# 2011-101U
# Metro Engineering & Surveying Co., Inc.
# California Fault Line Sites
# Geodetic Control Survey Report

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Prepared by:     Craig Robertson
Date:            May 2010


Control Source:   NGS
Horizontal Datum: WGS84
Vertical Datum:   WGS84 Ellipsoid
Grid Coords:      UTM zone 10
Units:            Metres


Executive Summary

The purpose of this geodetic survey was to establish Horizontal and Vertical control to support an aerial LiDAR survey.  The survey data is required to be in WGS84 format; for this reason Terrapoint used COR station data to establish the control as it is the only data that has published values that meets those needs.

New Control Stations:

Ten survey control points were established to support the LiDAR aerial survey

| STA ID | LATITUDE | LONGITUDE | EASTING | NORTHING | ELLHGT |
|---|---|---|---|---|---|
| 11101-01 | 34 54 17.59555 | -120 19 17.26742 | 744 734.425 | 3 865 770.368 | 87.655 |
| 11101-02 | 35 19 05.78927 | -120 41 33.66284 | 709 746.839 | 3 910 781.788 | 109.463 |
| 11101-03 | 35 35 39.82494 | -121 07 25.69684 | 669 968.545 | 3 940 582.637 | -31.351 |
| 11101-04 | 36 17 27.37973 | -121 51 27.55059 | 602 579.581 | 4 016 823.916 | -4.258 |
| 11101-05 | 37 38 33.02236 | -121 38 09.41624 | 620 341.983 | 4 167 026.518 | 331.007 |
| 11101-06 | 38 48 48.94442 | -122 11 30.86946 | 570 157.821 | 4 296 401.540 | 81.021 |
| 11101-07 | 39 01 02.13680 | -122 50 51.68051 | 513 185.672 | 4 318 703.005 | 378.030 |
| 11101-08 | 39 18 13.04660 | -123 05 27.32385 | 492 160.552 | 4 350 474.891 | 262.922 |
| 11101-09 | 39 47 18.99484 | -123 15 50.82585 | 477 385.561 | 4 404 328.747 | 402.107 |
| CMSairp | 38 30 41.57704 | -122 48 28.47400 | 516 747.220 | 4 262 592.424 | 3.783 |

## Requirements for LiDAR Control Points

Final control used for flight data processing should:

1) Be tied to geodetic control stations.
   a. Geodetic control stations should be first order or better (unless otherwise specified by client). Preference shall be given to nationally maintained control points before provincial/state level.
   b. All final flight & ground truthing control (published and/or new) should be tied to these geodetic points by two or more occupations (prove or disprove HI errors).
   c. All new points used in final flight & ground truthing control require a tie to two AGREEING 3-D geodetic control stations (alternatively any combination of horizontal and vertical control such that both are represented twice). If disagreement is found (i.e. exceeding the tolerance required to meet project specifications), sufficient additional control points must be included in the survey to clearly identify the erroneous monument.
   d. Final adjusted coordinates of published geodetic control stations should agree to +/- 1/3$^{rd}$ the required RMSE of the project or better. In cases where this is not achieved, additional control will be required to establish the error in the geodetic control point(s). When insufficient control can be found to agree to this standard, the issue must be taken to Operations Manager and the client.
2) Geodetic control stations may be used as final control for data processing if they meet the standards described in point 1d. In this case, the published coordinates shall be used unless special circumstances dictate otherwise.
3) Where projects use multiple control points for flight data processing, in addition to meeting the requirements of point 1, the flight control points must also be shown to tie to each other within the same specification (1d).

Note: Even if all control stations are published, they must still be tied in order to validate the coordinates.

Typical collection parameters are defined as 6 satellites, PDOP of less than 4 and low geomagnetic activity. Under these conditions, the formula of 20 minutes plus 3 minutes per baseline kilometre shall be set as the minimum for each

observation.  Additional time shall be observed where the collection requirements cannot be met and/or obstructions are present.

## CORS for GPS Control Network Observations

COR or CAC Stations may be used to supplement ground-based control but shall not be used exclusively.  CORS shall not be relied upon to provide flight control (even if they do log at 1 second) since there is no guarantee that the station(s) are operational.
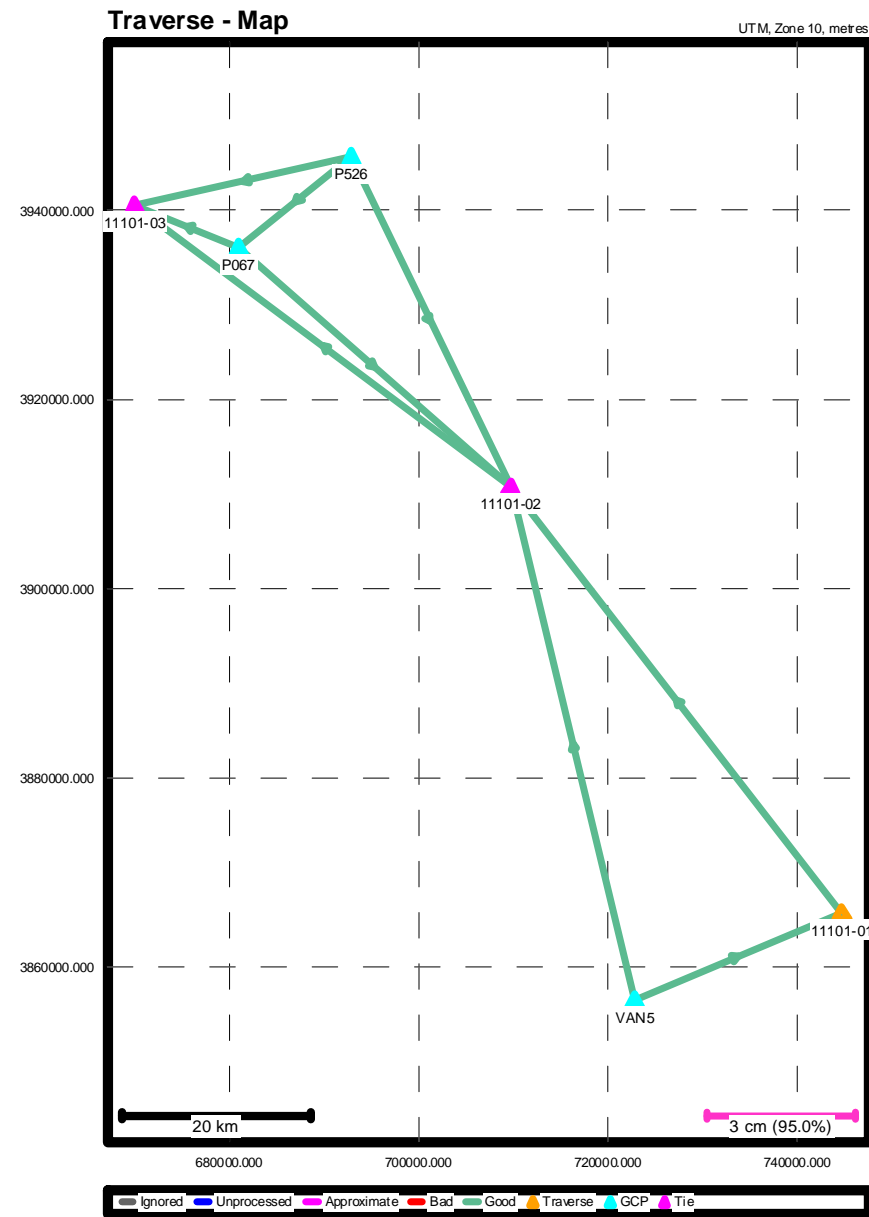
**Traverse - Map**

UTM, Zone 10, metres

```
                 **************************************************
                 * NETWORK - WEIGHTED GPS NETWORK ADJUSTMENT      *
                 *                                                *
                 * (c) Copyright NovAtel Inc., (2007)             *
                 *                                                *
                 * Version: 7.80.2517                             *
                 *                                                *
                 * FILE: C:\Projects\11101U Metro\2_Operations\4_Control\Grafnet Project\
         11101U Metro Eng Fully Constrained.net
                 **************************************************

DATE(m/d/y): Wed.   3/23/11   TIME: 18:32:26




****************************************************************
  DATUM:             'WGS84'
  GRID:              UTM, Zone 10
  SCALE_FACTOR:      35.5000
  CONFIDENCE LEVEL: 95.00 %   (Scale factor is 2.4479)


****************************************************************
    INPUT CONTROL/CHECK POINTS
****************************************************************

STA_ID      TYPE    -- LATITUDE --  -- LONGITUDE --  ELLHGT -   HZ-SD   V-SD
P067        GCP-3D  35 33 06.29871 -121 00 10.63994    107.107 0.01000 0.01000
P526        GCP-3D  35 38 09.49949 -120 52 11.03569    416.947 0.01000 1.00000
VAN5        GCP-3D  34 49 35.80420 -120 33 48.61384     99.157 0.01000 0.01000


****************************************************************
    INPUT VECTORS
****************************************************************

SESSION NAME            VECTOR(m)   ------ Covariance (m) [unscaled] ------
                         DX/DY/DZ          standard deviations in brackets
11101-01 to 11101-02 (1) -15775.3215  2.7220e-006 (0.0016)
                         39891.6001  2.7613e-006 5.8255e-006 (0.0024)
                         37529.8891 -1.4857e-006 -2.5593e-006 3.2396e-006 (0.0018)

11101-01 to 11101-02 (2) -15775.3401  1.4906e-006 (0.0012)
                         39891.5927  1.5300e-006 3.2338e-006 (0.0018)
                         37529.9098 -9.0042e-007 -1.5106e-006 2.1267e-006 (0.0015)

11101-02 to 11101-03 (1) -24391.5352  1.2358e-006 (0.0011)
                         35448.7822  1.2879e-006 2.6506e-006 (0.0016)
                         24872.7297 -7.4673e-007 -1.2496e-006 1.6527e-006 (0.0013)

11101-02 to 11101-03 (2) -24391.5070  5.1003e-007 (0.0007)
                         35448.8019  5.0146e-007 1.1079e-006 (0.0011)
                         24872.6912 -3.1010e-007 -5.5745e-007 7.5189e-007 (0.0009)

P067 to 11101-02 (1)    16486.1413  1.9048e-006 (0.0014)
                        -27342.0038  1.9536e-006 3.7087e-006 (0.0019)
                        -21104.6698 -1.2172e-006 -1.7521e-006 2.3583e-006 (0.0015)

P067 to 11101-02 (2)    16486.1329  6.8695e-006 (0.0026)
                        -27342.0095  6.2136e-006 1.0506e-005 (0.0032)
                        -21104.6679 -2.8389e-006 -4.3553e-006 7.1939e-006 (0.0027)
```

```
P067 to 11101-03 (1)  -7905.3704  1.3439e-006 (0.0012)
                        8106.7889  1.4094e-006 2.5099e-006 (0.0016)
                        3768.0233  -8.3328e-007 -1.2131e-006 1.5818e-006 (0.0013)

P067 to 11101-03 (2)  -7905.3758  2.2612e-007 (0.0005)
                        8106.7867  2.1843e-007 5.0621e-007 (0.0007)
                        3768.0250  -1.4140e-007 -2.6206e-007 3.5404e-007 (0.0006)

P526 to 11101-02 (1)   3463.4543  6.9563e-006 (0.0026)
                      -25584.2736  6.2920e-006 1.0638e-005 (0.0033)
                      -28883.9367  -2.8748e-006 -4.4103e-006 7.2847e-006 (0.0027)

P526 to 11101-02 (2)   3463.4634  8.3384e-006 (0.0029)
                      -25584.2715  7.3197e-006 1.3957e-005 (0.0037)
                      -28883.9380  -5.4822e-006 -6.9209e-006 1.4506e-005 (0.0038)

P526 to 11101-03 (1)  -20928.0470  2.9372e-006 (0.0017)
                        9864.5316  2.5094e-006 5.0896e-006 (0.0023)
                       -4011.2399  -1.4682e-006 -2.5456e-006 4.6605e-006 (0.0022)

P526 to 11101-03 (2)  -20928.0460  5.7619e-006 (0.0024)
                        9864.5255  5.2119e-006 7.9428e-006 (0.0028)
                       -4011.2433  -4.2134e-006 -7.0238e-006 8.3379e-006 (0.0029)

P526 to P067 (1)      -13022.6814  2.6003e-006 (0.0016)
                        1757.7319  1.8950e-006 3.7892e-006 (0.0019)
                       -7779.2638  -1.7970e-006 -1.6331e-006 2.9697e-006 (0.0017)

P526 to P067 (2)      -13022.6746  2.3696e-006 (0.0015)
                        1757.7437  2.0430e-006 4.6036e-006 (0.0021)
                       -7779.2708  -1.8797e-006 -2.2179e-006 3.3266e-006 (0.0018)

VAN5 to 11101-01 (1)   21600.6632  2.8628e-005 (0.0054)
                       -6925.6554  2.4466e-005 3.2310e-005 (0.0057)
                        7118.5039  -1.7411e-005 -2.4275e-005 4.3636e-005 (0.0066)

VAN5 to 11101-02 (1)    5825.3578  3.5572e-005 (0.0060)
                       32965.9500  2.2084e-005 3.0225e-005 (0.0055)
                       44648.3693  -1.5320e-005 -1.6990e-005 1.6568e-005 (0.0041)

VAN5 to 11101-02 (2)    5825.3402  1.1117e-006 (0.0011)
                       32965.9344  1.0889e-006 2.2260e-006 (0.0015)
                       44648.3808  -6.7284e-007 -1.0937e-006 1.5718e-006 (0.0013)
```

```
****************************************************************
    OUTPUT VECTOR RESIDUALS (East, North, Height - Local Level)
****************************************************************
```

| SESSION NAME | -- RE -- (m) | -- RN -- (m) | -- RH -- (m) | - PPM - | DIST (km) | - STD - (m) |
|---|---|---|---|---|---|---|
| 11101-01 to 11101-02 (1) | -0.0073 | 0.0033 | 0.0160 | 0.314 | 57.0 | 0.0205 |
| 11101-01 to 11101-02 (2) | 0.0050 | -0.0045 | -0.0088 | 0.194 | 57.0 | 0.0156 |
| 11101-02 to 11101-03 (1) | 0.0096 | -0.0117 | -0.0340 | 0.749 | 49.7 | 0.0140 |
| 11101-02 to 11101-03 (2) | -0.0044 | 0.0015 | 0.0139 | 0.295 | 49.7 | 0.0092 |
| P067 to 11101-02 (1) | 0.0023 | -0.0047 | -0.0006 | 0.136 | 38.3 | 0.0168 |
| P067 to 11101-02 (2) | 0.0066 | -0.0009 | -0.0092 | 0.297 | 38.3 | 0.0295 |
| P067 to 11101-03 (1) | -0.0027 | 0.0012 | 0.0039 | 0.413 | 11.9 | 0.0139 |
| P067 to 11101-03 (2) | 0.0007 | 0.0025 | -0.0009 | 0.230 | 11.9 | 0.0062 |
| P526 to 11101-02 (1) | 0.0079 | -0.0036 | -0.0096 | 0.334 | 38.7 | 0.0297 |
| P526 to 11101-02 (2) | 0.0012 | -0.0063 | -0.0036 | 0.189 | 38.7 | 0.0361 |
| P526 to 11101-03 (1) | 0.0003 | -0.0101 | 0.0058 | 0.495 | 23.5 | 0.0212 |
| P526 to 11101-03 (2) | -0.0037 | -0.0045 | 0.0039 | 0.301 | 23.5 | 0.0280 |
| P526 to P067 (1) | 0.0017 | -0.0039 | -0.0073 | 0.554 | 15.3 | 0.0182 |
| P526 to P067 (2) | 0.0019 | -0.0062 | 0.0078 | 0.665 | 15.3 | 0.0191 |

```
VAN5 to 11101-01 (1)        0.0063    -0.0209   -0.0148    1.108  23.8  0.0609
VAN5 to 11101-02 (1)       -0.0121    -0.0054    0.0252    0.511  55.8  0.0541
VAN5 to 11101-02 (2)       -0.0049    -0.0021    0.0003    0.096  55.8  0.0132
                         -------------------------------
                  RMS      0.0056     0.0073    0.0131
```

