December 2008

Survey Report

for the

Monitoring and Control Surveys

of the

Rancho Palos Verdes Portuguese Landslide

By

McGee Surveying Consulting and Charles Abbott Associates, Inc.

INDEX

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for the

Rancho Palos Verdes Portuguese Landslide December 2008 Monitoring and Control Survey

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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
Location: Rancho Palos Verdes, California; **County:** Los Angeles**; State:** California

PROJECT OVERVIEW:

McGee Surveying Consulting performed a ground slide monitoring and control survey at Portuguese Bend on behalf of the City of Rancho Palos Verdes in December 2008. The purpose of the survey was to establish high accuracy positions on monitoring points and determine the overall and periodical movements. This survey is a continuation of a monitoring survey program conducted by the City since 1994 and assumed by McGee Surveying Consulting in September 2007. 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 and reports. The monitoring points cover approximately a 1½ square mile area and are measured annually or more often as necessary to determine the rate and extent of ground movement. Global Positioning System (GPS) technology was 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) and are referenced to the CORS (Continuously Operated Reference Stations) which are permanently mounted GPS receivers. In California CORS are also referred to as CGPS or Continuous GPS stations.

This survey is required to meet a relative accuracy standard of two centimeters (0.066 feet) in the active slide area and one centimeter (0.033 feet) in other areas at the 95% Level of Confidence to ensure the reliability of the results. Field procedures are designed to accomplish this purpose and Quality Control-Quality Assurance (QAQC) processes are incorporated to verify this accuracy is attained. The movements reported between September 2007 and December 2008 (15 months) statistically attained accuracies of 0.02 feet at the 95% Level of Confidence. However, the results obtained at points believed to be stable and the fact that the directions of the present movements of the points are very similar to the overall movement directions are good indications that the accuracies of the movement measurements approach an unprecedented 0.01 feet in the horizontal.

HISTORY

This survey is a continuation of a monitoring program initiated by the County of Los Angeles and taken over by the City of Rancho Palos Verdes circa 1994. See the September 2007 Survey Report by McGee Surveying Consulting for a detailed History of the 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).; **Units:** Feet

Reference Network: The survey is referenced to the CORS 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. PVE3's position was downloaded from the California Spatial Reference Center (CSRC). CSRC provides NGS sanctioned positions on all California CORS.

	NAD83(2007)				
CORS	Latitude(dms)	Longitude(dms)	EH(feet)	NGS PID	NAME
PVE3	33 44 35.853290	-118 24 15.269036	235.42	none available	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

Regional CORS

Vertical Datum: North American Vertical Datum of 1988 (NAVD88) orthometric heights per NGS
Geoid Model: Geoid 03

Reference Network: CORS Station VTIS (see NGS Data Sheets)

CORS	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, therefore the average Combined Grid Factor is 1.00006635. Multiply the Combined Factor times ground distances to obtain grid distances relative to this survey. 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±.

Datum Notes: 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 for all 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 (0.13 feet) per year; however, the City as a whole is moving at a constant rate as exhibited by the N, E, Up velocities of the CORS, shown below, which serve as a rigid reference frame for the Portuguese Landslide Monitoring. See the September 2007 Survey Report by McGee Surveying Consulting for additional information.

Annual Velocities in Feet

CORS	North	East	Up
PVE3	0.06	-0.13	-0.01
PVHS	0.06	-0.13	-0.01
PVRS	0.06	-0.13	-0.00
VTIS	0.06	-0.13	-0.01

FIELD SURVEYS, DATA COLLECTION, EQUIPMENT & PROCESSING

Sixty-seven monitoring points were occupied and reported in December 2008. 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 December 2008" and "Monitoring Point Photos - Update December 2008 in the for additional information. See the September 2007 Survey report for photos of all points.

AB61, established in 2007 on Portuguese Point as a permanent GPS Base Station, was occupied as a base for this survey. 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 up a GPS receiver on a tripod at AB61 while two GPS receivers roamed freely collecting observations on fixed height poles at the 66 on-site points. Many of the points are surrounded by mature trees and plants which attenuate satellite signals passing through foliage degrading the measurement accuracies. To obtain the highest possible accuracies, available satellites are compared in real time with the obstruction diagrams to estimate the best time for observing a point. Upon arriving at a point to be observed, the receiver is set up, the location in the sky of each satellite is estimated with a compass and abney, and 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 were available then the measurement commenced for 15-30 minutes of data collection. If sufficient satellites and geometry were not available then the receiver was moved to the next point and the point was returned to later. This process was followed until all points were occupied twice under a different constellation of satellites. If the two measurements were not in agreement, then a third occupation was made.

Three Leica geodetic GPS receivers and antennas listed below were utilized to collect, process and store satellite signal data. Two, 2 meter fixed height poles were used for the field observations of the monitoring points with a base station receiver utilizing a tribrach on tripod setup. Prior to initiating the field observations a calibration of the tribrach and fixed height poles was conducted to verify the accuracy of the equipment. There were no equipment failures. See below for the GPS Survey Parameters.

Date of Field Surveys: 12/07/2008 to 12/13/2008 between 0700-1700 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 15-30 minutes and 4-10 hours for CORS connections.
Minimum Satellites: 5 ; GDOP < 4.5 ; Elevation Mask for Data Collection: 15 degrees; Processing: 15 deg.
Ephemeris: Rapid 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: Tribrach on Tripod; Height: varies
GPS Rover Receiver Unit No.: M3, Operator: M. McGee, PLS;
Make & Model: Leica 530; Antenna Leica AT502; Mount: Fixed Height Pole #1; Antenna Height: 2.082m
GPS Rover Receiver Unit No.: M4, Operator: R. Reese, PLS,
Make & Model: Leica 530; Antenna Leica AT502; Mount: Fixed Height Pole #3; Antenna Height: 2.083m

A total of 67 on site points and 4 CORS were connected with 164 measured vectors. Data was processed using the Leica LGO post processing software. The baseline connections to the CORS were processed with a rapid ephemeris and the monitoring network baselines were processed with a broadcast ephemeris, both at a cutoff vertical angle of 15°. Analysis of processing statistics and residuals led to the rejection of 2 vectors. Network adjustments and analysis were performed with "Starnet-PRO" version 6.0 software. The CORS stations were included by downloading Rinex files from the NGS and using the NGS antenna models in the processing.

