

October 2010
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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ATTACHMENTS

FULL DATA POSTING (Monitoring point overall movements and periodical movements)
COORDINATE LIST-Oct. 2010 Survey (Current NAD83 Geodetic, Grid Coordinates, NAVD88 Heights)

Survey Report
of the
Portuguese Landslide November October 2010 Monitoring Survey
for the
City of Rancho Palos Verdes
by
McGee Surveying Consulting

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 in October 2010 at Portuguese Bend on behalf of the City of Rancho Palos Verdes. 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 described in this Report and reported on spreadsheets 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 about an inch (0.08') or less per year, the 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 greater, 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 November 2009 and October 2010 (11.25 months) statistically attained an average accuracy of 0.027 feet at the 95% Level of Confidence overall as reported in the attached document "FULL DATA POSTING". The actual accuracies of these measurements are better by a factor of two as demonstrated by the measured vector residuals, repeatability of measurements at points considered stable, and the general consistency in the 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 information.

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 September 2007 Survey Report for a detailed history of the previous survey process between 1994 and 2007. See the subsequent Survey Reports for the December 2008 and November 2009 campaigns.

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 the 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 falls in the proximity of a Fault Line as shown below but appears unaffected to date



Vertical Datum: North American Vertical Datum of 1988 (NAVD88) orthometric heights per NGS
Geoid Model: Geoid 03; Note, Geoid09 became available from the NGS in late 2009; however, 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 original 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 one of a series of adjustments of NAD83 since its adoption in 1986 and is the datum used for the 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 listed below. These CGPS Stations provide a rigid reference frame for the Portuguese Landslide Monitoring Program that is validated during each monitoring campaign. See the Adjustment results on Page 6 and the September 2007 Monitoring Survey Report by McGee Surveying Consulting for additional information.

Annual Velocities in Feet			
Reference Epoch 2010.84			
CGPS	North	East	Up
PVE3	0.064	-0.130	-0.002
PVHS	0.063	-0.129	-0.002
PVRS	0.062	-0.129	0.000
VTIS	0.065	-0.129	-0.002

FIELD SURVEYS, DATA COLLECTION, EQUIPMENT & PROCESSING

Sixty-five monitoring points were occupied and reported in October 2010. 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 October 2010" and "Monitoring Points Photo Update October 2010" for additional information. See prior Monitoring Survey Reports for all photos.

AB61 was established in September 2007 on Portuguese Point and is used as the primary base station because of its suitability for GPS observations. The location is secured behind a locked gate, has a clear horizon above 10 degrees, and sits on a stable basalt geological formation. A 5/8" x 2' rebar with a plastic cap and tack was set on 10/23/2010 for a reference monument named "AB61ECC" at 313-40 Azimuth, 21.155' at +0.641'.

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 64 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. After arriving at a point to be observed, the GPS 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 10-25 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 measurement is obtained.

Three Leica geodetic GPS receivers and antennas listed below were utilized to collect, process and store satellite signal data. Three, 2.00 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: 10/23/10 to 10/28/10 (10/25/2010 mean date) 0600-1800 PST (+8 hrs for UTC).

Constellation: The NAVSTAR GPS constellation consisted of 31 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 10-25 minutes and 6-11 hours for CGPS connections.

Minimum Satellites: 5 ; GDOP < 4.5 ; Elevation Mask for Data Collection: 10 degrees;

Processing: 10 degrees except for connections to CGPS stations at 12 degrees.

Ephemeris: Precise for Static Post-Processing for all CGPS connections and Broadcast for on site.

Weather conditions: Generally clear skies and mild temperatures.

Space Weather: Boulder K Index was 4-2 on a scale of 0-9 and gauges ionospheric activity.

GPS Base Receiver Unit No.: M5, Operator: M. McGee, PLS; Station Identification: AB61

Make & Model: Leica GS15; Antenna Leica GS15; Mount: Fixed Height Pole #1; Antenna Height: 2.086m

GPS Rover Receiver Unit No.: M6, Operator: M. McGee, PLS;

Make & Model: Leica GS15; Antenna Leica GS15; Mount: Fixed Height Pole #2; Antenna Height: 2.086m

