

## OPUS-RS solution : 018697\_14\_226\_A0.14O OP1408198782331

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

Sat 8/16/2014 8:22 AM

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

FILE: 018697\_14\_226\_A0.14O OP1408198782331

## 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: August 16, 2014  
 RINEX FILE: 0186226q.14o                              TIME: 14:22:34 UTC

SOFTWARE: rsgps 1.37 RS94.prl 1.99.2              START: 2014/08/14 16:12:45  
 EPHEMERIS: igr18054.eph [rapid]                    STOP: 2014/08/14 17:19:15  
 NAV FILE: brdc2260.14n                              OBS USED: 5015 / 5625 : 89%  
 ANT NAME: CHCX90D-OPUS    NONE                    QUALITY IND. 27.69/ 15.63  
 ARP HEIGHT: 1.8000                                  NORMALIZED RMS:    0.298

REF FRAME: NAD\_83(2011)(EPOCH:2010.0000)              IGS08 (EPOCH:2014.61835)

X: -1379552.018(m) 0.006(m)              -1379552.893(m) 0.006(m)  
 Y: -4032218.073(m) 0.013(m)              -4032216.850(m) 0.013(m)  
 Z: 4730749.928(m) 0.015(m)              4730749.920(m) 0.015(m)

LAT: 48 10 38.13441 0.006(m)              48 10 38.15532 0.006(m)  
 E LON: 251 6 45.09422 0.003(m)              251 6 45.03499 0.003(m)  
 W LON: 108 53 14.90578 0.003(m)              108 53 14.96501 0.003(m)  
 EL HGT: 949.812(m) 0.020(m)              949.223(m) 0.020(m)  
 ORTHO HGT: 965.316(m) 0.022(m) [NAVD88 (Computed using GEOID12A)]

## UTM COORDINATES    STATE PLANE COORDINATES

UTM (Zone 12)              SPC (2500 MT )

Northing (Y) [meters]    5338160.107              436575.332  
 Easting (X) [meters]    657040.467              645534.492  
 Convergence [degrees]    1.57459868              0.44806547  
 Point Scale              0.99990303              0.99960002  
 Combined Factor              0.99975420              0.99945124

US NATIONAL GRID DESIGNATOR: 12UXU5704038160(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DG9749	MTMS MONTANA STATE UNI CORS ARP	N483227.426	W1094111.858	71722.0
DL7731	P053 WHITEWATERMT2007 CORS ARP	N484333.865	W1074331.456	105432.2
DM7133	MTLW LEWISTOWN CORS ARP	N470314.929	W1092633.764	131682.3
DI3425	P052 LRRNCHJRDNMT2006 CORS ARP	N472229.026	W1070107.185	166083.0
DI2257	P049 ARMINGTON_MT2006 CORS ARP	N472059.850	W1105422.382	177113.4

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	-1425435.578	-3984013.204	4757493.881
p053	-1283559.257	-4015770.332	4771131.608
mtlw	-1449333.479	-4105829.820	4646773.494
p052	-1266648.336	-4138194.571	4670709.500
p049	-1545099.845	-4044895.877	4669084.579
0186	-1379552.893	-4032216.850	4730749.920

Covariance matrix of the stations:

1	2.3270E-07	4.4310E-07	-4.4550E-07	-1.3400E-08	-1.0690E-07	9.5040E-08	-3.6110E-09	-1.0970E-07	1.1650E-07
	-1.8440E-08	-1.0790E-07	1.1790E-07	2.9710E-09	-1.1870E-07	1.1630E-07	3.0740E-08	-2.0640E-08	1.8680E-08
2	4.4310E-07	1.3410E-06	-1.2750E-06	-9.2380E-08	-2.6040E-07	3.0860E-07	-1.2140E-07	-3.0160E-07	3.2750E-07
	-8.6780E-08	-2.6430E-07	2.8890E-07	-1.4170E-07	-3.1410E-07	3.5040E-07	2.6250E-09	6.3850E-08	-1.1710E-08
3	-4.4550E-07	-1.2750E-06	1.4550E-06	1.3210E-07	3.3580E-07	-3.0260E-07	9.7130E-08	3.0270E-07	-3.1210E-07
	1.4260E-07	3.3440E-07	-3.5060E-07	7.3220E-08	3.0280E-07	-2.9030E-07	2.3760E-08	4.5670E-08	-8.8750E-10
4	-1.3400E-08	-9.2380E-08	1.3210E-07	2.2670E-07	4.0780E-07	-3.6160E-07	-1.5370E-08	-1.2270E-07	8.6230E-08
	6.8540E-08	-3.3970E-08	-8.8460E-09	-6.6860E-08	-1.5780E-07	1.5170E-07	6.7530E-08	6.5930E-08	-4.9690E-08
5	-1.0690E-07	-2.6040E-07	3.3580E-07	4.0780E-07	1.3030E-06	-1.2110E-06	-1.1170E-07	-2.9770E-07	3.0150E-07
	-3.1090E-08	-2.1720E-07	2.1570E-07	-1.6000E-07	-3.2640E-07	3.5830E-07	2.8390E-08	9.2520E-08	-3.3590E-08
6	9.5040E-08	3.0860E-07	-3.0260E-07	-3.6160E-07	-1.2110E-06	1.3420E-06	9.1710E-08	3.0430E-07	-2.8130E-07
	6.6960E-08	2.7180E-07	-2.4920E-07	1.0990E-07	3.2650E-07	-3.0930E-07	-9.9460E-09	-1.9280E-09	3.3170E-08
7	-3.6110E-09	-1.2140E-07	9.7130E-08	-1.5370E-08	-1.1170E-07	9.1710E-08	2.3400E-07	4.6300E-07	-4.1500E-07
	-2.0420E-08	-1.0990E-07	1.1500E-07	5.4880E-09	-1.2050E-07	1.1120E-07	2.7280E-08	-3.2930E-08	2.3410E-08
8	-1.0970E-07	-3.0160E-07	3.0270E-07	-1.2270E-07	-2.9770E-07	3.0430E-07	4.6300E-07	1.3990E-06	-1.2570E-06
	-1.2870E-07	-2.9970E-07	3.3280E-07	-1.0110E-07	-3.0070E-07	3.1740E-07	-2.1520E-08	-1.1920E-08	3.3580E-08
9	1.1650E-07	3.2750E-07	-3.1210E-07	8.6230E-08	3.0150E-07	-2.8130E-07	-4.1500E-07	-1.2570E-06	1.3370E-06
	7.1800E-08	2.7650E-07	-2.2780E-07	1.3940E-07	3.5160E-07	-3.1540E-07	1.6680E-09	-8.4440E-10	4.7480E-08
10	-1.8440E-08	-8.6780E-08	1.4260E-07	6.8540E-08	-3.1090E-08	6.6960E-08	-2.0420E-08	-1.2870E-07	7.1800E-08
	2.6350E-07	4.2230E-07	-4.4490E-07	-9.3870E-08	-1.7480E-07	1.6280E-07	8.0770E-08	9.7310E-08	-7.8820E-08
11	-1.0790E-07	-2.6430E-07	3.3440E-07	-3.3970E-08	-2.1720E-07	2.7180E-07	-1.0990E-07	-2.9970E-07	2.7650E-07

```

4.2230E-07 1.3220E-06 -1.2370E-06 -1.7300E-07 -3.4110E-07 3.5430E-07 3.8790E-08 1.0520E-07 -6.0040E-08
 12 1.1790E-07 2.8890E-07 -3.5060E-07 -8.8460E-09 2.1570E-07 -2.4920E-07 1.1500E-07 3.3280E-07 -2.2780E-07
-4.4490E-07 -1.2370E-06 1.3880E-06 2.2280E-07 3.9930E-07 -3.5980E-07 -6.1980E-08 -1.2810E-07 1.4830E-07
 13 2.9710E-09 -1.4170E-07 7.3220E-08 -6.6860E-08 -1.6000E-07 1.0990E-07 5.4880E-09 -1.0110E-07 1.3940E-07
-9.3870E-08 -1.7300E-07 2.2280E-07 3.5290E-07 5.7460E-07 -5.4460E-07 -6.3620E-09 -1.0970E-07 8.6630E-08
 14 -1.1870E-07 -3.1410E-07 3.0280E-07 -1.5780E-07 -3.2640E-07 3.2650E-07 -1.2050E-07 -3.0070E-07 3.5160E-07
-1.7480E-07 -3.4110E-07 3.9930E-07 5.7460E-07 1.4820E-06 -1.3800E-06 -4.8000E-08 -4.8990E-08 7.1500E-08
 15 1.1630E-07 3.5040E-07 -2.9030E-07 1.5170E-07 3.5830E-07 -3.0930E-07 1.1120E-07 3.1740E-07 -3.1540E-07
1.6280E-07 3.5430E-07 -3.5980E-07 -5.4460E-07 -1.3800E-06 1.4750E-06 4.6420E-08 8.5040E-08 -2.8030E-08
 16 3.0740E-08 2.6250E-09 2.3760E-08 6.7530E-08 2.8390E-08 -9.9460E-09 2.7280E-08 -2.1520E-08 1.6680E-09
8.0770E-08 3.8790E-08 -6.1980E-08 -6.3620E-09 -4.8000E-08 4.6420E-08 2.3210E-06 5.6040E-06 -5.3460E-06
 17 -2.0640E-08 6.3850E-08 4.5670E-08 6.5930E-08 9.2520E-08 -1.9280E-09 -3.2930E-08 -1.1920E-08 -8.4440E-
10 9.7310E-08 1.0520E-07 -1.2810E-07 -1.0970E-07 -4.8990E-08 8.5040E-08 5.6040E-06 1.6920E-05 -1.6370E-05
 18 1.8680E-08 -1.1710E-08 -8.8750E-10 -4.9690E-08 -3.3590E-08 3.3170E-08 2.3410E-08 3.3580E-08 4.7480E-08
-7.8820E-08 -6.0040E-08 1.4830E-07 8.6630E-08 7.1500E-08 -2.8030E-08 -5.3460E-06 -1.6370E-05 1.7380E-05

