

## OPUS-RS solution : 018772\_14\_227\_A0.14O OP1408204856917

opus &lt;opus@ngs.noaa.gov&gt;

Sat 8/16/2014 10:03 AM

To: John Freetly &lt;John.Freetly@neciusa.com&gt;;

FILE: 018772\_14\_227\_A0.14O OP1408204856917

2005 NOTE: The IGS precise and IGS rapid orbits were not available  
 2005 at processing time. The IGS ultra-rapid orbit was/will be used to  
 2005 process the data.  
 2005

## NGS OPUS-RS SOLUTION REPORT

=====

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: August 16, 2014  
 RINEX FILE: 0187227a.14o                         TIME: 16:03:29 UTC

SOFTWARE: rsgps 1.37 RS50.prl 1.99.2           START: 2014/08/15 00:48:30  
 EPHEMERIS: igu18055.eph [ultra-rapid]        STOP: 2014/08/15 01:38:30  
 NAV FILE: brdc2270.14n                        OBS USED: 2556 / 3204 : 80%  
 ANT NAME: CHCX90D-OPUS   NONE                QUALITY IND. 7.60/ 13.84  
 ARP HEIGHT: 1.80000                         NORMALIZED RMS:     0.339

REF FRAME: NAD\_83(2011)(EPOCH:2010.0000)           IGS08 (EPOCH:2014.61932)

X: -1376055.039(m) 0.008(m)           -1376055.914(m) 0.008(m)  
 Y: -4037331.825(m) 0.014(m)         -4037330.601(m) 0.014(m)  
 Z: 4727372.209(m) 0.025(m)           4727372.200(m) 0.025(m)

LAT: 48 7 55.74113   0.011(m)   48 7 55.76206   0.011(m)  
 E LON: 251 10 45.14524   0.006(m)   251 10 45.08610   0.006(m)  
 W LON: 108 49 14.85476   0.006(m)   108 49 14.91390   0.006(m)  
 EL HGT:     908.130(m) 0.027(m)     907.538(m) 0.027(m)  
 ORTHO HGT:     923.678(m) 0.028(m) [NAVD88 (Computed using GEOID12A)]

## UTM COORDINATES   STATE PLANE COORDINATES

UTM (Zone 12)       SPC (2500 MT )

Northing (Y) [meters]   5333285.066       431602.594  
 Easting (X) [meters]   662139.231       650534.827  
 Convergence [degrees]   1.62317707       0.49684278

Point Scale           0.99992303       0.99958421  
 Combined Factor       0.99978073       0.99944196

US NATIONAL GRID DESIGNATOR: 12UXU6213933285(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DG9749	MTMS MONTANA STATE UNI CORS ARP	N483227.426	W1094111.858	78666.5
DL7731	P053 WHITEWATERMT2007 CORS ARP	N484333.865	W1074331.456	104572.3
DM7133	MTLW LEWISTOWN CORS ARP	N470314.929	W1092633.764	128677.5
DI3425	P052 LRRNCHJRDNMT2006 CORS ARP	N472229.026	W1070107.185	159230.1
DI2257	P049 ARMINGTON_MT2006 CORS ARP	N472059.850	W1105422.382	178970.7
DI3422	P050 WICKUMRNCHMT2006 CORS ARP	N484834.096	W1111454.296	194682.7

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)

mtms	-1425435.574	-3984013.207	4757493.880
p053	-1283559.254	-4015770.308	4771131.583
mtlw	-1449333.483	-4105829.815	4646773.474
p052	-1266648.334	-4138194.571	4670709.504
p049	-1545099.840	-4044895.884	4669084.608
p050	-1525480.196	-3923083.451	4777585.206
0187	-1376055.914	-4037330.601	4727372.200

Covariance matrix of the stations:

1	2.6930E-07	5.3690E-07	-7.3690E-07	-3.6310E-08	-1.0130E-07	1.2210E-07	-2.1570E-08	-1.1290E-07	1.8140E-07
	-4.8890E-08	-1.1660E-07	1.9050E-07	-2.9340E-09	-1.0900E-07	1.5720E-07	7.0570E-09	-9.7160E-08	8.5720E-08
		7.6280E-09	-3.7680E-08	5.5230E-08					
2	5.3690E-07	1.7000E-06	-2.1290E-06	-1.3290E-07	-3.1740E-07	4.1820E-07	-1.0860E-07	-3.1020E-07	4.6630E-07
	-1.4890E-07	-3.3860E-07	5.0710E-07	-7.9820E-08	-2.9100E-07	4.1660E-07	-6.6430E-08	-2.7570E-07	3.2090E-07
		-3.2080E-08	-2.1500E-08	8.2980E-08					
3	-7.3690E-07	-2.1290E-06	3.2620E-06	2.5800E-07	4.7660E-07	-5.9880E-07	1.5050E-07	4.3870E-07	-7.7840E-07
	3.2180E-07	5.5420E-07	-9.4470E-07	2.7840E-08	3.5630E-07	-5.7210E-07	-2.1520E-08	3.0350E-07	-2.0170E-07
		1.0990E-07	1.9900E-07	-2.5120E-07					
4	-3.6310E-08	-1.3290E-07	2.5800E-07	2.9790E-07	4.7290E-07	-5.7330E-07	8.3770E-09	-4.3880E-08	-6.7710E-08
	1.4660E-07	6.5440E-08	-2.2050E-07	-9.7500E-08	-1.3680E-07	1.2680E-07	-1.5280E-07	-2.2440E-07	4.7580E-07
		1.0420E-07	1.4090E-07	-1.8400E-07					
5	-1.0130E-07	-3.1740E-07	4.7660E-07	4.7290E-07	1.6340E-06	-1.9610E-06	-7.4080E-08	-2.6080E-07	2.8410E-07
	4.7500E-09	-2.0630E-07	2.0610E-07	-1.3510E-07	-3.1270E-07	3.9340E-07	-1.6880E-07	-3.6940E-07	6.0010E-07
		4.3620E-08	8.3120E-08	-6.6100E-08					

6 1.2210E-07 4.1820E-07 -5.9880E-07 -5.7330E-07 -1.9610E-06 2.8830E-06 9.7770E-08 3.5510E-07 -4.6730E-07  
6.2950E-08 3.2770E-07 -4.2780E-07 1.3020E-07 3.9450E-07 -5.3550E-07 1.6200E-07 4.6490E-07 -6.8670E-07  
-1.9730E-08 1.8330E-09 1.5610E-08

7 -2.1570E-08 -1.0860E-07 1.5050E-07 8.3770E-09 -7.4080E-08 9.7770E-08 2.4710E-07 4.8920E-07 -6.2470E-07  
2.1980E-08 -4.7740E-08 2.7870E-08 -3.7460E-08 -1.1660E-07 1.3270E-07 -5.1740E-08 -1.4240E-07 2.1590E-07  
3.9620E-08 2.1920E-08 -3.6150E-08

8 -1.1290E-07 -3.1020E-07 4.3870E-07 -4.3880E-08 -2.6080E-07 3.5510E-07 4.8920E-07 1.5980E-06 -1.8760E-06  
-8.5710E-09 -1.9900E-07 1.7300E-07 -1.4460E-07 -3.0110E-07 3.5080E-07 -1.7910E-07 -3.6100E-07 5.5840E-07  
3.0380E-08 8.6720E-08 -9.8360E-08

9 1.8140E-07 4.6630E-07 -7.7840E-07 -6.7710E-08 2.8410E-07 -4.6730E-07 -6.2470E-07 -1.8760E-06 2.8610E-06  
-1.9640E-07 5.8210E-08 2.0520E-07 2.8950E-07 4.2370E-07 -4.4250E-07 4.1770E-07 6.4370E-07 -1.2100E-06  
-1.3990E-07 -2.7220E-07 4.1240E-07

10 -4.8890E-08 -1.4890E-07 3.2180E-07 1.4660E-07 4.7500E-09 6.2950E-08 2.1980E-08 -8.5710E-09 -1.9640E-07  
4.2060E-07 5.8540E-07 -9.4710E-07 -1.4360E-07 -1.4800E-07 1.0300E-07 -2.3060E-07 -2.8430E-07 6.5470E-07  
1.5090E-07 2.3140E-07 -3.1060E-07