GPS Rover Receiver Unit No.: M3, Operator: R. Reese, PLS,

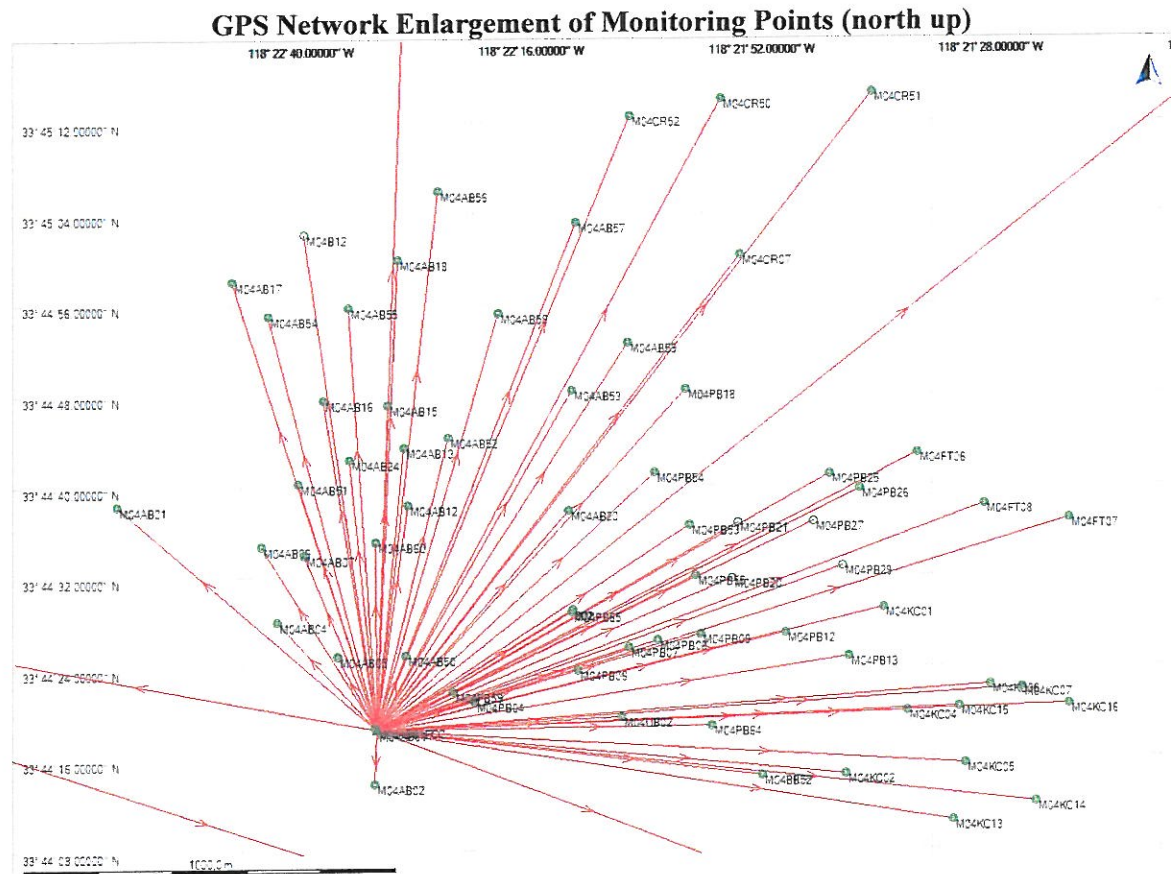
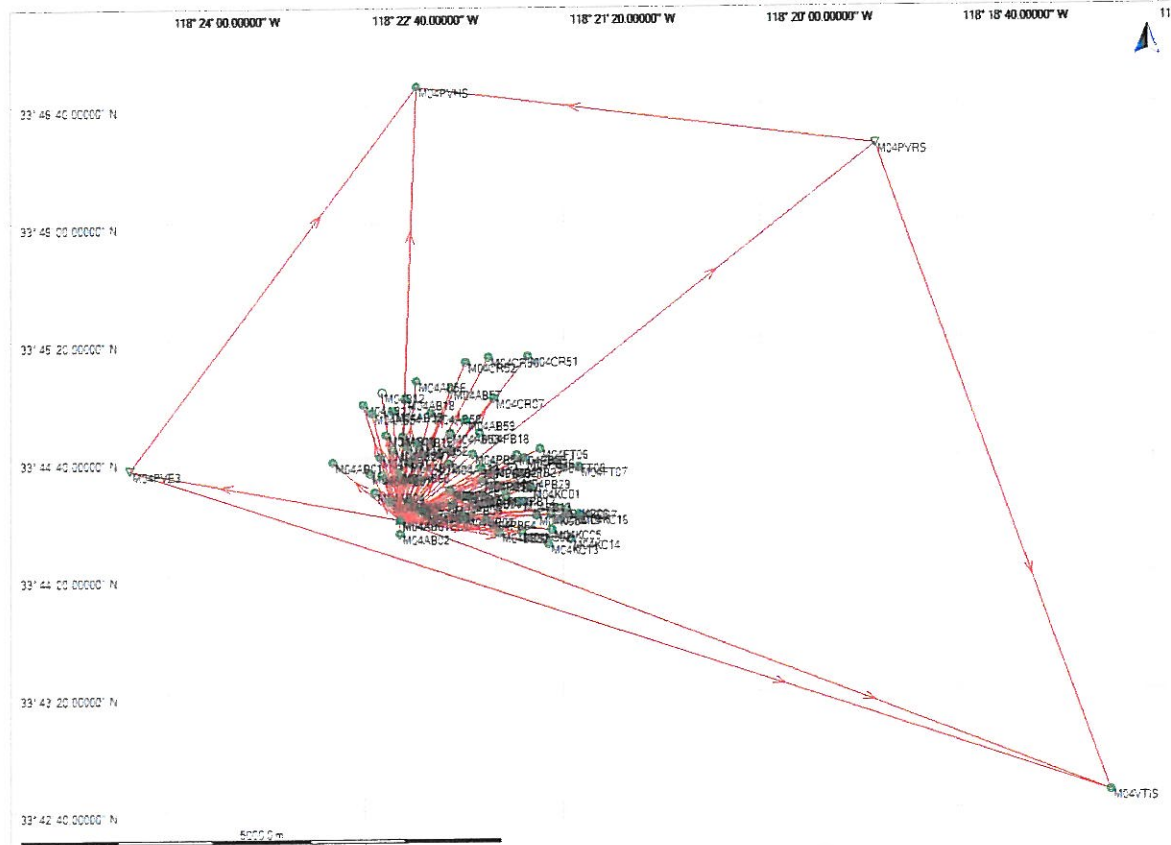
Make & Model: Leica 530; Antenna Leica AT502; Mount: Fixed Height Pole #3; Antenna Height: 2.083m

Data was processed using Leica LGO post processing software. The longer baseline connections to the CGPS were processed with a precise ephemeris at a cutoff vertical angle of 12° and the shorter monitoring network baselines were processed with a broadcast ephemeris at a cutoff vertical angle of 10°. Analysis of processing statistics and residuals led to the rejection of 3 vectors. Network adjustments and analysis were performed with "Starnet-PRO" version 6.0 software. Data files in the rinex format of the satellite measurements for the CGPS Stations were downloaded from the SOPAC website. The precise ephemeris and antenna models were downloaded from the NGS website. NGS Relative Antenna models were used to process connecting vectors to CGPS Stations.

NETWORK

The monitoring plan uses four CGPS Stations and several local points to verify the stability of the reference system. The CGPS Station PVE3, near City Hall, is located 1.8 miles west-northwest of the base station point AB61. PVHS is 2.8 miles north, PVR3 3.9 miles northeast, and VTIS is 4.9 miles east-southeast of AB61 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 65 on site points and 4 CGPS Stations were connected with 72 vectors measured 2-3 times to each point (159 total). See the Network Maps below.



MONITORING POINT STATUS

For data management purposes during the field survey and data processing, the point names are prefixed with "M04" i.e. AB61 is M04AB61 to distinguish between different monitoring periods. M04 indicates this survey is the fourth 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 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.

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 resumed in 2009. 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.

In 2009, a new point PB64 was set east of the Archery Range to replace PB63 which had become unsafe to access. PB64 is reported for the first time in 2010 and PB63 was destroyed sometime in 2010.