$ - This session is flagged as a 3-sigma outlier


```
****************************************************************
   CONTROL POINT RESIDUALS (ADJUSTMENT MADE)
****************************************************************

STA. NAME      -- RE --    -- RN --    -- RH --
                (m)         (m)         (m)
P067           0.0169      0.0547     -0.0008
P526           0.0110     -0.0427      0.0193
VAN5          -0.0280     -0.0118      0.0007
              -------------------------------
RMS            0.0199      0.0406      0.0111
```


```
****************************************************************
   OUTPUT STATION COORDINATES (LAT/LONG/HT)
****************************************************************

STA_ID      -- LATITUDE --   -- LONGITUDE --  - ELLHGT -
11101-01    34 54 17.59555  -120 19 17.26742     87.6547
11101-02    35 19 05.78927  -120 41 33.66284    109.4626
11101-03    35 35 39.82494  -121 07 25.69684    -31.3512
P067        35 33 06.30048  -121 00 10.63927    107.1062
P526        35 38 09.49810  -120 52 11.03525    416.9662
VAN5        34 49 35.80381  -120 33 48.61494     99.1577
```


```
****************************************************************
   OUTPUT STATION COORDINATES (GRID)
****************************************************************

STA_ID      - EASTING -    - NORTHING -   - ELLHGT -
                (m)            (m)            (m)
11101-01    744734.4248    3865770.3675      87.6547
11101-02    709746.8389    3910781.7883     109.4626
11101-03    669968.5445    3940582.6371     -31.3512
P067        681013.9015    3936067.5012     107.1062
P526        692888.8679    3945663.4029     416.9662
VAN5        722825.7971    3856521.9995      99.1577
```


```
****************************************************************
   OUTPUT VARIANCE/COVARIANCE
****************************************************************
                                              2
STA_ID      SE/SN/SUP  --------- CX matrix (m )-----------
            (95.00 %)  (not scaled by confidence level)
             (m)          (ECEF, XYZ cartesian)
11101-01     0.0173  7.9195e-005
             0.0195  4.7382e-005 1.2686e-004
             0.0337  -2.9290e-005 -4.8298e-005 9.6976e-005

11101-02     0.0150  4.7140e-005
             0.0156  1.5522e-005 6.2678e-005
             0.0227  -1.0818e-005 -1.7880e-005 5.4055e-005
```

```
11101-03        0.0149  4.5872e-005
                0.0153  1.4233e-005 6.0534e-005
                0.0223  -1.0330e-005 -1.7509e-005 5.3008e-005

P067            0.0148  4.3342e-005
                0.0152  1.0956e-005 5.4730e-005
                0.0208  -8.2160e-006 -1.3356e-005 4.8953e-005

P526            0.0152  5.7494e-005
                0.0156  2.9581e-005 8.3961e-005
                0.0283  -2.3741e-005 -3.6570e-005 7.0745e-005

VAN5            0.0157  4.7843e-005
                0.0165  1.0449e-005 5.7788e-005
                0.0208  -6.2192e-006 -1.0346e-005 5.3208e-005
```

```
****************************************************************
    VARIANCE FACTOR = 1.0033

    Note: Values < 1.0 indicate statistics are pessimistic, while
          values > 1.0 indicate optimistic statistics. Entering this
          value as the network adjustment scale factor will bring
          variance factor to one.
****************************************************************
```

## Traverse - Map

4070000.000

4060000.000

4050000.000

MTRYairp

4040000.000

P171

4030000.000

4020000.000

P210

11101-04

10 km

3 cm (95.0%)

590000.000        600000.000        610000.000        620000.000

Ignored   Unprocessed   Approximate   Bad   Good   GCP   Tie
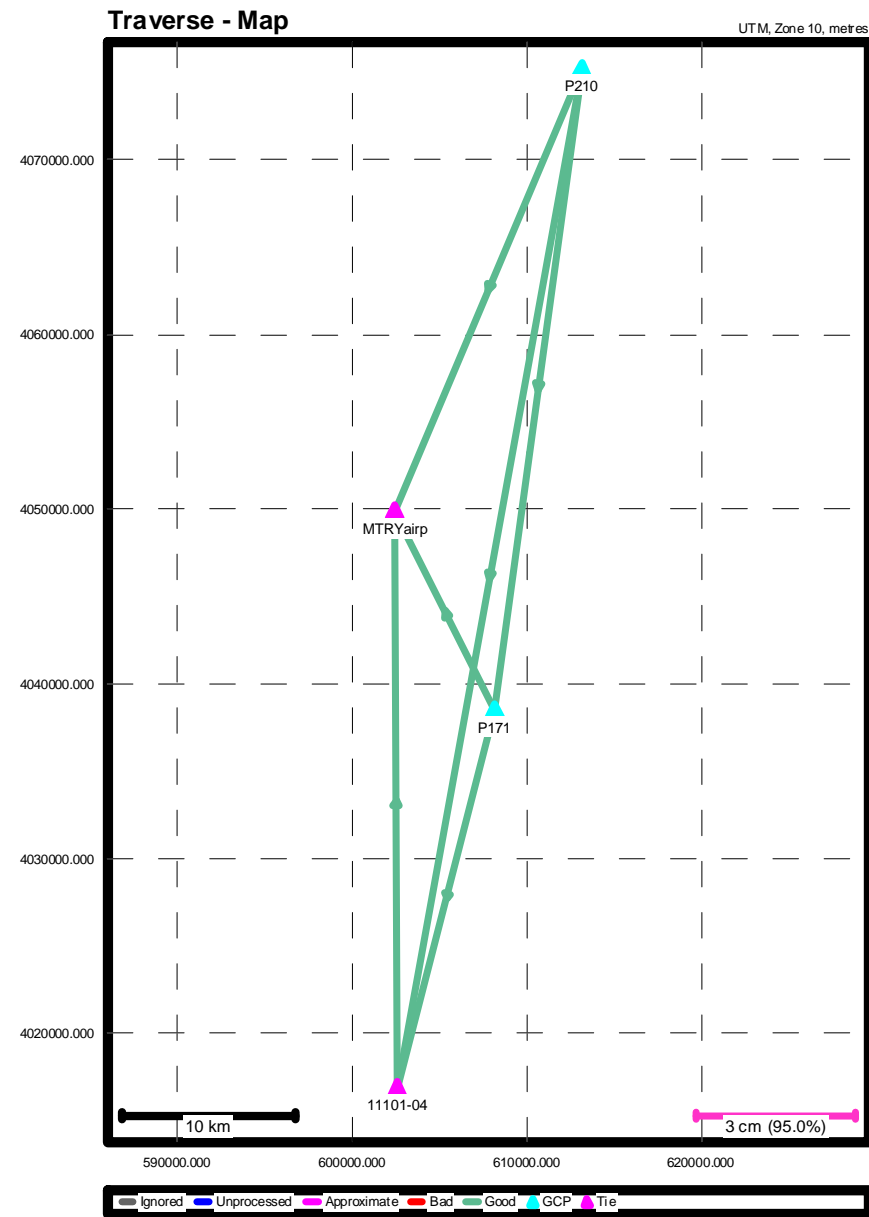
```
              ****************************************************
              * NETWORK - WEIGHTED GPS NETWORK ADJUSTMENT       *
              *                                                 *
              * (c) Copyright NovAtel Inc., (2007)              *
              *                                                 *
              * Version: 7.80.2517                              *
              *                                                 *
              * FILE: C:\Projects\11101U Metro\2_Operations\4_Control\Grafnet Project\
11101U Big Sur Fully Constrained.net
              ****************************************************

DATE(m/d/y): Fri.   4/29/11   TIME: 10:43:35




****************************************************************

  DATUM:            'WGS84'
  GRID:             UTM, Zone 10
  SCALE_FACTOR:     38.5000
  CONFIDENCE LEVEL: 95.00 %   (Scale factor is 2.4479)


****************************************************************
    INPUT CONTROL/CHECK POINTS
****************************************************************

STA_ID      TYPE     -- LATITUDE --  -- LONGITUDE --  ELLHGT -   HZ-SD   V-SD
P171        GCP-3D  36 29 07.87672 -121 47 33.04784    572.846 0.01000 0.01000
P210        GCP-3D  36 48 58.08639 -121 43 54.61222      3.134 0.01000 0.01000


****************************************************************
    INPUT VECTORS
****************************************************************

SESSION NAME            VECTOR(m)   ------ Covariance (m) [unscaled] ------
                         DX/DY/DZ           standard deviations in brackets
11101-04 to MTRYairp (1) 10573.6525  8.6747e-007 (0.0009)
                         16519.1757  8.4664e-007 1.6963e-006 (0.0013)
                         26595.2079  -5.2549e-007 -8.4713e-007 1.1578e-006 (0.0011)

11101-04 to MTRYairp (2) 10573.6789  2.1757e-006 (0.0015)
                         16519.1975  2.3037e-006 4.5771e-006 (0.0021)
                         26595.2159  -1.5738e-006 -2.4834e-006 3.4072e-006 (0.0018)

P171 to 11101-04 (1)    -11476.0758  6.0776e-007 (0.0008)
                         -7407.5830  5.9401e-007 1.1855e-006 (0.0011)
                        -17725.1269  -3.6233e-007 -5.8257e-007 8.0060e-007 (0.0009)

P171 to MTRYairp (1)     -902.4228  9.2143e-007 (0.0010)
                         9111.5942  8.2385e-007 1.4227e-006 (0.0012)
                         8870.0812  -4.6288e-007 -8.2007e-007 1.1280e-006 (0.0011)

P210 to 11101-04 (1)    -27858.7740  1.4136e-006 (0.0012)
                        -23561.8001  1.3778e-006 2.7453e-006 (0.0017)
                        -46821.1052  -8.4657e-007 -1.3594e-006 1.8852e-006 (0.0014)

P210 to MTRYairp (1)    -17285.1221  7.3897e-007 (0.0009)
                         -7042.6262  7.1856e-007 1.4514e-006 (0.0012)
                        -20225.8954  -4.5299e-007 -7.3290e-007 1.0155e-006 (0.0010)

P210 to P171 (1)        -16382.7040  3.1094e-007 (0.0006)
```

```
                       -16154.2221  2.9375e-007 6.3381e-007 (0.0008)
                       -29095.9757  -1.9608e-007 -3.4067e-007 4.8979e-007 (0.0007)




****************************************************************
   OUTPUT VECTOR RESIDUALS (East, North, Height - Local Level)
****************************************************************

SESSION NAME                 -- RE --   -- RN --   -- RH --    - PPM -   DIST - STD -
                             (m)        (m)        (m)                   (km)   (m)
11101-04 to MTRYairp (1)      0.0024     0.0051    -0.0043     0.214    33.0  0.0120
11101-04 to MTRYairp (2)     -0.0085    -0.0206     0.0171     0.851    33.0  0.0198
P171 to 11101-04 (1)         -0.0003    -0.0003    -0.0011     0.052    22.4  0.0100
P171 to MTRYairp (1)          0.0024     0.0037    -0.0041     0.473    12.7  0.0116
P210 to 11101-04 (1)         -0.0021    -0.0047     0.0078     0.157    59.4  0.0153
P210 to MTRYairp (1)         -0.0001    -0.0001     0.0009     0.032    27.5  0.0111
P210 to P171 (1)              0.0006    -0.0022     0.0013     0.071    37.1  0.0074
                             -----------------------------
              RMS             0.0036     0.0084     0.0075

 $ - This session is flagged as a 3-sigma outlier




****************************************************************
   CONTROL POINT RESIDUALS (ADJUSTMENT MADE)
****************************************************************

STA. NAME     -- RE --   -- RN --   -- RH --
              (m)        (m)        (m)
P171          -0.0003     0.0366    -0.0066
P210           0.0002    -0.0366     0.0064
              -------------------------------
RMS            0.0002     0.0366     0.0065




****************************************************************
   OUTPUT STATION COORDINATES (LAT/LONG/HT)
****************************************************************

STA_ID     -- LATITUDE --   -- LONGITUDE -- - ELLHGT -
11101-04   36 17 27.37973 -121 51 27.55059    -4.2576
MTRYairp   36 35 19.40194 -121 51 17.01625    15.5212
P171       36 29 07.87790 -121 47 33.04785   572.8394
P210       36 48 58.08520 -121 43 54.61221     3.1404




****************************************************************
   OUTPUT STATION COORDINATES (GRID)
****************************************************************

STA_ID      - EASTING -   - NORTHING - - ELLHGT -
              (m)           (m)          (m)
11101-04   602579.5807  4016823.9155    -4.2576
MTRYairp   602450.1066  4049860.0072    15.5212
P171       608159.2866  4038479.8391   572.8394
P210       613109.9170  4075226.1104     3.1404




****************************************************************
   OUTPUT VARIANCE/COVARIANCE
****************************************************************
```

```
                                          2
STA_ID      SE/SN/SUP  --------- CX matrix (m )-----------
            (95.00 %)  (not scaled by confidence level)
              (m)           (ECEF, XYZ cartesian)
11101-04    0.0181  6.1699e-005
            0.0186  1.1416e-005 7.2680e-005
            0.0229  -7.0387e-006 -1.1359e-005 6.5655e-005

MTRYairp    0.0180  6.1300e-005
            0.0185  1.0744e-005 7.0435e-005
            0.0226  -6.5625e-006 -1.0900e-005 6.4968e-005

P171        0.0175  5.2011e-005
            0.0176  1.7972e-006 5.3868e-005
            0.0184  -1.1459e-006 -1.9670e-006 5.2988e-005

P210        0.0175  5.2011e-005
            0.0176  1.7972e-006 5.3868e-005
            0.0184  -1.1459e-006 -1.9670e-006 5.2988e-005




****************************************************************
    VARIANCE FACTOR = 1.0009

    Note: Values < 1.0 indicate statistics are pessimistic, while
          values > 1.0 indicate optimistic statistics. Entering this
          value as the network adjustment scale factor will bring
          variance factor to one.
****************************************************************
```