11 -1.1660E-07 -3.3860E-07 5.5420E-07 6.5440E-08 -2.0630E-07 3.2770E-07 -4.7740E-08 -1.9900E-07 5.8210E-08  
5.8540E-07 1.6960E-06 -2.1310E-06 -2.0230E-07 -3.2480E-07 3.3200E-07 -2.8650E-07 -4.6060E-07 8.5880E-07  
1.2030E-07 2.2670E-07 -2.8380E-07

12 1.9050E-07 5.0710E-07 -9.4470E-07 -2.2050E-07 2.0610E-07 -4.2780E-07 2.7870E-08 1.7300E-07 2.0520E-07  
-9.4710E-07 -2.1310E-06 3.3940E-06 3.7620E-07 4.5860E-07 -4.1770E-07 5.7530E-07 7.8600E-07 -1.6420E-06  
-2.6500E-07 -4.7230E-07 6.7690E-07

13 -2.9340E-09 -7.9820E-08 2.7840E-08 -9.7500E-08 -1.3510E-07 1.3020E-07 -3.7460E-08 -1.4460E-07 2.8950E-07  
-1.4360E-07 -2.0230E-07 3.7620E-07 3.6760E-07 5.9790E-07 -7.1410E-07 8.1040E-08 -3.6510E-08 -1.0880E-07  
-4.5760E-08 -1.3660E-07 1.7560E-07

14 -1.0900E-07 -2.9100E-07 3.5630E-07 -1.3680E-07 -3.1270E-07 3.9450E-07 -1.1660E-07 -3.0110E-07 4.2370E-07  
-1.4800E-07 -3.2480E-07 4.5860E-07 5.9790E-07 1.6760E-06 -1.9490E-06 -8.5850E-08 -2.8000E-07 3.1680E-07  
-4.5850E-08 -3.8260E-08 7.7020E-08

15 1.5720E-07 4.1660E-07 -5.7210E-07 1.2680E-07 3.9340E-07 -5.3550E-07 1.3270E-07 3.5080E-07 -4.4250E-07  
1.0300E-07 3.3200E-07 -4.1770E-07 -7.1410E-07 -1.9490E-06 2.7810E-06 1.9260E-07 4.5710E-07 -6.4710E-07  
1.7750E-08 4.8820E-09 3.4250E-08

16 7.0570E-09 -6.6430E-08 -2.1520E-08 -1.5280E-07 -1.6880E-07 1.6200E-07 -5.1740E-08 -1.7910E-07 4.1770E-07  
-2.3060E-07 -2.8650E-07 5.7530E-07 8.1040E-08 -8.5850E-08 1.9260E-07 5.1410E-07 7.8650E-07 -1.3250E-06  
-9.0050E-08 -2.2050E-07 3.0050E-07

17 -9.7160E-08 -2.7570E-07 3.0350E-07 -2.2440E-07 -3.6940E-07 4.6490E-07 -1.4240E-07 -3.6100E-07 6.4370E-07  
-2.8430E-07 -4.6060E-07 7.8600E-07 -3.6510E-08 -2.8000E-07 4.5710E-07 7.8650E-07 1.9140E-06 -2.6550E-06  
-1.1630E-07 -1.7020E-07 2.8830E-07

18 8.5720E-08 3.2090E-07 -2.0170E-07 4.7580E-07 6.0010E-07 -6.8670E-07 2.1590E-07 5.5840E-07 -1.2100E-06  
6.5470E-07 8.5880E-07 -1.6420E-06 -1.0880E-07 3.1680E-07 -6.4710E-07 -1.3250E-06 -2.6550E-06 4.5530E-06  
2.9650E-07 5.3810E-07 -7.2060E-07

19 7.6280E-09 -3.2080E-08 1.0990E-07 1.0420E-07 4.3620E-08 -1.9730E-08 3.9620E-08 3.0380E-08 -1.3990E-07  
1.5090E-07 1.2030E-07 -2.6500E-07 -4.5760E-08 -4.5850E-08 1.7750E-08 -9.0050E-08 -1.1630E-07 2.9650E-07  
2.4190E-06 5.5270E-06 -7.1090E-06

20 -3.7680E-08 -2.1500E-08 1.9900E-07 1.4090E-07 8.3120E-08 1.8330E-09 2.1920E-08 8.6720E-08 -2.7220E-07  
2.3140E-07 2.2670E-07 -4.7230E-07 -1.3660E-07 -3.8260E-08 4.8820E-09 -2.2050E-07 -1.7020E-07 5.3810E-07  
5.5270E-06 1.8700E-05 -2.2670E-05