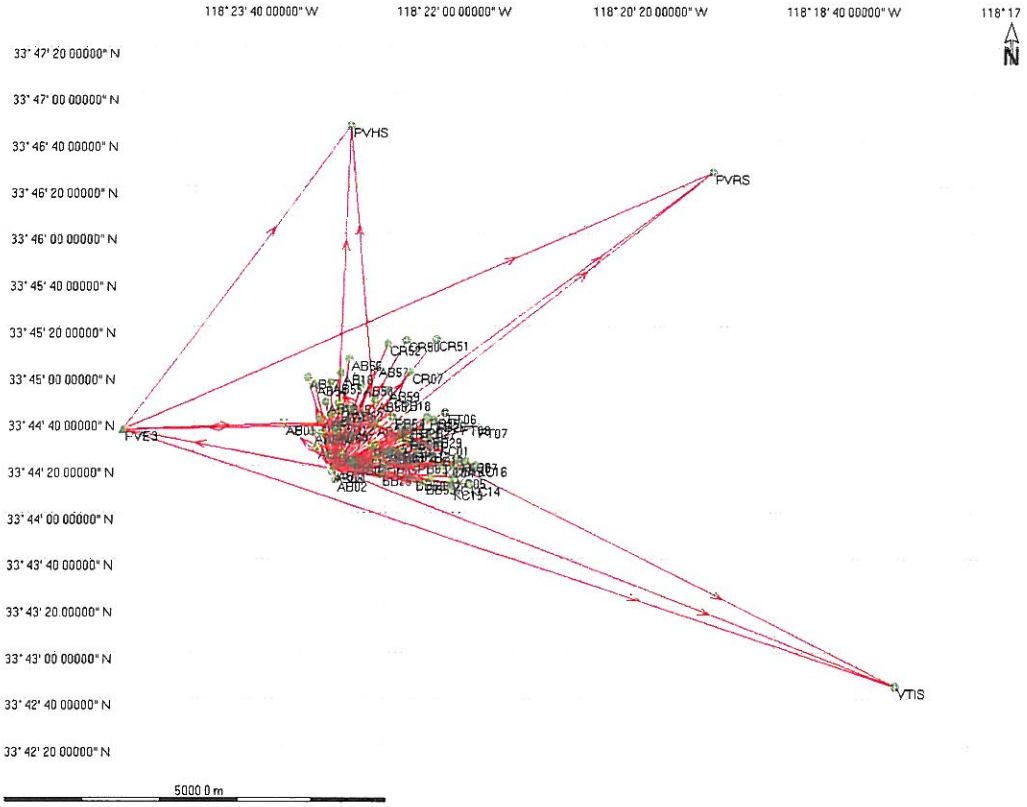
NETWORK

AB61 is the primary Base Station monument on Portuguese Point which is the focal point of a static network connecting the 67 monitoring points and four CORS control points as shown below. 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 2007 for the last time because they were replaced by new points, better suited for GPS, set nearby. Eighteen new points set in 2007 have their movements reported for the first time in this December 2008 survey. In December 2008, 49 original and 18 points set in September 2007 were surveyed for a total of 67 monitoring points.

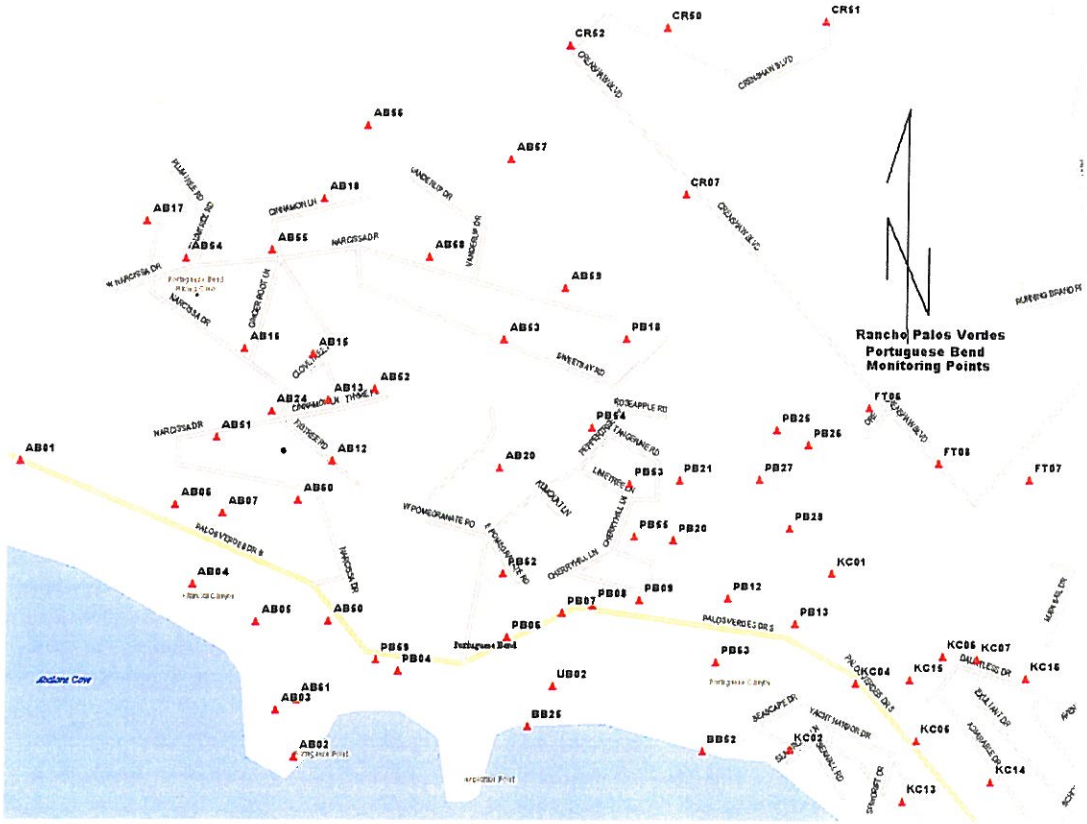
Monitoring Points: Points take their ID from previous surveys. For data management purposes the point ID's were prefixed in this survey with "M02" i.e. AB61 is M02AB61. This is to indicate the survey is the second monitoring since the initial September 2007 Monitoring Survey when the Monitoring Program was modernized. The prefix is stripped in the coordinate and movement listing reports.