```

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

```

0.0000023210 0.0000056040 -0.0000053460
0.0000056040 0.0000169200 -0.0000163700
-0.0000053460 -0.0000163700 0.0000173800

```

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

```

0.0000004180 0.0000001302 0.0000002071
0.0000001302 0.0000010509 -0.0000025091
0.0000002071 -0.0000025091 0.0000351521

```

Horizontal network accuracy = 0.00217 meters.

Vertical network accuracy = 0.01163 meters.

		Vectors		
To	From	X	Y	Z
mtms	0186	-45882.685	48203.646	26743.961
p053	0186	95993.636	16446.518	40381.687
mtlw	0186	-69780.586	-73612.970	-83976.427
p052	0186	112904.557	-105977.722	-60040.421
p049	0186	-165546.952	-12679.027	-61665.341

Covariance matrix of the 5 vectors

```

 1 2.4922E-06 6.0651E-06 -5.8339E-06 2.2093E-06 5.4894E-06 -5.2597E-06 2.2594E-06 5.5365E-06 -5.2498E-
06 2.1910E-06 5.4779E-06 -5.1848E-06 2.2996E-06 5.5539E-06 -5.2948E-06
 2 6.0651E-06 1.8133E-05 -1.7679E-05 5.4431E-06 1.6503E-05 -1.6048E-05 5.5129E-06 1.6566E-05 -1.6030E-05
5.4173E-06 1.6487E-05 -1.5941E-05 5.5694E-06 1.6591E-05 -1.6093E-05
 3 -5.8339E-06 -1.7679E-05 1.8837E-05 -5.1880E-06 -1.6046E-05 1.7045E-05 -5.2960E-06 -1.6147E-05 1.7021E-05
-5.1483E-06 -1.6021E-05 1.6882E-05 -5.3832E-06 -1.6184E-05 1.7119E-05
 4 2.2093E-06 5.4431E-06 -5.1880E-06 2.4126E-06 5.9175E-06 -5.6480E-06 2.2108E-06 5.4369E-06 -5.2117E-06
2.2412E-06 5.4653E-06 -5.2432E-06 2.1930E-06 5.4283E-06 -5.1910E-06
 5 5.4894E-06 1.6503E-05 -1.6046E-05 5.9175E-06 1.8038E-05 -1.7545E-05 5.4968E-06 1.6542E-05 -1.6034E-05
5.4472E-06 1.6505E-05 -1.5993E-05 5.5253E-06 1.6550E-05 -1.6063E-05
 6 -5.2597E-06 -1.6048E-05 1.7045E-05 -5.6480E-06 -1.7545E-05 1.8656E-05 -5.2678E-06 -1.6097E-05 1.7018E-05
-5.1903E-06 -1.6036E-05 1.6949E-05 -5.3128E-06 -1.6113E-05 1.7066E-05

