 9146047 2 15 -8583685 2 16 7830920 2 17 9173785
D 2 18 -8562056 2 19 7775399 2 20 9168461 2 21 -8586610 3 4 -7055340
D 3 5 -8529071 3 6 9102082 3 7 -7028851 3 8 -8568599 3 9 9106884
D 3 10 -7028327 3 11 -8506767 3 12 9107496 3 13 -6975675 3 14 -8565642
D 3 15 9112833 3 16 -7064605 3 17 -8580482 3 18 9097255 3 19 -7039223
D 3 20 -8567267 3 21 9113455 4 5 8536316 4 6 -7739178 4 7 9055735
D 4 8 7794292 4 9 -7058874 4 10 9059345 4 11 7738478 4 12 -7062499
D 4 13 8980257 4 14 7791565 4 15 -7063302 4 16 9118088 4 17 7807032
D 4 18 -7051053 4 19 9071100 4 20 7795231 4 21 -7062977 5 6 -9386859
D 5 7 7734134 5 8 9089970 5 9 -8531430 5 10 7736529 5 11 9041335
D 5 12 -8529580 5 13 7684589 5 14 9084899 5 15 -8532399 5 16 7747289
D 5 17 9091660 5 18 -8524094 5 19 7736395 5 20 9069966 5 21 -8529610
D 6 7 -7025668 6 8 -8570205 6 9 9107592 6 10 -7028463 6 11 -8506656
D 6 12 9113346 6 13 -6968194 6 14 -8567477 6 15 9114552 6 16 -7071608
D 6 17 -8585732 6 18 9096557 6 19 -7037267 6 20 -8573882 6 21 9114480
D 7 8 8530108 7 9 -7743211 7 10 9029350 7 11 7718093 7 12 -7021916
D 7 13 8972806 7 14 7748779 7 15 -7028785 7 16 9044663 7 17 7748137
D 7 18 -7025990 7 19 9033827 7 20 7726298 7 21 -7026271 8 9 -9384187
D 8 10 7753830 8 11 9062357 8 12 -8581652 8 13 7680063 8 14 9147519
D 8 15 -8585617 8 16 7833729 8 17 9175793 8 18 -8562734 8 19 7776270
D 8 20 9171705 8 21 -8588673 9 10 -7029454 9 11 -8508220 9 12 9114766
D 9 13 -6973731 9 14 -8572772 9 15 9120190 9 16 -7075031 9 17 -8590135
D 9 18 9101955 9 19 -7043240 9 20 -8579556 9 21 9121292 10 11 8554743
D 10 12 -7736496 10 13 8970656 10 14 7748762 10 15 -7027950 10 16 9046245
D 10 17 7748611 10 18 -7024319 10 19 9031637 10 20 7726332 10 21 -7023839
D 11 12 -9369748 11 13 7674961 11 14 9056626 11 15 -8507285 11 16 7713855

D 11 17 9056807 11 18 -8501260 11 19 7715008 11 20 9031188 11 21 -8502265
D 12 13 -6953729 12 14 -8580952 12 15 9125974 12 16 -7096877 12 17 -8607840
D 12 18 9100481 12 19 -7041089 12 20 -8603295 12 21 9126906 13 14 8496553
D 13 15 -7717365 13 16 8924542 13 17 7650004 13 18 -6973731 13 19 8959764
D 13 20 7614217 13 21 -6957577 14 15 -9385293 14 16 7838052 14 17 9178409
D 14 18 -8559221 14 19 7774356 14 20 9177520 14 21 -8588774 15 16 -7096106
D 15 17 -8609133 15 18 9106898 15 19 -7048507 15 20 -8604825 15 21 9133568
D 16 17 8520260 16 18 -7658563 16 19 9095814 16 20 7912622 16 21 -7105728
D 17 18 -9348725 17 19 7789357 17 20 9240870 17 21 -8617813 18 19 -7036061
D 18 20 -8560080 18 21 9108772 19 20 8486748 19 21 -7734295 20 21 -9351253

ITRF position of 0187 as determined by individual baselines

	X	Y	Z
bil5	-1344920.892	-4277631.741	4522015.725
wysh	-1344920.907	-4277631.740	4522015.732
p051	-1344920.905	-4277631.739	4522015.722
p033	-1344920.901	-4277631.737	4522015.708
p722	-1344920.907	-4277631.750	4522015.735
p052	-1344920.896	-4277631.737	4522015.716
mtlw	-1344920.898	-4277631.744	4522015.735

Residuals of position determined by individual baselines from the final position

	X	Y	Z	East	North	Up
bil5	0.009	-0.001	0.002	0.009	0.002	0.000
wysh	-0.006	-0.000	0.008	-0.005	0.005	0.007
p051	-0.003	0.001	-0.002	-0.004	-0.001	-0.001
p033	0.000	0.003	-0.015	-0.001	-0.009	-0.013
p722	-0.006	-0.010	0.011	-0.002	0.000	0.016
p052	0.005	0.003	-0.007	0.004	-0.002	-0.008
mtlw	0.003	-0.004	0.011	0.004	0.006	0.010

STATE PLANE COORDINATES - International Foot
SPC (2500 MT)

Northing (Y) [feet]	438496.178
Easting (X) [feet]	2493698.655
Convergence [degrees]	1.49699372
Point Scale	0.99976734
Combined Factor	0.99961083

** Orthometric Heights Above Future Geopotential Datum.

Prototype orthometric heights are now being made available as a precursor to the completion of GRAV-D and the replacement of NAVD 88 with a new geopotential reference system. The following height reflects the current best estimate of the true orthometric height, based on the existing gravimetric geoid model. This height is subject to change as data and modeling for the gravimetric geoid change throughout the lifetime of the GRAV-D project, or as new realizations of the ITRF are adopted. However, at the completion of GRAV-D, these heights will supersede the NAVD 88 heights

APPROX ORTHO HGT: 1012.274 (m) [PROTOTYPE (Computed using USGG2012,GRS80,IGS08)]

dop from interpolation is 0.461
scatter (mean square distance from rover) is 25528.029
average edop for rover is 0.650
average ndop for rover is 0.880
average hdop for rover is 1.094
average vdop for rover is 1.700
average gdop for rover is 2.340

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.