BB53 was destroyed by wave action since the September 2007 Survey. The overall movement of point BB25 is referenced to the 11/04/1998 position because the position changed 6 feet west of its first reported position on 12/13/1997, further review of the history and the direction of its recent movement suggest that wave action may affect the stability of this point. In the September 2007 Report, it was noted that KC01 was reported by the previous surveyor on 9/14/2006 to be N29°E 1.24' from the 12/9/2005 position. After completion of this survey, a brass cap in concrete stamped "COUNTY ENGINEER RE8869 1956 STA ??IELDS" was found S46°W 1.47 feet from the 1" GIP found in 2007 and used for the 2007 and 2008 Reports. Analysis of the distance and direction between these two monuments, and historic data indicates the overall movement at this location since 1997 to be S63°W 0.78 feet +/-0.1 feet.

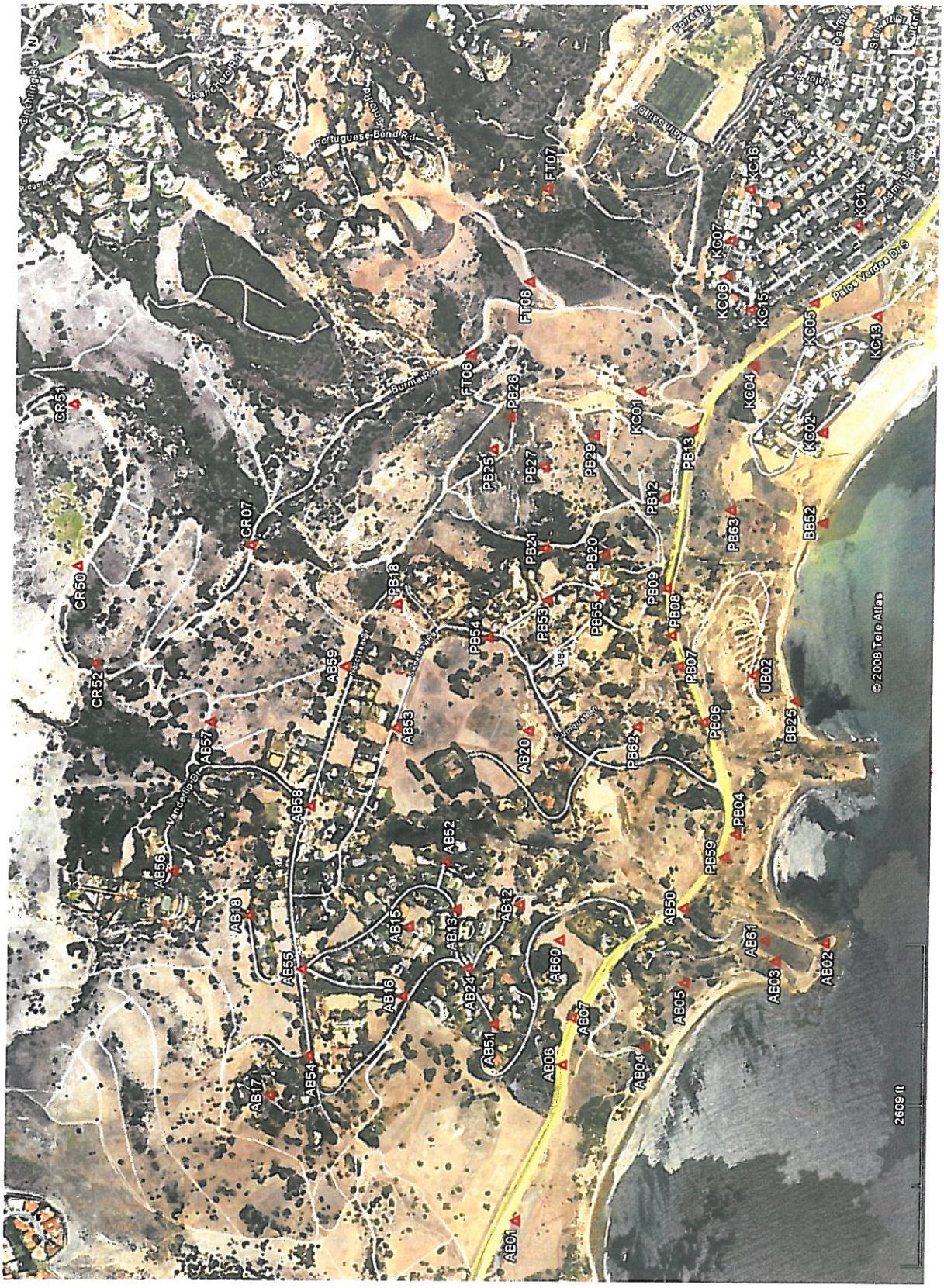
GPS – CORS Network



Monitoring Point Locations



Aerial Photo of Monitoring Point Locations



ADJUSTMENTS & ANALYSIS

Adjustment 1: Minimally Constrained to develop Geodetic and Ellipsoid Coordinates in NAD83(2007)
Fixed Control: The CORS 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 shown below. See the attached file "COORDINATE LIST–Dec 2008 Survey.xls" for a list of coordinates which are the basis for computing future movements.