## Traverse - Map
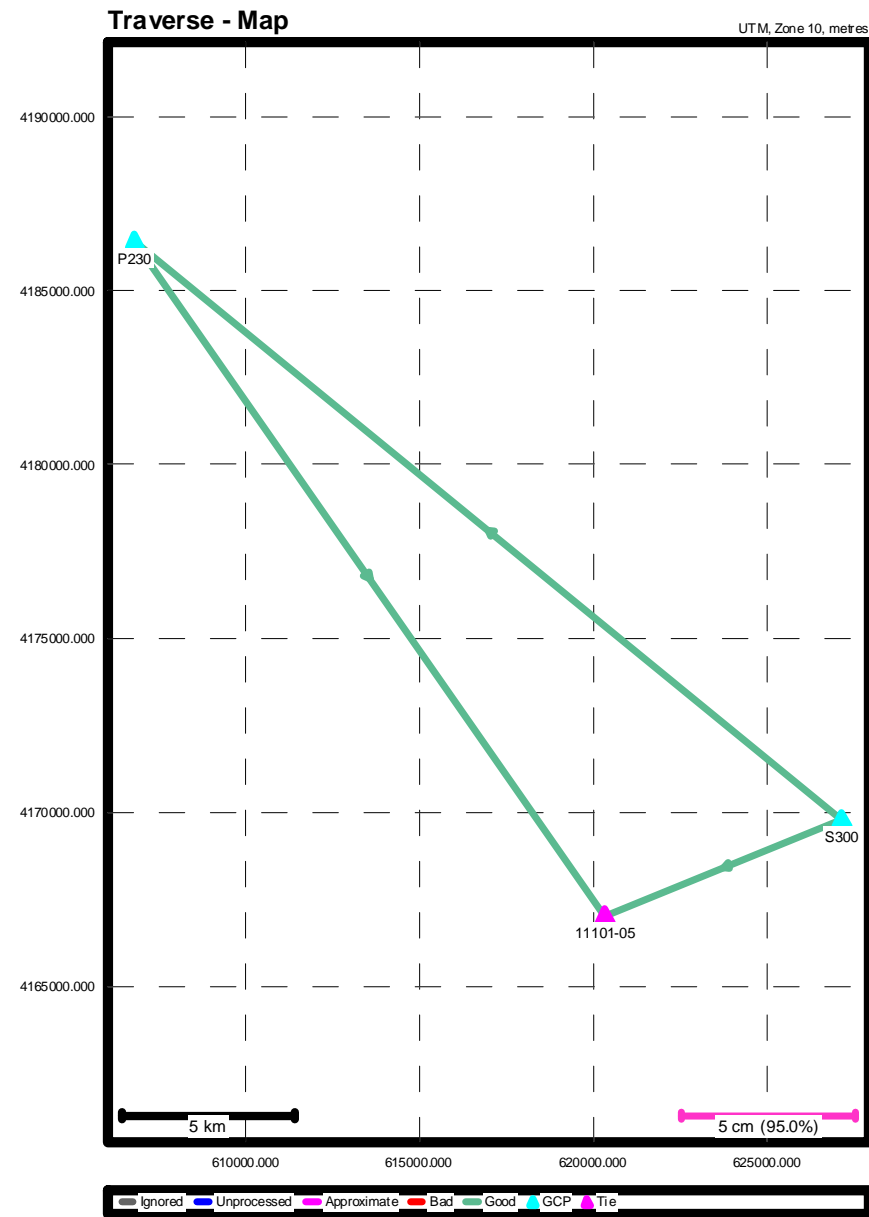
```
                  **************************************************
                  * NETWORK - WEIGHTED GPS NETWORK ADJUSTMENT      *
                  *                                                *
                  * (c) Copyright NovAtel Inc., (2007)             *
                  *                                                *
                  * Version: 7.80.2517                             *
                  *                                                *
                  * FILE: C:\Projects\11101U Metro\2_Operations\4_Control\Grafnet Project\
11101U Livermore Fully Constrained.net
                  **************************************************

DATE(m/d/y): Tue.   4/12/11   TIME: 22:20:35




****************************************************************
   DATUM:            'WGS84'
   GRID:             UTM, Zone 10
   SCALE_FACTOR:     7.0400
   CONFIDENCE LEVEL: 95.00 %   (Scale factor is 2.4479)


****************************************************************
    INPUT CONTROL/CHECK POINTS
****************************************************************

STA_ID      TYPE   -- LATITUDE --  -- LONGITUDE --  ELLHGT -   HZ-SD   V-SD
P230        GCP-3D 37 49 08.27384 -121 47 11.02638   648.093 0.01000 0.01000
S300        GCP-3D 37 39 59.42742 -121 33 29.75530   495.890 0.01000 0.01000


****************************************************************
    INPUT VECTORS
****************************************************************

SESSION NAME           VECTOR(m)    ------ Covariance (m) [unscaled] ------
                        DX/DY/DZ          standard deviations in brackets
P230 to 11101-05 (1)   5114.6551  3.8673e-006 (0.0020)
                     -16955.1377  3.7402e-006 8.1181e-006 (0.0028)
                     -15685.2177  -3.3615e-006 -3.5751e-006 6.4067e-006 (0.0025)

P230 to 11101-05 (2)   5114.6601  5.3669e-006 (0.0023)
                     -16955.1405  5.0920e-006 1.0307e-005 (0.0032)
                     -15685.2222  -3.9406e-006 -7.2095e-006 8.7966e-006 (0.0030)

S300 to 11101-05 (1)  -6623.5175  1.9200e-006 (0.0014)
                       2316.8400  1.8957e-006 4.2028e-006 (0.0021)
                      -2209.9111  -1.5989e-006 -1.7079e-006 2.9966e-006 (0.0017)

S300 to 11101-05 (2)  -6623.5096  1.6420e-006 (0.0013)
                       2316.8441  1.7273e-006 3.0052e-006 (0.0017)
                      -2209.9172  -1.0042e-006 -1.5585e-006 2.2036e-006 (0.0015)

S300 to P230 (1)      -11738.1719  4.2167e-006 (0.0021)
                      19271.9808  3.9312e-006 8.3931e-006 (0.0029)
                      13475.3071  -2.8105e-006 -3.0971e-006 5.5553e-006 (0.0024)

S300 to P230 (2)      -11738.1798  4.5931e-007 (0.0007)
                      19271.9666  4.7960e-007 9.7060e-007 (0.0010)
                      13475.3156  -3.8016e-007 -4.7460e-007 7.7820e-007 (0.0009)
```

```
****************************************************************
    OUTPUT VECTOR RESIDUALS (East, North, Height - Local Level)
****************************************************************

SESSION NAME                 -- RE --    -- RN --    -- RH --    - PPM -   DIST - STD -
                               (m)         (m)         (m)                 (km)   (m)
P230 to 11101-05 (1)          0.0030     -0.0015     -0.0119      0.524    23.7  0.0114
P230 to 11101-05 (2)         -0.0028      0.0019     -0.0090      0.405    23.7  0.0131
S300 to 11101-05 (1)          0.0028     -0.0017     -0.0015      0.485     7.4  0.0080
S300 to 11101-05 (2)         -0.0017     -0.0015      0.0083      1.169     7.4  0.0069
S300 to P230 (1)              0.0009     -0.0023      0.0124      0.483    26.3  0.0113
S300 to P230 (2)              0.0001      0.0009     -0.0056      0.215    26.3  0.0039
                             -------------------------------
               RMS            0.0022      0.0017      0.0089

   $ - This session is flagged as a 3-sigma outlier



****************************************************************
    CONTROL POINT RESIDUALS (ADJUSTMENT MADE)
****************************************************************

STA. NAME     -- RE --    -- RN --    -- RH --
                (m)         (m)         (m)
P230         -0.0218     -0.0161      0.0138
S300          0.0219      0.0161     -0.0138
             -------------------------------
RMS           0.0219      0.0161      0.0138



****************************************************************
    OUTPUT STATION COORDINATES (LAT/LONG/HT)
****************************************************************

STA_ID      -- LATITUDE --   -- LONGITUDE --  - ELLHGT -
11101-05    37 38 33.02236  -121 38 09.41624   331.0066
P230        37 49 08.27331  -121 47 11.02727   648.1068
S300        37 39 59.42794  -121 33 29.75441   495.8761



****************************************************************
    OUTPUT STATION COORDINATES (GRID)
****************************************************************

STA_ID       - EASTING -   - NORTHING - - ELLHGT -
                (m)           (m)          (m)
11101-05    620341.9828  4167026.5183   331.0066
P230        606814.5510  4186422.7987   648.1068
S300        627154.9743  4169792.1130   495.8761



****************************************************************
    OUTPUT VARIANCE/COVARIANCE
****************************************************************
                                        2
STA_ID     SE/SN/SUP  --------- CX matrix (m )-----------
           (95.00 %)  (not scaled by confidence level)
             (m)            (ECEF, XYZ cartesian)
11101-05    0.0176   5.4515e-005
            0.0178   4.6359e-006  5.8898e-005
            0.0198  -3.3918e-006 -4.6555e-006  5.6712e-005
```

```
P230            0.0174  5.0620e-005
                0.0174  6.2875e-007 5.1285e-005
                0.0177  -4.9259e-007 -6.1462e-007 5.1015e-005

S300            0.0174  5.0620e-005
                0.0174  6.2875e-007 5.1285e-005
                0.0177  -4.9259e-007 -6.1462e-007 5.1015e-005



****************************************************************
    VARIANCE FACTOR = 1.0010

    Note: Values < 1.0 indicate statistics are pessimistic, while
          values > 1.0 indicate optimistic statistics. Entering this
          value as the network adjustment scale factor will bring
          variance factor to one.
****************************************************************
```

## Traverse - Map

UTM, Zone 10, metres
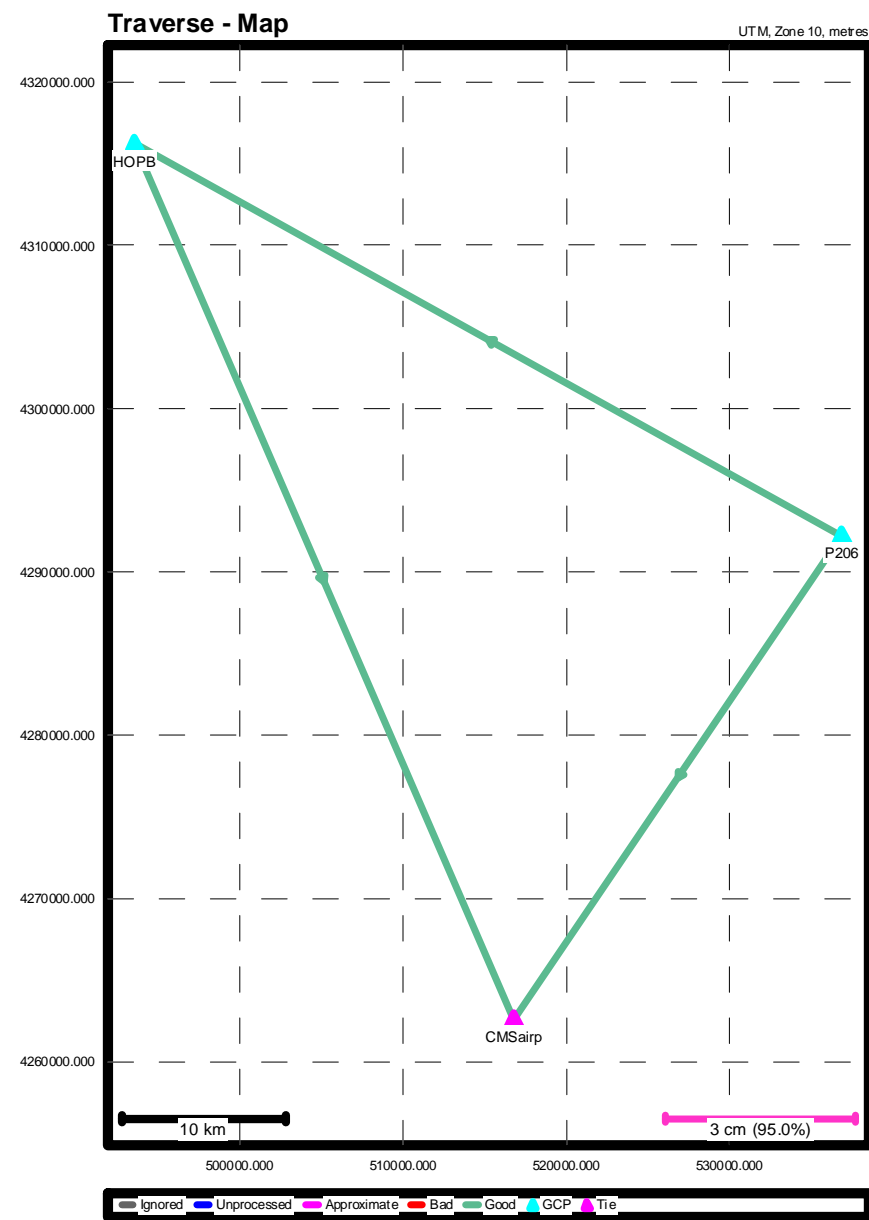
```
              **************************************************
              * NETWORK - WEIGHTED GPS NETWORK ADJUSTMENT      *
              *                                                *
              * (c) Copyright NovAtel Inc., (2007)             *
              *                                                *
              * Version: 7.80.2517                             *
              *                                                *
              * FILE: C:\Projects\11101U Metro\2_Operations\4_Control\Grafnet Project\
11101U Metro Eng Add On Fully Const.net
              **************************************************

DATE(m/d/y): Mon.   5/30/11   TIME: 17:09:34




****************************************************************
   DATUM:            'WGS84'
   GRID:             UTM, Zone 10
   SCALE_FACTOR:     500.0000
   CONFIDENCE LEVEL: 95.00 %   (Scale factor is 2.4479)


****************************************************************
    INPUT CONTROL/CHECK POINTS
****************************************************************

STA_ID     TYPE    -- LATITUDE --  -- LONGITUDE --  ELLHGT -   HZ-SD   V-SD
HOPB       GCP-3D  38 59 42.66142 -123 04 29.00629   353.444 0.01000 0.01000
P206       GCP-3D  38 46 40.13938 -122 34 32.84388   283.717 0.01000 0.01000


****************************************************************
    INPUT VECTORS
****************************************************************

SESSION NAME            VECTOR(m)   ------ Covariance (m) [unscaled] ------
                         DX/DY/DZ          standard deviations in brackets
HOPB to CMSairp (1)     1337.7038   2.0100e-005 (0.0045)
                       -40588.1117  3.1871e-005 7.7713e-005 (0.0088)
                       -42089.1358  -1.8689e-005 -3.1657e-005 2.7322e-005 (0.0052)

HOPB to CMSairp (2)     1337.5388   3.0407e-005 (0.0055)
                       -40588.3554  6.5171e-006 7.6100e-006 (0.0028)
                       -42088.8580  -6.5535e-006 -3.7398e-006 5.2535e-006 (0.0023)

P206 to CMSairp (1)    -26859.1161  1.4267e-004 (0.0119)
                        -4436.0302  2.2584e-004 4.4921e-004 (0.0212)
                       -23260.8980  -2.0630e-004 -3.5626e-004 3.4500e-004 (0.0186)

P206 to HOPB (2)       -28196.5712  1.5793e-005 (0.0040)
                        36152.3526  2.5080e-005 6.1249e-005 (0.0078)
                        18827.8719  -1.4647e-005 -2.4842e-005 2.1392e-005 (0.0046)



****************************************************************
    OUTPUT VECTOR RESIDUALS (East, North, Height - Local Level)
****************************************************************

SESSION NAME              -- RE --   -- RN --   -- RH --     - PPM -   DIST - STD -
                            (m)        (m)        (m)                  (km)   (m)
```

```
HOPB to CMSairp (1)          -0.0060     0.0234     0.3536     6.060   58.5  0.2501
HOPB to CMSairp (2)          -0.0001    -0.0091    -0.0498     0.865   58.5  0.1471
P206 to CMSairp (1)           0.0681    -0.0911    -0.2109     6.692   35.8  0.6844
P206 to HOPB (2)              0.0124    -0.0555    -0.0531     1.569   49.6  0.2218
                          -------------------------------
               RMS            0.0347     0.0548     0.2090
```

 $ - This session is flagged as a 3-sigma outlier

```
*****************************************************************
    CONTROL POINT RESIDUALS (ADJUSTMENT MADE)
*****************************************************************

STA. NAME    -- RE --    -- RN --    -- RH --
              (m)         (m)         (m)
HOPB         0.0001      0.0023      0.0006
P206        -0.0001     -0.0023     -0.0006
          -------------------------------
RMS          0.0001      0.0023      0.0006


*****************************************************************
    OUTPUT STATION COORDINATES (LAT/LONG/HT)
*****************************************************************

STA_ID     -- LATITUDE --   -- LONGITUDE -- - ELLHGT -
CMSairp    38 30 41.57704 -122 48 28.47400     3.7831
HOPB       38 59 42.66149 -123 04 29.00628   353.4445
P206       38 46 40.13930 -122 34 32.84389   283.7164


*****************************************************************
    OUTPUT STATION COORDINATES (GRID)
*****************************************************************

STA_ID      - EASTING -   - NORTHING - - ELLHGT -
               (m)           (m)          (m)
CMSairp    516747.2202   4262592.4239     3.7831
HOPB       493529.0816   4316244.7741   353.4445
P206       536847.7682   4292206.5426   283.7164


*****************************************************************
    OUTPUT VARIANCE/COVARIANCE
*****************************************************************
                                2
STA_ID     SE/SN/SUP  --------- CX matrix (m )-----------
           (95.00 %)  (not scaled by confidence level)
           (m)            (ECEF, XYZ cartesian)
CMSairp     0.0941  2.7004e-003
            0.0805  1.5372e-003 3.3053e-003
            0.1817 -1.3459e-003 -1.4980e-003 2.0647e-003

HOPB        0.0238  9.4562e-005
            0.0240  1.3014e-006 9.8864e-005
            0.0244 -2.1180e-006 -3.9847e-007 9.7202e-005

P206        0.0238  9.4562e-005
            0.0240  1.3014e-006 9.8864e-005
            0.0244 -2.1180e-006 -3.9847e-007 9.7202e-005
```

```
****************************************************************
    VARIANCE FACTOR = 1.1814

    Note: Values < 1.0 indicate statistics are pessimistic, while
          values > 1.0 indicate optimistic statistics. Entering this
          value as the network adjustment scale factor will bring
          variance factor to one.
****************************************************************
```

## Traverse - Map

UTM, Zone 10, metres

4400000.000 — 11101-09

4350000.000 — 11101-08

KT2012

HOPB

11101-07

4300000.000 —

P206

11101-06

PLSB

4250000.000 —

VACAairp

30 km

3 cm (95.0%)