In 2010, points AB03 and BB25 were deleted from the survey. AB03 was redundant and not moving and BB25 is on an apparently unstable rock affected by the surf. In the summer of 2010, PB62 was destroyed by road construction, and a new point PB65 was set 24' south-southwest. Movement will be reported for the first time in 2011. The following points may have been slightly disturbed. AB05 may have been disturbed by mower machinery and AB15 (a ½" GIP in a meter box) has been driven over recently by vehicles occasionally accessing an adjacent field.

The present status of monitored points is provided in the Appendix under "Monitoring Point Status as of October 2010".

ADJUSTMENTS & ANALYSIS

Adjustment 1: Minimally Constrained Adjustment processed 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, state plane coordinates, and to check other known points. PVE3 has been fixed in all adjustments since 2007. 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

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period to date. The other three CGPS Station positions determined by this and prior surveys relative to PVE3 are used to assess stability of the reference frame. The positions determined by this survey are based 6-11 hour measurement collected on four days over a six day period. The coordinate differences at other CGPS Stations from previous positions to the present are listed below in feet.

11/2009 Positions to 10/2010				9/2007 Positions to 10/2010			
Station	dN	dE	dZ	Station	dN	dE	dZ
PVE3	0.000	0.000	0.000	PVE3	0.000	0.000	0.000
PVHS	-0.002	0.001	-0.033	PVHS	-0.004	0.006	0.011
PVRS	-0.002	-0.001	-0.004	PVRS	-0.000	0.008	0.006
VTIS	-0.001	-0.003	0.005	VTIS	-0.003	0.005	-0.001
AB61	-0.009	-0.002	0.050	AB61	-0.019	0.011	0.005

Fixed 2010

Base Station

The two dimensional (2D) differences from the November 2009 to the October 2010 measured positions of the three free CGPS Stations range 0.002 to 0.003 feet and 0.009 feet at AB61. Since the initial survey in 2007, the 2D difference range 0.006 to 0.008 feet at the CGPS and 0.022 feet at AB61. For the purpose of this survey, a constrained adjustment is not preferred as the purpose here is to track their relative stability which is within 0.01 feet. In addition to the CGPS, points AB02, AB17, AB61, and KC16 have a stable history. Their prior positions when compared to this survey indicate repeatability at the level of 0.01 feet as listed in the "FULL DATA POSTING".

The survey reference frame is deemed stable and successfully recovered at the level indicated. See the attached file "COORDINATE LIST-Oct 2010" for a list of coordinates resulting from this adjustment. See prior Reports for coordinates resulting from earlier surveys.

Adjustment 2: Minimally Constrained Adjustment processed to develop Orthometric Heights (Elevations) in NAVD88

Fixed Control: The CGPS Station PVE3 was fixed horizontally and vertically. The NAVD88 orthometric height of PVE3 was determined in the September 2007 survey based on the published 2nd Order NAVD88 Height of CGPS Station VTIS located 4.9 miles east-southeasterly. 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 other CGPS Stations. The differences from prior surveys to the heights determined in the present survey are listed below in feet.

11/2009 to 10/2010			9/2007 to 10/2010		
PVE3	-0.000	Fixed	PVE3	-0.000	
PVHS	-0.033		PVHS	0.008	
PVRS	-0.004		PVRS	0.010	
VTIS	0.005		VTIS	-0.002	

Note: This survey checks from PVE3 to VTIS 0.005 feet in the present survey and -0.002 feet with the 2007 survey. See the attached file "COORDINATE LIST-Oct 2010 Survey" for a list of heights resulting from this survey.

ACCURACY

Movement Accuracy: For the movements reported in this period, the statistical analysis of points moving less than 0.3 feet returned a relative error at the 95% Level of Confidence averaging 0.026 feet with a standard deviation of 0.006 feet and a range of 0.005 to 0.037 feet. Overall, the relative error averaged 0.027 feet with a standard deviation of 0.006 feet and a range of 0.005 to 0.044 feet. No movement is considered detected unless the movement exceeds the 95% Error. See Page 4 of the "FULL DATA POSTING" for listing.

Vector Residuals: 159 measured vectors were processed in Adjustment #1 resulting in 72 vectors connecting 69 points. The two dimensional residuals and the absolute value of the vertical residuals are listed below in feet.

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	Two Dimensional Residuals			Vertical Residuals		
	Average	Std.Dev.	Maximum	Average	Std.Dev.	Range
Monitoring Pts	0.007	0.004	0.022	0.014	0.013	-0.05 to +0.06
CGPS Stations	0.005	0.003	0.012	0.023	0.022	-0.09 to +0.06

Note, if six of the twelve vectors connecting CGPS Station PVHS to the network were excluded the vertical residuals would range -0.027 to +0.032 feet for the other CGPS Stations indicating some signal interference is occurring; however, the horizontal position is considered reliable.

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

	Lengths		Precisions		Relative Dist. Error		Precision
	Vary	Average	Vary	Average	Average	Maximum	
Monitoring Pts	478-7134	3599	2.5-58.0	8.4 ppm	0.020	0.034	1: 180,000
CGPS Stations	9396-35386	22300	0.1- 0.4	0.2 ppm	0.004	0.004	1:5,575,000

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 1.8, and the vectors connecting AB61 and the CGPS Stations exceeds the criteria for a B Order survey by a factor of 5.6 per the FGCS requirements for the former classification system.

Coordinate Accuracy: The Standard Deviations (68% Level of Confidence) the coordinates derived from Adjustment #1, relative to the CGPS Station PVE3 follow in feet.

	Monitoring Point			CGPS Stations		
	North	East	Up	North	East	Up
Standard Deviation Average	0.008	0.007	0.029	0.002	0.001	0.005
Standard Deviation Maximum	0.013	0.010	0.043	0.002	0.002	0.006

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.

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 notwithstanding severely obstructed sites. 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 value 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 agreed 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 2007, 2008 and 2009

surveys. See the "QAQC ANALYSIS" section of the September 2007 and the December 2008 Monitoring Survey Reports for detailed analysis. The results found 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 points is not warranted.

Deflection Analysis is used to assess the consistency of movements reported on prior surveys. Assuming that movements are generally linear over short distances, the separation can be implied as an indication of the survey accuracy of the reported movements. If the deflection or separation between the direction for the previous and present periods is equal to or less than 0.02 feet then it is considered linear. Of the 48 points with detected movements, 46 have a history and 33 points meet this criteria. Their deflection between the direction for the previous and present periods, taken over the moved distance, returned an average separation of 0.009 feet with a standard deviation of 0.006 feet and a maximum of 0.024 feet. Significant deflections noted at the following points should be reviewed by the City Geologist: AB15 moved 0.07 feet deflecting +52 degree, and CR07 moved 0.06 feet deflecting +41 degree.