The 3D and Ellipsoid Height adjustment results follow with coordinate differences (closures) from previous positions to the present in feet. The differences with the September 2007 positions determined by this surveyor are smaller than the differences with the record positions, and are a better indicator of the accuracy and repeatability of this survey. The differences with the record are similar to those reported in 2007.

Sept. 2007 to Dec. 2008

	Station	dN	dE	dZ
Fixed	PVE3	0.000	0.000	0.000
	PVHS	0.002	0.006	0.034
	PVRS	-0.002	0.007	0.002
	VTIS	-0.001	0.006	0.000

NGS Record Positions to Dec. 2008

	Station	dN	dE	dZ
Fixed	PVE3	0.000	0.000	0.000
	PVHS	0.006	-0.011	0.067
	PVRS	0.010	-0.004	-0.030
	VTIS	0.006	0.003	-0.012

Notes/Comments: Relative to the primary Base Station point AB61, the CORS station PVE3 is located 1.8 miles west-northwest, PVHS is 2.8 miles north, PVRS 3.9 miles northeast and VTIS is 4.9 miles east-southeast. The 2D closures on the CORS are 0.007 feet or less, and for the purpose of this survey a constrained adjustment was not computed. The monitoring plan is to use the CORS and those points deemed to be stable over time to verify the stability of the reference system.

Below are differences in feet from the September 2007 positions to the present surveyed positions of select points. Points believed to be stable are listed first, followed by those that did not appear to have moved because the difference is less than 0.02 feet. These points will be reviewed with the next monitoring. Points AB02, AB03 and AB17, considered stable, agree on average +0.000 north, -0.004 east, and -0.015 up. PVE3 was fixed in this adjustment because it is in better agreement with these three points than AB61 (Base) which is -0.005 north, +0.010 east, and -0.037 up. The survey reference frame is deemed stable and successfully recovered. AB61 will be watched.

Point	N	E	Up	
Stable Points				
AB01	-0.012	-0.015	-0.038	
AB02	0.004	-0.008	-0.019	
AB03	0.001	-0.002	-0.018	
AB17	-0.005	-0.001	-0.009	
CR52	-0.003	-0.014	0.009	
No Movement Detected				
AB54	-0.010	0.003	-0.015	
AB61	-0.005	0.010	-0.037	New Base Station Established in 2007
CR50	0.008	0.009	0.046	
CR51	-0.011	0.002	-0.013	
FT08	-0.009	0.020	0.032	
KC07	0.002	0.019	-0.002	
KC14	-0.003	-0.015	-0.025	
KC16	-0.005	0.005	0.015	

Adjustment 2: Minimally Constrained to develop Orthometric Heights (Elevations) in NAVD88
Fixed Control: The CORS PVE3 was fixed horizontally and vertically at the NAVD88 height determined in September 2007 survey, in a Minimally Constrained Adjustment that combined the measured ellipsoid height differences with the NGS Geoid 03 (models the undulations between the ellipsoid and geoid surfaces) to determine NAVD88 orthometric heights on all points. These results are compared with other known points shown below. See the attached file "COORDINATE LIST-Dec 2008 Survey.xls" for a list of heights which is the basis for computing future movements.

NAVD88 Orthometric Height adjustment results follow with the height differences (closures) from the September 2007 surveyed heights to the heights determined in the present survey.

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

Notes/Comments: The orthometric height of PVE3 was established in September 2007 based on the published NAVD88 Height of VTIS, and is confirmed here at 0.001 feet.

ACCURACY

Relative Accuracy: On site the points are expected to be 0.02 feet or less at the 95% Level of Confidence.

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

Vector Residuals: For the monitoring points in Adjustment #1, referred to above, the two dimensional horizontal residuals average 0.006 feet with a standard deviation of 0.004 feet and a maximum of 0.021 feet. The absolute value of the vertical residuals average 0.013 feet with a standard deviation of 0.013 feet and a range between -0.058 and +0.066 feet. For the CORS points, the two dimensional horizontal residuals average 0.005 feet with a standard deviation of 0.003 feet and a maximum of 0.012 feet. The absolute value of the vertical residuals average 0.018 feet with a standard deviation of 0.015 feet and a range between -0.047 and +0.059 feet.

NAVD88 Heights: The North American Vertical Datum 1988 orthometric heights (elevations) resulting from Adjustment #2 are derived from the GPS ellipsoid heights combined with the Geoid 03 model and constrained to known elevations. 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. Relative elevation accuracies are expected to be 0.03-0.04 feet. The absolute accuracy of these heights is dependent on the published values on the VTIS CORS.

Measurement Precisions: The vectors (baselines) for all points vary in length between 192 feet and 26,103 feet and averaging 3979 feet. The vector precisions at the 95% Level of Confidence (2 sigma) vary 0.2 ppm to 69 ppm and average 7.8 ppm. The relative distance error at the 95% Level of Confidence averages 0.018 feet with a maximum of 0.028 feet. The precision ratio based on the averages is 1:221,000 exceeding the criteria for a First Order (C-1) survey per the FGCS requirements by a factor of two under the former classification system.

The vectors connecting AB61 to the CORS vary in length between 9,395 and 26,103 feet and average 7,217 feet. The precisions, at the 95% Level of Confidence (2 sigma), vary 0.2 ppm to 0.4 ppm and average 0.3 ppm for 4 vectors measured over a 6 day period each. The relative distance error at the 95% Level of Confidence averages 0.004 feet with a maximum of 0.006 feet. The precision ratio is 1:1,800,000 exceeding the criteria for a B Order survey per the FGCS requirements for the former classification system..