500000.000

550000.000

600000.000

Ignored  Unprocessed  Approximate  Bad  Good  GCP  Tie
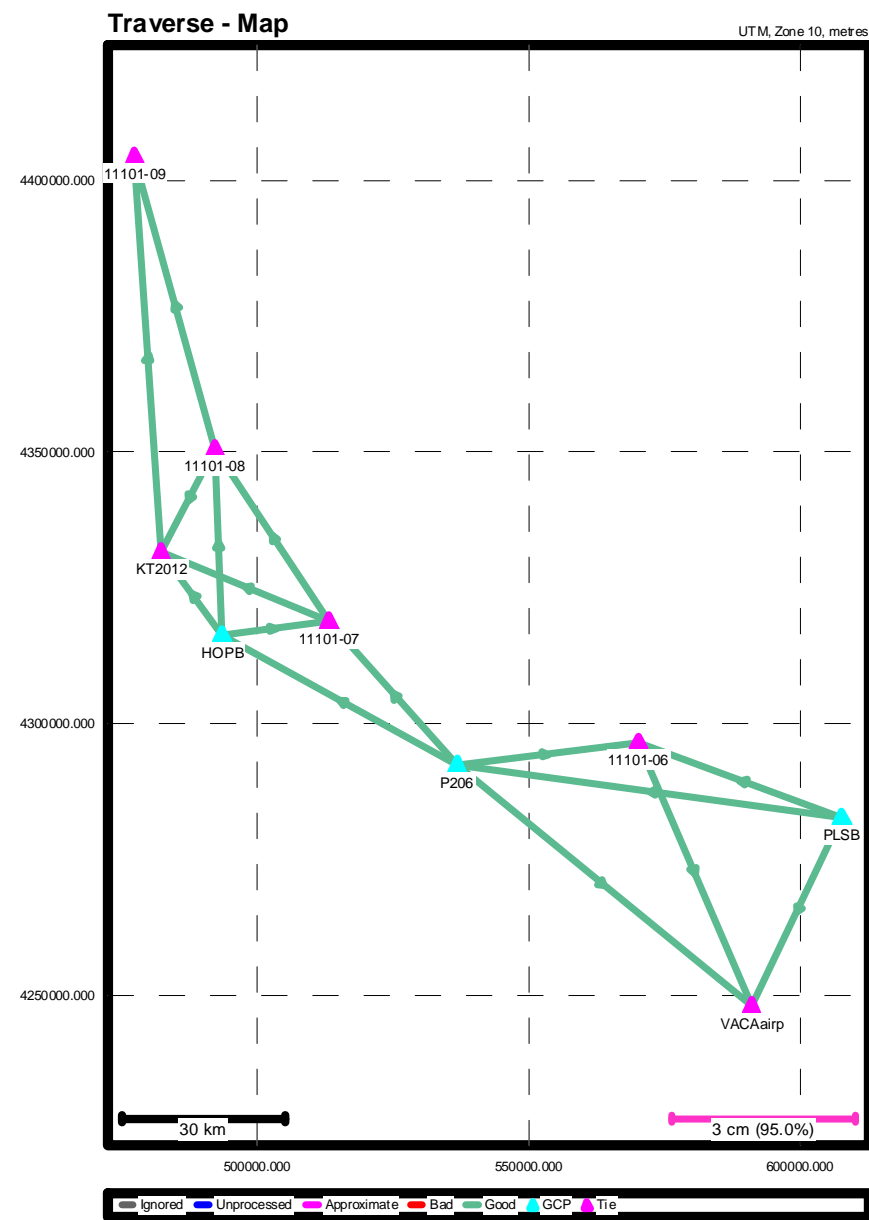
```
               **************************************************
               * NETWORK - WEIGHTED GPS NETWORK ADJUSTMENT       *
               *                                                 *
               * (c) Copyright NovAtel Inc., (2007)              *
               *                                                 *
               * Version: 7.80.2517                              *
               *                                                 *
               * FILE: C:\Projects\11101U Metro\2_Operations\4_Control\Grafnet Project\
11101U Metro North Fully Constrained.net
               **************************************************

DATE(m/d/y): Fri.   5/20/11   TIME: 16:59:58




****************************************************************
   DATUM:            'WGS84'
   GRID:             UTM, Zone 10
   SCALE_FACTOR:     750.0000
   CONFIDENCE LEVEL: 95.00 %   (Scale factor is 2.4479)


****************************************************************
    INPUT CONTROL/CHECK POINTS
****************************************************************

STA_ID      TYPE     -- LATITUDE --  -- LONGITUDE --  ELLHGT -   HZ-SD   V-SD
HOPB        GCP-3D  38 59 42.66142 -123 04 29.00629    353.444 0.01000 0.01000
P206        GCP-3D  38 46 40.13938 -122 34 32.84388    283.717 0.01000 0.01000
PLSB        GCP-3D  38 41 06.14565 -121 45 45.18457     -7.534 0.01000 0.01000


****************************************************************
    INPUT VECTORS
****************************************************************

SESSION NAME            VECTOR(m)   ------ Covariance (m) [unscaled] ------
                         DX/DY/DZ           standard deviations in brackets
11101-06 to VACAairp (1)  1158.2990   4.2949e-007 (0.0007)
                        -36515.8908   4.0422e-007 7.2333e-007 (0.0009)
                        -38126.6874  -3.1638e-007 -4.0355e-007 5.8792e-007 (0.0008)

11101-06 to VACAairp (2)  1158.3023   3.5591e-007 (0.0006)
                        -36515.8861   2.4198e-007 8.5150e-007 (0.0009)
                        -38126.6935  -2.3307e-007 -4.9714e-007 7.5520e-007 (0.0009)

11101-06 to VACAairp (3)  1158.2688   1.0052e-007 (0.0003)
                        -36515.9292   1.0087e-007 2.1026e-007 (0.0005)
                        -38126.6494  -6.0529e-008 -1.0591e-007 1.6116e-007 (0.0004)

11101-07 to 11101-08 (2) -6663.8027   2.0985e-008 (0.0001)
                         28359.8546   1.8601e-008 3.9976e-008 (0.0002)
                         24579.1897  -1.3922e-008 -2.2758e-008 3.6660e-008 (0.0002)

11101-07 to 11101-08 (3) -6663.8133   2.3364e-006 (0.0015)
                         28359.8372   2.5327e-006 3.3343e-006 (0.0018)
                         24579.2028  -1.7162e-006 -2.1660e-006 2.0924e-006 (0.0014)

11101-07 to KT2012 (1) -21368.6771   8.4367e-008 (0.0003)
                         23722.3367   7.4065e-008 1.5420e-007 (0.0004)
                          9805.0450  -5.1422e-008 -8.4067e-008 1.4530e-007 (0.0004)
```

```
11101-07 to KT2012 (3) -21368.6756  5.8290e-008 (0.0002)
                        23722.3687  5.4026e-008 1.1151e-007 (0.0003)
                         9805.0217  -3.4480e-008 -5.6658e-008 8.7352e-008 (0.0003)

11101-08 to 11101-09 (1)  6242.5568  5.5978e-008 (0.0002)
                        36753.4477  5.0079e-008 1.0711e-007 (0.0003)
                        41611.9606  -3.4485e-008 -6.0946e-008 9.6461e-008 (0.0003)

11101-08 to KT2012 (1) -14704.8611  4.5981e-007 (0.0007)
                        -4637.4529  4.4231e-007 5.7302e-007 (0.0008)
                       -14774.2076  -3.3566e-008 -1.4549e-007 3.6304e-007 (0.0006)

11101-08 to KT2012 (2) -14704.8718  4.2276e-008 (0.0002)
                        -4637.4860  3.9076e-008 8.0839e-008 (0.0003)
                       -14774.1660  -2.5021e-008 -4.1342e-008 6.3996e-008 (0.0003)

11101-08 to KT2012 (3) -14704.8701  2.5776e-007 (0.0005)
                        -4637.4649  2.0161e-007 3.4774e-007 (0.0006)
                       -14774.1893  -1.0623e-007 -1.3353e-007 2.4072e-007 (0.0005)

HOPB to 11101-07 (2)  17329.9633  9.5982e-007 (0.0010)
                        -9421.7346  9.7012e-007 1.7361e-006 (0.0013)
                         1920.0428  -6.9563e-007 -9.2013e-007 1.3639e-006 (0.0012)

HOPB to 11101-07 (1)  17329.9816  2.9706e-007 (0.0005)
                        -9421.7183  2.6385e-007 5.4760e-007 (0.0007)
                         1920.0426  -1.8427e-007 -3.0575e-007 5.0024e-007 (0.0007)

HOPB to 11101-07 (3)  17329.9672  3.6910e-007 (0.0006)
                        -9421.7288  3.5797e-007 7.5459e-007 (0.0009)
                         1920.0446  -2.1737e-007 -3.7112e-007 5.7489e-007 (0.0008)

HOPB to 11101-08 (1)  10666.1579  7.4087e-007 (0.0009)
                        18938.0592  6.3924e-007 1.2213e-006 (0.0011)
                        26499.2036  -4.6090e-007 -6.7030e-007 1.1606e-006 (0.0011)

HOPB to KT2012 (1)    -4038.6546  4.0924e-007 (0.0006)
                        14300.5877  3.9102e-007 8.4429e-007 (0.0009)
                        11725.0702  -2.1910e-007 -4.4232e-007 7.2359e-007 (0.0009)

HOPB to KT2012 (2)    -4038.6655  4.0595e-007 (0.0006)
                        14300.5928  3.7478e-007 7.9368e-007 (0.0009)
                        11725.0454  -2.2512e-007 -4.0517e-007 6.4107e-007 (0.0008)

KT2012 to 11101-09 (3) 20947.4359  1.5964e-005 (0.0040)
                        41390.9222  1.2772e-005 2.3604e-005 (0.0049)
                        56386.1378  -3.7302e-006 -1.1113e-005 1.2740e-005 (0.0036)

P206 to 11101-06 (1)  29581.3671  4.2483e-006 (0.0021)
                       -15627.2330  2.9444e-006 5.0194e-006 (0.0022)
                         2968.6840  -1.9338e-006 -4.0600e-006 7.3517e-006 (0.0027)

P206 to 11101-06 (2)  29581.3720  5.5392e-006 (0.0024)
                       -15627.2408  4.0281e-006 7.6258e-006 (0.0028)
                         2968.6820  -3.8792e-006 -3.6656e-006 6.3452e-006 (0.0025)

P206 to 11101-06 (3)  29581.3820  1.3326e-006 (0.0012)
                       -15627.2217  1.2829e-006 2.5098e-006 (0.0016)
                         2968.6640  -7.8531e-007 -1.2579e-006 1.9086e-006 (0.0014)

P206 to 11101-07 (1) -10866.6129  7.4625e-007 (0.0009)
                        26730.6453  6.6228e-007 1.5256e-006 (0.0012)
                        20747.9264  -4.5298e-007 -8.1632e-007 1.3835e-006 (0.0012)

P206 to 11101-07 (2) -10866.5887  2.6245e-006 (0.0016)
                        26730.6816  2.6191e-006 4.7967e-006 (0.0022)
                        20747.9018  -1.8862e-006 -2.6998e-006 4.0179e-006 (0.0020)
```

```
P206 to 11101-07 (3)  -10866.5932  1.1286e-006 (0.0011)
                       26730.6790  1.0786e-006  2.2822e-006 (0.0015)
                       20747.9044  -6.7924e-007  -1.1528e-006  1.8509e-006 (0.0014)

P206 to HOPB (1)       -28196.5597  6.8725e-006 (0.0026)
                       36152.4017  5.7097e-006  9.1176e-006 (0.0030)
                       18827.8778  -5.7859e-006  -5.1615e-006  1.1500e-005 (0.0034)

P206 to HOPB (2)       -28196.5541  1.2539e-006 (0.0011)
                       36152.3465  9.3772e-007  1.9795e-006 (0.0014)
                       18827.8520  -7.1753e-007  -7.7678e-007  2.1857e-006 (0.0015)

P206 to VACAairp (1)   30739.6803  9.1183e-007 (0.0010)
                       -52143.1023  8.3474e-007  1.8843e-006 (0.0014)
                       -35158.0388  -5.9332e-007  -1.0635e-006  1.6351e-006 (0.0013)

P206 to VACAairp (2)   30739.6623  2.1307e-006 (0.0015)
                       -52143.1389  2.0519e-006  3.9228e-006 (0.0020)
                       -35157.9982  -1.3548e-006  -2.0151e-006  2.9840e-006 (0.0017)

PLSB to 11101-06 (2)  -26967.0961  1.3325e-007 (0.0004)
                       27284.8794  1.2184e-007  2.8337e-007 (0.0005)
                       11185.4005  -9.1987e-008  -1.4510e-007  2.4618e-007 (0.0005)

PLSB to 11101-06 (1)  -26967.0828  3.4083e-006 (0.0018)
                       27284.8915  2.3840e-006  4.0711e-006 (0.0020)
                       11185.3949  -1.5842e-006  -3.3119e-006  5.9374e-006 (0.0024)

PLSB to 11101-06 (3)  -26967.0680  1.0215e-007 (0.0003)
                       27284.9177  9.9865e-008  1.9833e-007 (0.0004)
                       11185.3629  -6.0486e-008  -9.8809e-008  1.4532e-007 (0.0004)

PLSB to P206 (1)      -56548.4660  1.2320e-006 (0.0011)
                       42912.1150  1.1636e-006  2.5322e-006 (0.0016)
                        8216.7291  -8.1355e-007  -1.3961e-006  2.1261e-006 (0.0015)

PLSB to P206 (2)      -56548.4599  1.5917e-006 (0.0013)
                       42912.1259  1.5190e-006  3.0627e-006 (0.0018)
                        8216.7112  -1.0328e-006  -1.5816e-006  2.4575e-006 (0.0016)

PLSB to VACAairp (1)  -25808.7993  1.9535e-006 (0.0014)
                       -9231.0263  1.2436e-006  3.9789e-006 (0.0020)
                       -26941.2631  -9.8013e-007  -1.8417e-006  4.2411e-006 (0.0021)

PLSB to VACAairp (2)  -25808.7937  7.4367e-008 (0.0003)
                       -9231.0068  7.2157e-008  1.3962e-007 (0.0004)
                       -26941.2924  -4.6894e-008  -7.1186e-008  1.0486e-007 (0.0003)
```

```
****************************************************************
   OUTPUT VECTOR RESIDUALS (East, North, Height - Local Level)
****************************************************************
```

| SESSION NAME | -- RE --<br>(m) | -- RN --<br>(m) | -- RH --<br>(m) | - PPM - | DIST -<br>(km) | STD -<br>(m) |
|---|---|---|---|---|---|---|
| 11101-06 to VACAairp (1) | -0.0030 | -0.0001 | 0.0339 | 0.644 | 52.8 | 0.0361 |
| 11101-06 to VACAairp (2) | -0.0033 | 0.0010 | 0.0422 | 0.801 | 52.8 | 0.0384 |
| 11101-06 to VACAairp (3) | 0.0022 | 0.0004 | -0.0278 | 0.529 | 52.8 | 0.0188 |
| 11101-07 to 11101-08 (2) | 0.0042 | -0.0021 | 0.0075 | 0.232 | 38.1 | 0.0086 |
| 11101-07 to 11101-08 (3) | 0.0037 | 0.0007 | -0.0165 | 0.445 | 38.1 | 0.0763 |
| 11101-07 to KT2012 (1) | -0.0090 | -0.0029 | -0.0330 | 1.028 | 33.4 | 0.0170 |
| 11101-07 to KT2012 (3) | 0.0072 | -0.0022 | 0.0031 | 0.243 | 33.4 | 0.0139 |
| 11101-08 to 11101-09 (1) | 0.0001 | -0.0000 | 0.0000 | 0.001 | 55.9 | 0.0140 |
| 11101-08 to KT2012 (1) | 0.0111 | 0.0089 | 0.0471 | 2.304 | 21.4 | 0.0324 |

```
11101-08 to KT2012 (2)      0.0019   -0.0021   -0.0053    0.281   21.4   0.0118
11101-08 to KT2012 (3)      0.0121    0.0042    0.0239    1.271   21.4   0.0252
HOPB to 11101-07 (2)        0.0198    0.0060   -0.0027    1.053   19.8   0.0552
HOPB to 11101-07 (1)        0.0133   -0.0088    0.0158    1.133   19.8   0.0318
HOPB to 11101-07 (3)        0.0196    0.0002    0.0016    0.995   19.8   0.0357
HOPB to 11101-08 (1)       -0.0069    0.0595   -0.0175    1.820   34.3   0.0484
HOPB to KT2012 (1)         -0.0468    0.0040   -0.0088    2.524   18.9   0.0385
HOPB to KT2012 (2)         -0.0348    0.0243    0.0054    2.261   18.9   0.0372
KT2012 to 11101-09 (3)     -0.0143   -0.0030   -0.0062    0.217   73.0   0.1981
P206 to 11101-06 (1)       -0.0081    0.0463    0.0011    1.399   33.6   0.1116
P206 to 11101-06 (2)       -0.0165    0.0504   -0.0007    1.578   33.6   0.1210
P206 to 11101-06 (3)       -0.0147    0.0508    0.0274    1.775   33.6   0.0657
P206 to 11101-07 (1)        0.0322   -0.0575   -0.0457    2.258   35.5   0.0524
P206 to 11101-07 (2)        0.0315   -0.0658    0.0036    2.054   35.5   0.0926
P206 to 11101-07 (3)        0.0338   -0.0649   -0.0016    2.059   35.5   0.0628
P206 to HOPB (1)            0.0104   -0.0760   -0.0183    1.592   49.6   0.1436
P206 to HOPB (2)           -0.0242   -0.0287   -0.0358    1.048   49.6   0.0638
P206 to VACAairp (1)       -0.0115    0.0577    0.0771    1.386   70.0   0.0576
P206 to VACAairp (2)       -0.0158    0.0513    0.0201    0.819   70.0   0.0823
PLSB to 11101-06 (2)        0.0040   -0.0055   -0.0406    1.031   40.0   0.0223
PLSB to 11101-06 (1)       -0.0008   -0.0119   -0.0236    0.663   40.0   0.1003
PLSB to 11101-06 (3)        0.0005   -0.0058    0.0199    0.518   40.0   0.0183
PLSB to P206 (1)            0.0158   -0.0621   -0.0491    1.129   71.5   0.0665
PLSB to P206 (2)            0.0164   -0.0559   -0.0281    0.906   71.5   0.0730
PLSB to VACAairp (1)       -0.0050   -0.0158   -0.0324    0.946   38.4   0.0874
PLSB to VACAairp (2)        0.0006   -0.0051    0.0012    0.136   38.4   0.0155
                          -------------------------------
                RMS         0.0173    0.0353    0.0274
```