SUMMARY

A modernization of field procedures and processing techniques began with the September 2007 survey. Thereafter, temporal movements are based on a rigorous simultaneous least squares adjustment of multiple observations at two different epochs on each point. The statistical results of the November 2009 to October 2010 monitoring period show the relative accuracy of the reported movements averages 0.026 feet at the 95% Level of Confidence. Prior to September 2007, successive coordinate differences were used to compute movements which did not provide statistical information about the relative accuracies.

Results of the adjustment indicate the probability at the 95% level of confidence that movement (signal) has occurred at a point when the horizontal distance between two epochs is greater than the 95% Error (noise) listed in the "Full Data Posting" (ranges 0.005 to 0.044 feet). Using these criteria, 17 points have not moved and 48 points have moved. Between November 2009 and October 2010 (11.25 months), points in the Portuguese Bend Landslide moved between 0.08 and 27.7 feet. Points in the Abalone Cove Landslide west of the Portuguese Bend Landslide moved between 0.04 and 0.14 feet. Points in the Klondike Canyon east of the Portuguese Bend Landslide moved between 0.03 and 0.07 feet. See the Contours of Horizontal Movement in the Appendix for a graphical representation of the movements across the site.

Velocity Analysis: The movement distances for points moving less than 0.3 feet in the present period (11.25 month) are 111% on average (30% std. dev.) of the movements for the previous period (11.3 months). The movement distances for points moving greater than 0.6 feet in the present period (11.25 month) are 194% on average (16% std. dev.) of the movements for the previous period (11.3 months). The City Geologist should be referred to for assessment and interpretation of the movements.

See the attached "FULL DATA POSTING" spreadsheet 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 relative to north. The direction is given as an azimuth in degrees where 0° is north and increases clockwise (180° is south). 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 October 2010". 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

A program was discussed in the 2010 Planning Meeting for the replacement of Monitoring Monuments. Presently, monuments are within several feet of the surface and it has been recommended that deeper monuments be set that would be more reliable in detecting sub-surface movements. Many of the points should be moved to locations with less overhead obstructions and therefore more suitable for GPS observations. A few locations have safety issues and require time consuming traffic control during the survey. A re-location program will have long term benefits resulting in lower survey costs and a better understanding of sub-surface movements. Monuments suitable to this purpose would be of a design approved by the City Geologist and ACLAD.

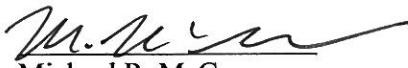
Attachments: Find the following documents attached to this Report.

FULL DATA POSTING - Lists the coordinates of the initial positions and the overall and periodic movements of monitoring point since 2007 in NAD83(2007.00) State Plane Coordinates and NAVD88 Heights.

COORDINATE LIST- October 2010 Survey - 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 was prepared by me December 15, 2010 at the request of the 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



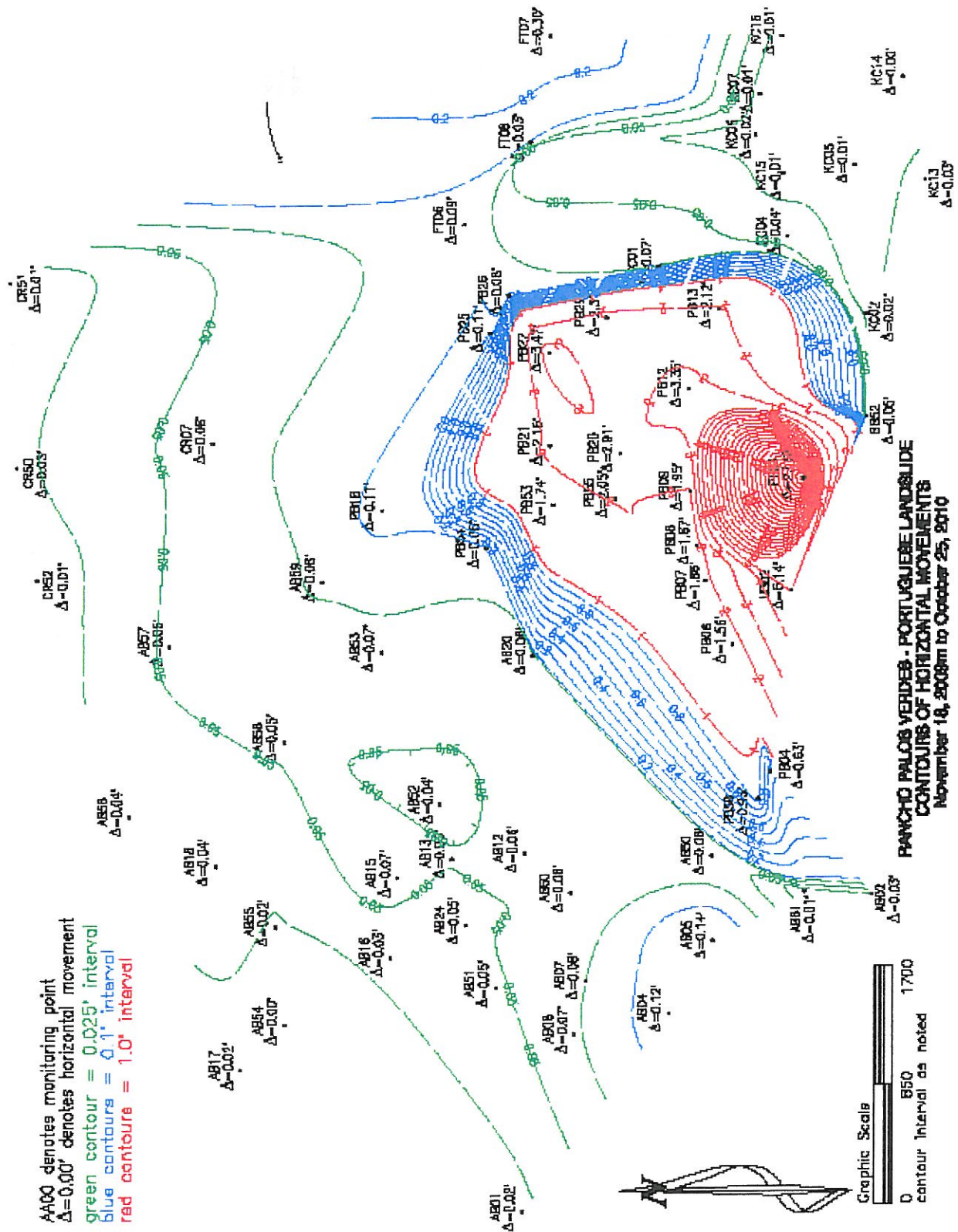
APPENDIX

Find the following:

1. Contours of Horizontal Movements –Nov. 2009 to Oct. 2010 (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. Aerial Photo - Monitoring Point Locations
3. Aerial Photo – Regional View of Monitoring Points & CGPS Locations
4. Oblique View of Monitoring Points
5. Monitoring Point Status as of October 2010
6. Monitoring Points Photo Update October 2010 (Updated photos of changes since last Monitoring)

1. Contours of Horizontal Movements (north is left)

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



2. Aerial Photo - Monitoring Point Locations - Photography Dated 11/15/2009 (north is left)



4. Monitoring Point Status as of October 2010
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
 10/2010 65 Points Monitored: AB03 & BB25 Deleted, Set PB65 to Replace PB62 Destroyed

Pt ID	Last Obs'd	Comments	GPS	Pt ID	Last Obs'd	Comments	GPS
AB01	10/25/2010	1994-2006 Base	G	FT06	10/25/2010		G
AB02	10/25/2010		G	FT07	10/25/2010		G
AB03	10/25/2010	Deleted	G	FT08	10/25/2010		G
AB04	10/25/2010		G				
AB05	10/25/2010		G	KC01	10/25/2010	NE'ly of 2 pipes	G
AB06	10/25/2010		G	KC02	10/25/2010		G
AB07	10/25/2010		G	KC04	10/25/2010		G
AB12	10/25/2010		G	KC05	10/25/2010		G
AB13	10/25/2010		P	KC06	10/25/2010		G
AB15	10/25/2010		F	KC07	10/25/2010		G
AB16	10/25/2010		P	KC13	10/25/2010		G
AB17	10/25/2010		F	KC14	10/25/2010		G
AB18	10/25/2010		P	KC15	10/25/2010		F
AB20	10/25/2010	NE'ly of 2 pipes	G	KC16	10/25/2010		G
AB24	10/25/2010		F				
AB50	10/25/2010		G	PB04	10/25/2010		G
AB51	10/25/2010		G	PB06	10/25/2010		G
AB52	10/25/2010		P	PB07	10/25/2010		G
AB53	10/25/2010		F	PB08	10/25/2010		G
AB54	10/25/2010		P	PB09	10/25/2010		G
AB55	10/25/2010		G	PB12	10/25/2010		G
AB56	10/25/2010		F	PB13	10/25/2010		G
AB57	10/25/2010		G	PB18	10/25/2010		G
AB58	10/25/2010		P	PB20	10/25/2010	S'ly of 2 pipes	G
AB59	10/25/2010		G	PB21	10/25/2010		F
AB60	10/25/2010		G	PB25	10/25/2010		G
AB61	10/25/2010	Base Station since 2007	G	PB26	10/25/2010		F
				PB27	10/25/2010		G
BB25	10/25/2010	Deleted	G	PB29	10/25/2010		G
BB52	10/25/2010		G	PB53	10/25/2010		P
				PB54	10/25/2010		F
CR07	10/25/2010		F	PB55	10/25/2010		P
CR50	10/25/2010		G	PB59	10/25/2010		G
CR51	10/25/2010		G	PB62	10/25/2010		G
CR52	10/25/2010		P	PB64	10/25/2010	Replaces PB63	G
				PB65	10/25/2010	Replaces PB62	G
				UB02	10/25/2010		G

GPS indicated Good, Fair or Poor Obstruction Conditions

Revised 02/09/2010

5. Monitoring Points - Photo Update for October 2010

Update for Points, AB05, AB61ECC, BB52, PB53, PB55, PB64, PB65 (See prior Reports for all photos)



PB53-S.JPG



PB65-S-X3.JPG



BB52-E-X2.JPG



PB65-N.JPG



AB61ECC-E.JPG



PB64-W.JPG



AB05-W.JPG



PB55-W.JPG

FULL DATA POSTING as of Sept.2007													Page 1/4
Document Date: 12/08/10													
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													
Point	Date	Original Positions			Sept. 24, 2007 Positions			Overall Movements (US Feet)					
		NAD83 SPC Zone 5 (Ft)	NAVD88	Elev(ft)	NAD83 SPC Zone 5 (Ft)	NAVD88	Elev(ft)	Original Position to Sept. 24, 2007					
		North (ft)	East (ft)	Elev(ft)	North (ft)	East (ft)	Elev(ft)	North	East	Height	Axim.°	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									
PB65	10/25/2010	1728454.67	6449707.82	287.75									
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

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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)			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	

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# 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)				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	Azim.°	Dist.	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		
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.																

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Notes:

* Indicates no movement detected

Point	Oct. 25, 2010 Positions			Overall Movements (US Feet)						Periodic (11.1 months) Movements (US Feet)						
	NAD83 SPC Zone 5 (Ft)			Original Position to Oct. 25, 2010						Nov. 18, 2009 Position to Oct. 25, 2010						
	North (ft)	East (ft)	Elev(ft)	North	East	Height	Azim.°	Dist.	Note	North	East	Height	Azim.°	Dist.	95%Error	Note
AB01	1729427.53	6445709.61	178.52	-0.05	-0.01	-0.10	187	0.05		-0.01	-0.02	-0.02	241	0.02	0.032	*
AB02	1726946.97	6447968.66	116.45	0.00	0.01	0.00	111	0.01	*	0.00	-0.02	-0.01	270	0.02	0.024	*
AB03	Deleted															
AB04	1728390.27	6447121.79	67.25	-1.72	-1.56	-0.32	222	2.32		-0.09	-0.08	0.00	220	0.12	0.023	
AB05	1728074.67	6447643.89	80.53	-1.05	-1.28	-0.37	231	1.66		-0.12	-0.07	-0.04	211	0.14	0.026	
AB06	1729058.36	6446975.83	164.82	-1.37	-0.43	-0.46	197	1.44		-0.07	-0.03	-0.02	207	0.07	0.026	
AB07	1728981.28	6447357.64	159.31	-1.51	-0.77	-0.61	207	1.70		-0.07	-0.03	-0.02	207	0.08	0.032	
AB12	1729415.46	6448271.20	283.20	-1.03	-0.44	-0.23	203	1.12		-0.04	-0.04	0.01	219	0.06	0.017	
AB13	1729928.09	6448235.85	364.53	-0.81	-0.19	-0.50	193	0.83		-0.04	-0.02	-0.01	208	0.05	0.021	
AB15	1730311.47	6448099.25	396.86	-0.62	-0.14	-0.42	192	0.63		-0.04	-0.05	-0.02	232	0.07	0.023	
AB16	1730358.61	6447532.16	376.46	-0.28	0.03	-0.16	173	0.28		-0.03	-0.01	0.01	197	0.03	0.028	*
AB17	1731421.10	6446727.76	442.80	-0.04	-0.01	-0.25	188	0.04		-0.01	-0.01	0.00	217	0.01	0.021	*
AB18	1731602.22	6448187.61	456.82	-0.40	0.12	-0.37	164	0.42		-0.04	0.01	-0.05	165	0.04	0.031	
AB20	1729359.72	6449685.94	396.23	-0.90	-0.32	-0.20	200	0.96		-0.06	-0.02	0.00	203	0.06	0.012	
AB24	1729829.65	6447759.73	335.77	-0.71	-0.23	-0.15	198	0.75		-0.04	-0.02	0.01	212	0.04	0.024	
AB50	1728084.62	6448247.38	182.00	-0.38	-0.80	0.02	244	0.89		-0.02	-0.06	0.00	247	0.06	0.031	
AB51	1729616.56	6447306.49	305.24	-0.45	-0.05	-0.18	186	0.45		-0.05	0.01	-0.01	172	0.05	0.022	
AB52	1730015.61	6448624.30	368.38	-0.49	-0.14	-0.23	196	0.51		-0.04	-0.02	0.03	209	0.04	0.037	
AB53	1730430.49	6449712.26	352.91	-0.61	-0.11	-0.22	190	0.62		-0.06	-0.02	0.02	196	0.07	0.027	
AB54	1731111.92	6447047.87	407.34	-0.02	0.00	0.03	182	0.02		0.00	0.00	-0.02	326	0.00	0.036	*
AB55	1731174.66	6447753.58	405.40	-0.11	0.02	0.02	171	0.11		-0.02	0.00	0.01	183	0.02	0.018	*
AB56	1732214.12	6448545.51	571.63	-0.19	0.05	-0.02	165	0.20		-0.04	0.00	-0.06	179	0.04	0.028	
AB57	1731926.67	6449759.42	564.92	-0.23	0.06	-0.01	165	0.24		-0.05	0.01	0.06	164	0.06	0.027	
AB58	1731117.80	6449074.93	405.69	-0.22	0.00	0.02	180	0.22		-0.05	-0.01	0.05	196	0.05	0.026	
AB59	1730850.56	6450212.51	434.35	-0.31	-0.04	-0.02	188	0.31		-0.08	-0.01	0.01	185	0.08	0.028	
AB60	1729089.53	6447987.50	179.42	-0.17	-0.07	-0.03	201	0.18		-0.05	-0.02	0.03	207	0.06	0.020	
AB61	1727424.48	6447990.27	140.47	-0.02	0.01	0.00	150	0.02	*	-0.01	0.00	0.05	193	0.01	0.005	*
BB25	Deleted															
BB52	1726996.13	6451384.34	3.85	-0.23	-0.04	0.02	190	0.24		-0.05	0.00	-0.01	180	0.05	0.029	
BB53	Destroyed															
CR07	1731628.12	6451203.32	632.33	-0.66	0.13	-0.95	169	0.67		-0.06	-0.02	-0.06	202	0.06	0.027	
CR50	1733013.59	6451037.37	872.67	0.04	0.00	-0.37	354	0.04		-0.02	-0.02	-0.02	217	0.03	0.023	
CR51	1733062.01	6452361.88	976.18	0.11	0.06	-0.57	29	0.12		0.00	0.01	-0.04	98	0.01	0.026	*
CR52	1732867.55	6450239.31	779.65	0.01	-0.03	-0.36	283	0.03	*	-0.01	0.00	-0.08	186	0.01	0.031	*