The residuals and the closures between known control points discussed in the above Adjustments are good indications of the accuracies obtained by this survey. 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 this process, an independent test of the methods used in these surveys was made by using conventional instrumentation. See the September 2007 Monitoring Survey Report under QAQC for the analysis and results that support the use of GPS techniques to obtain the accuracies reported in these surveys.

To validate the present survey, the inverse distance between the GPS positions of AB20 and four other points spread across the site were computed and then compared with the direct single independently measured GPS vectors as listed below.

Comparison of Computed GPS Distances v. Direct GPS Measurements

From-To	Calculated Bearing & Distance		Measured Bearing & Distance	
AB20-AB55	N46-47-47.3W	2651.040	N46-47-47.6W	2651.024
AB20-AB60	S80-57-37.2W	1719.811	S80-57-35.5W	1719.810
AB20-FT06	N80-50-32.4E	3113.870	N80-50-32.5E	3113.871
AB20-PB62	S02-02-37.4E	883.982	S02-02-37.0E	883.988

The difference in the distances average 0.006 feet with a maximum of 0.016 feet. The differences in the bearings are comparable. This test indicates the accuracies in a two dimensional sense are 0.009 feet or 0.017 feet at the 95% level of confidence. This test indicates the radial method of positioning monitoring points is reliable at 0.01 feet, more than sufficient for monitoring purposes.

SUMMARY

A modernization of field procedures and processing techniques began with the September 2007 survey. The present movements are based on a rigorous simultaneous adjustment of the September 2007 and the December 2008 surveys, resulting in measured movement reliability of 0.02 feet at the 95% Level of Confidence for this period. Statistical analysis of the data indicates the probability that movement has occurred when the distance is greater than 0.02 feet and the direction is consistent with the direction of the overall movement for a particular point. The results of this survey find the periodic movement direction to be generally within 10° of the overall movement direction. The overall and periodic 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. See the spreadsheet "FULL DATA POSTING.xls" for the overall and periodic movements, and the coordinates used to compute movements. The overall movements are from the beginning positions which vary between 1994 and 2005.

Between September 2007 and December 2008 (14.5 months) the points in the Portuguese Bend Landslide moved between 0.20 and 9.73 feet. Points in the Abalone Cove Landslide west of the Portuguese Bend Landslide moved between 0.05 and 0.17 feet. Points in the Klondike Canyon east of the Portuguese Bend Landslide moved between 0.03 and 0.13 feet. See the Contours of Horizontal Displacement in the Appendix for a graphical representation of the movements across the site. The City Geologist should be referred to for assessment and interpretation of the movements.

The present status of all monitoring points is given in the Appendix under "Monitoring Point Status as of December 2008". The historical status of all monitoring points is given 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".

Attachments: Find the following document attached to this Report as separate documents.

FULL DATA POSTING.xls (Monitoring point overall movements and periodical movements including coordinates of the initial positions, 2007 and post 2007 positions in NAD83 and NAVD88 Systems)

COORDINATE LIST-Dec 2008 Survey.xls (Current NAD83 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 9, 2009 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:

Monitoring Point Photo Update December 2008 (Updated photos for those points that changed since Sept. 2007)

Monitoring Point Status as of December 2008 (Status of all points ; last observed, comments)

Contours of Horizontal Displacement – Sept. 2007 to Dec. 2008 (Contours at 0.05 foot and 1.0 foot indicating the general horizontal movement across the site; refer to the City Geologist for assessment and interpretation of movements)

Monitoring Point Photos - Updated December 2008
(See September 2007 Report for all photos)