21 5.5230E-08 8.2980E-08 -2.5120E-07 -1.8400E-07 -6.6100E-08 1.5610E-08 -3.6150E-08 -9.8360E-08 4.1240E-07  
-3.1060E-07 -2.8380E-07 6.7690E-07 1.7560E-07 7.7020E-08 3.4250E-08 3.0050E-07 2.8830E-07 -7.2060E-07  
-7.1090E-06 -2.2670E-05 3.2280E-05

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

0.0000024190 0.0000055270 -0.0000071090

0.0000055270 0.0000187000 -0.0000226700  
 -0.0000071090 -0.0000226700 0.0000322800

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

0.0000007380 -0.0000000501 0.0000008327  
 -0.0000000501 0.0000020945 0.0000034843  
 0.0000008327 0.0000034843 0.0000505664

Horizontal network accuracy = 0.00301 meters.

Vertical network accuracy = 0.01394 meters.

		Vectors		
To	From	X	Y	Z
mtms	0187	-49379.661	53317.394	30121.681
p053	0187	92496.660	21560.293	43759.383
mtlw	0187	-73277.570	-68499.214	-80598.726
p052	0187	109407.579	-100863.970	-56662.696
p049	0187	-169043.927	-7565.283	-58287.592
p050	0187	-149424.282	114247.150	50213.007