FT06	1729855.25	6452457.77	488.89	-0.35	-0.08	-0.17	193	0.36		-0.08	-0.03	-0.03	199	0.09	0.019	
FT07	1729252.76	6454104.00	588.85	-0.49	-0.75	-0.16	237	0.90		-0.16	-0.25	-0.05	237	0.30	0.026	
FT08	1729388.66	6453350.51	658.43	-0.02	0.00	-0.01	166	0.02	*	-0.02	-0.01	-0.05	206	0.03	0.028	*
KC01	1728476.12	6452457.77	312.38	-0.67	-0.46	-0.50	215	0.81		-0.06	-0.04	0.03	216	0.07	0.023	
KC02	1727002.62	6452118.86	13.72	-0.28	-0.14	-0.12	206	0.31		-0.02	-0.01	0.03	197	0.02	0.033	*
KC04	1727559.36	6452667.01	238.44	-0.20	-0.23	-0.40	228	0.30		-0.03	-0.02	-0.01	215	0.04	0.027	
KC05	1727081.96	6453178.92	227.47	-0.04	-0.17	-0.39	256	0.18		-0.01	0.00	-0.04	180	0.01	0.029	*
KC06	1727784.89	6453396.32	299.89	-0.02	-0.35	-0.46	266	0.35		-0.01	-0.02	-0.02	233	0.02	0.027	*
KC07	1727759.39	6453683.87	313.47	0.19	-0.04	-0.36	347	0.20		0.01	0.01	0.00	32	0.01	0.031	*
KC13	1726581.08	6453069.61	191.18	-0.07	-0.02	-0.02	195	0.08		-0.03	-0.01	0.00	204	0.03	0.021	
KC14	1726742.43	6453806.02	259.89	-0.01	-0.03	-0.05	258	0.03	*	0.00	0.00	-0.03	333	0.00	0.036	*
KC15	1727590.38	6453121.02	287.10	-0.07	-0.07	0.00	227	0.10		0.00	-0.01	0.01	265	0.01	0.027	*
KC16	1727602.23	6454098.24	326.88	-0.02	0.01	-0.02	148	0.02	*	-0.01	0.01	0.01	139	0.01	0.023	*
PB04	1727665.94	6448848.86	167.11	-9.99	-2.88	-3.41	196	10.40		-0.62	-0.13	-0.20	192	0.63	0.030	
PB06	1727937.25	6449758.35	177.58	-31.19	-3.49	-5.48	186	31.39		-1.55	-0.17	-0.24	186	1.56	0.032	
PB07	1728137.00	6450212.58	197.66	-38.93	-7.18	-2.55	190	39.58		-1.83	-0.32	-0.14	190	1.86	0.030	
PB08	1728200.66	6450463.24	194.16	-36.85	-6.56	0.48	190	37.43		-1.65	-0.28	0.04	190	1.67	0.033	
PB09	1728247.35	6450848.79	189.24	-41.23	-2.24	-3.28	183	41.29		-1.95	-0.13	-0.22	184	1.95	0.032	
PB12	1728260.50	6451585.29	185.30	-69.99	-19.28	-7.99	195	72.60		-3.20	-0.96	-0.64	197	3.35	0.027	
PB13	1728045.47	6452149.17	206.87	-40.50	-15.17	-3.67	201	43.25		-1.96	-0.81	-0.11	202	2.12	0.025	
PB18	1730431.32	6450719.88	363.10	-15.64	8.89	-4.48	150	17.99		-0.11	0.02	-0.04	169	0.11	0.024	
PB20	1728746.24	6451125.33	233.20	-66.45	-10.35	-10.34	189	67.25		-2.86	-0.49	-0.49	190	2.91	0.038	
PB21	1729244.44	6451178.35	272.60	-53.78	6.30	-7.42	173	54.14		-2.15	0.18	-0.24	175	2.16	0.029	
PB25	1729670.68	6451986.36	326.01	-31.64	0.71	-2.98	179	31.64		-0.10	-0.03	-0.03	196	0.11	0.021	
PB26	1729538.86	6452252.16	282.99	-23.79	2.60	-2.35	174	23.93		-0.08	-0.03	0.06	200	0.08	0.028	
PB27	1729249.12	6451842.31	272.17	-90.22	6.25	-12.25	176	90.44		-3.47	0.11	-0.56	178	3.47	0.029	
PB29	1728844.53	6452094.53	171.59	-44.42	-25.96	-14.34	210	51.45		-2.10	-0.97	-0.64	205	2.31	0.032	
PB53	1729219.81	6450754.71	290.67	-32.96	0.78	-7.08	179	32.97		-1.73	0.10	-0.53	177	1.74	0.035	
PB54	1729691.04	6450448.55	357.73	-3.86	-0.13	-0.89	182	3.87		-0.08	-0.02	0.02	191	0.08	0.026	
PB55	1728777.36	6450801.45	240.18	-34.92	-2.59	-6.15	184	35.02		-2.05	-0.13	-0.32	184	2.05	0.044	
PB59	1727759.39	6448659.97	159.70	-6.98	-1.69	-3.69	194	7.18		-0.93	-0.21	-0.47	193	0.95	0.032	
PB62	Destroyed															
PB63	Destroyed															
PB64	1727439.04	6450942.07	69.69	-27.25	-4.88	-3.08	190	27.68		-27.25	-4.88	-3.08	190	27.68	0.031	
PB65	1728454.67	6449707.82	287.75													
UB02	1727522.77	6450142.13	62.75	-58.34	8.34	-4.40	172	58.94		-5.10	0.67	-0.17	173	5.14	0.030	

