November 2009

Survey Report

for the

Monitoring and Control Surveys

of the

Rancho Palos Verdes Portuguese Landslide

By

McGee Surveying Consulting and Charles Abbott Associates, Inc.

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Survey Report
of the
Portuguese Landslide November 2009 Monitoring Survey
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Surveyed by: McGee Surveying Consulting of Santa Barbara, CA, and Charles Abbott Associates, Inc.
Client: City of Rancho Palos Verdes**; Project Name**: Portuguese Bend Landslide Monitoring Program
Location: Rancho Palos Verdes, California; **County:** Los Angeles**; State:** California

PROJECT OVERVIEW:

McGee Surveying Consulting performed a slide monitoring and control survey at Portuguese Bend on behalf of the City of Rancho Palos Verdes in November 2009. The purpose of the survey was to establish accurate positions on monitoring points to determine overall and periodic movements. The results of this Survey are reported on spreadsheets described in this Report and attached hereto.

The field survey was planned, coordinated and executed by Michael McGee, PLS3945 of McGee Surveying Consulting of Santa Barbara, California in coordination with Frederick (Rick) Jones; P.E., P.L.S., City Engineer, City of Rancho Palos Verdes. Michael McGee PLS was responsible for the final processing of the observations, network adjustments, analysis and reports. The monitoring points cover approximately a 1½ mile square area and are measured annually or more often as necessary to determine the rate and extent of ground movement. Global Positioning System (GPS) technology is used for the purpose of determining positions based on the North American Datum of 1983 (NAD83) and the North American Vertical Datum of 1988 (NAVD 88) as referenced to the California CGPS (Continuous GPS) Stations in the region which are permanently mounted GPS receivers for monitoring seismic activity. The CGPS in California are similar to the national CORS (Continuously Operated Reference Stations).

Given that many points move an inch (0.08') or less per year, our requirement is to meet a relative accuracy standard of one centimeter (0.033 feet) at the 95% Level of Confidence. In the active slide area (central portion) where the movements are larger, two centimeters (0.066 feet) is sufficient. Field procedures are designed to accomplish this purpose and Quality Control-Quality Assurance (QAQC) processes discussed hereafter are incorporated to verify this accuracy is attained.

The movements reported between December 2008 and November 2009 (11.3 months) statistically attained accuracies of 0.02 feet at the 95% Level of Confidence as reported in the attached document "FULL DATA POSTING.xls". The actual accuracies of these measurements approach 0.01 feet in the horizontal as demonstrated by the measured vector residuals, repeatability of measurements at points considered stable, and the consistent direction of the movements reported from one period to the next. Refer to the sections titled ACCURACY and SUMMARY at the end of this Report for more details.

HISTORY

This survey is a continuation of a monitoring survey program initiated by the County of Los Angeles and taken over by the City of Rancho Palos Verdes circa 1994. McGee Surveying Consulting has conducted the field surveys and reporting since September 2007. See the Survey Reports for the September 2007 and December 2008 campaigns and the September 2007 Report for a detailed history of the previous survey process between 1994 and the September 2007.

PROJECT DATUMS, REFERENCE SYSTEM

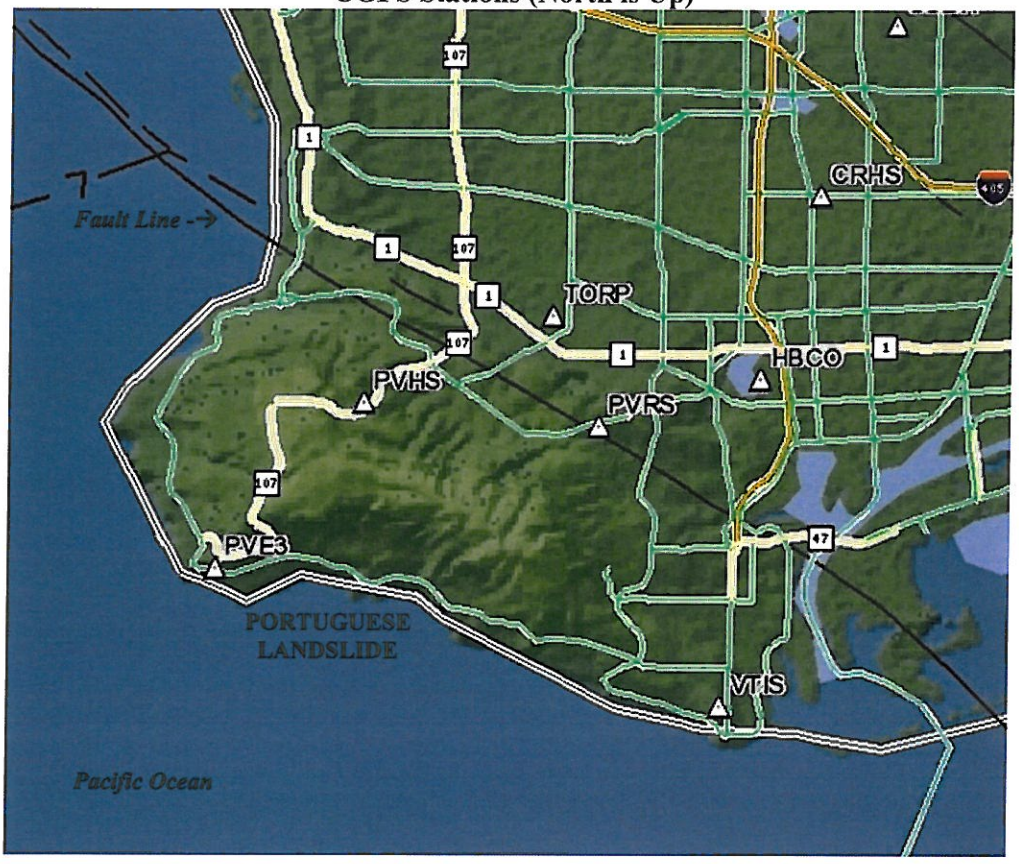
Horizontal Datum: North American Datum of 1983 (NAD83) per the National Geodetic Survey (NGS); **Epoch:** 2007.00 referred to as NAD83(2007.00).; **Units:** Feet

Reference Network: The survey is referenced to the CGPS Stations which are continuously operating reference GPS receivers mounted on a stabile platform (for more information see NGS Data Sheets for the PID's listed below). No data sheet exists for PVE3. The positions were obtained from the California Spatial Reference Center (CSRC). CSRC provides NGS sanctioned positions on all California CGPS Stations.

CGPS	Latitude(dms)	Longitude(dms)	EH(feet)	NGS PID	NAME
PVE3	33 44 35.853290	-118 24 15.269036	235.42	none	PALOS VERDES CORS
PVHS	33 46 46.020150	-118 22 19.741258	853.99	AJ1915	PENINSULA HIGH SCH
PVRS	33 46 25.891904	-118 19 14.067218	198.63	AJ1916	PALOS VERDES RES
VTIS	33 42 45.489584	-118 17 37.712290	197.52	AJ1936	MARINE EXCHANGE

Note: PVRS fall in the proximity of a Fault Line as shown below but appears unaffected to date

CGPS Stations (North is Up)



Vertical Datum: North American Vertical Datum of 1988 (NAVD88) orthometric heights per NGS
Geoid Model: Geoid 03 (Geoid09 became available from the NGS in late 2009; however, using Geoid09 would not affect the results and Geoid03 is retained to be consistent with prior reported heights and the purpose of determining relative changes)

Reference Network: CGPS Station VTIS is the basis for this survey (see NGS Data Sheets)

CGPS	NAVD 88 Ht(feet)	
PVE3	none	
PVHS	972.1	Based on a Refined Geoid Model
PVRS	316.3	Based on a Refined Geoid Model
VTIS	315.26	Based on Second Order Leveling by CSRC and basis for this survey

Projection: NAD83 California State Plane Coordinates Zone 5: The State Plane Coordinates Parameters for Zone Five follow. The average Scale Factor is 1.00007543, the Ellipsoid Height Reduction Factor based on the average ellipsoid heights is 0.99999092, and the average Combined Grid Factor is 1.00006635. Distances in this survey are grid. To obtain ground distance divide the grid distances by the Combined Grid Factor. Grid bearings resulting from this survey must be rotated by a Convergence Angle to obtain geodetic (true) bearings. The average convergence angle is -0-12-30.2± (rotate left 0-12-30).

Datum Stability: The NAD83, 2007.00 Epoch adjustment is the latest in a series of adjustments of NAD83 since its adoption in 1986 and is the datum used for monitoring surveys since 2007. Rancho Palos Verdes sits on the Pacific Plate which is moving west-northwesterly relative to the North American Plate about 4 centimeters (0.14 feet) per year. The area southwesterly of the Fault Line shown on the above map includes the City and is moving at a constant rate as exhibited by the N, E, Up velocities of the CGPS Stations used in this survey, listed below. The CGPS Stations provide a rigid reference frame for the Portuguese Landslide Monitoring Program that is validated during each monitoring campaign. See the Minimally Constrained Adjustment results on Page 7 and the September 2007 Monitoring Survey Report by McGee Surveying Consulting for additional information.

Annual Velocities in Feet (2000-2010.04)

CGPS	North	East	Up
PVE3	0.064	-0.130	-0.001
PVHS	0.064	-0.128	0.000
PVRS	0.062	-0.128	0.001
VTIS	0.064	-0.128	-0.001

FIELD SURVEYS, DATA COLLECTION, EQUIPMENT & PROCESSING

Sixty-seven monitoring points were occupied and reported in November 2009. Site photographs and recovery sheets detailing the location, character of the monument and obstructions were updated. See the Appendix for "Monitoring Point Status as of November 2009" and "Monitoring Points Photo Update November 2009" for additional information. See the September 2007 and December 2008 Monitoring Survey Reports for all photos.

AB61, established in 2007 on Portuguese Point was used as a Base Station because of its suitability for GPS observations. The location is secured behind a locked gate, has a clear horizon above 15 degrees, and sits on a stable basalt geological formation.

The field survey commenced each day by setting a GPS receiver on a fixed height pole on AB61 while two GPS receivers roamed freely collecting observations on fixed height poles at the 66 other on-site points. Many of the points are over-shadowed by mature trees and shrubbery which interfere with signals received from satellites and affect the quality of measurements. To obtain the highest possible accuracies, satellites are compared with obstruction diagrams to estimate the best time for observing a point. Upon arriving at a point to be observed, the receiver is set up, and the location in the sky of each satellite is estimated with a compass and abney. Those

satellites obstructed by foliage and trees are turned off. If 5 or more un-obstructed satellites with a GDOP (measure of the geometry of the constellation) of 4.5 or less are available, then the measurement commenced for 15-30 minutes of data collection. If sufficient satellites and geometry are not available, then the receiver is moved to the next point and returned later when satellite availability improves. This process is followed until all points are occupied twice under a different constellation of satellites on a different day. If the two measurements are within 0.03 feet in slow movement areas or 0.06 feet in active slide areas, then they are accepted, otherwise a third and sometimes fourth occupation is necessary.