Points AB05, AB12, AB24, AB57, AB59, AB61, CR07, CR50, FT06, FT08, KC01, PB06, PB07, PB08, PB09, PB13, PBN26


AB05-W.JPG


AB05-X2.JPG


AB12-N.JPG


AB12-NW.JPG


AB12-X.JPG


AB24-REBUILTa.JPG


AB24-REBUILTb.JPG


AB57-S.JPG


AB59-NW.JPG


AB61-N.JPG


AB61-X3.JPG


CR07-N2.JPG


CR07-NW.JPG

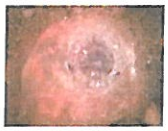

CR50-N.JPG


CR50-X.JPG


FT06-W.JPG


FT08-N.JPG


FT08-X.JPG


KC01-ALTERNATE.JPG


KC01-E.JPG


KC01-N2.JPG


KC01-N3.JPG


KC01-N4.JPG


PB06-NE.JPG


PB07-E.JPG


PB08-NNE.JPG

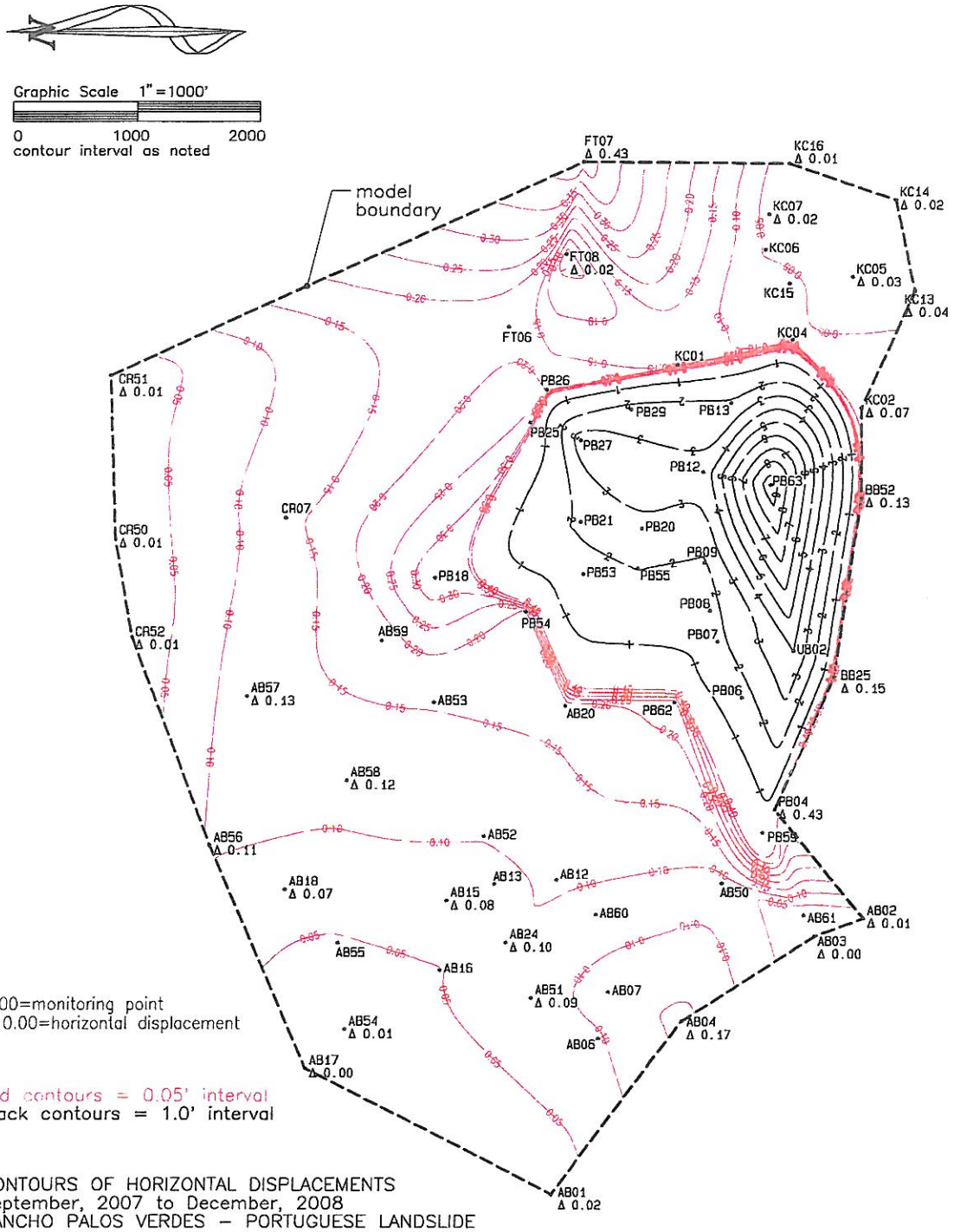

PB09-N.JPG

PB09-X.JPG


PB13-S.JPG


PB26-W.JPG

RANCHO PALOS VERDES - PORTUGUESE LAND SLIDE MONITORING							
Monitoring Point Status as of December 2008							
Notes:	149 Monitoring Points established since 1994						
2007	71 Points Monitored: 60 old points found with 52 monitored plus 19 new points						
2008	67 Points Monitored: AB09, KC11, PB51 discontinued; BB53 destroyed; AB05 disturbed						
2008							
Pt ID	**Last Obs'd**	**Comments**	**GPS**	**Pt ID**	**Last Obs'd**	**Comments**	**GPS**
AB01	12/10/2008	1994-2006 Base	**G**	**FT06**	12/10/2008		**G**
AB02	12/10/2008	Stable	**G**	**FT07**	12/10/2008		**G**
AB03	12/10/2008	Stable	**G**	**FT08**	12/10/2008		**G**
AB04	12/10/2008		**G**				
AB05	12/10/2008	Disturbed 09/07-12/08	**G**	**KC01**	12/10/2008	NE'ly of 2 pipes	**G**
AB06	12/10/2008		**G**	**KC02**	12/10/2008		**G**
AB07	12/10/2008		**G**	**KC04**	12/10/2008		**G**
AB12	12/10/2008		**G**	**KC05**	12/10/2008		**G**
AB13	12/10/2008		**P**	**KC06**	12/10/2008		**G**
AB15	12/10/2008		**F**	**KC07**	12/10/2008		**G**
AB16	12/10/2008		**P**	**KC13**	12/10/2008		**G**
AB17	12/10/2008	Stable	**F**	**KC14**	12/10/2008		**G**
AB18	12/10/2008		**P**	**KC15**	12/10/2008		**F**
AB20	12/10/2008	NE'ly of 2 pipes	**G**	**KC16**	12/10/2008		**G**
AB24	12/10/2008	rebuilt monument 12/08	**F**				
AB50	12/10/2008		**G**	**PB04**	12/10/2008		**G**
AB51	12/10/2008		**G**	**PB06**	12/10/2008		**G**
AB52	12/10/2008		**P**	**PB07**	12/10/2008		**G**
AB53	12/10/2008		**F**	**PB08**	12/10/2008		**G**
AB54	12/10/2008		**P**	**PB09**	12/10/2008		**G**
AB55	12/10/2008		**G**	**PB12**	12/10/2008		**G**
AB56	12/10/2008		**F**	**PB13**	12/10/2008		**G**
AB57	12/10/2008		**G**	**PB18**	12/10/2008		**G**
AB58	12/10/2008		**P**	**PB20**	12/10/2008	S'ly of 2 pipes	**G**
AB59	12/10/2008		**G**	**PB21**	12/10/2008		**F**
AB60	12/10/2008	added concrete collar	**G**	**PB25**	12/10/2008		**G**
AB61	12/10/2008	2007-2008 Base	**G**	**PB26**	12/10/2008		**F**
				PB27	12/10/2008		**G**
BB25	12/10/2008		**G**	**PB29**	12/10/2008		**G**
BB52	12/10/2008		**G**	**PB53**	12/10/2008		**P**
BB53	9/24/2007	Destroyed		**PB54**	12/10/2008		**F**
CR07	12/10/2008		**F**	**PB55**	12/10/2008		**F**
CR50	12/10/2008		**G**	**PB59**	12/10/2008		**G**
CR51	12/10/2008		**G**	**PB62**	12/10/2008		**G**
CR52	12/10/2008		**P**	**PB63**	12/10/2008		**G**
				UB02	12/10/2008		**G**
GPS indicated Good, Fair or Poor Obstruction Conditions						Prepared 01/20/2009	



CONTOURS OF HORIZONTAL DISPLACEMENTS
September, 2007 to December, 2008
RANCHO PALOS VERDES – PORTUGUESE LANDSLIDE

Attachments

Find the following document attached to this Report as separate documents.