```

7 2.2594E-06 5.5129E-06 -5.2960E-06 2.2108E-06 5.4968E-06 -5.2678E-06 2.5004E-06 6.1215E-06 -5.7861E-06  
 2.1925E-06 5.4882E-06 -5.1924E-06 2.3056E-06 5.5644E-06 -5.3046E-06  
 8 5.5365E-06 1.6566E-05 -1.6147E-05 5.4369E-06 1.6542E-05 -1.6097E-05 6.1215E-06 1.8343E-05 -1.7660E-05  
 5.3995E-06 1.6527E-05 -1.5943E-05 5.6341E-06 1.6680E-05 -1.6171E-05  
 9 -5.2498E-06 -1.6030E-05 1.7021E-05 -5.2117E-06 -1.6034E-05 1.7018E-05 -5.7861E-06 -1.7660E-05 1.8622E-05  
 -5.1970E-06 -1.6033E-05 1.6956E-05 -5.2949E-06 -1.6089E-05 1.7045E-05  
 10 2.1910E-06 5.4173E-06 -5.1483E-06 2.2412E-06 5.4472E-06 -5.1903E-06 2.1925E-06 5.3995E-06 -5.1970E-06  
 2.4230E-06 5.8902E-06 -5.6501E-06 2.1527E-06 5.3799E-06 -5.1508E-06  
 11 5.4779E-06 1.6487E-05 -1.6021E-05 5.4653E-06 1.6505E-05 -1.6036E-05 5.4882E-06 1.6527E-05 -1.6033E-05  
 5.8902E-06 1.8032E-05 -1.7419E-05 5.5019E-06 1.6523E-05 -1.6041E-05  
 12 -5.1848E-06 -1.5941E-05 1.6882E-05 -5.2432E-06 -1.5993E-05 1.6949E-05 -5.1924E-06 -1.5943E-05 1.6956E-05  
 -5.6501E-06 -1.7419E-05 1.8471E-05 -5.1479E-06 -1.5914E-05 1.6900E-05  
 13 2.2996E-06 5.5694E-06 -5.3832E-06 2.1930E-06 5.5253E-06 -5.3128E-06 2.3056E-06 5.6341E-06 -5.2949E-06  
 2.1527E-06 5.5019E-06 -5.1479E-06 2.6866E-06 6.3363E-06 -6.0237E-06  
 14 5.5539E-06 1.6591E-05 -1.6184E-05 5.4283E-06 1.6550E-05 -1.6113E-05 5.5644E-06 1.6680E-05 -1.6089E-05  
 5.3799E-06 1.6523E-05 -1.5914E-05 6.3363E-06 1.8500E-05 -1.7907E-05  
 15 -5.2948E-06 -1.6093E-05 1.7119E-05 -5.1910E-06 -1.6063E-05 1.7066E-05 -5.3046E-06 -1.6171E-05 1.7045E-05  
 -5.1508E-06 -1.6041E-05 1.6900E-05 -6.0237E-06 -1.7907E-05 1.8911E-05