Three Leica geodetic GPS receivers and antennas listed below were utilized to collect, process and store satellite signal data. Three, 2 meter fixed height poles were used for the base station and for the observations of the monitoring points. Prior to initiating the field observations a calibration of the fixed height poles was conducted with a theodolite to verify their height and plumb. The top of the poles were found to be plumb within 0.003 feet of the bottom consistent with prior years. Additional checks were made each day. There were no equipment failures.

GPS Survey Parameters:
Date of Field Surveys: 11/14/2009 to 11/20/2009 between 0700-1700 PST (+8 hrs for UTC).
Constellation: The NAVSTAR GPS constellation consisted of 30 Block II satellites.
GPS Observables: L1 & L2 Carrier Wave, C/A Code & P-Code; P-code was encrypted and SA off.
Epoch Rate & Occupation Times: 10 seconds for 15-30 minutes and 4-10 hours for CGPS connections.
Minimum Satellites: 5 ; GDOP < 4.5 ; Elevation Mask for Data Collection: 10 degrees; Processing: 10 deg.
Ephemeris: Broadcast and Precise for Static Post-Processing.
Weather conditions: Generally clear skies and mild temperatures.
Space Weather: Boulder K Index was 0-2 on a scale of 0-9 and gauges ionospheric activity.
GPS Base Receiver Unit No.: M1, Operator: M. McGee, PLS; Station Identification: AB61
Make & Model: Leica 530; Antenna Leica AT302; Mount: Fixed Height Pole #2; Antenna Height: 2.086m
GPS Rover Receiver Unit No.: M3, Operator: M. McGee, PLS;
Make & Model: Leica 530; Antenna Leica AT502; Mount: Fixed Height Pole #3; Antenna Height: 2.085m
GPS Rover Receiver Unit No.: M4, Operator: R. Reese, PLS,
Make & Model: Leica 530; Antenna Leica AT502; Mount: Fixed Height Pole #1; Antenna Height: 2.086m

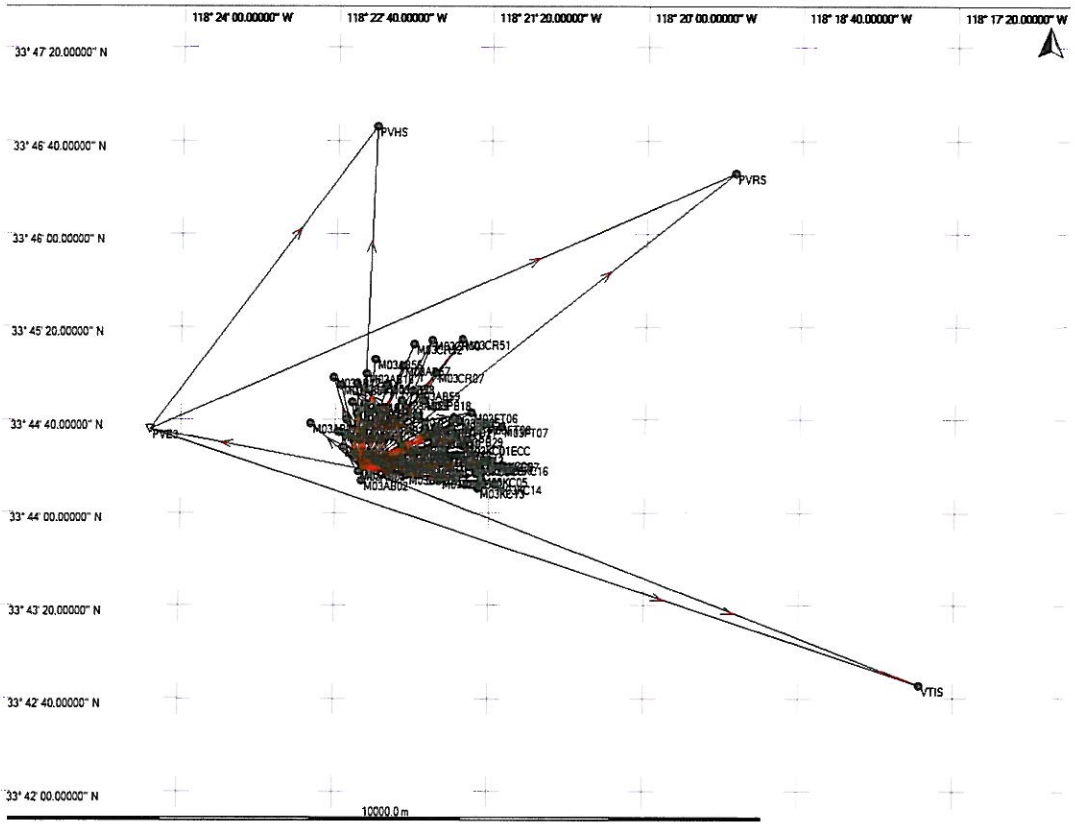
Data was processed using Leica LGO post processing software. The long baseline connections to the CGPS were processed with a precise ephemeris and the short monitoring network baselines were processed with a broadcast ephemeris, both at a cutoff vertical angle of 10°. Analysis of processing statistics and residuals led to the rejection of 4 vectors. Network adjustments and analysis were performed with "Starnet-PRO" version 6.0 software. Data files for the CGPS Stations were downloaded from the following websites: Rinex files from CSRC/SOPAC, rapid and precise ephemeris from the NGS, and antenna models from the NGS .

NETWORK

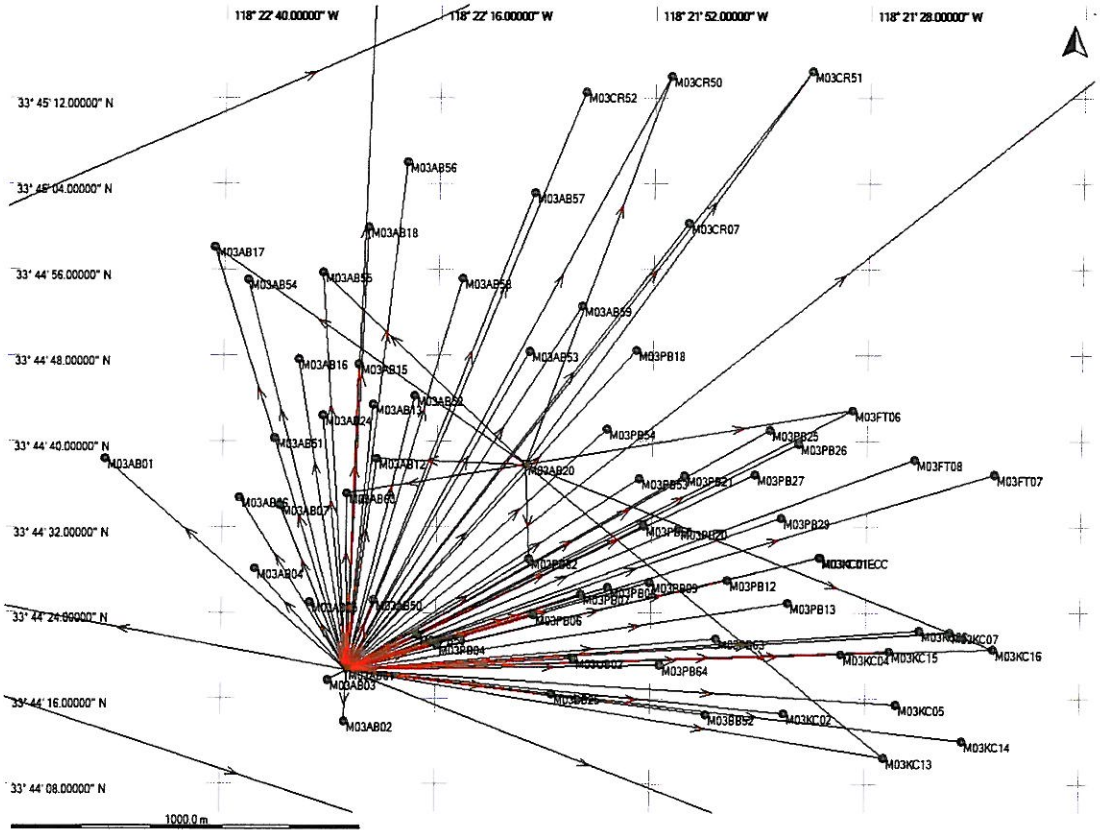
The monitoring plan uses the CGPS Stations and those points deemed to be stable to verify the stability of the reference system. Relative to the Base Station point AB61, the CGPS Station PVE3 is located 1.8 miles west-northwest near City Hall, PVHS is 2.8 miles north, PVRS 3.9 miles northeast near a fault line, and VTIS is 4.9 miles east-southeast as shown on the Network diagram on the next page.

AB61, is the primary Base Station and sits on Portuguese Point. It is focal point of the static network connecting the monitoring points and CGPS Stations. A total of 68 on site points and 4 CGPS Stations were connected with 83 vectors measured 2-4 times to each point (197 measured vectors total). See the Network Maps below for points and vectors.

GPS Network with CGPS Stations (North up)



GPS Network – Enlargement of Monitoring Points (North up)



MONITORING POINT STATUS

For data management purposes during the field survey and data processing, the point names are prefixed with "M03" i.e. AB61 is M03AB61 to distinguish between different monitoring periods. This indicates this survey is the third monitoring since the initial September 2007 Monitoring Survey when the Program was modernized. This allows queries between epochs that include statistical information about accuracies. The prefix is stripped in the coordinate and movement listing reports.

Since 1994, 149 monitoring points have been established in the Portuguese Bend area, many of which are now lost or destroyed. Sixty of the original points were recovered in 2007. Eight of the 60 points were deleted because they were in close proximity of other better suited for GPS leaving 52 points monitored for movement between September 2006 and September 2007. Three of the 52 points (AB09, KC11, PB51) were monitored in September 2007 for the last time because they were replaced by new points, set nearby and better suited for GPS. Eighteen new points set in 2007 had their movements reported for the first time in the December 2008 survey. In December 2008, 49 original and 18 points set in September 2007 were surveyed for a total of 67 monitoring points.

One new point PB64 was set east of the Archery Range to replace PB63 which has become unsafe to access over waffled terrain. At the next Monitoring PB63 will be discontinued.

In the September 2007 Report, it was noted that KC01 was reported by the previous survey on 9/14/2006 to have moved N 29°E 1.24' from its 12/9/2005 position. This surveyor found a buried brass cap in concrete stamped "COUNTY ENGINEER RE8869 1956 STA ??IELDS" S31°29'W 1.48 feet from the 1" IP with steel guard post that was found in September 2007 and used on subsequent surveys. The original position of KC01 is adjusted in this Report to be consistent with the 1" IP, resulting in correct overall reported movements.