FULL DATA POSTING.xls (Monitoring point overall movements and periodical movements including coordinates of the initial positions, 2007 and post 2007 positions in NAD83 and NAVD88 Systems)

COORDINATE LIST-Dec 2008 Survey.xls (Current NAD83 Geodetic, Grid Coordinates, NAVD88 Heights of all points)

FULL DATA POSTING as of Dec.2008

Date: 01/30/09

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= In 2005 and prior surveyors used a nearby monument, see Report and Station Recover Form

	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	1728076.00	6447645.10	80.90	1728075.30	6447644.13	80.67	-0.70	-0.98	-0.23	234	1.20	
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	1728475.52	6452457.46	312.88	1728476.36	6452457.91	312.42	*0.84*	*0.45*	*-0.46*	*28*	*0.96*	* 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						
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: 01/30/09

Notes:

\# Indicates stable points, not moving

* Indicates no movement detected

Notes: 2 = Hit by mower between 09/07 and 12/08, displaced southerly about 0.4', to be reported next period

	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	0.02	#
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	0.02	#
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	0.02	#
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	0.02	
AB05	1728074.86	6447644.04	80.59	*-1.14*	*-1.07*	*-0.31*	*223*	*1.56*	* 2	*-0.44*	*-0.09*	*-0.08*	*191*	*0.44*		* 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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	#
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	0.02	
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	0.01	
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	0.02	
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	0.02	
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	0.02	
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	0.03	
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	0.03	
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	0.03	*
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.00	#
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	0.02	
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	0.02	
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	0.02	
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	0.02	*
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	0.02	*
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	0.02	*
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	0.03	
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	0.02	
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	0.02	*
KC01	1728476.25	6452457.85	312.38	*0.73*	*0.39*	*-0.50*	*28*	*0.82*	* 1	-0.12	-0.06	-0.04	208	0.13	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	*
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	0.02	
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	0.02	*
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	0.02	
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	0.02	*
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.03	
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	0.02	
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	0.02	
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	0.02	
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	0.02	

COORDINATE LIST - December 2008 Survey

Date: 01/29/2009

Portuguese Landslide Monitoring of Dec. 10, 2008

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

Note, Fixed PVE3 CORS for 3D Position and Orthometric Height consistent with 09/2007 Survey; See Survey Report