    $ - This session is flagged as a 3-sigma outlier


```
****************************************************************
    CONTROL POINT RESIDUALS (ADJUSTMENT MADE)
****************************************************************

STA. NAME    -- RE --   -- RN --   -- RH --
              (m)        (m)        (m)
HOPB        -0.0198     0.0307     0.0060
P206        -0.0011     0.0123     0.0032
PLSB         0.0205    -0.0434    -0.0086
            -------------------------------
RMS          0.0165     0.0315     0.0063


****************************************************************
    OUTPUT STATION COORDINATES (LAT/LONG/HT)
****************************************************************

STA_ID      -- LATITUDE --  -- LONGITUDE -- - ELLHGT -
11101-06    38 48 48.94442 -122 11 30.86946    81.0213
11101-07    39 01 02.13680 -122 50 51.68051   378.0298
11101-08    39 18 13.04660 -123 05 27.32385   262.9222
11101-09    39 47 18.99484 -123 15 50.82585   402.1067
HOPB        38 59 42.66241 -123 04 29.00711   353.4499
KT2012      39 07 57.44414 -123 12 14.83876   159.1683
P206        38 46 40.13978 -122 34 32.84392   283.7201
PLSB        38 41 06.14424 -121 45 45.18372    -7.5427
VACAairp    38 22 29.04694 -121 57 29.02147     0.6079


****************************************************************
    OUTPUT STATION COORDINATES (GRID)
****************************************************************
```

```
STA_ID      - EASTING -   - NORTHING - - ELLHGT -
               (m)           (m)         (m)
11101-06    570157.8207  4296401.5402    81.0213
11101-07    513185.6722  4318703.0054   378.0298
11101-08    492160.5517  4350474.8913   262.9222
11101-09    477385.5611  4404328.7466   402.1067
HOPB        493529.0616  4316244.8026   353.4499
KT2012      482357.7650  4331513.9430   159.1683
P206        536847.7672  4292206.5572   283.7201
PLSB        607628.1505  4282552.6026    -7.5427
VACAairp    591013.1151  4247907.7815     0.6079


****************************************************************
     OUTPUT VARIANCE/COVARIANCE
****************************************************************
                                      2
STA_ID      SE/SN/SUP  --------- CX matrix (m )-----------
           (95.00 %)  (not scaled by confidence level)
            (m)            (ECEF, XYZ cartesian)
11101-06    0.0200  8.8182e-005
            0.0224  3.4310e-005 1.2115e-004
            0.0319  -2.1511e-005 -3.4558e-005 1.1102e-004

11101-07    0.0208  1.0330e-004
            0.0242  5.0349e-005 1.5412e-004
            0.0369  -3.2038e-005 -5.2474e-005 1.4054e-004

11101-08    0.0213  1.1001e-004
            0.0249  5.5865e-005 1.6569e-004
            0.0385  -3.5707e-005 -5.8507e-005 1.5101e-004

11101-09    0.0238  1.5174e-004
            0.0286  9.3195e-005 2.4552e-004
            0.0482  -6.1259e-005 -1.0386e-004 2.2254e-004

HOPB        0.0194  6.8739e-005
            0.0210  9.5089e-006 7.8067e-005
            0.0231  -4.4968e-006 -5.9811e-006 7.9189e-005

KT2012      0.0213  1.0922e-004
            0.0249  5.4997e-005 1.6451e-004
            0.0382  -3.4459e-005 -5.7132e-005 1.4927e-004

P206        0.0171  5.5493e-005
            0.0186  1.0544e-005 6.5488e-005
            0.0218  -5.7950e-006 -8.7464e-006 6.4900e-005

PLSB        0.0189  6.5634e-005
            0.0202  9.9243e-006 7.4897e-005
            0.0229  -4.8185e-006 -7.7682e-006 7.4571e-005

VACAairp    0.0200  9.0203e-005
            0.0225  3.7005e-005 1.2563e-004
            0.0326  -2.3263e-005 -3.6920e-005 1.1310e-004


****************************************************************
     VARIANCE FACTOR = 1.5512

     Note: Values < 1.0 indicate statistics are pessimistic, while
           values > 1.0 indicate optimistic statistics. Entering this
           value as the network adjustment scale factor will bring
```

```
        variance factor to one.
***************************************************************
```

**STATION DESCRIPTION FORM**

PROJECT No.: _____ 2011-101 U _____

PHOTOS TAKEN:

PROJECT NAME: _____ California Fault Lines _____

LOCATION: _____ Santa Maria, CA _____

| STATION NAME: 11101-01 | MARKER TYPE: Carriage Bolt and Washer | DATE: March 12, 2011 |
|---|---|---|
| STATION NUMBER: 11101-01 | STATION LOCALITY: Santa Maria, CA | LEGAL DESCRIPTION: |
| DATUM: WGS 84 | CENTRAL MERIDIAN: 237 | UTM ZONE: 10 |
| LATITUDE: 34 54 17.59555 | LONGITUDE: -120 19 17.26741 | ELLIPSOID HEIGHT metres (h): 87.6547 |
| UTM NORTHING metres: 3 865 770.368 | UTM EASITNG metres: 744 734.425 | GEOID HEIGHT metres (MSL): 87.6547 |

MONUMENT IS: ☐ FLUSH WITH GROUND    ☐ ABOVE GROUND _____ cm    ☐ BELOW GROUND _____ cm

MARKER LOCATION:

DIAGRAM (Include Ties to Relevant Features)

**STATION DESCRIPTION FORM**

**Terra**point

PROJECT No.:            2011-101 U                PHOTOS TAKEN:

PROJECT NAME:        California Fault Lines

LOCATION:                    California

| STATION NAME: <br> 11101-02 | MARKER TYPE: <br> Carriage Bolt and Washer | DATE: <br> March 14, 2011 |
|---|---|---|
| STATION NUMBER: <br> 11101-02 | STATION LOCALITY: <br> San Luis Abispo, CA | LEGAL DESCRIPTION: |
| DATUM: <br> WGS 84 | CENTRAL MERIDIAN: <br> 237 | UTM ZONE: <br> 10 |
| LATITUDE: <br> 35 19 05.78927 | LONGITUDE: <br> -120 41 33.66284 | ELLIPSOID HEIGHT metres (h): <br> 109.4626 |
| UTM NORTHING metres: <br> 3 910 781.788 | UTM EASITNG metres: <br> 709 746.839 | GEOID HEIGHT metres (MSL): <br> 109.4626 |

MONUMENT IS:    ☐ FLUSH WITH GROUND        ☐ ABOVE GROUND _____ cm        ☐ BELOW GROUND _____ cm

MARKER LOCATION:

DIAGRAM (Include Ties to Relevant Features)



**Terra**point

N

# STATION DESCRIPTION FORM

**Terrapoint**

PROJECT No.: _____ 2011-101 U _____

PHOTOS TAKEN:

PROJECT NAME: _____ California Fault Lines _____

LOCATION: _____ Cambria, CA _____

| STATION NAME:<br>11101-03 | MARKER TYPE:<br>Carriage Bolt and Washer | DATE:<br>March 18, 2011 |
|---|---|---|
| STATION NUMBER:<br>11101-03 | STATION LOCALITY:<br>Cambria, CA | LEGAL DESCRIPTION: |
| DATUM:<br>WGS 84 | CENTRAL MERIDIAN:<br>237 | UTM ZONE:<br>10 |
| LATITUDE:<br>35 35 39.82494 | LONGITUDE:<br>-121 07 25.69684 | ELLIPSOID HEIGHT metres (h):<br>-31.3512 |
| UTM NORTHING metres:<br>3 940 582.637 | UTM EASITNG metres:<br>669 968.545 | GEOID HEIGHT metres (MSL):<br>-31.3512 |

MONUMENT IS:  ☐ FLUSH WITH GROUND  ☐ ABOVE GROUND _____ cm  ☐ BELOW GROUND _____ cm

MARKER LOCATION:

DIAGRAM (Include Ties to Relevant Features)



**Terrapoint**

N

**STATION DESCRIPTION FORM**

Terrapoint

PROJECT No.: 2011-101 U

PROJECT NAME: California Fault Lines

LOCATION: Big Sur, CA

| STATION NAME: | MARKER TYPE: | DATE: |
|---|---|---|
| 11101-04 | Carriage Bolt and Washer | March 29, 2011 |
| STATION NUMBER: | STATION LOCALITY: | LEGAL DESCRIPTION: |
| 11101-04 | Big Sur, CA | |
| DATUM: | CENTRAL MERIDIAN: | UTM ZONE: |
| WGS 84 | 237 | 10 |
| LATITUDE: | LONGITUDE: | ELLIPSOID HEIGHT metres (h): |
| 36 17 27.37973 | -121 51 27.55059 | -4.2576 |
| UTM NORTHING metres: | UTM EASITNG metres: | GEOID HEIGHT metres (MSL): |
| 4 016 823.916 | 602 579.581 | -4.2576 |

MONUMENT IS: ☐ FLUSH WITH GROUND ☐ ABOVE GROUND _____ cm ☐ BELOW GROUND _____ cm

MARKER LOCATION:

DIAGRAM (Include Ties to Relevant Features)



Terrapoint

N

## STATION DESCRIPTION FORM

**Terrapoint**

PROJECT No.: 2011-101 U

PHOTOS TAKEN:

PROJECT NAME: California Fault Lines

LOCATION: Livermore, CA

| STATION NAME: 11101-05 | MARKER TYPE: Carriage Bolt and Washer | DATE: March 25, 2011 |
|---|---|---|
| STATION NUMBER: 11101-05 | STATION LOCALITY: Livermore, CA | LEGAL DESCRIPTION: |
| DATUM: WGS 84 | CENTRAL MERIDIAN: 237 | UTM ZONE: 10 |
| LATITUDE: 37 38 33.02236 | LONGITUDE: -121 38 09.41624 | ELLIPSOID HEIGHT metres (h): 331.0066 |
| UTM NORTHING metres: 4 167 026.518 | UTM EASITNG metres: 620 341.983 | GEOID HEIGHT metres (MSL): 331.0066 |

MONUMENT IS: ☐ FLUSH WITH GROUND   ☐ ABOVE GROUND _____ cm   ☐ BELOW GROUND _____ cm

MARKER LOCATION:

DIAGRAM (Include Ties to Relevant Features)



**Terrapoint**

N

## STATION DESCRIPTION FORM

**Terrapoint**

PROJECT No.: _2011-101 U_

PROJECT NAME: _California Fault Lines_

LOCATION: _Guinda, CA_

PHOTOS TAKEN:

| STATION NAME:<br>11101-06 | MARKER TYPE:<br>Carriage Bolt and Washer | DATE:<br>April 17, 2011 |
|---|---|---|
| STATION NUMBER:<br>11101-06 | STATION LOCALITY:<br>Guinda, CA | LEGAL DESCRIPTION: |
| DATUM:<br>WGS 84 | CENTRAL MERIDIAN:<br>237 | UTM ZONE:<br>10 |
| LATITUDE:<br>38 48 48.94442 | LONGITUDE:<br>-122 11 30.86946 | ELLIPSOID HEIGHT metres (h):<br>81.0213 |
| UTM NORTHING metres:<br>4 296 401.540 | UTM EASITNG metres:<br>570 157.821 | GEOID HEIGHT metres (MSL):<br>81.0213 |

MONUMENT IS: ☐ FLUSH WITH GROUND   ☐ ABOVE GROUND _____ cm   ☐ BELOW GROUND _____ cm

MARKER LOCATION:

DIAGRAM (Include Ties to Relevant Features)



**Terrapoint**

N

**STATION DESCRIPTION FORM**

PROJECT No.: 2011-101 U

PROJECT NAME: California Fault Lines

LOCATION: Lakeport, CA

PHOTOS TAKEN:

| STATION NAME:<br>11101-07 | MARKER TYPE:<br>Carriage Bolt and Washer | DATE:<br>May 03, 2011 |
|---|---|---|
| STATION NUMBER:<br>11101-07 | STATION LOCALITY:<br>Lakeport, CA | LEGAL DESCRIPTION: |
| DATUM:<br>WGS 84 | CENTRAL MERIDIAN:<br>237 | UTM ZONE:<br>10 |
| LATITUDE:<br>39 01 02.13680 | LONGITUDE:<br>-122 50 51.68051 | ELLIPSOID HEIGHT metres (h):<br>378.0298 |
| UTM NORTHING metres:<br>4 318 703.005 | UTM EASTING metres:<br>513 185.672 | GEOID HEIGHT metres (MSL):<br>378.0298 |

MONUMENT IS: ☐ FLUSH WITH GROUND   ☐ ABOVE GROUND _____ cm   ☐ BELOW GROUND _____ cm

MARKER LOCATION:

DIAGRAM (Include Ties to Relevant Features)
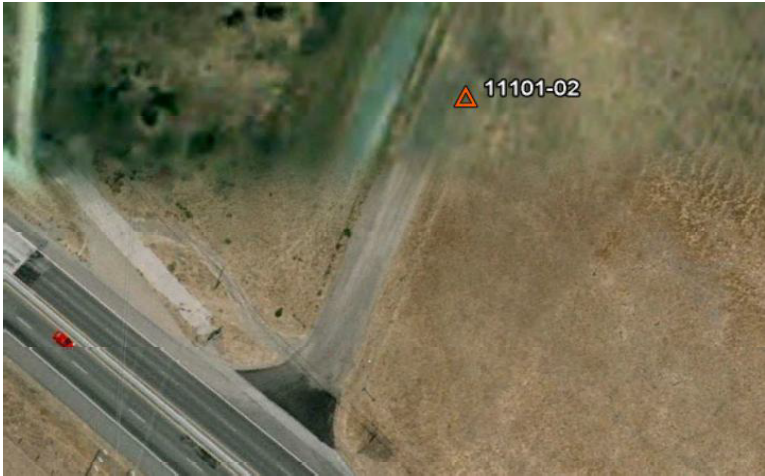
# STATION DESCRIPTION FORM

**Terra**point

PROJECT No.:     2011-101 U

PHOTOS TAKEN:

PROJECT NAME:     California Fault Lines

LOCATION:     LOCATION NEEDED

| STATION NAME:<br>11101-08 | MARKER TYPE:<br>Carriage Bolt and Washer | DATE:<br>DATE NEEDED |
|---|---|---|
| STATION NUMBER:<br>11101-08 | STATION LOCALITY:<br>LOCATION NEEDED | LEGAL DESCRIPTION: |
| DATUM:<br>WGS 84 | CENTRAL MERIDIAN:<br>237 | UTM ZONE:<br>10 |
| LATITUDE:<br>39 18 13.04660 | LONGITUDE:<br>-123 05 27.32385 | ELLIPSOID HEIGHT metres (h):<br>262.9222 |
| UTM NORTHING metres:<br>4 350 474.891 | UTM EASITNG metres:<br>492 160.552 | GEOID HEIGHT metres (MSL):<br>262.9222 |

MONUMENT IS:  ☐ FLUSH WITH GROUND     ☐ ABOVE GROUND _____ cm     ☐ BELOW GROUND _____ cm

MARKER LOCATION:

DIAGRAM (Include Ties to Relevant Features)



**Terra**point

N

## STATION DESCRIPTION FORM

**Terrapoint**

| | | |
|---|---|---|
| PROJECT No.: | 2011-101 U | PHOTOS TAKEN: |
| PROJECT NAME: | California Fault Lines | |
| LOCATION: | Covelo, CA | |

| STATION NAME:<br>11101-09 | MARKER TYPE:<br>Carriage Bolt and Washer | DATE:<br>DATE NEEDED |
|---|---|---|
| STATION NUMBER:<br>11101-09 | STATION LOCALITY:<br>Covelo, CA | LEGAL DESCRIPTION: |
| DATUM:<br>WGS 84 | CENTRAL MERIDIAN:<br>237 | UTM ZONE:<br>10 |
| LATITUDE:<br>39 47 18.99484 | LONGITUDE:<br>-123 15 50.82585 | ELLIPSOID HEIGHT metres (h):<br>402.1067 |
| UTM NORTHING metres:<br>4 404 328.747 | UTM EASITNG metres:<br>477 385.561 | GEOID HEIGHT metres (MSL):<br>402.1067 |

MONUMENT IS: ☐ FLUSH WITH GROUND   ☐ ABOVE GROUND _____ cm   ☐ BELOW GROUND _____ cm

MARKER LOCATION:

DIAGRAM (Include Ties to Relevant Features)



**Terrapoint**

N
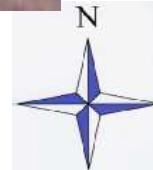
## STATION DESCRIPTION FORM

**PROJECT No.:** 2011-101 U

**PROJECT NAME:** California Fault Lines

**LOCATION:** Santa Rosa, CA

**PHOTOS TAKEN:**

| STATION NAME: | MARKER TYPE: | DATE: |
|---|---|---|
| CMS Airp | Carriage Bolt and Washer | DATE NEEDED |
| STATION NUMBER:<br>CMS Airp | STATION LOCALITY:<br>Santa Rosa, CA | LEGAL DESCRIPTION: |
| DATUM:<br>WGS 84 | CENTRAL MERIDIAN:<br>237 | UTM ZONE:<br>10 |
| LATITUDE:<br>38 30 41.57704 | LONGITUDE:<br>-122 48 28.47400 | ELLIPSOID HEIGHT metres (h):<br>3.7831 |
| UTM NORTHING metres:<br>4 262 592.424 | UTM EASITNG metres:<br>516 747.220 | GEOID HEIGHT metres (MSL):<br>3.7831 |