In the December 2008 Report, it was noted that AB05 had been previously disturbed by a mowing machine. AB05 was found chipped and leaning to southerly about 0.4'. The movement reporting resumes with this survey. Analysis of the present movement and historic data makes it possible to estimate the disturbance to within 0.05'. The original position of AB05 is adjusted S14°02'E 0.29' in this Report to be consistent with the disturbed position, resulting in correct overall reported movements.

The present status of monitored points is provided in the Appendix under "Monitoring Point Status as of November 2009".

ADJUSTMENTS & ANALYSIS

Adjustment 1: Minimally Constrained to develop Geodetic and Ellipsoid Coordinates in NAD83(2007.00)
Fixed Control: The CGPS Station PVE3 was fixed at its published three dimensional position in a Minimally Constrained Adjustment to determine latitude, longitude, ellipsoid heights, and state plane coordinates, and check other known points. The CSRC publishes a Time Series for the horizontal and vertical stability of PVE3 which indicate the position has been stable over a ten year period to date. The coordinate differences at other CGPS Stations from previous positions to the present are listed below in feet. See the attached file "COORDINATE LIST–Nov 2009" for a list of coordinates resulting from this survey.

Record Positions Compared to 12/2008

Station	dN	dE	dZ	
PVE3	-0.000	-0.000	-0.000	Fixed
PVHS	0.004	-0.010	0.081	
PVRS	0.017	0.002	-0.015	
VTIS	0.005	0.006	-0.021	

9/2007 Positions Compared to 11/2009

Station	dN	dE	dZ	
PVE3	-0.000	-0.000	-0.000	Fixed
PVHS	-0.002	0.005	0.045	
PVRS	0.001	0.009	0.010	
VTIS	-0.003	0.007	-0.005	

12/2008 Positions Compared to 11/2009

Station	dN	dE	dZ	
PVE3	-0.000	-0.000	-0.000	Fixed
PVHS	-0.004	-0.001	0.015	
PVRS	0.003	0.001	0.006	
VTIS	-0.002	0.001	-0.002	
AB61	-0.005	0.002	-0.007	

The 2D differences from the December 2008 to the November 2009 measured positions of the CGPS Stations vary 0.002 to 0.004 feet, and for the purpose of this survey, a constrained adjustment is not preferred or necessary. The CGPS Station positions as determined by this and prior surveys relative to PVE3 are more useful than the record positions for determining the stability of PVE3. The positions determined by these surveys are based on a set of six measurement collected each day for about 10 hours over a six to seven day period during each campaign.

Points AB01, AB02, AB03, AB17, AB61, FT08, and KC16 are presently considered stable, given their history. The prior positions when compared to this survey indicate repeatability at the level of 0.01' as listed in the "FULL DATA POSTING". The survey reference frame is deemed stable and successfully recovered at the level indicated.

Adjustment 2: Minimally Constrained to develop Orthometric Heights (Elevations) in NAVD88
Fixed Control: The CGPS Station PVE3 was fixed horizontally and vertically at the NAVD88 height determined in September 2007 survey based on VTIS CGPS Station. The Adjustment combined the measured ellipsoid height differences with the NGS Geoid 03 (models the separation between the ellipsoid and geoid surfaces) to determine NAVD88 orthometric heights of all points. Prior surveys are compared with the heights determined in the present survey as listed below. See the attached file "COORDINATE LIST-Nov 2009 Survey" for a list of heights resulting from this survey.

09/2007 to 12/2008

Station	dZ(ft)
PVE3	0.000
PVHS	0.031
PVRS	0.006
VTIS	-0.001

12/2008 to 11/2009

Station	dZ(ft)
PVE3	-0.000
PVHS	0.010
PVRS	0.008
VTIS	-0.006

9/2007 to 11/2009

Station	dZ(ft)
PVE3	-0.000
PVHS	0.041
PVRS	0.014
VTIS	-0.007
AB61	-0.010

Note: The orthometric height of PVE3, established in September 2007 based on the published 2nd Order NAVD88 Height of VTIS located 35,386 feet east-southeasterly, is confirmed here at -0.007 feet.

ACCURACY

Coordinate Accuracy: In the Minimally Constrained Adjustment #1, the Standard Deviations (68% Level of Confidence) of the coordinates follow in feet.

	68 Monitoring Point				CGPS Stations		
	North	East	Up		North	East	Up
Average	0.006	0.005	0.021	Average	0.002	0.001	0.004
Maximum	0.009	0.008	0.032	Maximum	0.002	0.002	0.005

Absolute Coordinate Accuracy: The network accuracy is expected to be less than 0.02 feet horizontal relative to the NAD83 Datum based on the CGPS Station PVE3 fixed in Adjustment #1.

Relative Movement Accuracy: For the 67 movements reported here at the 95% Level of Confidence, the statistical analysis indicates the relative error averages 0.022 feet with a standard deviation of 0.004 feet and a range of 0.004 to 0.031 feet.

Vector Accuracy: 197 measured vectors were processed in Adjustment #1 resulting in 83 vectors connecting 72 points. The two dimensional residuals and the absolute value of the vertical residuals of the 197 vectors are listed below in feet. The vector residuals at each point and the closures on stable control points discussed in "Adjustment 1" are good indications of the accuracies obtained by this survey.

	Two Dimensional Residuals			Vertical Residuals		
	Average	Std.Dev.	Maximum	Average	Std.Dev.	Range
Monitoring Pts	0.006	0.004	0.020	0.01	0.01	-0.04 to +0.04
CGPS Stations	0.005	0.004	0.017	0.02	0.016	-0.06 to +0.04

The precisions and the relative distance errors resulting from the adjustment, at the 95% Level of Confidence, for the 83 vectors (baselines) connecting 72 points are listed below in feet.

	Lengths		Precisions		Relative Dist.Error		
	Vary	Average	Vary	Average	Average	Maximum	Precision
Monitoring Pts	192-7134	3484	1.5-63.0	5.9 ppm	0.013	0.023	1: 268,000
CGPS Stations	9396-35386	21519	0.1- 0.3	0.2 ppm	0.003	0.004	1:7,173,000

The precision ratio based on the averages for the vectors connecting the Monitoring points exceeds the criteria for a First Order (C-1) by a factor of 2.7, and the vectors connecting AB61 and the CGPS Stations exceeds the criteria for a B Order survey by a factor of 7.2 per the FGCS requirements for the former classification system.

NAVD88 Heights: The North American Vertical Datum 1988 orthometric heights (elevations) resulting from Adjustment #2 are derived from the difference in ellipsoid heights combined with the Geoid 03 model and constrained to the orthometric height of PVE3. The ellipsoid heights are expected to be within 0.03 feet. The Geoid 03 model is expected to have a probable error of 1 part per million. Although relative elevation accuracies are expected to be 0.03+/- feet, there are no requirements for these surveys. The absolute accuracy of these heights is dependent on the published values on the CGPS Station VTIS.

This survey conforms to the intent of the Federal Geodetic Control Subcommittee (FGCS) Specifications for GPS Relative Positioning (1988) and the California Geodetic Control Committee (CGCC) Specifications for High-Production GPS Surveying Techniques (1993).

QAQC ANALYSIS

To ensure the accuracy and validity of the systems used to obtain the accuracies reported in these GPS surveys, an independent test was made using conventional terrestrial based instruments as reported in the "QAQC ANALYSIS" section of the September 2007 Monitoring Survey Report. The results found the GPS systems and conventional instrumentation horizontal measurements agree 0.01 feet on average.

To validate the radial survey method of positioning points from a single base station (AB61), independent GPS cross connections were measured and compared with the computed inverse distances in the present and prior surveys as reported in the "QAQC ANALYSIS" section of the September 2007 and the December 2008 Monitoring Survey Report. The results find the two dimensional accuracy to agree 0.01 feet on average, indicating the radial method of measurements is reliable and the extra labor cost of measuring cross connection between all points is not warranted.

SUMMARY

A modernization of field procedures and processing techniques began with the September 2007 survey. The temporal movements are based on a rigorous simultaneous least squares adjustment of multiple observations on each point at two different epochs. The statistical results of the December 2008 to November 2009 monitoring period show the relative accuracy of the reported movements is 0.022 feet on average at the 95% Level of Confidence. Prior to September 2007, successive coordinates were used to compute movements which did not provide statistical information about the relative accuracy of the movements.

Analysis of the adjustment indicates the probability at the 95% level of confidence that movement (signal) has occurred at a point when the horizontal distance is greater than 0.02 feet (noise). Using these criteria, 15 points have not moved, BB25 moved in a direction inconsistent with the prior period, leaving 51 points that have moved. Between December 2008 and November 2009 (11.3 months), points in the Portuguese Bend Landslide moved between 0.10 and 7.30 feet. Points in the Abalone Cove Landslide west of the Portuguese Bend Landslide moved between 0.04 and 0.11 feet. Points in the Klondike Canyon east of the Portuguese Bend Landslide moved between 0.03 and 0.08 feet. See the Contours of Horizontal Movement in the Appendix for a graphical representation of the movements across the site.

Deflection Analysis: 49 of these points moved in a direction that was linear when compared with the previous period's direction of movement. The deflection or separation between the direction for the previous and present periods, taken over the moved distance, returned an average separation of 0.01 feet with a standard deviation of 0.01 feet. This implies the expectation that the direction of movement is linear unless acted upon by other forces. Furthermore, the 0.01 foot separation is an implied accuracy of the measurement of the reported movements.

Velocity Analysis: The movement distances for this period are 54% on average (12% standard deviation) of the movements for the last period; however, the 11.3 month period is 78% of the prior period. If the 54% average is normalized with the previous period (.54/.78=.68), then the movements have slowed about 1/3. The City Geologist should be referred to for assessment and interpretation of the movements.

See the spreadsheet "FULL DATA POSTING.xls" for overall and periodic movements of each point. The movements are given in north, east and up or down as well as a vector of distance and direction. The direction is given as an azimuth in degrees where 0° is north, 90° is east, 180° is south and 270° is west. The overall movements are from the beginning position of each point which varies between 1994 and 2007.

The present status of monitored points is provided in the Appendix under "Monitoring Point Status as of November 2009". The historical status of all monitoring points is provided in the September 2007 Survey Report. The historical 1994-2006 positions of all points are listed in the Charles Abbott Associates Inc. file "ALL POINTS MOST RECENT OBSERVED POSITION AS OF SEPTEMBER 15, 2006.xls" attached to the 2007 Report.

RECOMMENDATION

Monitoring Point AB03 on Portuguese Point should be deleted from the survey because it sits atop a high cliff subject to erosion and AB61 set nearby in 2007 is a suitable replacement. AB54 is one of the worst points for collecting GPS data. A suitable location may exist north-northeasterly about 300 feet on what may be City property. BB25 sits on a rock which appears to be unstable given its history of incongruous movements. It will be difficult to find a suitable nearby replacement along the shoreline.

Attachments: Find the following documents attached to this Report.