Correlation matrix of the 5 vectors

1 1.0000E+00 9.0221E-01 -8.5146E-01 9.0099E-01 8.1872E-01 -7.7137E-01 9.0508E-01 8.1885E-01 -7.7062E-01  
 8.9163E-01 8.1716E-01 -7.6417E-01 8.8870E-01 8.1794E-01 -7.7126E-01  
 2 9.0221E-01 1.0000E+00 -9.5657E-01 8.2292E-01 9.1251E-01 -8.7251E-01 8.1872E-01 9.0836E-01 -8.7233E-01  
 8.1728E-01 9.1175E-01 -8.7103E-01 7.9793E-01 9.0584E-01 -8.6904E-01  
 3 -8.5146E-01 -9.5657E-01 1.0000E+00 -7.6957E-01 -8.7052E-01 9.0927E-01 -7.7168E-01 -8.6865E-01 9.0882E-01  
 -7.6206E-01 -8.6931E-01 9.0505E-01 -7.5671E-01 -8.6698E-01 9.0700E-01  
 4 9.0099E-01 8.2292E-01 -7.6957E-01 1.0000E+00 8.9701E-01 -8.4186E-01 9.0012E-01 8.1728E-01 -7.7754E-01  
 9.2698E-01 8.2861E-01 -7.8541E-01 8.6136E-01 8.1251E-01 -7.6851E-01  
 5 8.1872E-01 9.1251E-01 -8.7052E-01 8.9701E-01 1.0000E+00 -9.5646E-01 8.1849E-01 9.0940E-01 -8.7486E-01  
 8.2396E-01 9.1518E-01 -8.7614E-01 7.9371E-01 9.0598E-01 -8.6972E-01  
 6 -7.7137E-01 -8.7251E-01 9.0927E-01 -8.4186E-01 -9.5646E-01 1.0000E+00 -7.7128E-01 -8.7019E-01 9.1304E-01  
 -7.7199E-01 -8.7434E-01 9.1306E-01 -7.5044E-01 -8.6734E-01 9.0857E-01  
 7 9.0508E-01 8.1872E-01 -7.7168E-01 9.0012E-01 8.1849E-01 -7.7128E-01 1.0000E+00 9.0388E-01 -8.4793E-01  
 8.9077E-01 8.1735E-01 -7.6403E-01 8.8954E-01 8.1814E-01 -7.7142E-01  
 8 8.1885E-01 9.0836E-01 -8.6865E-01 8.1728E-01 9.0940E-01 -8.7019E-01 9.0388E-01 1.0000E+00 -9.5551E-01  
 8.0993E-01 9.0875E-01 -8.6612E-01 8.0258E-01 9.0549E-01 -8.6826E-01  
 9 -7.7062E-01 -8.7233E-01 9.0882E-01 -7.7754E-01 -8.7486E-01 9.1304E-01 -8.4793E-01 -9.5551E-01 1.0000E+00  
 -7.7370E-01 -8.7493E-01 9.1426E-01 -7.4858E-01 -8.6682E-01 9.0830E-01  
 10 8.9163E-01 8.1728E-01 -7.6206E-01 9.2698E-01 8.2396E-01 -7.7199E-01 8.9077E-01 8.0993E-01 -7.7370E-01  
 1.0000E+00 8.9113E-01 -8.4457E-01 8.4375E-01 8.0355E-01 -7.6093E-01  
 11 8.1716E-01 9.1175E-01 -8.6931E-01 8.2861E-01 9.1518E-01 -8.7434E-01 8.1735E-01 9.0875E-01 -8.7493E-01  
 8.9113E-01 1.0000E+00 -9.5445E-01 7.9048E-01 9.0464E-01 -8.6866E-01  
 12 -7.6417E-01 -8.7103E-01 9.0505E-01 -7.8541E-01 -8.7614E-01 9.1306E-01 -7.6403E-01 -8.6612E-01 9.1426E-01  
 -8.4457E-01 -9.5445E-01 1.0000E+00 -7.3076E-01 -8.6089E-01 9.0423E-01  
 13 8.8870E-01 7.9793E-01 -7.5671E-01 8.6136E-01 7.9371E-01 -7.5044E-01 8.8954E-01 8.0258E-01 -7.4858E-01  
 8.4375E-01 7.9048E-01 -7.3076E-01 1.0000E+00 8.9877E-01 -8.4508E-01  
 14 8.1794E-01 9.0584E-01 -8.6698E-01 8.1251E-01 9.0598E-01 -8.6734E-01 8.1814E-01 9.0549E-01 -8.6682E-01  
 8.0355E-01 9.0464E-01 -8.6089E-01 8.9877E-01 1.0000E+00 -9.5734E-01  
 15 -7.7126E-01 -8.6904E-01 9.0700E-01 -7.6851E-01 -8.6972E-01 9.0857E-01 -7.7142E-01 -8.6826E-01 9.0830E-01  
 -7.6093E-01 -8.6866E-01 9.0423E-01 -8.4508E-01 -9.5734E-01 1.0000E+00