Covariance matrix of the 6 vectors

1 2.6730E-06 6.1337E-06 -8.0110E-06 2.2709E-06 5.4198E-06 -7.0224E-06 2.3502E-06 5.4214E-06 -6.8429E-06  
 2.2116E-06 5.3278E-06 -6.7087E-06 2.4542E-06 5.5015E-06 -7.0248E-06 2.5085E-06 5.5838E-06 -7.3750E-06  
 2 6.1337E-06 2.0443E-05 -2.5081E-05 5.2853E-06 1.8321E-05 -2.2337E-05 5.4286E-06 1.8325E-05 -2.2014E-05  
 5.1788E-06 1.8156E-05 -2.1774E-05 5.6159E-06 1.8469E-05 -2.2341E-05 5.7131E-06 1.8616E-05 -2.2970E-05  
 3 -8.0110E-06 -2.5081E-05 3.6044E-05 -6.7769E-06 -2.2326E-05 3.1917E-05 -7.0323E-06 -2.2332E-05 3.1340E-05  
 -6.5865E-06 -2.2031E-05 3.0910E-05 -7.3667E-06 -2.2590E-05 3.1925E-05 -7.5409E-06 -2.2854E-05 3.3050E-05  
 4 2.2709E-06 5.2853E-06 -6.7769E-06 2.5085E-06 5.8154E-06 -7.4786E-06 2.2836E-06 5.3118E-06 -6.8528E-06  
 2.3105E-06 5.3312E-06 -6.8805E-06 2.2631E-06 5.2951E-06 -6.8160E-06 2.2520E-06 5.2780E-06 -6.7457E-06  
 5 5.4198E-06 1.8321E-05 -2.2326E-05 5.8154E-06 2.0168E-05 -2.4567E-05 5.3874E-06 1.8269E-05 -2.2048E-05  
 5.2567E-06 1.8184E-05 -2.1926E-05 5.4849E-06 1.8342E-05 -2.2215E-05 5.5351E-06 1.8418E-05 -2.2542E-05  
 6 -7.0224E-06 -2.2337E-05 3.1917E-05 -7.4786E-06 -2.4567E-05 3.5132E-05 -6.9554E-06 -2.2218E-05 3.1385E-05  
 -6.7157E-06 -2.2060E-05 3.1160E-05 -7.1347E-06 -2.2354E-05 3.1695E-05 -7.2278E-06 -2.2495E-05 3.2298E-05  
 7 2.3502E-06 5.4286E-06 -7.0323E-06 2.2836E-06 5.3874E-06 -6.9554E-06 2.5869E-06 5.9639E-06 -7.5577E-06  
 2.2505E-06 5.3370E-06 -6.7800E-06 2.3877E-06 5.4343E-06 -6.9579E-06 2.4177E-06 5.4790E-06 -7.1535E-06  
 8 5.4214E-06 1.8325E-05 -2.2332E-05 5.3118E-06 1.8269E-05 -2.2218E-05 5.9639E-06 2.0125E-05 -2.4175E-05  
 5.2566E-06 1.8188E-05 -2.1926E-05 5.4886E-06 1.8350E-05 -2.2226E-05 5.5380E-06 1.8422E-05 -2.2551E-05  
 9 -6.8429E-06 -2.2014E-05 3.1340E-05 -6.8528E-06 -2.2048E-05 3.1385E-05 -7.5577E-06 -2.4175E-05 3.4316E-05  
 -6.8549E-06 -2.2056E-05 3.1396E-05 -6.8552E-06 -2.2051E-05 3.1391E-05 -6.8519E-06 -2.2042E-05 3.1378E-05  
 10 2.2116E-06 5.1788E-06 -6.5865E-06 2.3105E-06 5.2567E-06 -6.7157E-06 2.2505E-06 5.2566E-06 -6.8549E-06  
 2.5378E-06 5.7607E-06 -7.4805E-06 2.1703E-06 5.1935E-06 -6.7132E-06 2.1276E-06 5.1276E-06 -6.4402E-06  
 11 5.3278E-06 1.8156E-05 -2.2031E-05 5.3312E-06 1.8184E-05 -2.2060E-05 5.3370E-06 1.8188E-05 -2.2056E-05  
 5.7607E-06 1.9943E-05 -2.4045E-05 5.3410E-06 1.8187E-05 -2.2059E-05 5.3407E-06 1.8183E-05 -2.2066E-05  
 12 -6.7087E-06 -2.1774E-05 3.0910E-05 -6.8805E-06 -2.1926E-05 3.1160E-05 -6.7800E-06 -2.1926E-05 3.1396E-05  
 -7.4805E-06 -2.4045E-05 3.4320E-05 -6.6434E-06 -2.1816E-05 3.1151E-05 -6.5692E-06 -2.1700E-05 3.0682E-05  
 13 2.4542E-06 5.6159E-06 -7.3667E-06 2.2631E-06 5.4849E-06 -7.1347E-06 2.3877E-06 5.4886E-06 -6.8552E-06  
 2.1703E-06 5.3410E-06 -6.6434E-06 2.8781E-06 6.3073E-06 -8.0165E-06 2.6358E-06 5.7434E-06 -7.6899E-06  
 14 5.5015E-06 1.8469E-05 -2.2590E-05 5.2951E-06 1.8342E-05 -2.2354E-05 5.4343E-06 1.8350E-05 -2.2051E-05  
 5.1934E-06 1.8187E-05 -2.1816E-05 6.3073E-06 2.0453E-05 -2.4701E-05 5.7075E-06 1.8628E-05 -2.2968E-05  
 15 -7.0248E-06 -2.2341E-05 3.1925E-05 -6.8160E-06 -2.2215E-05 3.1695E-05 -6.9579E-06 -2.2226E-05 3.1391E-05

-6.7132E-06 -2.2059E-05 3.1151E-05 -8.0165E-06 -2.4701E-05 3.4993E-05 -7.2347E-06 -2.2506E-05 3.2319E-05  
 16 2.5085E-06 5.7131E-06 -7.5409E-06 2.2520E-06 5.5351E-06 -7.2278E-06 2.4177E-06 5.5380E-06 -6.8519E-06  
 2.1276E-06 5.3407E-06 -6.5692E-06 2.6358E-06 5.7075E-06 -7.2347E-06 3.1132E-06 6.6503E-06 -9.0310E-06  
 17 5.5838E-06 1.8616E-05 -2.2854E-05 5.2780E-06 1.8418E-05 -2.2495E-05 5.4790E-06 1.8422E-05 -2.2042E-05  
 5.1276E-06 1.8183E-05 -2.1700E-05 5.7434E-06 1.8628E-05 -2.2506E-05 6.6503E-06 2.0954E-05 -2.6151E-05  
 18 -7.3750E-06 -2.2970E-05 3.3050E-05 -6.7457E-06 -2.2542E-05 3.2298E-05 -7.1535E-06 -2.2551E-05 3.1378E-05  
 -6.4402E-06 -2.2066E-05 3.0682E-05 -7.6899E-06 -2.2968E-05 3.2319E-05 -9.0310E-06 -2.6151E-05 3.8274E-05