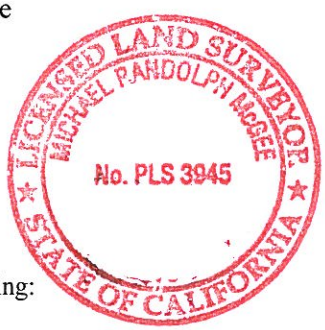
FULL DATA POSTING.xls - Lists the overall and periodic movements of monitoring point including coordinates of the initial positions, 2007 and post 2007 positions in NAD83(2007.00) and NAVD88 Systems

COORDINATE LIST-Nov 2009 Survey.xls - Current NAD83(2007.00) Geodetic, Grid Coordinates, NAVD88 Heights of all points

SURVEYOR'S STATEMENT

This Report on the criteria, procedures and results of the Rancho Palos Verdes Portuguese Landslide Monitoring Survey were prepared by me February 23, 2010 at the request of Frederick (Rick) Jones; P.E., P.L.S. of Charles Abbott Associates Inc. and City Engineer of the City of Rancho Palos Verdes.

Michael R. McGee
P.L.S. 3945



Frederick (Rick) Jones
R.C.E. 36665, P.L.S. 5458

APPENDIX

Find the following:

1. Contours of Horizontal Movements – Dec. 2008 to Nov. 2009 (Contours at 0.025, 0.10 and 1.00 feet providing a general visual representation of movements; see the City Geologist for interpretation of movements)
2. Contours of Horizontal Movements with Photo Overlay
3. Aerial Photo - Monitoring Point Locations
4. Aerial Photo – Regional View of Monitoring Points & CGPS Locations
5. Oblique View of Monitoring Points (North is up)
6. Monitoring Point Status as of November 2009
7. Monitoring Points Photo Update November 2009 (2 pages) (Updated photos for changes since Sept. 2007)

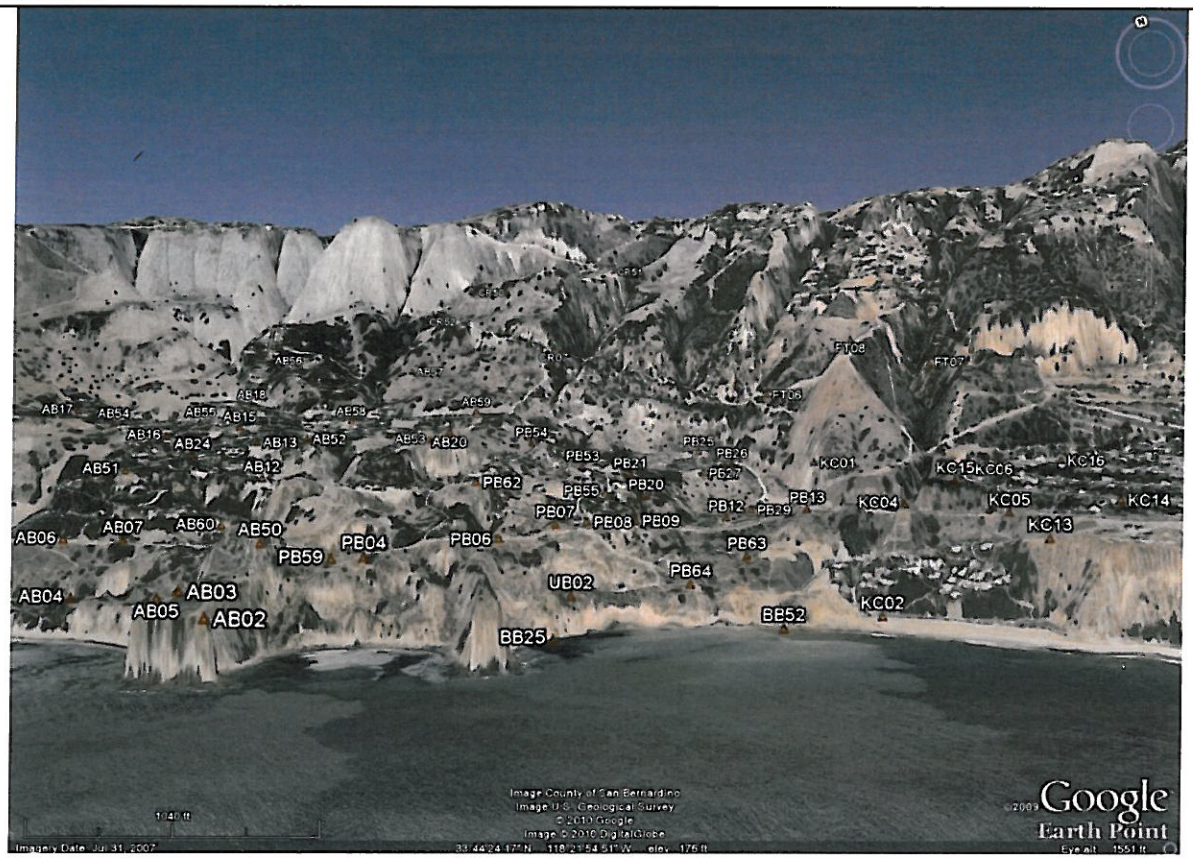
2. Contours of Horizontal Movements with Photo Overlay (North is left)

(This is a general visual representation of movements; see the Full Data Posting for actual movements)

3. Aerial Photo - Monitoring Point Locations (North is left)

4. Aerial Photo – Regional View of Monitoring Points & CGPS Locations (North is up)

5. Oblique View of Monitoring Points (North is up)



6. Monitoring Point Status as of November 2009

RANCHO PALOS VERDES - PORTUGUESE LAND SLIDE MONITORING

Notes: 150 Monitoring Points established since 1994
09/2007 71 Points Monitored: 60 old points found with 52 monitored plus 19 new points
12/2008 67 Points Monitored: AB09, KC11, PB51 discontinued; BB53 destroyed; AB05 disturbed
11/2009 68 Points Monitored: Set PB64 new point to replace PB63

Pt ID	Last Obs'd	Comments	GPS
AB01	11/18/2009	1994-2006 Base	G
AB02	11/18/2009		G
AB03	11/18/2009		G
AB04	11/18/2009		G
AB05	11/18/2009		G
AB06	11/18/2009		G
AB07	11/18/2009		G
AB12	11/18/2009		G
AB13	11/18/2009		P
AB15	11/18/2009		F
AB16	11/18/2009		P
AB17	11/18/2009		F
AB18	11/18/2009		P
AB20	11/18/2009	NE'ly of 2 pipes	G
AB24	11/18/2009		F
AB50	11/18/2009		G
AB51	11/18/2009		G
AB52	11/18/2009		P
AB53	11/18/2009		F
AB54	11/18/2009		P
AB55	11/18/2009		G
AB56	11/18/2009		F
AB57	11/18/2009		G
AB58	11/18/2009		P
AB59	11/18/2009		G
AB60	11/18/2009		G
AB61	11/18/2009	2007-2009 Base	G
BB25	11/18/2009		G
BB52	11/18/2009		G
CR07	11/18/2009		F
CR50	11/18/2009		G
CR51	11/18/2009		G
CR52	11/18/2009		P

Pt ID	Last Obs'd	Comments	GPS
FT06	11/18/2009		G
FT07	11/18/2009		G
FT08	11/18/2009		G
KC01	11/18/2009	NE'ly of 2 pipes	G
KC02	11/18/2009		G
KC04	11/18/2009		G
KC05	11/18/2009		G
KC06	11/18/2009		G
KC07	11/18/2009		G
KC13	11/18/2009		G
KC14	11/18/2009		G
KC15	11/18/2009		F
KC16	11/18/2009		G
PB04	11/18/2009		G
PB06	11/18/2009		G
PB07	11/18/2009		G
PB08	11/18/2009		G
PB09	11/18/2009		G
PB12	11/18/2009		G
PB13	11/18/2009		G
PB18	11/18/2009		G
PB20	11/18/2009	S'ly of 2 pipes	G
PB21	11/18/2009		F
PB25	11/18/2009		G
PB26	11/18/2009		F
PB27	11/18/2009		G
PB29	11/18/2009		G
PB53	11/18/2009		P
PB54	11/18/2009		F
PB55	11/18/2009		P
PB59	11/18/2009		G
PB62	11/18/2009		G
PB63	11/18/2009	Discontinue after 11/09	G
PB64	11/18/2009	Replaces PB63	G
UB02	11/18/2009		G

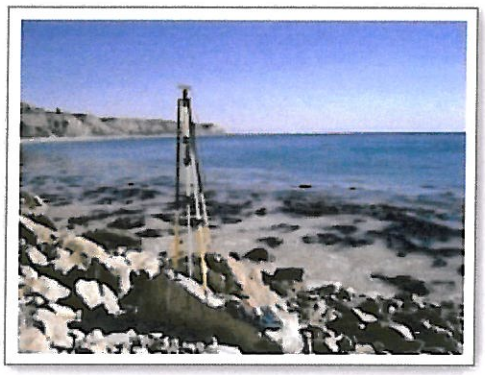
GPS indicated Good, Fair or Poor Obstruction Conditions

Revised 02/09/2010

7. Monitoring Points - Photo Update for November 2009

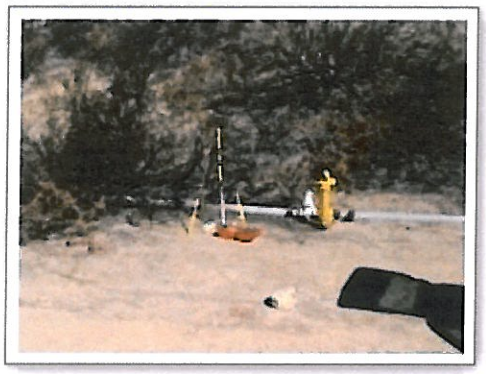
(See September 2007 and November 2009 Report for all photos)
Update for Points BB25, BB52, CR07, CR51, CR52, KC01, PB09, PB64, PVE3 CGPS Station

BB25-closeup1.JPG



BB25-se5.JPG

BB52-closeup3.JPG

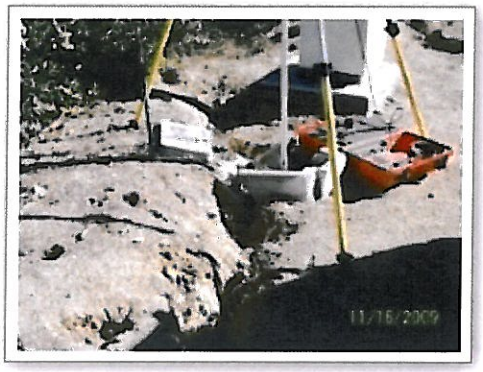


CR07-N.JPG

CR51-W.JPG

CR52-X.JPG

KC01-N.JPG



PB09-e.JPG

PB64-S.JPG

PB64-S2.JPG

PVE3-E.JPG

Attachments

Find the following documents attachments to this Report

FULL DATA POSTING.xls - Lists the overall and periodic movements of monitoring point including coordinates of the initial positions, 2007 and post 2007 positions in NAD83(2007.00) and NAVD88 Systems