MONUMENT IS: ☐ FLUSH WITH GROUND    ☐ ABOVE GROUND _____ cm    ☐ BELOW GROUND _____ cm

MARKER LOCATION:

Charles M Shultz Airport Santa Rosa, CA

DIAGRAM (Include Ties to Relevant Features)
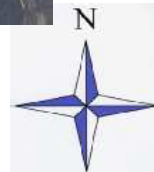


N

Source:/home/hvan/Release/checkout/pv_ret/pv_ret.c
Version 2.0 July 24, 2011
                         ***ITRF 00***
                 HOPLAND BARD (HOPB),  CALIFORNIA

 Retrieved from NGS DataBase on 07/28/11 at 18:16:02.
  _____

            Antenna Reference Point(ARP): HOPLAND BARD CORS ARP
            --------------------------------------------------
                            PID = AF9699


 ITRF00 POSITION (EPOCH 1997.0)
 Computed in Aug. 2006 using 406 days of data.
     X = -2708981.769 m     latitude    = 38 59 42.66142 N
     Y = -4159579.592 m     longitude   = 123 04 29.00629 W
     Z =  3992123.821 m     ellipsoid height =  353.334   m

 ITRF00 VELOCITY
 Computed in Aug. 2001 using every third day of data through 2000.
     VX = -0.0222 m/yr      northward =   0.0071 m/yr
     VY =  0.0259 m/yr      eastward  =  -0.0327 m/yr
     VZ =  0.0014 m/yr      upward    =  -0.0066 m/yr


 NAD_83 (CORS96) POSITION (EPOCH 2002.0)
 Transformed from ITRF00 (epoch 1997.0) position in Aug. 2006.
     X = -2708981.218 m     latitude    = 38 59 42.64699 N
     Y = -4159580.709 m     longitude   = 123 04 28.96177 W
     Z =  3992123.763 m     ellipsoid height =  353.791   m

 NAD_83 (CORS96) VELOCITY
 Transformed from ITRF00 velocity in Aug. 2006.
     VX = -0.0053 m/yr      northward =   0.0218 m/yr
     VY =  0.0266 m/yr      eastward  =  -0.0190 m/yr
     VZ =  0.0124 m/yr      upward    =  -0.0073 m/yr
  _____

 L1 Phase Center of the current GPS antenna: HOPLAND BARD CORS L1 PC C
 --------------------------------------------------------------------
 The D/M element, milled chokerings, -radome antenna
 (Antenna Code = ASH700936C_M) was installed on 06/01/98.
         The L2 phase center is 0.018 m above the L1 phase center.
                            PID = AJ7940


 ITRF00 POSITION (EPOCH 1997.0)
 Computed in Aug. 2006 using 406 days of data.
     X = -2708981.816 m     latitude    = 38 59 42.66142 N
     Y = -4159579.664 m     longitude   = 123 04 29.00629 W
     Z =  3992123.890 m     ellipsoid height =  353.444   m

 The ITRF00 VELOCITY of the L1 PC is the same as that for the ARP.


 NAD_83 (CORS96) POSITION (EPOCH 2002.0)
 Transformed from ITRF00 (epoch 1997.0) position in Aug. 2006.
     X = -2708981.265 m     latitude    = 38 59 42.64699 N
     Y = -4159580.781 m     longitude   = 123 04 28.96177 W
     Z =  3992123.832 m     ellipsoid height =  353.901   m

 The NAD_83 (CORS96) VELOCITY of the L1 PC is the same as that for the ARP.
  _____

            Monument: HOPLAND BARD CORS POINT

```
|         --------------------------------                                     |
|                          PID = AF9701                                        |
|         Inscribed: NONE                                                      |
|                                                                              |
|                                                                              |
| ITRF00 POSITION (EPOCH 1997.0)                                               |
| Computed in Aug. 2006 using 406 days of data.                                |
|      X =  -2708981.755 m     latitude    =  38 59 42.66142 N                 |
|      Y =  -4159579.570 m     longitude   = 123 04 29.00629 W                 |
|      Z =   3992123.799 m     ellipsoid height =  353.300   m                 |
|                                                                              |
| The ITRF00 VELOCITY of the monument is the same as that for the ARP.         |
|                                                                              |
|                                                                              |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                                      |
| Transformed from ITRF00 (epoch 1997.0) position in Aug. 2006.                |
|      X =  -2708981.204 m     latitude    =  38 59 42.64699 N                 |
|      Y =  -4159580.687 m     longitude   = 123 04 28.96177 W                 |
|      Z =   3992123.741 m     ellipsoid height =  353.757   m                 |
|                                                                              |
| The NAD_83 (CORS96) VELOCITY of the monument is the same as that for the ARP |
|_____|
```

* Latitude, longitude and ellipsoid height are computed from their
  corresponding cartesian coordinates using dimensions for the
  GRS 80 ellipsoid: semi-major axis = 6,378,137.0 meters
                    flattening = 1/298.257222101...

* WARNING: Mixing of antenna types can lead to errors of up to 10 cm.
  in height unless antenna-phase-center variation is properly modeled.

* For additional information about the interpretation and/or derivation
  of these positions and velocities, consult
  http://www.ngs.noaa.gov/CORS/Coords.html
  For additional information on the relation of the GPS antenna to other
  relevant points at the site and on GPS equipment, consult the
  link http://www.ngs.noaa.gov/cors/Logfiles.html

* The NAD_83 position & velocity were revised in Mar. 2002.
* The NAD_83 & ITRF00 position & velocity were revised in Aug. 2006.

Source:/home/hvan/Release/checkout/pv_ret/pv_ret.c
Version 2.0 July 24, 2011
                        ***ITRF 00***
              SANTALUCIACN2004 (P171),  CALIFORNIA

 Retrieved from NGS DataBase on 07/28/11 at 18:11:48.
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 _____
|                                                                        |
|           Antenna Reference Point(ARP): SANTALUCIACN2004 CORS ARP      |
|           ------------------------------------------------------       |
|                           PID = DH3876                                 |
|                                                                        |
|                                                                        |
| ITRF00 POSITION (EPOCH 1997.0)                                         |
| Computed in June 2005 using 26 days of data.                           |
|     X =  -2705141.178 m     latitude    = 36 29 07.87668 N             |
|     Y =  -4364219.290 m     longitude   = 121 47 33.04786 W            |
|     Z =   3771983.451 m     ellipsoid height =  572.736   m            |
|                                                                        |
| ITRF00 VELOCITY                                                        |
| Predicted with HTDP_2.7 June 2005.                                     |
|     VX =  -0.0274 m/yr     northward =   0.0240 m/yr                    |
|     VY =   0.0331 m/yr     eastward  =  -0.0407 m/yr                    |
|     VZ =   0.0197 m/yr     upward    =   0.0007 m/yr                    |
|                                                                        |
|                                                                        |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                                |
| Transformed from ITRF00 (epoch 1997.0) position in June 2005.          |
|     X =  -2705140.658 m     latitude    = 36 29 07.86533 N             |
|     Y =  -4364220.399 m     longitude   = 121 47 33.00663 W            |
|     Z =   3771983.510 m     ellipsoid height =  573.310   m            |
|                                                                        |
| NAD_83 (CORS96) VELOCITY                                               |
| Transformed from ITRF00 velocity in June 2005.                         |
|     VX =  -0.0113 m/yr     northward =   0.0383 m/yr                    |
|     VY =   0.0337 m/yr     eastward  =  -0.0274 m/yr                    |
|     VZ =   0.0308 m/yr     upward    =   0.0001 m/yr                    |
|_____|
|                                                                        |
| L1 Phase Center of the current GPS antenna: SANTALUCIACN2004 CORS L1 PC C|
| ----------------------------------------------------------------------  |
| The D/M element, chokerings, -radome antenna                           |
| (Antenna Code = TRM29659.00) was installed on 08/31/04.                |
|        The L2 phase center is 0.018 m above the L1 phase center.        |
|                           PID = DH3877                                 |
|                                                                        |
|                                                                        |
| ITRF00 POSITION (EPOCH 1997.0)                                         |
| Computed in June 2005 using 26 days of data.                           |
|     X =  -2705141.223 m     latitude    = 36 29 07.87672 N             |
|     Y =  -4364219.364 m     longitude   = 121 47 33.04784 W            |
|     Z =   3771983.517 m     ellipsoid height =  572.846   m            |
|                                                                        |
| The ITRF00 VELOCITY of the L1 PC is the same as that for the ARP.      |
|                                                                        |
|                                                                        |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                                |
| Transformed from ITRF00 (epoch 1997.0) position in June 2005.          |
|     X =  -2705140.703 m     latitude    = 36 29 07.86537 N             |
|     Y =  -4364220.474 m     longitude   = 121 47 33.00661 W            |
|     Z =   3771983.577 m     ellipsoid height =  573.419   m            |
|                                                                        |
| The NAD_83 (CORS96) VELOCITY of the L1 PC is the same as that for the ARP.|
|_____|
|           Monument: SANTALUCIACN2004 GRP                               |
|                                                                        |
```

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|          ------------------------------                          |
|                          PID = DH3878                            |
|          Inscribed: UNKNOWN                                      |
|                                                                  |
|                                                                  |
| ITRF00 POSITION (EPOCH 1997.0)                                   |
| Computed in June 2005 using 26 days of data.                     |
|     X =  -2705141.174 m     latitude   =  36 29 07.87669 N       |
|     Y =  -4364219.284 m     longitude  = 121 47 33.04786 W       |
|     Z =   3771983.446 m     ellipsoid height =  572.728   m      |
|                                                                  |
| The ITRF00 VELOCITY of the monument is the same as that for the ARP. |
|                                                                  |
|                                                                  |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                          |
| Transformed from ITRF00 (epoch 1997.0) position in June 2005.    |
|     X =  -2705140.654 m     latitude   =  36 29 07.86533 N       |
|     Y =  -4364220.393 m     longitude  = 121 47 33.00663 W       |
|     Z =   3771983.505 m     ellipsoid height =  573.301   m      |
|                                                                  |
| The NAD_83 (CORS96) VELOCITY of the monument is the same as that for the ARP |
|_____|
```

* Latitude, longitude and ellipsoid height are computed from their
  corresponding cartesian coordinates using dimensions for the
  GRS 80 ellipsoid: semi-major axis = 6,378,137.0 meters
                     flattening = 1/298.257222101...


* WARNING: Mixing of antenna types can lead to errors of up to 10 cm.
  in height unless antenna-phase-center variation is properly modeled.


* For additional information about the interpretation and/or derivation
  of these positions and velocities, consult
  http://www.ngs.noaa.gov/CORS/Coords.html
  For additional information on the relation of the GPS antenna to other
  relevant points at the site and on GPS equipment, consult the
  link http://www.ngs.noaa.gov/cors/Logfiles.html

Source:/home/hvan/Release/checkout/pv_ret/pv_ret.c
Version 2.0 July 24, 2011
                        ***ITRF 00***
                CRAZYCREEKCN2006 (P206),  CALIFORNIA

 Retrieved from NGS DataBase on 07/28/11 at 18:15:13.
_____
|                                                                      |
|           Antenna Reference Point(ARP): CRAZYCREEKCN2006 CORS ARP    |
|           ------------------------------------------------------     |
|                           PID = DK6396                               |
|                                                                      |
|                                                                      |
| ITRF00 POSITION (EPOCH 1997.0)                                       |
| Computed in Aug. 2008 using 19 days of data.                         |
|     X =  -2680785.214 m     latitude    = 38 46 40.13935 N           |
|     Y =  -4195731.943 m     longitude   = 122 34 32.84392 W          |
|     Z =   3973296.031 m     ellipsoid height = 283.610   m           |
|                                                                      |
| ITRF00 VELOCITY                                                      |
| Predicted with HTDP_3.0 Aug. 2008.                                   |
|     VX =  -0.0227 m/yr      northward =   0.0014 m/yr                 |
|     VY =   0.0161 m/yr      eastward  =  -0.0278 m/yr                 |
|     VZ =   0.0007 m/yr      upward    =  -0.0006 m/yr                 |
|                                                                      |
|                                                                      |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                              |
| Transformed from ITRF00 (epoch 1997.0) position in Aug. 2008.        |
|     X =  -2680784.667 m     latitude    = 38 46 40.12388 N           |
|     Y =  -4195733.113 m     longitude   = 122 34 32.79873 W          |
|     Z =   3973295.975 m     ellipsoid height =  284.114   m          |
|                                                                      |
| NAD_83 (CORS96) VELOCITY                                             |
| Transformed from ITRF00 velocity in Aug. 2008.                       |
|     VX =  -0.0059 m/yr      northward =   0.0159 m/yr                 |
|     VY =   0.0168 m/yr      eastward  =  -0.0140 m/yr                 |
|     VZ =   0.0116 m/yr      upward    =  -0.0013 m/yr                 |
|_____|
| L1 Phase Center of the current GPS antenna: CRAZYCREEKCN2006 CORS L1 PC C |
| ---------------------------------------------------------------------- |
| The D/M element, CR, +SCIT radome SCIGN mt antenna                   |
| (Antenna Code = TRM29659.00     SCIT) was installed on 04/19/06.     |
|         The L2 phase center is 0.018 m above the L1 phase center.    |
|                           PID = DK6397                               |
|                                                                      |
|                                                                      |
| ITRF00 POSITION (EPOCH 1997.0)                                       |
| Computed in Aug. 2008 using 19 days of data.                         |
|     X =  -2680785.257 m     latitude    = 38 46 40.13938 N           |
|     Y =  -4195732.014 m     longitude   = 122 34 32.84388 W          |
|     Z =   3973296.099 m     ellipsoid height = 283.717   m           |
|                                                                      |
| The ITRF00 VELOCITY of the L1 PC is the same as that for the ARP.    |
|                                                                      |
|                                                                      |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                              |
| Transformed from ITRF00 (epoch 1997.0) position in Aug. 2008.        |
|     X =  -2680784.711 m     latitude    = 38 46 40.12391 N           |
|     Y =  -4195733.184 m     longitude   = 122 34 32.79869 W          |
|     Z =   3973296.042 m     ellipsoid height =  284.221   m          |
|                                                                      |
| The NAD_83 (CORS96) VELOCITY of the L1 PC is the same as that for the ARP. |
|_____|
|           Monument: CRAZYCREEKCN2006 GRP                             |
|                                                                      |

```
|          -----------------------------                                    |
|                          PID = DK6398                                     |
|          Inscribed: UNKNOWN                                               |
|                                                                           |
|                                                                           |
| ITRF00 POSITION (EPOCH 1997.0)                                            |
| Computed in Aug. 2008 using 19 days of data.                              |
|     X =  -2680785.210 m     latitude    =  38 46 40.13935 N               |
|     Y =  -4195731.938 m     longitude   = 122 34 32.84392 W               |
|     Z =   3973296.026 m     ellipsoid height =  283.602   m               |
|                                                                           |
| The ITRF00 VELOCITY of the monument is the same as that for the ARP.      |
|                                                                           |
|                                                                           |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                                   |
| Transformed from ITRF00 (epoch 1997.0) position in Aug. 2008.             |
|     X =  -2680784.663 m     latitude    =  38 46 40.12388 N               |
|     Y =  -4195733.108 m     longitude   = 122 34 32.79873 W               |
|     Z =   3973295.970 m     ellipsoid height =  284.106   m               |
|                                                                           |
| The NAD_83 (CORS96) VELOCITY of the monument is the same as that for the ARP|
|_____|
```

* Latitude, longitude and ellipsoid height are computed from their
  corresponding cartesian coordinates using dimensions for the
  GRS 80 ellipsoid: semi-major axis = 6,378,137.0 meters
                           flattening = 1/298.257222101...


* WARNING: Mixing of antenna types can lead to errors of up to 10 cm.
  in height unless antenna-phase-center variation is properly modeled.