Correlation matrix of the 6 vectors

1 1.0000E+00 8.2974E-01 -8.1614E-01 8.7696E-01 7.3816E-01 -7.2466E-01 8.9374E-01 7.3917E-01 -7.1448E-01  
 8.4912E-01 7.2971E-01 -7.0043E-01 8.8481E-01 7.4406E-01 -7.2634E-01 8.6957E-01 7.4609E-01 -7.2913E-01  
 2 8.2974E-01 1.0000E+00 -9.2396E-01 7.3805E-01 9.0229E-01 -8.3348E-01 7.4649E-01 9.0344E-01 -8.3116E-01  
 7.1900E-01 8.9921E-01 -8.2202E-01 7.3213E-01 9.0322E-01 -8.3531E-01 7.1614E-01 8.9945E-01 -8.2118E-01  
 3 -8.1614E-01 -9.2396E-01 1.0000E+00 -7.1270E-01 -8.2807E-01 8.9691E-01 -7.2826E-01 -8.2917E-01 8.9112E-01  
 -6.8866E-01 -8.2172E-01 8.7882E-01 -7.2326E-01 -8.3199E-01 8.9892E-01 -7.1187E-01 -8.3158E-01 8.8982E-01  
 4 8.7696E-01 7.3805E-01 -7.1270E-01 1.0000E+00 8.1760E-01 -7.9664E-01 8.9643E-01 7.4761E-01 -7.3860E-01  
 9.1574E-01 7.5376E-01 -7.4155E-01 8.4224E-01 7.3926E-01 -7.2750E-01 8.0587E-01 7.2799E-01 -6.8844E-01  
 5 7.3816E-01 9.0229E-01 -8.2807E-01 8.1760E-01 1.0000E+00 -9.2293E-01 7.4587E-01 9.0684E-01 -8.3808E-01  
 7.3478E-01 9.0671E-01 -8.3339E-01 7.1992E-01 9.0314E-01 -8.3625E-01 6.9854E-01 8.9592E-01 -8.1135E-01  
 6 -7.2466E-01 -8.3348E-01 8.9691E-01 -7.9664E-01 -9.2293E-01 1.0000E+00 -7.2960E-01 -8.3560E-01 9.0390E-01  
 -7.1124E-01 -8.3343E-01 8.9736E-01 -7.0953E-01 -8.3395E-01 9.0396E-01 -6.9112E-01 -8.2909E-01 8.8080E-01  
 7 8.9374E-01 7.4649E-01 -7.2826E-01 8.9643E-01 7.4587E-01 -7.2960E-01 1.0000E+00 8.2657E-01 -8.0214E-01  
 8.7833E-01 7.4306E-01 -7.1956E-01 8.7505E-01 7.4711E-01 -7.3131E-01 8.5194E-01 7.4418E-01 -7.1891E-01  
 8 7.3917E-01 9.0344E-01 -8.2917E-01 7.4761E-01 9.0684E-01 -8.3560E-01 8.2657E-01 1.0000E+00 -9.1994E-01  
 7.3556E-01 9.0786E-01 -8.3431E-01 7.2118E-01 9.0450E-01 -8.3754E-01 6.9966E-01 8.9711E-01 -8.1256E-01  
 9 -7.1448E-01 -8.3116E-01 8.9112E-01 -7.3860E-01 -8.3808E-01 9.0390E-01 -8.0214E-01 -9.1994E-01 1.0000E+00  
 -7.3455E-01 -8.4311E-01 9.1485E-01 -6.8979E-01 -8.3235E-01 9.0587E-01 -6.6292E-01 -8.2200E-01 8.6582E-01  