COORDINATE LIST-Nov 2009 Survey.xls - Current NAD83(2007.00) Geodetic, Grid Coordinates, NAVD88 Heights of all points

FULL DATA POSTING as of Dec.2008

Date: 02/09/10

PORTUGUESE POINT LANDSLIDE MONITORING

NAD83(2007) COORDINATES and NAVD88 ELEVATIONS of BEGINNING, 2007 & POST 2007 MONITORING POINT POSITIONS

Notes:

\# Indicates stable points, not moving

* Indicates no movement detected

1= 2005 and prior surveys used a nearby monument S31-29W 1.48', the original position is adjusted here to be relative to the 1" IP used presently, resulting in correct Overall Movements, see Reports

	Original Positions				Sept. 24, 2007 Positions			Overall Movements (US Feet)					
		NAD83 SPC Zone 5 (Ft)		NAVD88	NAD83 SPC Zone 5 (Ft)		NAVD88	Original Position to Sept. 24, 2007					
Point	Date	North (ft)	East (ft)	Elev(ft)	North (ft)	East (ft)	Elev(ft)	North	East	Height	Azim.°	Dist.	Note
AB01	12/1/1994	1729427.58	6445709.61	178.62	1729427.55	6445709.64	178.62	-0.03	0.03	0.00	-	0	#
AB02	11/30/1994	1726946.97	6447968.65	116.45	1726946.98	6447968.69	116.48	0.01	0.04	0.03	72	0.04	#
AB03	12/1/1994	1727338.34	6447818.82	139.60	1727338.39	6447818.81	139.59	0.04	-0.01	-0.01	351	0.04	#
AB04	11/30/1994	1728391.99	6447123.34	67.57	1728390.55	6447122.03	67.31	-1.44	-1.32	-0.26	222	1.95	
AB05	3/14/1995	1728075.72	6447645.17	80.90									
AB06	4/27/1995	1729059.73	6446976.26	165.28	1729058.58	6446975.91	164.91	-1.15	-0.35	-0.37	197	1.21	
AB07	11/30/1994	1728982.79	6447358.41	159.92	1728981.51	6447357.74	159.40	-1.28	-0.67	-0.52	208	1.44	
AB12	11/30/1994	1729416.49	6448271.64	283.43	1729415.67	6448271.30	283.19	-0.82	-0.35	-0.24	203	0.89	
AB13	11/30/1994	1729928.90	6448236.04	365.03	1729928.25	6448235.90	364.54	-0.65	-0.13	-0.49	192	0.66	
AB15	11/30/1994	1730312.09	6448099.38	397.28	1730311.64	6448099.31	396.90	-0.45	-0.07	-0.38	189	0.45	
AB16	11/30/1994	1730358.89	6447532.12	376.62	1730358.70	6447532.17	376.44	-0.19	0.04	-0.18	168	0.19	
AB17	11/30/1994	1731421.14	6446727.77	443.05	1731421.12	6446727.77	442.80	-0.02	0.00	-0.25	167	0.02	#
AB18	12/1/1994	1731602.62	6448187.49	457.19	1731602.37	6448187.58	456.93	-0.26	0.09	-0.26	162	0.27	
AB20	3/16/1995	1729360.63	6449686.27	396.43	1729360.00	6449686.03	396.23	-0.62	-0.23	-0.20	201	0.67	
AB24	3/12/1997	1729830.35	6447759.96	335.92	1729829.83	6447759.82	335.74	-0.52	-0.14	-0.18	196	0.54	
AB50	1/16/1998	1728085.00	6448248.18	181.98	1728084.71	6448247.54	182.03	-0.29	-0.65	0.05	246	0.71	
AB51	3/22/2002	1729617.01	6447306.54	305.42	1729616.73	6447306.52	305.25	-0.28	-0.02	-0.17	184	0.28	
AB52	3/22/2002	1730016.10	6448624.44	368.61	1730015.79	6448624.36	368.39	-0.31	-0.08	-0.22	195	0.32	
AB53	3/22/2002	1730431.11	6449712.37	353.13	1730430.77	6449712.33	352.90	-0.34	-0.04	-0.23	187	0.34	
AB54	9/24/2007	1731111.94	6447047.87	407.31	1731111.94	6447047.87	407.31						
AB55	9/24/2007	1731174.77	6447753.57	405.38	1731174.77	6447753.57	405.38						
AB56	9/24/2007	1732214.31	6448545.46	571.65	1732214.31	6448545.46	571.65						
AB57	9/24/2007	1731926.91	6449759.36	564.93	1731926.91	6449759.36	564.93						
AB58	9/24/2007	1731118.02	6449074.93	405.67	1731118.02	6449074.93	405.67						
AB59	9/24/2007	1730850.87	6450212.56	434.37	1730850.87	6450212.56	434.37						
AB60	9/24/2007	1729089.70	6447987.57	179.45	1729089.70	6447987.57	179.45						
AB61	9/24/2007	1727424.50	6447990.26	140.47	1727424.50	6447990.26	140.47						
BB25	11/4/1998	1727200.54	6449932.73	3.81	1727200.25	6449932.73	4.12	-0.29	-0.01	0.31	182	0.29	
BB52	9/24/2007	1726996.36	6451384.38	3.83	1726996.36	6451384.38	3.83						
BB53	9/24/2007	1726831.16	6451840.89	13.81	1726831.16	6451840.89	13.81						
CR07	11/30/1994	1731628.78	6451203.19	633.28	1731628.37	6451203.29	632.48	-0.41	0.10	-0.80	166	0.42	
CR50	1/16/1998	1733013.55	6451037.38	873.04	1733013.62	6451037.38	872.66	0.07	0.00	-0.38	358	0.07	
CR51	1/16/1998	1733061.90	6452361.82	976.75	1733062.03	6452361.86	976.25	0.13	0.04	-0.50	17	0.14	
CR52	1/16/1998	1732867.54	6450239.34	780.01	1732867.58	6450239.32	779.63	0.03	-0.02	-0.38	333	0.04	#
FT06	9/24/2007	1729855.61	6452760.21	489.06	1729855.61	6452760.21	489.06						
FT07	9/24/2007	1729253.24	6454104.75	589.01	1729253.24	6454104.75	589.01						
FT08	9/24/2007	1729388.68	6453350.51	658.44	1729388.68	6453350.51	658.44						
KC01	11/30/1994	1728476.78	6452458.23	312.88	1728476.36	6452457.91	312.42	-0.42	-0.32	-0.46	217	0.52	1
KC02	3/14/1995	1727002.89	6452118.99	13.84	1727002.74	6452118.89	13.74	-0.15	-0.11	-0.10	216	0.18	
KC04	3/14/1995	1727559.56	6452667.24	238.84	1727559.46	6452667.09	238.51	-0.10	-0.15	-0.33	236	0.18	
KC05	11/30/1994	1727082.00	6453179.09	227.86	1727082.01	6453178.94	227.53	0.01	-0.15	-0.33	273	0.15	
KC06	11/30/1994	1727784.91	6453396.67	300.35	1727784.94	6453396.40	299.97	0.03	-0.26	-0.38	276	0.26	
KC07	11/30/1994	1727759.19	6453683.92	313.83	1727759.37	6453683.85	313.51	0.18	-0.07	-0.32	340	0.19	
KC13	9/24/2007	1726581.16	6453069.63	191.20	1726581.16	6453069.63	191.20						
KC14	9/24/2007	1726742.44	6453806.05	259.94	1726742.44	6453806.05	259.94						
KC15	9/24/2007	1727590.45	6453121.10	287.10	1727590.45	6453121.10	287.10						
KC16	9/24/2007	1727602.25	6454098.23	326.90	1727602.25	6454098.23	326.90						
PB04	11/30/1994	1727675.94	6448851.74	170.52	1727667.25	6448849.17	167.49	-8.69	-2.57	-3.03	196	9.06	
PB06	3/15/1995	1727968.45	6449761.84	183.06	1727941.12	6449758.81	178.25	-27.33	-3.03	-4.81	186	27.50	
PB07	3/14/1995	1728175.93	6450219.76	200.21	1728141.60	6450213.44	198.02	-34.32	-6.32	-2.19	190	34.90	
PB08	12/1/1994	1728237.51	6450469.80	193.68	1728204.81	6450463.98	194.09	-32.70	-5.82	0.41	190	33.21	
PB09	11/30/1994	1728288.58	6450851.02	192.52	1728252.20	6450849.11	189.84	-36.38	-1.91	-2.68	183	36.43	
PB12	11/30/1994	1728330.49	6451604.57	193.29	1728268.52	6451587.83	186.93	-61.97	-16.74	-6.36	195	64.19	
PB13	3/14/1995	1728085.97	6452164.34	210.54	1728050.44	6452151.18	207.21	-35.53	-13.16	-3.33	200	37.89	
PB18	3/15/1995	1730446.88	6450711.00	367.58	1730431.80	6450719.76	363.24	-15.08	8.77	-4.34	150	17.44	
PB20	3/14/1995	1728812.77	6451135.67	243.54	1728753.50	6451126.52	234.48	-59.27	-9.16	-9.06	189	59.97	
PB21	3/14/1995	1729298.22	6451172.05	280.02	1729249.90	6451177.92	273.29	-48.32	5.87	-6.73	173	48.68	
PB25	12/1/1994	1729702.31	6451985.65	328.99	1729671.12	6451986.48	326.10	-31.19	0.83	-2.89	178	31.20	
PB26	3/14/1995	1729562.65	6452249.56	285.34	1729539.22	6452252.23	282.95	-23.42	2.67	-2.39	174	23.58	
PB27	3/14/1995	1729339.34	6451836.06	284.42	1729257.91	6451842.02	273.51	-81.43	5.96	-10.91	176	81.65	
PB29	3/15/1995	1728888.95	6452120.49	185.93	1728849.86	6452097.03	173.29	-39.08	-23.46	-12.64	211	45.58	
PB53	12/4/1997	1729252.77	6450753.92	297.75	1729224.25	6450754.60	291.85	-28.52	0.67	-5.90	179	28.53	
PB54	12/4/1997	1729694.90	6450448.69	358.62	1729691.38	6450448.62	357.73	-3.52	-0.07	-0.89	181	3.52	
PB55	1/21/1998	1728812.28	6450804.04	246.33	1728782.51	6450801.87	241.07	-29.77	-2.18	-5.26	184	29.85	
PB59	6/26/2001	1727766.36	6448661.67	163.39	1727761.30	6448660.42	160.61	-5.07	-1.24	-2.78	194	5.22	
PB62	9/24/2007	1728476.64	6449717.56	287.25	1728476.64	6449717.56	287.25						
PB63	9/24/2007	1727734.04	6451488.11	126.06	1727734.04	6451488.11	126.06						
PB64	11/18/2009	1727466.29	6450946.95	72.76									
UB02	7/23/1997	1727581.11	6450133.78	67.15	1727534.46	6450140.57	63.20	-46.66	6.78	-3.95	172	47.15	