* For additional information about the interpretation and/or derivation
  of these positions and velocities, consult
  http://www.ngs.noaa.gov/CORS/Coords.html
  For additional information on the relation of the GPS antenna to other
  relevant points at the site and on GPS equipment, consult the
  link http://www.ngs.noaa.gov/cors/Logfiles.html

Source:/home/hvan/Release/checkout/pv_ret/pv_ret.c
Version 2.0 July 24, 2011
                        ***ITRF 00***
                ELKHRNSLGHCN2005 (P210),  CALIFORNIA

 Retrieved from NGS DataBase on 07/28/11 at 18:12:18.

```
            Antenna Reference Point(ARP): ELKHRNSLGHCN2005 CORS ARP
            -------------------------------------------------------
                              PID = DI7526


 ITRF00 POSITION (EPOCH 1997.0)
 Computed in Jun. 2007 using 27 days of data.
     X =  -2688758.447 m      latitude    =  36 48 58.08636 N
     Y =  -4348065.021 m      longitude   = 121 43 54.61226 W
     Z =   3801079.480 m      ellipsoid height =    3.027   m

 ITRF00 VELOCITY
 Predicted with HTDP_2.9 Jun. 2007.
     VX =  -0.0290 m/yr     northward =   0.0177 m/yr
     VY =   0.0298 m/yr     eastward  =  -0.0403 m/yr
     VZ =   0.0146 m/yr     upward    =   0.0007 m/yr


 NAD_83 (CORS96) POSITION (EPOCH 2002.0)
 Transformed from ITRF00 (epoch 1997.0) position in Jun. 2007.
     X =  -2688757.935 m      latitude    =  36 48 58.07387 N
     Y =  -4348066.144 m      longitude   = 121 43 54.57086 W
     Z =   3801079.513 m      ellipsoid height =    3.596   m

 NAD_83 (CORS96) VELOCITY
 Transformed from ITRF00 velocity in Jun. 2007.
     VX =  -0.0128 m/yr     northward =   0.0320 m/yr
     VY =   0.0305 m/yr     eastward  =  -0.0269 m/yr
     VZ =   0.0256 m/yr     upward    =  -0.0000 m/yr

 L1 Phase Center of the current GPS antenna: ELKHRNSLGHCN2005 CORS L1 PC C
 ------------------------------------------------------------------------
 The D/M element, CR, +SCIT radome SCIGN mt antenna
 (Antenna Code = TRM29659.00     SCIT) was installed on 05/25/05.
         The L2 phase center is 0.018 m above the L1 phase center.
                              PID = DI7527


 ITRF00 POSITION (EPOCH 1997.0)
 Computed in Jun. 2007 using 27 days of data.
     X =  -2688758.490 m      latitude    =  36 48 58.08639 N
     Y =  -4348065.094 m      longitude   = 121 43 54.61222 W
     Z =   3801079.545 m      ellipsoid height =    3.134   m

 The ITRF00 VELOCITY of the L1 PC is the same as that for the ARP.


 NAD_83 (CORS96) POSITION (EPOCH 2002.0)
 Transformed from ITRF00 (epoch 1997.0) position in Jun. 2007.
     X =  -2688757.979 m      latitude    =  36 48 58.07390 N
     Y =  -4348066.217 m      longitude   = 121 43 54.57082 W
     Z =   3801079.577 m      ellipsoid height =    3.703   m

 The NAD_83 (CORS96) VELOCITY of the L1 PC is the same as that for the ARP.

            Monument: ELKHRNSLGHCN2005 GRP
```

```
|          ----------------------------                                      |
|                          PID = DI7528                                      |
|          Inscribed: UNKNOWN                                                |
|                                                                            |
|                                                                            |
| ITRF00 POSITION (EPOCH 1997.0)                                             |
| Computed in Jun. 2007 using 27 days of data.                               |
|      X =  -2688758.443 m     latitude   =  36 48 58.08636 N                |
|      Y =  -4348065.015 m     longitude  = 121 43 54.61226 W                |
|      Z =   3801079.475 m     ellipsoid height =    3.019   m               |
|                                                                            |
| The ITRF00 VELOCITY of the monument is the same as that for the ARP.       |
|                                                                            |
|                                                                            |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                                    |
| Transformed from ITRF00 (epoch 1997.0) position in Jun. 2007.              |
|      X =  -2688757.931 m     latitude   =  36 48 58.07387 N                |
|      Y =  -4348066.138 m     longitude  = 121 43 54.57086 W                |
|      Z =   3801079.507 m     ellipsoid height =    3.588   m               |
|                                                                            |
| The NAD_83 (CORS96) VELOCITY of the monument is the same as that for the ARP|
|_____|
```

 * Latitude, longitude and ellipsoid height are computed from their
   corresponding cartesian coordinates using dimensions for the
   GRS 80 ellipsoid: semi-major axis = 6,378,137.0 meters
                         flattening = 1/298.257222101...


 * WARNING: Mixing of antenna types can lead to errors of up to 10 cm.
   in height unless antenna-phase-center variation is properly modeled.


 * For additional information about the interpretation and/or derivation
   of these positions and velocities, consult
   http://www.ngs.noaa.gov/CORS/Coords.html
   For additional information on the relation of the GPS antenna to other
   relevant points at the site and on GPS equipment, consult the
   link http://www.ngs.noaa.gov/cors/Logfiles.html

Source:/home/hvan/Release/checkout/pv_ret/pv_ret.c
Version 2.0 July 24, 2011
                         ***ITRF 00***
               HARRISRNCHCN2004 (P300),  CALIFORNIA

 Retrieved from NGS DataBase on 07/28/11 at 18:12:55.
_____
|                                                                       |
|          Antenna Reference Point(ARP): HARRISRNCHCN2004 CORS ARP      |
|          ------------------------------------------------------       |
|                            PID = DM6174                               |
|                                                                       |
|                                                                       |
| ITRF00 POSITION (EPOCH 1997.0)                                        |
| Computed in Mar. 2011 using 19 days of data.                          |
|     X = -2594605.241 m      latitude    = 36 18 15.93775 N            |
|     Y = -4444233.243 m      longitude   = 120 16 37.11953 W           |
|     Z =  3755548.507 m      ellipsoid height = 137.284   m            |
|                                                                       |
| ITRF00 VELOCITY                                                       |
| Predicted with HTDP_3.1 Mar. 2011.                                    |
|     VX = -0.0195 m/yr      northward = -0.0014 m/yr                   |
|     VY =  0.0111 m/yr      eastward  = -0.0224 m/yr                   |
|     VZ = -0.0015 m/yr      upward    = -0.0007 m/yr                   |
|                                                                       |
|                                                                       |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                               |
| Transformed from ITRF00 (epoch 1997.0) position in Mar. 2011.         |
|     X = -2594604.685 m      latitude    = 36 18 15.92190 N            |
|     Y = -4444234.470 m      longitude   = 120 16 37.07551 W           |
|     Z =  3755548.474 m      ellipsoid height = 137.893   m            |
|                                                                       |
| NAD_83 (CORS96) VELOCITY                                              |
| Transformed from ITRF00 velocity in Mar. 2011.                        |
|     VX = -0.0034 m/yr      northward =  0.0124 m/yr                   |
|     VY =  0.0118 m/yr      eastward  = -0.0089 m/yr                   |
|     VZ =  0.0092 m/yr      upward    = -0.0014 m/yr                   |
|_____|
| L1 Phase Center of the current GPS antenna: HARRISRNCHCN2004 CORS L1 PC C |
| ------------------------------------------------------------------------ |
| The D/M element, CR, +SCIT radome SCIGN mt antenna                    |
| (Antenna Code = TRM29659.00     SCIT) was installed on 12/15/04.      |
|       The L2 phase center is 0.018 m above the L1 phase center.       |
|                            PID = DM6175                               |
|                                                                       |
|                                                                       |
| ITRF00 POSITION (EPOCH 1997.0)                                        |
| Computed in Mar. 2011 using 19 days of data.                          |
|     X = -2594605.283 m      latitude    = 36 18 15.93778 N            |
|     Y = -4444233.317 m      longitude   = 120 16 37.11950 W           |
|     Z =  3755548.572 m      ellipsoid height = 137.391   m            |
|                                                                       |
| The ITRF00 VELOCITY of the L1 PC is the same as that for the ARP.     |
|                                                                       |
|                                                                       |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                               |
| Transformed from ITRF00 (epoch 1997.0) position in Mar. 2011.         |
|     X = -2594604.728 m      latitude    = 36 18 15.92193 N            |
|     Y = -4444234.544 m      longitude   = 120 16 37.07547 W           |
|     Z =  3755548.538 m      ellipsoid height = 138.000   m            |
|                                                                       |
| The NAD_83 (CORS96) VELOCITY of the L1 PC is the same as that for the ARP. |
|_____|
|          Monument: HARRISRNCHCN2004 GRP                               |
|                                                                       |

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|        ----------------------------                                          |
|                          PID = DM6176                                        |
|         Inscribed: UNKNOWN                                                   |
|                                                                              |
|                                                                              |
| ITRF00 POSITION (EPOCH 1997.0)                                               |
| Computed in Mar. 2011 using 19 days of data.                                 |
|      X =  -2594605.237 m      latitude    =  36 18 15.93775 N                |
|      Y =  -4444233.237 m      longitude   = 120 16 37.11953 W                |
|      Z =   3755548.503 m      ellipsoid height =  137.276   m                |
|                                                                              |
| The ITRF00 VELOCITY of the monument is the same as that for the ARP.         |
|                                                                              |
|                                                                              |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                                       |
| Transformed from ITRF00 (epoch 1997.0) position in Mar. 2011.                |
|      X =  -2594604.682 m      latitude    =  36 18 15.92190 N                |
|      Y =  -4444234.464 m      longitude   = 120 16 37.07551 W                |
|      Z =   3755548.469 m      ellipsoid height =  137.884   m                |
|                                                                              |
| The NAD_83 (CORS96) VELOCITY of the monument is the same as that for the ARP |
|_____|


 * Latitude, longitude and ellipsoid height are computed from their
   corresponding cartesian coordinates using dimensions for the
   GRS 80 ellipsoid: semi-major axis = 6,378,137.0 meters
                     flattening = 1/298.257222101...


 * WARNING: Mixing of antenna types can lead to errors of up to 10 cm.
   in height unless antenna-phase-center variation is properly modeled.


 * For additional information about the interpretation and/or derivation
   of these positions and velocities, consult
   http://www.ngs.noaa.gov/CORS/Coords.html
   For additional information on the relation of the GPS antenna to other
   relevant points at the site and on GPS equipment, consult the
   link http://www.ngs.noaa.gov/cors/Logfiles.html
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Source:/home/hvan/Release/checkout/pv_ret/pv_ret.c
Version 2.0 July 24, 2011

```
                        ***ITRF 00***
                WOODLAND COOP (PLSB),  CALIFORNIA
```

 Retrieved from NGS DataBase on 07/28/11 at 18:17:17.

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_____
|                                                                    |
|          Antenna Reference Point(ARP): WOODLAND COOP CORS ARP       |
|          ----------------------------------------------------       |
|                            PID = DG5210                             |
|                                                                    |
|                                                                    |
| ITRF00 POSITION (EPOCH 1997.0)                                      |
| Computed in May 2006 using 45 days of data.                         |
|     X =  -2624236.777 m      latitude    =  38 41 06.14562 N         |
|     Y =  -4238644.036 m      longitude   = 121 45 45.18455 W         |
|     Z =   3965079.450 m      ellipsoid height =  -7.612   m          |
|                                                                    |
| ITRF00 VELOCITY                                                     |
| Predicted with on-line HTDP ver 2.8 in May 2006                     |
|     VX =  -0.0235 m/yr      northward =  -0.0055 m/yr                |
|     VY =   0.0099 m/yr      eastward  =  -0.0252 m/yr                |
|     VZ =  -0.0039 m/yr      upward    =   0.0006 m/yr                |
|                                                                    |
|                                                                    |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                             |
| Transformed from ITRF00 (epoch 1997.0) position in May 2006.        |
|     X =  -2624236.236 m      latitude    =  38 41 06.12879 N         |
|     Y =  -4238645.241 m      longitude   = 121 45 45.13927 W         |
|     Z =   3965079.378 m      ellipsoid height =   -7.079   m         |
|                                                                    |
| NAD_83 (CORS96) VELOCITY                                            |
| Transformed from ITRF00 velocity in May 2006.                       |
|     VX =  -0.0067 m/yr      northward =   0.0087 m/yr                |
|     VY =   0.0106 m/yr      eastward  =  -0.0113 m/yr                |
|     VZ =   0.0068 m/yr      upward    =  -0.0000 m/yr                |
|_____|
|                                                                    |
| L1 Phase Center of the current GPS antenna: WOODLAND COOP CORS L1 PC C|
| ---------------------------------------------------------------------|
| The Micropulse chokering antenna -radome antenna                    |
| (Antenna Code = LEIAT503) was installed on 02/21/04.                |
|        The L2 phase center is 0.016 m above the L1 phase center.     |
|                            PID = DG5211                             |
|                                                                    |
|                                                                    |
| ITRF00 POSITION (EPOCH 1997.0)                                      |
| Computed in May 2006 using 45 days of data.                         |
|     X =  -2624236.809 m      latitude    =  38 41 06.14565 N         |
|     Y =  -4238644.087 m      longitude   = 121 45 45.18457 W         |
|     Z =   3965079.500 m      ellipsoid height =  -7.534    m         |
|                                                                    |
| The ITRF00 VELOCITY of the L1 PC is the same as that for the ARP.   |
|                                                                    |
|                                                                    |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                             |
| Transformed from ITRF00 (epoch 1997.0) position in May 2006.        |
|     X =  -2624236.268 m      latitude    =  38 41 06.12882 N         |
|     Y =  -4238645.292 m      longitude   = 121 45 45.13929 W         |
|     Z =   3965079.428 m      ellipsoid height =  -7.001   m          |
|                                                                    |
| The NAD_83 (CORS96) VELOCITY of the L1 PC is the same as that for the ARP.|
|_____|
```

 * Latitude, longitude and ellipsoid height are computed from their
   corresponding cartesian coordinates using dimensions for the
   GRS 80 ellipsoid: semi-major axis = 6,378,137.0 meters
                          flattening = 1/298.257222101...


 * WARNING: Mixing of antenna types can lead to errors of up to 10 cm.
   in height unless antenna-phase-center variation is properly modeled.


 * For additional information about the interpretation and/or derivation
   of these positions and velocities, consult
   http://www.ngs.noaa.gov/CORS/Coords.html
   For additional information on the relation of the GPS antenna to other
   relevant points at the site and on GPS equipment, consult the
   link http://www.ngs.noaa.gov/cors/Logfiles.html


 * The ITRF00 and NAD_83 positions were revised in May 2006.

Source:/home/hvan/Release/checkout/pv_ret/pv_ret.c
Version 2.0 July 24, 2011
                         ***ITRF 00***
             VANDENBERG AFB 5 (VAN5),  CALIFORNIA

 Retrieved from NGS DataBase on 07/28/11 at 18:10:08.
```
 _____
|                                                                        |
|          Antenna Reference Point(ARP): VANDENBERG AFB 5 CORS ARP       |
|          ------------------------------------------------------        |
|                           PID = DK4195                                 |
|                                                                        |
|                                                                        |
| ITRF00 POSITION (EPOCH 1997.0)                                         |
| Computed in Jun. 2008 using 21 days of data.                           |
|     X =  -2665275.066 m     latitude    = 34 49 35.80432 N             |
|     Y =  -4513292.877 m     longitude   = 120 33 48.61376 W            |
|     Z =   3622150.059 m     ellipsoid height =   99.076   m            |
|                                                                        |
| ITRF00 VELOCITY                                                        |
| Estimated from vel van1 in Jun. 2008 using 841 days of data.           |
|     VX =  -0.0272 m/yr     northward =   0.0203 m/yr                    |
|     VY =   0.0302 m/yr     eastward  =  -0.0388 m/yr                    |
|     VZ =   0.0162 m/yr     upward    =  -0.0007 m/yr                    |
|                                                                        |
|                                                                        |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                                |
| Transformed from ITRF00 (epoch 1997.0) position in Jun. 2008.          |
|     X =  -2665274.549 m     latitude    = 34 49 35.79257 N             |
|     Y =  -4513294.022 m     longitude   = 120 33 48.57335 W            |
|     Z =   3622150.121 m     ellipsoid height =   99.705   m            |
|                                                                        |
| NAD_83 (CORS96) VELOCITY                                               |
| Transformed from ITRF00 velocity in Jun. 2008.                         |
|     VX =  -0.0116 m/yr     northward =   0.0341 m/yr                    |
|     VY =   0.0308 m/yr     eastward  =  -0.0256 m/yr                    |
|     VZ =   0.0272 m/yr     upward    =  -0.0014 m/yr                    |
|_____|
|                                                                        |
| L1 Phase Center of the current GPS antenna: VANDENBERG AFB 5 CORS L1 PC C|
| -----------------------------------------------------------------------|
| The Zephyr Geodetic L1/L2 +RD w/ USCG mount antenna                    |
| (Antenna Code = TRM41249USCG    SCIT) was installed on 04/08/08.       |
|        The L2 phase center is 0.012 m below the L1 phase center.       |
|                           PID = DK4196                                 |
|                                                                        |
|                                                                        |
| ITRF00 POSITION (EPOCH 1997.0)                                         |
| Computed in Jun. 2008 using 21 days of data.                           |
|     X =  -2665275.102 m     latitude    = 34 49 35.80420 N             |
|     Y =  -4513292.935 m     longitude   = 120 33 48.61384 W            |
|     Z =   3622150.103 m     ellipsoid height =   99.157   m            |
|                                                                        |
| The ITRF00 VELOCITY of the L1 PC is the same as that for the ARP.      |
|                                                                        |
|                                                                        |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                                |
| Transformed from ITRF00 (epoch 1997.0) position in Jun. 2008.          |
|     X =  -2665274.586 m     latitude    = 34 49 35.79246 N             |
|     Y =  -4513294.080 m     longitude   = 120 33 48.57342 W            |
|     Z =   3622150.165 m     ellipsoid height =   99.787   m            |
|                                                                        |
| The NAD_83 (CORS96) VELOCITY of the L1 PC is the same as that for the ARP.|
|_____|
```

 * Latitude, longitude and ellipsoid height are computed from their
   corresponding cartesian coordinates using dimensions for the
   GRS 80 ellipsoid: semi-major axis = 6,378,137.0 meters
                              flattening = 1/298.257222101...


 * WARNING: Mixing of antenna types can lead to errors of up to 10 cm.
   in height unless antenna-phase-center variation is properly modeled.


 * For additional information about the interpretation and/or derivation
   of these positions and velocities, consult
   http://www.ngs.noaa.gov/CORS/Coords.html
   For additional information on the relation of the GPS antenna to other
   relevant points at the site and on GPS equipment, consult the
   link http://www.ngs.noaa.gov/cors/Logfiles.html

Source:/home/hvan/Release/pv_ret/pv_ret.c
Version 2.11 June 04, 2010
                              ***ITRF 00***
               CLEGGRANCHCS2004 (P067),  CALIFORNIA

 Retrieved from NGS DataBase on 03/22/11 at 20:33:59.