 10 8.4912E-01 7.1900E-01 -6.8866E-01 9.1574E-01 7.3478E-01 -7.1124E-01 8.7833E-01 7.3556E-01 -7.3455E-01  
 1.0000E+00 8.0976E-01 -8.0154E-01 8.0302E-01 7.2086E-01 -7.1238E-01 7.5692E-01 7.0315E-01 -6.5346E-01  
 11 7.2971E-01 8.9921E-01 -8.2172E-01 7.5376E-01 9.0671E-01 -8.3343E-01 7.4306E-01 9.0786E-01 -8.4311E-01  
 8.0976E-01 1.0000E+00 -9.1909E-01 7.0498E-01 9.0052E-01 -8.3504E-01 6.7780E-01 8.8948E-01 -7.9867E-01  
 12 -7.0043E-01 -8.2202E-01 8.7882E-01 -7.4155E-01 -8.3339E-01 8.9736E-01 -7.1956E-01 -8.3431E-01 9.1485E-01  
 -8.0154E-01 -9.1909E-01 1.0000E+00 -6.6844E-01 -8.2343E-01 8.9890E-01 -6.3553E-01 -8.0918E-01 8.4655E-01  
 13 8.8481E-01 7.3213E-01 -7.2326E-01 8.4224E-01 7.1992E-01 -7.0953E-01 8.7505E-01 7.2118E-01 -6.8979E-01  
 8.0302E-01 7.0498E-01 -6.6844E-01 1.0000E+00 8.2209E-01 -7.9880E-01 8.8057E-01 7.3956E-01 -7.3268E-01  
 14 7.4406E-01 9.0322E-01 -8.3199E-01 7.3926E-01 9.0314E-01 -8.3395E-01 7.4711E-01 9.0450E-01 -8.3235E-01  
 7.2086E-01 9.0052E-01 -8.2343E-01 8.2209E-01 1.0000E+00 -9.2332E-01 7.1527E-01 8.9984E-01 -8.2092E-01  
 15 -7.2634E-01 -8.3531E-01 8.9892E-01 -7.2750E-01 -8.3625E-01 9.0396E-01 -7.3131E-01 -8.3754E-01 9.0587E-01  
 -7.1238E-01 -8.3504E-01 8.9890E-01 -7.9880E-01 -9.2332E-01 1.0000E+00 -6.9315E-01 -8.3114E-01 8.8312E-01  
 16 8.6957E-01 7.1614E-01 -7.1187E-01 8.0587E-01 6.9854E-01 -6.9112E-01 8.5194E-01 6.9966E-01 -6.6292E-01  
 7.5692E-01 6.7780E-01 -6.3553E-01 8.8057E-01 7.1527E-01 -6.9315E-01 1.0000E+00 8.2338E-01 -8.2733E-01  
 17 7.4609E-01 8.9945E-01 -8.3158E-01 7.2799E-01 8.9592E-01 -8.2909E-01 7.4418E-01 8.9711E-01 -8.2200E-01  
 7.0315E-01 8.8948E-01 -8.0918E-01 7.3956E-01 8.9984E-01 -8.3114E-01 8.2338E-01 1.0000E+00 -9.2343E-01  
 18 -7.2913E-01 -8.2118E-01 8.8982E-01 -6.8844E-01 -8.1135E-01 8.8080E-01 -7.1891E-01 -8.1256E-01 8.6582E-01  
 -6.5346E-01 -7.9867E-01 8.4655E-01 -7.3268E-01 -8.2092E-01 8.8312E-01 -8.2733E-01 -9.2343E-01 1.0000E+00