FULL DATA POSTING as of Dec.2008

Date: 02/09/10

Notes:

\# Indicates stable points, not moving

* Indicates no movement detected

2 = Hit by mower sometime between 09/07 and 12/08 with an estimated displacement S14E 0.29', the original position is adjusted here to be relative to monitored position used presently, resulting in correct Overall Movements, see Rpt

	Dec. 10, 2008 Positions			Overall Movements (US Feet)						Periodic (14.5 months) Movements (US Feet)						
	NAD83 SPC Zone 5 (Ft)		NAVD88	Original Position to Dec. 10, 2008						Sept. 24, 2007 Position to Dec. 10, 2008						
Point	North (ft)	East (ft)	Elev(ft)	North	East	Height	Azim.°	Dist.	Note	North	East	Height	Azimuth°	Distance	95%Error	Note
AB01	1729427.54	6445709.63	178.59	-0.05	0.02	-0.03	161	0.05	#	-0.01	-0.01	-0.03	231	0.02	0.017	#
AB02	1726946.99	6447968.68	116.46	0.02	0.03	0.01	61	0.03	#	0.00	-0.01	-0.02	297	0.01	0.016	#
AB03	1727338.39	6447818.81	139.58	0.04	-0.01	-0.02	348	0.04	#	0.00	0.00	-0.01	270	0.00	0.015	#
AB04	1728390.43	6447121.92	67.27	-1.56	-1.43	-0.30	222	2.12		-0.12	-0.11	-0.04	222	0.16	0.016	
AB05	1728074.86	6447644.04	80.59	-0.86	-1.13	-0.31	233	1.42	2							2
AB06	1729058.49	6446975.88	164.85	-1.24	-0.38	-0.43	197	1.30		-0.09	-0.03	-0.06	198	0.09	0.019	
AB07	1728981.40	6447357.70	159.34	-1.39	-0.71	-0.58	207	1.56		-0.11	-0.04	-0.06	202	0.12	0.021	
AB12	1729415.57	6448271.26	283.19	-0.92	-0.38	-0.24	203	0.99		-0.10	-0.03	0.00	199	0.11	0.018	
AB13	1729928.17	6448235.89	364.54	-0.73	-0.15	-0.49	192	0.74		-0.08	-0.01	0.00	191	0.08	0.019	
AB15	1730311.56	6448099.30	396.88	-0.53	-0.08	-0.40	189	0.53		-0.08	-0.01	-0.02	188	0.08	0.024	
AB16	1730358.65	6447532.17	376.46	-0.24	0.05	-0.16	168	0.24		-0.05	0.01	0.02	170	0.05	0.024	
AB17	1731421.12	6446727.77	442.79	-0.02	0.00	-0.26	171	0.02	#	0.00	0.00	-0.01	194	0.00	0.020	#
AB18	1731602.31	6448187.61	456.91	-0.32	0.11	-0.28	160	0.34		-0.06	0.03	-0.02	155	0.07	0.023	
AB20	1729359.84	6449685.99	396.23	-0.79	-0.28	-0.20	199	0.83		-0.16	-0.04	0.00	195	0.17	0.012	
AB24	1729829.75	6447759.77	335.76	-0.61	-0.19	-0.16	197	0.63		-0.09	-0.04	0.02	205	0.10	0.022	
AB50	1728084.66	6448247.47	181.98	-0.34	-0.71	0.00	245	0.79		-0.05	-0.07	-0.05	235	0.08	0.019	
AB51	1729616.65	6447306.51	305.26	-0.36	-0.03	-0.16	185	0.36		-0.09	-0.01	0.01	190	0.09	0.019	
AB52	1730015.70	6448624.32	368.38	-0.40	-0.12	-0.23	196	0.42		-0.10	-0.03	-0.01	200	0.10	0.028	
AB53	1730430.62	6449712.30	352.90	-0.49	-0.07	-0.23	188	0.50		-0.15	-0.03	0.00	189	0.15	0.028	
AB54	1731111.93	6447047.87	407.30	-0.01	0.00	-0.01	165	0.01		-0.01	0.00	-0.01	165	0.01	0.028	*
AB55	1731174.72	6447753.58	405.39	-0.05	0.01	0.01	166	0.05		-0.05	0.01	0.01	166	0.05	0.018	
AB56	1732214.21	6448545.49	571.64	-0.10	0.03	-0.01	161	0.11		-0.10	0.03	-0.01	161	0.11	0.018	
AB57	1731926.78	6449759.40	564.90	-0.13	0.03	-0.03	166	0.13		-0.13	0.03	-0.03	166	0.13	0.018	
AB58	1731117.90	6449074.93	405.65	-0.12	0.00	-0.02	178	0.12		-0.12	0.00	-0.02	178	0.12	0.020	
AB59	1730850.70	6450212.53	434.35	-0.17	-0.02	-0.02	188	0.17		-0.17	-0.02	-0.02	188	0.17	0.020	
AB60	1729089.63	6447987.54	179.39	-0.08	-0.03	-0.06	200	0.08		-0.08	-0.03	-0.06	200	0.08	0.021	
AB61	1727424.49	6447990.27	140.43	-0.01	0.01	-0.04	114	0.01		-0.01	0.01	-0.04	114	0.01	0.003	#
BB25	1727200.25	6449932.58	4.15	-0.29	-0.16	0.34	208	0.33		0.00	-0.15	0.03	269	0.15	0.017	
BB52	1726996.24	6451384.35	3.83	-0.12	-0.03	0.00	194	0.13		-0.12	-0.03	0.00	194	0.13	0.024	
BB53	Destroyed															
CR07	1731628.24	6451203.32	632.36	-0.54	0.13	-0.92	166	0.55		-0.13	0.03	-0.12	168	0.13	0.024	
CR50	1733013.62	6451037.38	872.71	0.08	0.01	-0.33	5	0.08		0.01	0.01	0.05	45	0.01	0.017	*
CR51	1733062.02	6452361.86	976.24	0.12	0.04	-0.51	20	0.13		-0.01	0.00	-0.01	171	0.01	0.019	*
CR52	1732867.58	6450239.31	779.64	0.03	-0.03	-0.37	315	0.04		0.00	-0.01	0.01	258	0.01	0.023	*
FT06	1729855.42	6452760.17	488.97	-0.19	-0.04	-0.09	192	0.19		-0.19	-0.04	-0.09	192	0.19	0.025	
FT07	1729253.01	6454104.39	588.99	-0.23	-0.36	-0.02	237	0.43		-0.23	-0.36	-0.02	237	0.43	0.015	
FT08	1729388.67	6453350.53	658.47	-0.01	0.02	0.03	114	0.02		-0.01	0.02	0.03	114	0.02	0.015	*
KC01	1728476.25	6452457.85	312.38	-0.53	-0.38	-0.50	215	0.66	1	-0.12	-0.06	-0.04	208	0.13	0.020	
KC02	1727002.67	6452118.88	13.72	-0.22	-0.11	-0.12	207	0.25		-0.07	-0.01	-0.02	185	0.07	0.021	
KC04	1727559.42	6452667.06	238.47	-0.14	-0.18	-0.37	233	0.23		-0.04	-0.04	-0.04	223	0.05	0.017	
KC05	1727081.98	6453178.94	227.52	-0.02	-0.15	-0.34	261	0.15		-0.03	0.00	-0.01	180	0.03	0.020	
KC06	1727784.92	6453396.36	299.93	0.01	-0.30	-0.42	273	0.30		-0.01	-0.04	-0.04	252	0.05	0.021	
KC07	1727759.38	6453683.87	313.50	0.18	-0.05	-0.33	346	0.19		0.00	0.02	-0.01	84	0.02	0.018	*
KC13	1726581.12	6453069.62	191.23	-0.04	-0.01	0.03	194	0.04		-0.04	-0.01	0.03	194	0.04	0.018	
KC14	1726742.44	6453806.04	259.91	0.00	-0.02	-0.03	259	0.02		0.00	-0.02	-0.03	259	0.02	0.020	*
KC15	1727590.41	6453121.06	287.13	-0.05	-0.04	0.03	220	0.06		-0.05	-0.04	0.03	220	0.06	0.022	
KC16	1727602.24	6454098.24	326.92	-0.01	0.00	0.02	135	0.01		-0.01	0.00	0.02	135	0.01	0.016	*
PB04	1727666.83	6448849.07	167.37	-9.10	-2.67	-3.15	196	9.49		-0.41	-0.10	-0.12	194	0.43	0.017	
PB06	1727939.65	6449758.62	177.96	-28.80	-3.22	-5.10	186	28.98		-1.47	-0.18	-0.29	187	1.48	0.021	
PB07	1728139.82	6450213.09	197.88	-36.10	-6.67	-2.33	190	36.72		-1.78	-0.35	-0.14	191	1.82	0.020	
PB08	1728203.20	6450463.68	194.13	-34.31	-6.12	0.45	190	34.85		-1.61	-0.30	0.04	190	1.64	0.024	
PB09	1728250.32	6450848.98	189.58	-38.26	-2.04	-2.94	183	38.31		-1.88	-0.13	-0.26	184	1.88	0.021	
PB12	1728265.36	6451586.81	186.31	-65.13	-17.76	-6.98	195	67.51		-3.16	-1.03	-0.62	198	3.32	0.019	
PB13	1728048.48	6452150.38	207.09	-37.49	-13.96	-3.45	200	40.01		-1.96	-0.80	-0.12	202	2.12	0.019	
PB18	1730431.47	6450719.84	363.18	-15.41	8.85	-4.40	150	17.77		-0.33	0.08	-0.06	166	0.34	0.020	
PB20	1728750.65	6451126.05	233.99	-62.12	-9.63	-9.55	189	62.86		-2.85	-0.47	-0.49	189	2.89	0.020	
PB21	1729247.73	6451178.08	273.02	-50.49	6.03	-7.00	173	50.85		-2.17	0.16	-0.27	176	2.17	0.021	
PB25	1729670.88	6451986.42	326.07	-31.44	0.77	-2.92	179	31.45		-0.25	-0.07	-0.03	195	0.26	0.019	
PB26	1729539.03	6452252.21	282.94	-23.62	2.65	-2.40	174	23.77		-0.20	-0.02	-0.01	187	0.20	0.018	
PB27	1729254.41	6451842.14	272.98	-84.93	6.08	-11.44	176	85.15		-3.50	0.13	-0.53	178	3.50	0.023	
PB29	1728847.75	6452096.03	172.60	-41.20	-24.46	-13.33	211	47.91		-2.11	-1.01	-0.69	205	2.34	0.020	
PB53	1729222.48	6450754.60	291.44	-30.28	0.68	-6.31	179	30.29		-1.76	0.00	-0.41	180	1.76	0.024	
PB54	1729691.20	6450448.58	357.73	-3.70	-0.11	-0.89	182	3.70		-0.18	-0.04	0.00	193	0.18	0.019	
PB55	1728780.51	6450801.66	240.62	-31.77	-2.38	-5.71	184	31.86		-2.01	-0.21	-0.45	186	2.02	0.031	
PB59	1727760.70	6448660.28	160.34	-5.66	-1.39	-3.05	194	5.83		-0.59	-0.15	-0.27	194	0.61	0.017	
PB62	1728476.42	6449717.52	287.22	-0.21	-0.04	-0.03	192	0.22		-0.21	-0.04	-0.03	192	0.22	0.016	
PB63	1727724.58	6451485.79	121.78	-9.45	-2.32	-4.28	194	9.73		-9.45	-2.32	-4.28	194	9.73	0.020	
UB02	1727530.48	6450141.10	63.00	-50.63	7.31	-4.15	172	51.16		-3.97	0.53	-0.20	172	4.01	0.023	