G-FILE for the vectors

```

Axx2014 8142014 814
B201408141600201408141700 5 rsgps 1.37IGS
lant_info.003 NGS
C00060001 -458826846 15 482036460 42 267439605 43
C00060002 959936358 15 164465178 42 403816872 43
C00060003 -697805862 15 -736129698 42 -839764266 43
C00060004 1129045570 15 -1059777215 42 -600404205 42
C00060005 -1655469519 16 -126790270 43 -616653411 43
D 1 2 9022095 1 3 -8514624 1 4 9009924 1 5 8187174 1 6 -7713686
D 1 7 9050774 1 8 8188525 1 9 -7706193 1 10 8916326 1 11 8171612
D 1 12 -7641681 1 13 8886982 1 14 8179417 1 15 -7712557 2 3 -9565661
D 2 4 8229223 2 5 9125082 2 6 -8725106 2 7 8187171 2 8 9083605
D 2 9 -8723283 2 10 8172786 2 11 9117522 2 12 -8710340 2 13 7979296
D 2 14 9058359 2 15 -8690379 3 4 -7695696 3 5 -8705172 3 6 9092669
D 3 7 -7716844 3 8 -8686467 3 9 9088161 3 10 -7620629 3 11 -8693115
D 3 12 9050454 3 13 -7567133 3 14 -8669756 3 15 9070003 4 5 8970090
D 4 6 -8418609 4 7 9001168 4 8 8172802 4 9 -7775413 4 10 9269770
D 4 11 8286123 4 12 -7854133 4 13 8613573 4 14 8125115 4 15 -7685096
D 5 6 -9564588 5 7 8184858 5 8 9093962 5 9 -8748554 5 10 8239621
D 5 11 9151805 5 12 -8761444 5 13 7937056 5 14 9059839 5 15 -8697192
D 6 7 -7712798 6 8 -8701935 6 9 9130422 6 10 -7719903 6 11 -8743390
D 6 12 9130558 6 13 -7504355 6 14 -8673360 6 15 9085677 7 8 9038842
D 7 9 -8479347 7 10 8907671 7 11 8173493 7 12 -7640337 7 13 8895423
D 7 14 8181385 7 15 -7714165 8 9 -9555144 8 10 8099308 8 11 9087493
D 8 12 -8661201 8 13 8025818 8 14 9054877 8 15 -8682635 9 10 -7736953
D 9 11 -8749306 9 12 9142619 9 13 -7485839 9 14 -8668247 9 15 9082998
D 10 11 8911273 10 12 -8445650 10 13 8437453 10 14 8035532 10 15 -7609281
D 11 12 -9544489 11 13 7904836 11 14 9046445 11 15 -8686568 12 13 -7307562
D 12 14 -8608877 12 15 9042261 13 14 8987660 13 15 -8450810 14 15 -9573442
    
```

ITRF position of 0186 as determined by individual baselines

	X	Y	Z
mtms	-1379552.898	-4032216.859	4730749.920
p053	-1379552.894	-4032216.848	4730749.927
mtlw	-1379552.897	-4032216.864	4730749.943
p052	-1379552.903	-4032216.863	4730749.932
p049	-1379552.893	-4032216.865	4730749.934

Residuals of position determined by individual baselines from the final position

	X	Y	Z	East	North	Up
mtms	-0.005	-0.009	-0.000	-0.001	-0.008	0.007
p053	-0.001	0.002	0.007	-0.002	0.005	0.004
mtlw	-0.004	-0.015	0.023	0.001	0.004	0.027
p052	-0.010	-0.014	0.011	-0.005	-0.004	0.019
p049	-0.000	-0.015	0.013	0.005	-0.002	0.020

STATE PLANE COORDINATES - International Foot

SPC (2500 MT )

Northing (Y) [feet] 1432333.766  
Easting (X) [feet] 2117895.315  
Convergence [degrees] 0.44806547  
Point Scale 0.99960002  
Combined Factor 0.99945124

\*\* 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: 964.316 (m) [PROTOTYPE (Computed using USGG2012,GRS80,IGS08)]

dop from interpolation is 0.506  
scatter (mean square distance from rover) is 18508.601  
average edop for rover is 0.600  
average ndop for rover is 0.810  
average hdop for rover is 1.008  
average vdop for rover is 1.670  
average gdop for rover is 2.240

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.