COORDINATE LIST							
Portuguese Landslide Monitoring Survey of October 25, 2010							
Document Date: 12/11/2010							
Datum: Horizontal & EH 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	33-44-38.30232	118-22-53.05130	60.040	1729427.531	6445709.605	178.522	Pre-2007 Base Stat.
AB02	33-44-13.84871	118-22-26.19279	-2.047	1726946.967	6447968.655	116.447	Monitoring Point
AB04	33-44-28.09447	118-22-36.28371	-51.213	1728390.269	6447121.788	67.245	Monitoring Point
AB05	33-44-24.99186	118-22-30.08784	-37.913	1728074.666	6447643.887	80.533	Monitoring Point
AB06	33-44-34.69781	118-22-38.04160	46.390	1729058.363	6446975.831	164.818	Monitoring Point
AB07	33-44-33.94944	118-22-33.51729	40.896	1728981.279	6447357.639	159.307	Monitoring Point
AB12	33-44-38.27798	118-22-22.71912	164.855	1729415.458	6448271.200	283.200	Monitoring Point
AB13	33-44-43.34756	118-22-23.16022	246.212	1729928.085	6448235.850	364.534	Monitoring Point
AB15	33-44-47.13495	118-22-24.79462	278.550	1730311.468	6448099.247	396.862	Monitoring Point
AB16	33-44-47.58034	118-22-31.51176	258.126	1730358.607	6447532.158	376.462	Monitoring Point
AB17	33-44-58.06063	118-22-41.08416	324.467	1731421.099	6446727.763	442.800	Stable Monitoring Point
AB18	33-44-59.90626	118-22-23.80503	338.571	1731602.221	6448187.612	456.821	Monitoring Point
AB20	33-44-37.77825	118-22-05.96482	277.959	1729359.722	6449685.944	396.230	Monitoring Point
AB24	33-44-42.35629	118-22-28.79368	217.416	1729829.646	6447759.729	335.768	Monitoring Point
AB50	33-44-25.11251	118-22-22.94269	63.579	1728084.617	6448247.379	181.999	Monitoring Point
AB51	33-44-40.23170	118-22-34.15108	186.852	1729616.559	6447306.490	305.236	Monitoring Point
AB52	33-44-44.22759	118-22-18.56433	250.086	1730015.610	6448624.303	368.383	Monitoring Point
AB53	33-44-48.37119	118-22-05.69962	234.685	1730430.491	6449712.263	352.906	Monitoring Point
AB54	33-44-55.01415	118-22-37.27987	289.010	1731111.920	6447047.865	407.339	Monitoring Point
AB55	33-44-55.66082	118-22-28.92583	287.104	1731174.655	6447753.583	405.396	Monitoring Point
AB56	33-45-05.97227	118-22-19.59373	453.419	1732214.121	6448545.508	571.626	Monitoring Point
AB57	33-45-03.17306	118-22-05.20607	446.764	1731926.674	6449759.424	564.921	Monitoring Point
AB58	33-44-55.14685	118-22-13.27648	287.468	1731117.800	6449074.930	405.693	Monitoring Point
AB59	33-44-52.54455	118-21-59.79413	316.169	1730850.557	6450212.514	434.346	Monitoring Point
AB60	33-44-35.04353	118-22-26.06400	61.045	1729089.533	6447987.502	179.420	Monitoring Point
AB61	33-44-18.57300	118-22-25.95793	22.003	1727424.477	6447990.267	140.471	Base Station
AB61ECC	33-44-18.71693	118-22-26.13974	22.644	1727439.084	6447974.966	141.112	Reference Monument
BB52	33-44-14.45880	118-21-45.75335	-114.455	1726996.127	6451384.335	3.852	Monitoring Point
CR07	33-45-00.27174	118-21-48.09482	514.236	1731628.119	6451203.319	632.332	Monitoring Point
CR50	33-45-13.97080	118-21-50.11932	754.616	1733013.588	6451037.373	872.672	Monitoring Point
CR51	33-45-14.49693	118-21-34.43614	858.187	1733062.009	6452361.879	976.180	Monitoring Point
CR52	33-45-12.49753	118-21-59.56393	661.553	1732867.551	6450239.310	779.652	Monitoring Point
FT06	33-44-42.78993	118-21-29.58458	370.810	1729855.254	6452760.129	488.894	Monitoring Point
FT07	33-44-36.87713	118-21-13.64657	470.804	1729252.756	6454103.999	588.847	Monitoring Point
FT08	33-44-38.19518	118-21-22.57424	540.357	1729388.662	6453350.510	658.432	Monitoring Point
KC01	33-44-29.13689	118-21-33.10653	194.203	1728476.115	6452457.767	312.379	Monitoring Point
KC02	33-44-14.54913	118-21-37.05687	-104.548	1727002.617	6452118.858	13.719	Monitoring Point
KC04	33-44-20.07579	118-21-30.59024	120.233	1727559.361	6452667.012	238.443	Monitoring Point
KC05	33-44-15.37135	118-21-24.50905	109.269	1727081.956	6453178.921	227.470	Monitoring Point
KC06	33-44-22.33232	118-21-21.96456	181.736	1727784.886	6453396.318	299.891	Monitoring Point
KC07	33-44-22.09013	118-21-18.55873	195.326	1727759.385	6453683.874	313.468	Monitoring Point
KC13	33-44-10.41291	118-21-25.78222	72.946	1726581.083	6453069.611	191.179	Monitoring Point
KC14	33-44-12.03479	118-21-17.06995	141.710	1726742.434	6453806.024	259.894	Monitoring Point
KC15	33-44-20.39864	118-21-25.21596	168.920	1727590.382	6453121.022	287.099	Monitoring Point
KC16	33-44-20.55002	118-21-13.64593	208.753	1727602.230	6454098.244	326.881	Stable Monitoring Point
PB04	33-44-20.99303	118-22-15.80258	48.702	1727665.942	6448848.863	167.111	Monitoring Point
PB06	33-44-23.70990	118-22-05.04575	59.232	1727937.253	6449758.353	177.578	Monitoring Point
PB07	33-44-25.70220	118-21-59.67620	79.348	1728137.000	6450212.577	197.660	Monitoring Point
PB08	33-44-26.34097	118-21-56.71098	75.864	1728200.661	6450463.241	194.160	Monitoring Point
PB09	33-44-26.81668	118-21-52.14795	70.969	1728247.352	6450848.786	189.241	Monitoring Point
PB12	33-44-26.97302	118-21-43.42797	67.069	1728260.495	6451585.289	185.302	Monitoring Point
PB13	33-44-24.86600	118-21-36.74222	88.661	1728045.466	6452149.170	206.874	Monitoring Point
PB18	33-44-48.41497	118-21-53.76810	244.928	1730431.242	6450719.884	363.096	Monitoring Point
PB20	33-44-31.76231	118-21-48.89495	114.972	1728746.316	6451125.327	233.196	Monitoring Point
PB21	33-44-36.69163	118-21-48.28842	154.399	1729244.441	6451178.352	272.597	Monitoring Point
PB25	33-44-40.93675	118-21-38.73901	207.870	1729670.679	6451986.361	326.006	Monitoring Point
PB26	33-44-39.64221	118-21-35.58607	164.860	1729538.858	6452252.161	282.988	Monitoring Point
PB27	33-44-36.76159	118-21-40.42681	154.007	1729249.120	6451842.307	272.170	Monitoring Point
PB29	33-44-32.76832	118-21-37.42306	53.422	1728844.526	6452094.534	171.591	Monitoring Point
PB53	33-44-36.43277	118-21-53.30366	172.446	1729219.807	6450754.709	290.667	Monitoring Point
PB54	33-44-41.08313	118-21-56.94910	239.515	1729691.035	6450448.554	357.731	Monitoring Point
PB55	33-44-32.05780	118-21-52.73124	121.940	1728777.361	6450801.447	240.180	Monitoring Point
PB59	33-44-21.91046	118-22-18.04317	41.281	1727759.386	6448659.973	159.695	Monitoring Point
PB64	33-44-18.82426	118-21-51.00873	-48.623	1727439.040	6450942.072	69.685	Monitoring Point
PB65	33-44-28.82629	118-22-05.66649	169.423	1728454.667	6449707.823	287.745	Monitoring Point: New 10/23/2010
UB02	33-44-19.62376	118-22-00.48384	-55.599	1727522.773	6450142.126	62.748	Monitoring Point
PVE3	33-44-35.85329	118-24-15.26904	235.421	1729207.091	6438765.185	354.360	CGPS Record Position Fixed All Surveys
PVHS	33-46-46.02015	118-22-19.74139	854.032	1742328.079	6448570.485	972.048	CGPS Pos. Determined Oct. 2010 Survey
PVRS	33-46-25.89202	118-19-14.06725	198.603	1740239.302	6464237.885	316.310	CGPS Pos. Determined Oct. 2010 Survey
VTIS	33-42-45.48962	118-17-37.71227	197.512	1717933.681	6472307.225	315.258	CGPS Pos. Determined Oct. 2010 Survey