FULL DATA POSTING as of Nov. 2009

Date: 02/09/10

Notes:

\# Indicates stable points, not moving

* Indicates no movement detected

	Nov. 18, 2009 Positions			Overall Movements (US Feet)						Periodic (11.3 months) Movements (US Feet)						
	NAD83 SPC Zone 5 (Ft)		NAVD88	Original Position to Nov. 18, 2009						Dec. 10, 2008 Position to Nov. 18, 2009						
Point	North (ft)	East (ft)	Elev(ft)	North	East	Height	Azim.°	Dist.	Note	North	East	Height	Azimuth°	Distance	95%Error	Note
AB01	1729427.54	6445709.62	178.540	-0.04	0.01	-0.08	167	0.04		0.00	-0.01	-0.05	304	0.01	0.020	#
AB02	1726946.97	6447968.68	116.460	0.00	0.03	0.01	95	0.03		-0.02	0.00	0.00	171	0.02	0.020	#
AB03	1727338.38	6447818.82	139.570	0.04	0.00	-0.03	4	0.04		-0.01	0.01	-0.01	117	0.01	0.017	#
AB04	1728390.36	6447121.86	67.250	-1.63	-1.48	-0.32	222	2.20		-0.07	-0.05	-0.02	217	0.09	0.019	
AB05	1728074.78	6447643.96	80.570	-0.94	-1.21	-0.33	232	1.53		-0.08	-0.08	-0.02	226	0.11	0.018	
AB06	1729058.43	6446975.87	164.840	-1.31	-0.39	-0.44	197	1.36		-0.06	-0.01	-0.01	191	0.06	0.019	
AB07	1728981.35	6447357.67	159.330	-1.44	-0.74	-0.59	207	1.62		-0.05	-0.03	-0.01	207	0.06	0.022	
AB12	1729415.50	6448271.24	283.190	-0.98	-0.41	-0.24	203	1.07		-0.07	-0.03	0.00	202	0.07	0.019	
AB13	1729928.13	6448235.87	364.540	-0.77	-0.16	-0.49	192	0.78		-0.04	-0.02	0.00	201	0.04	0.020	
AB15	1730311.51	6448099.30	396.880	-0.57	-0.08	-0.40	188	0.58		-0.05	0.00	0.00	180	0.05	0.026	
AB16	1730358.64	6447532.17	376.450	-0.25	0.04	-0.17	170	0.25		-0.01	-0.01	-0.01	203	0.02	0.021	*
AB17	1731421.11	6446727.77	442.800	-0.03	0.00	-0.25	173	0.03		0.00	0.00	0.01	180	0.00	0.019	#
AB18	1731602.26	6448187.60	456.870	-0.36	0.11	-0.32	163	0.38		-0.04	-0.01	-0.04	189	0.04	0.025	
AB20	1729359.78	6449685.97	396.230	-0.85	-0.30	-0.20	199	0.90		-0.06	-0.02	0.00	200	0.06	0.013	
AB24	1729829.68	6447759.75	335.760	-0.67	-0.21	-0.16	197	0.70		-0.06	-0.02	0.00	198	0.07	0.024	
AB50	1728084.64	6448247.44	182.000	-0.36	-0.74	0.02	244	0.83		-0.02	-0.03	0.02	238	0.04	0.024	
AB51	1729616.60	6447306.48	305.250	-0.41	-0.06	-0.17	188	0.41		-0.04	-0.02	-0.01	208	0.05	0.020	
AB52	1730015.65	6448624.32	368.350	-0.45	-0.12	-0.26	195	0.47		-0.05	0.00	-0.03	181	0.05	0.031	
AB53	1730430.55	6449712.28	352.890	-0.55	-0.09	-0.24	189	0.56		-0.06	-0.02	-0.01	198	0.06	0.026	
AB54	1731111.92	6447047.87	407.360	-0.03	0.00	0.05	178	0.03		-0.02	0.00	0.06	187	0.02	0.029	*
AB55	1731174.68	6447753.58	405.390	-0.09	0.02	0.01	169	0.09		-0.04	0.01	0.00	171	0.04	0.017	
AB56	1732214.16	6448545.51	571.690	-0.15	0.05	0.04	162	0.16		-0.05	0.02	0.05	164	0.05	0.024	
AB57	1731926.73	6449759.41	564.860	-0.18	0.04	-0.07	166	0.18		-0.05	0.01	-0.04	167	0.05	0.022	
AB58	1731117.85	6449074.94	405.640	-0.17	0.01	-0.03	175	0.17		-0.05	0.01	-0.01	168	0.05	0.022	
AB59	1730850.64	6450212.52	434.340	-0.23	-0.03	-0.03	188	0.23		-0.06	-0.01	-0.01	190	0.06	0.022	
AB60	1729089.58	6447987.53	179.390	-0.12	-0.04	-0.06	199	0.13		-0.04	-0.01	0.00	196	0.05	0.019	
AB61	1727424.49	6447990.27	140.420	-0.01	0.01	-0.05	128	0.02		0.00	0.00	-0.01	158	0.01	0.004	#
BB25	1727200.19	6449932.57	4.210	-0.35	-0.16	0.40	204	0.39		-0.06	0.00	0.06	183	0.06	0.024	
BB52	1726996.18	6451384.34	3.860	-0.18	-0.04	0.03	193	0.19		-0.06	-0.01	0.03	191	0.06	0.019	
BB53																
CR07	1731628.18	6451203.34	632.390	-0.60	0.15	-0.89	166	0.62		-0.06	0.02	0.03	161	0.07	0.024	
CR50	1733013.61	6451037.39	872.690	0.06	0.01	-0.35	10	0.06		-0.01	0.00	-0.02	162	0.02	0.022	*
CR51	1733062.01	6452361.87	976.220	0.11	0.05	-0.53	26	0.12		-0.01	0.01	-0.02	143	0.02	0.024	*
CR52	1732867.56	6450239.31	779.730	0.02	-0.03	-0.28	300	0.03		-0.01	0.00	0.09	176	0.01	0.026	*
FT06	1729855.34	6452760.16	488.920	-0.27	-0.05	-0.14	191	0.28		-0.08	-0.01	-0.05	189	0.08	0.020	
FT07	1729252.92	6454104.25	588.900	-0.33	-0.51	-0.11	237	0.60		-0.10	-0.14	-0.09	236	0.17	0.020	
FT08	1729388.69	6453350.52	658.480	0.00	0.02	0.04	74	0.02		0.01	0.00	0.01	348	0.01	0.027	#
KC01	1728476.18	6452457.81	312.350	-0.60	-0.42	-0.53	*215*	*0.74*		-0.07	-0.04	-0.03	209	0.08	0.019	
KC02	1727002.64	6452118.86	13.690	-0.26	-0.13	-0.15	207	0.29		-0.03	-0.02	-0.03	207	0.04	0.021	
KC04	1727559.39	6452667.04	238.450	-0.17	-0.20	-0.39	231	0.27		-0.03	-0.02	-0.02	216	0.04	0.019	
KC05	1727081.97	6453178.92	227.510	-0.03	-0.17	-0.35	259	0.18		-0.01	-0.02	-0.01	244	0.03	0.020	
KC06	1727784.90	6453396.33	299.910	-0.01	-0.33	-0.44	268	0.33		-0.02	-0.03	-0.02	227	0.04	0.025	
KC07	1727759.37	6453683.87	313.470	0.18	-0.05	-0.36	344	0.19		0.00	0.00	-0.03	256	0.00	0.021	*
KC13	1726581.11	6453069.63	191.180	-0.04	-0.01	-0.02	188	0.04		-0.01	0.00	-0.05	153	0.01	0.017	*
KC14	1726742.43	6453806.03	259.920	-0.01	-0.03	-0.02	253	0.03		0.00	-0.01	0.01	247	0.01	0.023	*
KC15	1727590.38	6453121.03	287.090	-0.07	-0.06	-0.01	222	0.09		-0.02	-0.02	-0.04	226	0.03	0.027	
KC16	1727602.24	6454098.24	326.870	-0.01	0.00	-0.03	159	0.01		0.00	0.00	-0.05	214	0.00	0.018	#
PB04	1727666.56	6448848.99	167.310	-9.38	-2.75	-3.21	196	9.77		-0.27	-0.07	-0.06	195	0.28	0.020	
PB06	1727938.80	6449758.52	177.820	-29.65	-3.32	-5.24	186	29.83		-0.85	-0.10	-0.14	187	0.85	0.022	
PB07	1728138.83	6450212.89	197.800	-37.09	-6.86	-2.41	190	37.72		-0.99	-0.19	-0.08	191	1.01	0.019	
PB08	1728202.31	6450463.52	194.120	-35.20	-6.28	0.44	190	35.75		-0.89	-0.16	-0.01	190	0.90	0.020	
PB09	1728249.30	6450848.91	189.460	-39.28	-2.11	-3.06	183	39.34		-1.02	-0.07	-0.12	184	1.02	0.022	
PB12	1728263.70	6451586.25	185.940	-66.79	-18.32	-7.35	195	69.25		-1.66	-0.55	-0.37	199	1.75	0.022	
PB13	1728047.43	6452149.98	206.980	-38.54	-14.36	-3.56	200	41.13		-1.05	-0.41	-0.11	201	1.12	0.019	
PB18	1730431.35	6450719.86	363.140	-15.53	8.87	-4.44	150	17.89		-0.12	0.02	-0.04	170	0.12	0.021	
PB20	1728749.18	6451125.82	233.690	-63.59	-9.86	-9.85	189	64.35		-1.47	-0.23	-0.30	189	1.49	0.022	
PB21	1729246.60	6451178.17	272.840	-51.62	6.12	-7.18	173	51.98		-1.13	0.09	-0.18	175	1.14	0.024	
PB25	1729670.78	6451986.39	326.040	-31.53	0.74	-2.95	179	31.54		-0.09	-0.02	-0.03	194	0.10	0.022	
PB26	1729538.93	6452252.19	282.930	-23.71	2.63	-2.41	174	23.86		-0.09	-0.02	-0.01	190	0.10	0.022	
PB27	1729252.59	6451842.20	272.730	-86.75	6.14	-11.69	176	86.97		-1.82	0.06	-0.25	178	1.82	0.026	
PB29	1728846.62	6452095.51	172.230	-42.32	-24.98	-13.70	211	49.15		-1.13	-0.52	-0.37	205	1.24	0.022	
PB53	1729221.54	6450754.61	291.200	-31.22	0.68	-6.55	179	31.23		-0.94	0.01	-0.24	180	0.94	0.026	
PB54	1729691.12	6450448.57	357.710	-3.78	-0.12	-0.91	182	3.78		-0.08	-0.01	-0.02	188	0.08	0.023	
PB55	1728779.41	6450801.58	240.500	-32.87	-2.47	-5.83	184	32.97		-1.10	-0.08	-0.12	184	1.10	0.030	
PB59	1727760.31	6448660.19	160.160	-6.05	-1.48	-3.23	194	6.23		-0.39	-0.09	-0.18	193	0.40	0.020	
PB62	1728476.31	6449717.49	287.200	-0.32	-0.07	-0.05	192	0.33		-0.11	-0.02	-0.02	193	0.11	0.017	
PB63	1727717.72	6451483.29	116.990	-16.31	-4.82	-9.07	196	17.01		-6.86	-2.50	-4.79	200	7.30	0.022	
PB64	1727466.29	6450946.95	72.760													
UB02	1727527.87	6450141.46	62.920	-53.24	7.67	-4.23	172	53.79		-2.61	0.36	-0.08	172	2.64	0.022	