```
         Antenna Reference Point(ARP): CLEGGRANCHCS2004 CORS ARP
         -------------------------------------------------------
                          PID = DG7411


 ITRF00 POSITION (EPOCH 1997.0)
 Computed in Aug. 2007 using 608 days of data.
     X = -2675935.923 m      latitude    = 35 33 06.29867 N
     Y = -4452984.927 m      longitude   = 121 00 10.63996 W
     Z =  3687903.037 m      ellipsoid height = 106.997   m

 ITRF00 VELOCITY
 Estimated in Aug. 2007 using 608 days of data.
     VX = -0.0233 m/yr      northward =   0.0265 m/yr
     VY =  0.0320 m/yr      eastward  =  -0.0365 m/yr
     VZ =  0.0216 m/yr      upward    =   0.0000 m/yr


 NAD_83 (CORS96) POSITION (EPOCH 2002.0)
 Transformed from ITRF00 (epoch 1997.0) position in Aug. 2007.
     X = -2675935.385 m      latitude    = 35 33 06.28782 N
     Y = -4452986.054 m      longitude   = 121 00 10.59862 W
     Z =  3687903.119 m      ellipsoid height = 107.605   m

 NAD_83 (CORS96) VELOCITY
 Transformed from ITRF00 velocity in Aug. 2007.
     VX = -0.0075 m/yr      northward =   0.0406 m/yr
     VY =  0.0326 m/yr      eastward  =  -0.0232 m/yr
     VZ =  0.0327 m/yr      upward    =  -0.0006 m/yr

 L1 Phase Center of the current GPS antenna: CLEGGRANCHCS2004 CORS L1 PC C
 ------------------------------------------------------------------------
 The D/M element, chokerings, -radome antenna
 (Antenna Code = TRM29659.00) was installed on 01/12/04.
        The L2 phase center is 0.018 m above the L1 phase center.
                          PID = DG7412


 ITRF00 POSITION (EPOCH 1997.0)
 Computed in Aug. 2007 using 608 days of data.
     X = -2675935.968 m      latitude    = 35 33 06.29871 N
     Y = -4452985.003 m      longitude   = 121 00 10.63994 W
     Z =  3687903.102 m      ellipsoid height = 107.107   m

 The ITRF00 VELOCITY of the L1 PC is the same as that for the ARP.


 NAD_83 (CORS96) POSITION (EPOCH 2002.0)
 Transformed from ITRF00 (epoch 1997.0) position in Aug. 2007.
     X = -2675935.430 m      latitude    = 35 33 06.28786 N
     Y = -4452986.130 m      longitude   = 121 00 10.59860 W
     Z =  3687903.183 m      ellipsoid height = 107.715   m

 The NAD_83 (CORS96) VELOCITY of the L1 PC is the same as that for the ARP.

         Monument: CLEGGRANCHCS2004 GRP
```

```
|         ----------------------------                                    |
|                            PID = DG7413                                 |
|          Inscribed: UNKNOWN                                             |
|                                                                         |
|                                                                         |
| ITRF00 POSITION (EPOCH 1997.0)                                          |
| Computed in Aug. 2007 using 608 days of data.                           |
|     X = -2675935.919 m      latitude    =  35 33 06.29868 N             |
|     Y = -4452984.921 m      longitude   = 121 00 10.63996 W             |
|     Z =  3687903.033 m      ellipsoid height =  106.989   m             |
|                                                                         |
| The ITRF00 VELOCITY of the monument is the same as that for the ARP.    |
|                                                                         |
|                                                                         |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                                 |
| Transformed from ITRF00 (epoch 1997.0) position in Aug. 2007.           |
|     X = -2675935.382 m      latitude    =  35 33 06.28782 N             |
|     Y = -4452986.048 m      longitude   = 121 00 10.59862 W             |
|     Z =  3687903.114 m      ellipsoid height =  107.597   m             |
|                                                                         |
| The NAD_83 (CORS96) VELOCITY of the monument is the same as that for the ARP|
|_____|
```

 * Latitude, longitude and ellipsoid height are computed from their
   corresponding cartesian coordinates using dimensions for the
   GRS 80 ellipsoid: semi-major axis = 6,378,137.0 meters
                     flattening = 1/298.257222101...


 * WARNING: Mixing of antenna types can lead to errors of up to 10 cm.
   in height unless antenna-phase-center variation is properly modeled.


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   of these positions and velocities, consult
   http://www.ngs.noaa.gov/CORS/Coords.html
   For additional information on the relation of the GPS antenna to other
   relevant points at the site and on GPS equipment, consult the
   link http://www.ngs.noaa.gov/cors/Logfiles.html


 * The ITRF00 & NAD83 position & velocity were revised in Aug. 2007.

Source:/home/hvan/Release/pv_ret/pv_ret.c
Version 2.11 June 04, 2010
                              ***ITRF 00***
                    RAMAGERNCHCS2004 (P526),  CALIFORNIA

 Retrieved from NGS DataBase on 03/22/11 at 20:34:36.
 _____
|                                                                           |
|          Antenna Reference Point(ARP): RAMAGERNCHCS2004 CORS ARP          |
|          -----------------------------------------------------            |
|                           PID = DG8359                                    |
|                                                                           |
|                                                                           |
| ITRF00 POSITION (EPOCH 1997.0)                                            |
| Computed in Mar. 2008 using 768 days of data.                             |
|     X =  -2662913.204 m      latitude    =  35 38 09.49946 N              |
|     Y =  -4454742.604 m      longitude   = 120 52 11.03572 W              |
|     Z =   3695682.378 m      ellipsoid height =  416.840   m              |
|                                                                           |
| ITRF00 VELOCITY                                                           |
| Adapted in Mar. 2008 using 768 days of data.                              |
|     VX =  -0.0258 m/yr      northward =   0.0190 m/yr                      |
|     VY =   0.0283 m/yr      eastward  =  -0.0367 m/yr                      |
|     VZ =   0.0154 m/yr      upward    =  -0.0000 m/yr                      |
|                                                                           |
|                                                                           |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                                   |
| Transformed from ITRF00 (epoch 1997.0) position in Mar. 2008.             |
|     X =  -2662912.679 m      latitude    =  35 38 09.48731 N              |
|     Y =  -4454743.749 m      longitude   = 120 52 10.99446 W              |
|     Z =   3695682.429 m      ellipsoid height =  417.450   m              |
|                                                                           |
| NAD_83 (CORS96) VELOCITY                                                   |
| Transformed from ITRF00 velocity in Mar. 2008.                            |
|     VX =  -0.0099 m/yr      northward =   0.0329 m/yr                      |
|     VY =   0.0289 m/yr      eastward  =  -0.0233 m/yr                      |
|     VZ =   0.0264 m/yr      upward    =  -0.0007 m/yr                      |
|_____|
|                                                                           |
| L1 Phase Center of the current GPS antenna: RAMAGERNCHCS2004 CORS L1 PC C  |
| ------------------------------------------------------------------------- |
| The D/M element, CR, +SCIT radome SCIGN mt antenna                        |
| (Antenna Code = TRM29659.00      SCIT) was installed on 01/10/04.         |
|        The L2 phase center is 0.018 m above the L1 phase center.          |
|                           PID = DI0792                                    |
|                                                                           |
|                                                                           |
| ITRF00 POSITION (EPOCH 1997.0)                                            |
| Computed in Mar. 2008 using 768 days of data.                             |
|     X =  -2662913.247 m      latitude    =  35 38 09.49949 N              |
|     Y =  -4454742.678 m      longitude   = 120 52 11.03569 W              |
|     Z =   3695682.441 m      ellipsoid height =  416.947   m              |
|                                                                           |
| The ITRF00 VELOCITY of the L1 PC is the same as that for the ARP.         |
|                                                                           |
|                                                                           |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                                   |
| Transformed from ITRF00 (epoch 1997.0) position in Mar. 2008.             |
|     X =  -2662912.722 m      latitude    =  35 38 09.48734 N              |
|     Y =  -4454743.823 m      longitude   = 120 52 10.99443 W              |
|     Z =   3695682.492 m      ellipsoid height =  417.556   m              |
|                                                                           |
| The NAD_83 (CORS96) VELOCITY of the L1 PC is the same as that for the ARP. |
|_____|
|          Monument: RAMAGERNCHCS2004 GRP                                   |

```
|              -----------------------------                                |
|                        PID = DG8361                                       |
|          Inscribed: UNKNOWN                                               |
|                                                                           |
|                                                                           |
| ITRF00 POSITION (EPOCH 1997.0)                                            |
| Computed in Mar. 2008 using 768 days of data.                             |
|      X =  -2662913.200 m      latitude    =  35 38 09.49946 N             |
|      Y =  -4454742.598 m      longitude   = 120 52 11.03572 W             |
|      Z =   3695682.373 m      ellipsoid height =  416.832   m             |
|                                                                           |
| The ITRF00 VELOCITY of the monument is the same as that for the ARP.      |
|                                                                           |
|                                                                           |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                                   |
| Transformed from ITRF00 (epoch 1997.0) position in Mar. 2008.             |
|      X =  -2662912.675 m      latitude    =  35 38 09.48731 N             |
|      Y =  -4454743.743 m      longitude   = 120 52 10.99446 W             |
|      Z =   3695682.424 m      ellipsoid height =  417.441   m             |
|                                                                           |
| The NAD_83 (CORS96) VELOCITY of the monument is the same as that for the ARP|
|_____|
```

  * Latitude, longitude and ellipsoid height are computed from their
    corresponding cartesian coordinates using dimensions for the
    GRS 80 ellipsoid: semi-major axis = 6,378,137.0 meters
                           flattening = 1/298.257222101...


  * WARNING: Mixing of antenna types can lead to errors of up to 10 cm.
    in height unless antenna-phase-center variation is properly modeled.


  * For additional information about the interpretation and/or derivation
    of these positions and velocities, consult
    http://www.ngs.noaa.gov/CORS/Coords.html
    For additional information on the relation of the GPS antenna to other
    relevant points at the site and on GPS equipment, consult the
    link http://www.ngs.noaa.gov/cors/Logfiles.html


  * The ITRF00 & NAD_83 positions & velocities were revised in Mar. 2008.

Source:/home/hvan/Release/checkout/pv_ret/pv_ret.c
Version 2.0 July 24, 2011
                           ***ITRF 00***
               MORGANTRTYCN2005 (P230),  CALIFORNIA

 Retrieved from NGS DataBase on 07/29/11 at 14:05:32.
 _____
|                                                                    |
|            Antenna Reference Point(ARP): MORGANTRTYCN2005 CORS ARP  |
|            ------------------------------------------------------   |
|                           PID = DH3882                             |
|                                                                    |
| ITRF00 POSITION (EPOCH 1997.0)                                     |
| Computed in Mar. 2008 using 415 days of data.                      |
|     X = -2657625.180 m     latitude    =  37 49 08.27381 N         |
|     Y = -4288583.874 m     longitude   = 121 47 11.02641 W         |
|     Z =  3889987.532 m     ellipsoid height =  647.986   m         |
|                                                                    |
| ITRF00 VELOCITY                                                    |
| Predicted with HTDP_2.7 June 2005.                                 |
|     VX = -0.0260 m/yr     northward = -0.0073 m/yr                 |
|     VY =  0.0102 m/yr     eastward  = -0.0275 m/yr                 |
|     VZ = -0.0054 m/yr     upward    =  0.0007 m/yr                 |
|                                                                    |
|                                                                    |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                            |
| Transformed from ITRF00 (epoch 1997.0) position in Mar. 2008.      |
|     X = -2657624.652 m     latitude    =  37 49 08.25696 N         |
|     Y = -4288585.085 m     longitude   = 121 47 10.98199 W         |
|     Z =  3889987.458 m     ellipsoid height =  648.534   m         |
|                                                                    |
| NAD_83 (CORS96) VELOCITY                                           |
| Transformed from ITRF00 velocity in Mar. 2008.                     |
|     VX = -0.0095 m/yr     northward =  0.0070 m/yr                 |
|     VY =  0.0109 m/yr     eastward  = -0.0138 m/yr                 |
|     VZ =  0.0055 m/yr     upward    =  0.0000 m/yr                 |
|_____|
|                                                                    |
| L1 Phase Center of the current GPS antenna: MORGANTRTYCN2005 CORS L1 PC C |
| ------------------------------------------------------------------ |
| The D/M element, CR, +SCIT radome SCIGN mt antenna                 |
| (Antenna Code = TRM29659.00     SCIT) was installed on 01/13/07.   |
|        The L2 phase center is 0.018 m above the L1 phase center.   |
|                           PID = DK2751                             |
|                                                                    |
|                                                                    |
| ITRF00 POSITION (EPOCH 1997.0)                                     |
| Computed in Mar. 2008 using 415 days of data.                      |
|     X = -2657625.223 m     latitude    =  37 49 08.27384 N         |
|     Y = -4288583.945 m     longitude   = 121 47 11.02638 W         |
|     Z =  3889987.598 m     ellipsoid height =  648.093   m         |
|                                                                    |
| The ITRF00 VELOCITY of the L1 PC is the same as that for the ARP.  |
|                                                                    |
|                                                                    |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                            |
| Transformed from ITRF00 (epoch 1997.0) position in Mar. 2008.      |
|     X = -2657624.695 m     latitude    =  37 49 08.25699 N         |
|     Y = -4288585.157 m     longitude   = 121 47 10.98195 W         |
|     Z =  3889987.524 m     ellipsoid height =  648.641   m         |
|                                                                    |
| The NAD_83 (CORS96) VELOCITY of the L1 PC is the same as that for the ARP. |
|_____|
|                                                                    |

```
|          Monument: MORGANTRTYCN2005 GRP                                    |
|          -----------------------------                                    |
|                           PID = DH3884                                    |
|          Inscribed: UNKNOWN                                               |
|                                                                           |
|                                                                           |
| ITRF00 POSITION (EPOCH 1997.0)                                            |
| Computed in Mar. 2008 using 415 days of data.                             |
|     X =  -2657625.176 m      latitude   =  37 49 08.27381 N               |
|     Y =  -4288583.868 m      longitude  = 121 47 11.02641 W               |
|     Z =   3889987.527 m      ellipsoid height =  647.978   m              |
|                                                                           |
| The ITRF00 VELOCITY of the monument is the same as that for the ARP.      |
|                                                                           |
|                                                                           |
| NAD_83 (CORS96) POSITION (EPOCH 2002.0)                                   |
| Transformed from ITRF00 (epoch 1997.0) position in Mar. 2008.             |
|     X =  -2657624.649 m      latitude   =  37 49 08.25696 N               |
|     Y =  -4288585.079 m      longitude  = 121 47 10.98199 W               |
|     Z =   3889987.453 m      ellipsoid height =  648.526   m              |
|                                                                           |
| The NAD_83 (CORS96) VELOCITY of the monument is the same as that for the ARP |
|_____|
```

 * Latitude, longitude and ellipsoid height are computed from their
   corresponding cartesian coordinates using dimensions for the
   GRS 80 ellipsoid: semi-major axis = 6,378,137.0 meters
                          flattening = 1/298.257222101...


 * WARNING: Mixing of antenna types can lead to errors of up to 10 cm.
   in height unless antenna-phase-center variation is properly modeled.


 * For additional information about the interpretation and/or derivation
   of these positions and velocities, consult
   http://www.ngs.noaa.gov/CORS/Coords.html
   For additional information on the relation of the GPS antenna to other
   relevant points at the site and on GPS equipment, consult the
   link http://www.ngs.noaa.gov/cors/Logfiles.html


 * The ITRF00 & NAD_83 positions were revised in Mar. 2008.