G-FILE for the vectors

Axx2014 8152014 815  
 B201408150000201408150100 6 rsgps 1.37IGS

```
lant_info.003    NGS
C00070001 -493796607 16 533173937 45 301216805 60
C00070002 924966599 15 215602929 44 437593830 59
C00070003 -732775696 16 -684992144 44 -805987256 58
C00070004 1094075794 15-1008639695 44 -566626957 58
C00070005 -1690439267 16 -75652831 45 -582875919 59
C00070006 -1494242820 17 1142471502 45 502130065 61
D 1 2 8297444 1 3 -8161432 1 4 8769617 1 5 7381560 1 6 -7246569
D 1 7 8937416 1 8 7391714 1 9 -7144789 1 10 8491243 1 11 7297134
D 1 12 -7004261 1 13 8848142 1 14 7440583 1 15 -7263437 1 16 8695687
D 1 17 7460891 1 18 -7291325 2 3 -9239602 2 4 7380548 2 5 9022929
D 2 6 -8334795 2 7 7464932 2 8 9034383 2 9 -8311636 2 10 7189959
D 2 11 8992112 2 12 -8220204 2 13 7321322 2 14 9032168 2 15 -8353104
D 2 16 7161430 2 17 8994487 2 18 -8211812 3 4 -7126973 3 5 -8280737
D 3 6 8969128 3 7 -7282641 3 8 -8291714 3 9 8911196 3 10 -6886635
D 3 11 -8217210 3 12 8788192 3 13 -7232647 3 14 -8319908 3 15 8989229
D 3 16 -7118720 3 17 -8315759 3 18 8898172 4 5 8176025 4 6 -7966387
D 4 7 8964340 4 8 7476093 4 9 -7386046 4 10 9157358 4 11 7537551
D 4 12 -7415459 4 13 8422374 4 14 7392610 4 15 -7274980 4 16 8058745
D 4 17 7279888 4 18 -6884412 5 6 -9229294 5 7 7458685 5 8 9068413
D 5 9 -8380750 5 10 7347813 5 11 9067067 5 12 -8333851 5 13 7199193
D 5 14 9031395 5 15 -8362525 5 16 6985404 5 17 8959184 5 18 -8113507
D 6 7 -7295960 6 8 -8356010 6 9 9038953 6 10 -7112361 6 11 -8334337
D 6 12 8973629 6 13 -7095277 6 14 -8339473 6 15 9039580 6 16 -6911156
D 6 17 -8290921 6 18 8807981 7 8 8265720 7 9 -8021410 7 10 8783268
D 7 11 7430586 7 12 -7195600 7 13 8750547 7 14 7471127 7 15 -7313145
D 7 16 8519431 7 17 7441759 7 18 -7189124 8 9 -9199444 8 10 7355582
D 8 11 9078640 8 12 -8343111 8 13 7211830 8 14 9045027 8 15 -8375393
D 8 16 6996612 8 17 8971132 8 18 -8125612 9 10 -7345524 9 11 -8431059
D 9 12 9148469 9 13 -6897887 9 14 -8323531 9 15 9058702 9 16 -6629150
D 9 17 -8219997 9 18 8658155 10 11 8097587 10 12 -8015433 10 13 8030241
D 10 14 7208648 10 15 -7123774 10 16 7569157 10 17 7031497 10 18 -6534578
D 11 12 -9190881 11 13 7049807 11 14 9005151 11 15 -8350434 11 16 6778034
D 11 17 8894768 11 18 -7986745 12 13 -6684378 12 14 -8234347 12 15 8989006
D 12 16 -6355270 12 17 -8091838 12 18 8465477 13 14 8220894 13 15 -7988038
D 13 16 8805676 13 17 7395648 13 18 -7326780 14 15 -9233193 14 16 7152683
D 14 17 8998413 14 18 -8209236 15 16 -6931488 15 17 -8311411 15 18 8831220
D 16 17 8233796 16 18 -8273309 17 18 -9234306
```

ITRF position of 0187 as determined by individual baselines

	X	Y	Z
mtms	-1376055.924	-4037330.611	4727372.209
p053	-1376055.919	-4037330.619	4727372.229
mtlw	-1376055.911	-4037330.616	4727372.242
p052	-1376055.921	-4037330.607	4727372.204
p049	-1376055.917	-4037330.607	4727372.189
p050	-1376055.903	-4037330.585	4727372.188

Residuals of position determined by individual baselines from the final position

	X	Y	Z	East	North	Up
mtms	-0.011	-0.010	0.009	-0.007	-0.004	0.016

p053	-0.005	-0.018	0.029	0.001	0.005	0.035
mtlw	0.002	-0.015	0.042	0.007	0.019	0.040
p052	-0.008	-0.006	0.005	-0.006	-0.003	0.009
p049	-0.003	-0.006	-0.011	-0.001	-0.012	-0.004
p050	0.011	0.016	-0.012	0.005	0.006	-0.021

## STATE PLANE COORDINATES - International Foot

SPC (2500 MT )

Northing (Y) [feet]	1416019.009
Easting (X) [feet]	2134300.614
Convergence [degrees]	0.49684278
Point Scale	0.99958421
Combined Factor	0.99944196

\*\* 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: 922.677 (m) [PROTOTYPE (Computed using USGG2012,GRS80,IGS08)]

dop from interpolation is	0.442
scatter (mean square distance from rover) is	21491.719
average edop for rover is	0.660
average ndop for rover is	1.030
average hdop for rover is	1.223
average vdop for rover is	2.150
average gdop for rover is	2.850

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.