COORDINATE LIST - Portuguese Landslide Monitoring Survey as of November 18, 2009

Date: 02/09/2010

Datum: Horizontal NAD83 (2007) Epoch; California State Plane Zone 5; Vertical: NAVD88

Note, Fixed CGPS Station PVE3 at Record 3D Position & Orthometric Height per 09/2007 Survey; See Survey Reports

Point	Latitude	Longitude	EH (ft)	North (ft)	East (ft)	OrthoHt(ft)	Description
AB01	33-44-38.30241	118-22-53.05110	60.05	1729427.540	6445709.621	178.54	Pre-2007 Base Stat.
AB02	33-44-13.84870	118-22-26.19249	-2.04	1726946.967	6447968.680	116.46	Monitoring Point
AB03	33-44-17.71502	118-22-27.98405	21.08	1727338.380	6447818.823	139.57	Monitoring Point
AB04	33-44-28.09536	118-22-36.28281	-51.20	1728390.359	6447121.864	67.25	Monitoring Point
AB05	33-44-24.99302	118-22-30.08703	-37.88	1728074.783	6447643.956	80.57	Monitoring Point
AB06	33-44-34.69846	118-22-38.04121	46.41	1729058.429	6446975.865	164.84	Monitoring Point
AB07	33-44-33.95010	118-22-33.51689	40.92	1728981.346	6447357.673	159.33	Monitoring Point
AB12	33-44-38.27842	118-22-22.71869	164.85	1729415.502	6448271.236	283.19	Monitoring Point
AB13	33-44-43.34801	118-22-23.15994	246.22	1729928.130	6448235.874	364.54	Monitoring Point
AB15	33-44-47.13537	118-22-24.79397	278.57	1730311.511	6448099.302	396.88	Monitoring Point
AB16	33-44-47.58063	118-22-31.51166	258.11	1730358.636	6447532.167	376.45	Monitoring Point
AB17	33-44-58.06075	118-22-41.08405	324.47	1731421.111	6446727.772	442.80	Stable Check Point
AB18	33-44-59.90666	118-22-23.80516	338.62	1731602.262	6448187.601	456.87	Monitoring Point
AB20	33-44-37.77882	118-22-05.96452	277.96	1729359.780	6449685.969	396.23	Monitoring Point
AB24	33-44-42.35667	118-22-28.79339	217.40	1729829.684	6447759.753	335.76	Monitoring Point
AB50	33-44-25.11276	118-22-22.94200	63.58	1728084.642	6448247.437	182.00	Monitoring Point
AB51	33-44-40.23214	118-22-34.15115	186.86	1729616.604	6447306.484	305.25	Monitoring Point
AB52	33-44-44.22795	118-22-18.56410	250.06	1730015.646	6448624.323	368.35	Monitoring Point
AB53	33-44-48.37182	118-22-05.69941	234.67	1730430.554	6449712.281	352.89	Monitoring Point
AB54	33-44-55.01411	118-22-37.27984	289.03	1731111.917	6447047.867	407.36	Monitoring Point
AB55	33-44-55.66103	118-22-28.92581	287.09	1731174.677	6447753.584	405.39	Monitoring Point
AB56	33-45-05.97265	118-22-19.59375	453.49	1732214.160	6448545.507	571.69	Monitoring Point
AB57	33-45-03.17359	118-22-05.20624	446.70	1731926.727	6449759.409	564.86	Monitoring Point
AB58	33-44-55.14735	118-22-13.27631	287.41	1731117.850	6449074.944	405.64	Monitoring Point
AB59	33-44-52.54532	118-21-59.79406	316.17	1730850.635	6450212.521	434.34	Monitoring Point
AB60	33-44-35.04401	118-22-26.06370	61.01	1729089.582	6447987.527	179.39	Monitoring Point
AB61	33-44-18.57309	118-22-25.95791	21.95	1727424.486	6447990.269	140.42	Base Station
BB25	33-44-16.42518	118-22-02.95102	-114.16	1727200.186	6449932.574	4.21	Monitoring Point
BB52	33-44-14.45930	118-21-45.75334	-114.45	1726996.177	6451384.335	3.86	Monitoring Point
BB53							Destroyed
CR07	33-45-00.27232	118-21-48.09456	514.29	1731628.177	6451203.342	632.39	Monitoring Point
CR50	33-45-13.97100	118-21-50.11915	754.63	1733013.608	6451037.388	872.69	Monitoring Point
CR51	33-45-14.49694	118-21-34.43622	858.23	1733062.010	6452361.872	976.22	Monitoring Point
CR52	33-45-12.49763	118-21-59.56393	661.63	1732867.561	6450239.311	779.73	Monitoring Point
FT06	33-44-42.79074	118-21-29.58424	370.84	1729855.336	6452760.158	488.92	Monitoring Point
FT07	33-44-36.87871	118-21-13.64363	470.85	1729252.915	6454104.248	588.90	Monitoring Point
FT08	33-44-38.19542	118-21-22.57410	540.41	1729388.687	6453350.522	658.48	Monitoring Point
KC01	33-44-29.13748	118-21-33.10602	194.17	1728476.175	6452457.811	312.35	Monitoring Point
KC02	33-44-14.54933	118-21-37.05680	-104.57	1727002.637	6452118.864	13.69	Monitoring Point
KC04	33-44-20.07612	118-21-30.58997	120.24	1727559.394	6452667.035	238.45	Monitoring Point
KC05	33-44-15.37144	118-21-24.50905	109.31	1727081.965	6453178.921	227.51	Monitoring Point
KC06	33-44-22.33244	118-21-21.96437	181.76	1727784.898	6453396.334	299.91	Monitoring Point
KC07	33-44-22.09003	118-21-18.55882	195.33	1727759.374	6453683.867	313.47	Monitoring Point
KC13	33-44-10.41322	118-21-25.78206	72.94	1726581.114	6453069.625	191.18	Monitoring Point
KC14	33-44-12.03476	118-21-17.06994	141.74	1726742.432	6453806.025	259.92	Monitoring Point
KC15	33-44-20.39865	118-21-25.21583	168.91	1727590.383	6453121.033	287.09	Monitoring Point
KC16	33-44-20.55010	118-21-13.64602	208.74	1727602.238	6454098.237	326.87	Monitoring Point
PB04	33-44-20.99916	118-22-15.80109	48.90	1727666.561	6448848.991	167.31	Monitoring Point
PB06	33-44-23.72521	118-22-05.04383	59.47	1727938.801	6449758.521	177.82	Monitoring Point
PB07	33-44-25.72033	118-21-59.67254	79.49	1728138.831	6450212.894	197.80	Monitoring Point
PB08	33-44-26.35728	118-21-56.70773	75.83	1728202.309	6450463.521	194.12	Monitoring Point
PB09	33-44-26.83597	118-21-52.14654	71.19	1728249.302	6450848.913	189.46	Monitoring Point
PB12	33-44-27.00476	118-21-43.41671	67.71	1728263.700	6451586.252	185.94	Monitoring Point
PB13	33-44-24.88543	118-21-36.73276	88.77	1728047.427	6452149.976	206.98	Monitoring Point
PB18	33-44-48.41603	118-21-53.76835	244.97	1730431.349	6450719.863	363.14	Monitoring Point
PB20	33-44-31.79067	118-21-48.88929	115.46	1728749.181	6451125.815	233.69	Monitoring Point
PB21	33-44-36.71294	118-21-48.29062	154.65	1729246.596	6451178.174	272.84	Monitoring Point
PB25	33-44-40.93775	118-21-38.73866	207.90	1729670.781	6451986.391	326.04	Monitoring Point
PB26	33-44-39.64296	118-21-35.58576	164.80	1729538.934	6452252.188	282.93	Monitoring Point
PB27	33-44-36.79592	118-21-40.42823	154.56	1729252.590	6451842.200	272.73	Monitoring Point
PB29	33-44-32.78909	118-21-37.41164	54.06	1728846.622	6452095.506	172.23	Monitoring Point
PB53	33-44-36.44993	118-21-53.30492	172.98	1729221.541	6450754.609	291.20	Monitoring Point
PB54	33-44-41.08394	118-21-56.94891	239.50	1729691.117	6450448.570	357.71	Monitoring Point
PB55	33-44-32.07805	118-21-52.72981	122.26	1728779.407	6450801.575	240.50	Monitoring Point
PB59	33-44-21.91966	118-22-18.04071	41.75	1727760.314	6448660.185	160.16	Monitoring Point
PB62	33-44-29.04074	118-22-05.55297	168.88	1728476.311	6449717.490	287.20	Monitoring Point
PB63	33-44-21.60033	118-21-44.61252	-1.28	1727717.724	6451483.290	116.99	Monitoring Point
PB64	33-44-19.09400	118-21-50.95218	-45.54	1727466.291	6450946.947	72.76	Monitoring Point: New 11/18/2009
UB02	33-44-19.67416	118-22-00.49201	-55.43	1727527.870	6450141.455	62.92	Monitoring Point
PVE3	33-44-35.85329	118-24-15.26904	235.42	1729207.091	6438765.185	354.36	CGPS Record Position Fixed All Surveys
PVHS	33-46-46.02017	118-22-19.74140	854.07	1742328.081	6448570.484	972.08	CGPS Pos. Determined Nov. 2009 Survey
PVRS	33-46-25.89204	118-19-14.06724	198.61	1740239.304	6464237.887	316.31	CGPS Pos. Determined Nov. 2009 Survey
VTIS	33-42-45.48963	118-17-37.71224	197.51	1717933.681	6472307.227	315.25	CGPS Pos. Determined Nov. 2009 Survey