Point	Latitude	Longitude	EH (ft)	North (ft)	East (ft)	OrthoHt(ft)	Description
AB01	33-44-38.30237	118-22-53.05103	60.10	1729427.536	6445709.627	178.59	Stable Check Point, Pre-2007 BASE
AB02	33-44-13.84890	118-22-26.19252	-2.03	1726946.986	6447968.677	116.46	Stable Check Point
AB03	33-44-17.71508	118-22-27.98419	21.10	1727338.386	6447818.811	139.58	Stable Check Point
AB04	33-44-28.09606	118-22-36.28219	-51.19	1728390.429	6447121.917	67.27	Monitoring Point
AB05	33-44-24.99379	118-22-30.08606	-37.85	1728074.861	6447644.038	80.59	Monitoring Point
AB06	33-44-34.69907	118-22-38.04106	46.42	1729058.491	6446975.877	164.85	Monitoring Point
AB07	33-44-33.95061	118-22-33.51657	40.92	1728981.397	6447357.699	159.34	Monitoring Point
AB12	33-44-38.27908	118-22-22.71837	164.84	1729415.568	6448271.263	283.19	Monitoring Point
AB13	33-44-43.34841	118-22-23.15976	246.22	1729928.170	6448235.889	364.54	Monitoring Point
AB15	33-44-47.13585	118-22-24.79398	278.57	1730311.560	6448099.302	396.88	Monitoring Point
AB16	33-44-47.58076	118-22-31.51158	258.13	1730358.650	6447532.173	376.46	Monitoring Point
AB17	33-44-58.06080	118-22-41.08405	324.45	1731421.116	6446727.772	442.79	Stable Check Point
AB18	33-44-59.90708	118-22-23.80508	338.66	1731602.305	6448187.608	456.91	Monitoring Point
AB20	33-44-37.77942	118-22-05.96427	277.96	1729359.840	6449685.991	396.23	Monitoring Point
AB24	33-44-42.35730	118-22-28.79315	217.41	1729829.748	6447759.774	335.76	Monitoring Point
AB50	33-44-25.11295	118-22-22.94164	63.56	1728084.661	6448247.468	181.98	Monitoring Point
AB51	33-44-40.23259	118-22-34.15088	186.87	1729616.648	6447306.507	305.26	Monitoring Point
AB52	33-44-44.22846	118-22-18.56409	250.08	1730015.698	6448624.324	368.38	Stable Check Point
AB53	33-44-48.37242	118-22-05.69918	234.68	1730430.615	6449712.301	352.90	Monitoring Point
AB54	33-44-55.01428	118-22-37.27982	288.97	1731111.933	6447047.869	407.30	Monitoring Point
AB55	33-44-55.66147	118-22-28.92590	287.10	1731174.721	6447753.577	405.39	Monitoring Point
AB56	33-45-05.97315	118-22-19.59392	453.43	1732214.211	6448545.492	571.64	Monitoring Point
AB57	33-45-03.17408	118-22-05.20639	446.75	1731926.777	6449759.397	564.90	Monitoring Point
AB58	33-44-55.14782	118-22-13.27644	287.42	1731117.898	6449074.934	405.65	Monitoring Point
AB59	33-44-52.54592	118-21-59.79393	316.17	1730850.696	6450212.532	434.35	Monitoring Point
AB60	33-44-35.04445	118-22-26.06356	61.02	1729089.626	6447987.540	179.39	Monitoring Point
AB61	33-44-18.57314	118-22-25.95793	21.96	1727424.491	6447990.267	140.43	Stable Point, BASE 2007 forward
BB25	33-44-16.42576	118-22-02.95097	-114.22	1727200.245	6449932.577	4.15	Monitoring Point
BB52	33-44-14.45989	118-21-45.75320	-114.48	1726996.237	6451384.347	3.83	Monitoring Point
CR07	33-45-00.27294	118-21-48.09481	514.27	1731628.240	6451203.320	632.36	Monitoring Point
CR50	33-45-13.97115	118-21-50.11920	754.65	1733013.623	6451037.383	872.71	Monitoring Point
CR51	33-45-14.49707	118-21-34.43633	858.25	1733062.022	6452361.863	976.24	Monitoring Point
CR52	33-45-12.49776	118-21-59.56394	661.54	1732867.575	6450239.310	779.64	Monitoring Point
FT06	33-44-42.79156	118-21-29.58409	370.89	1729855.418	6452760.171	488.97	Monitoring Point
FT07	33-44-36.87967	118-21-13.64193	470.95	1729253.012	6454104.392	588.99	Monitoring Point
FT08	33-44-38.19528	118-21-22.57406	540.40	1729388.673	6453350.525	658.47	Monitoring Point
KC01	33-44-29.13817	118-21-33.10555	194.20	1728476.245	6452457.850	312.38	Monitoring Point
KC02	33-44-14.54965	118-21-37.05662	-104.55	1727002.669	6452118.880	13.72	Monitoring Point
KC04	33-44-20.07642	118-21-30.58970	120.26	1727559.424	6452667.057	238.47	Monitoring Point
KC05	33-44-15.37155	118-21-24.50878	109.32	1727081.976	6453178.944	227.52	Monitoring Point
KC06	33-44-22.33269	118-21-21.96405	181.78	1727784.923	6453396.361	299.93	Monitoring Point
KC07	33-44-22.09004	118-21-18.55878	195.36	1727759.375	6453683.871	313.50	Monitoring Point
KC13	33-44-10.41328	118-21-25.78209	72.99	1726581.120	6453069.622	191.23	Monitoring Point
KC14	33-44-12.03481	118-21-17.06980	141.73	1726742.437	6453806.037	259.91	Monitoring Point
KC15	33-44-20.39887	118-21-25.21556	168.95	1727590.405	6453121.056	287.13	Monitoring Point
KC16	33-44-20.55013	118-21-13.64599	208.79	1727602.241	6454098.239	326.92	Monitoring Point
PB04	33-44-21.00185	118-22-15.80022	48.96	1727666.833	6448849.065	167.37	Monitoring Point
PB06	33-44-23.73359	118-22-05.04268	59.62	1727939.647	6449758.622	177.96	Monitoring Point
PB07	33-44-25.73013	118-21-59.67029	79.57	1728139.821	6450213.087	197.88	Monitoring Point
PB08	33-44-26.36606	118-21-56.70592	75.84	1728203.196	6450463.678	194.13	Monitoring Point
PB09	33-44-26.84607	118-21-52.14581	71.30	1728250.322	6450848.978	189.58	Monitoring Point
PB12	33-44-27.02116	118-21-43.41020	68.08	1728265.356	6451586.807	186.31	Monitoring Point
PB13	33-44-24.89582	118-21-36.72798	88.87	1728048.475	6452150.384	207.09	Monitoring Point
PB18	33-44-48.41722	118-21-53.76861	245.01	1730431.470	6450719.842	363.18	Monitoring Point
PB20	33-44-31.80521	118-21-48.88662	115.76	1728750.650	6451126.046	233.99	Monitoring Point
PB21	33-44-36.72415	118-21-48.29178	154.82	1729247.729	6451178.080	273.02	Monitoring Point
PB25	33-44-40.93869	118-21-38.73837	207.93	1729670.875	6451986.415	326.07	Monitoring Point
PB26	33-44-39.64389	118-21-35.58556	164.81	1729539.028	6452252.205	282.94	Monitoring Point
PB27	33-44-36.81393	118-21-40.42901	154.82	1729254.412	6451842.141	272.98	Monitoring Point
PB29	33-44-32.80027	118-21-37.40553	54.43	1728847.750	6452096.026	172.60	Monitoring Point
PB53	33-44-36.45924	118-21-53.30505	173.22	1729222.483	6450754.601	291.44	Monitoring Point
PB54	33-44-41.08474	118-21-56.94879	239.52	1729691.198	6450448.581	357.73	Monitoring Point
PB55	33-44-32.08894	118-21-52.72886	122.38	1728780.508	6450801.660	240.62	Monitoring Point
PB59	33-44-21.92351	118-22-18.03964	41.92	1727760.703	6448660.276	160.34	Monitoring Point
PB62	33-44-29.04183	118-22-05.55267	168.89	1728476.421	6449717.515	287.22	Monitoring Point
PB63	33-44-21.66828	118-21-44.58322	3.51	1727724.584	6451485.789	121.78	Monitoring Point
UB02	33-44-19.69998	118-22-00.49638	-55.35	1727530.482	6450141.095	63.00	Monitoring Point

NGS Record Positions of CORS; NAVD88 Heights fixed at PVE3 based on VTIS as established in Sept. 2007 Survey

PVE3	33-44-35.85329	118-24-15.26904	235.42	1729207.091	6438765.185	354.36	CORS, Fixed (Ortho Ht 354.36 in 2008)
PVHS	33-46-46.02015	118-22-19.74126	853.99	1742328.078	6448570.496	972.04	CORS, (Ortho Ht 972.07 in 2008)
PVRS	33-46-25.89190	118-19-14.06722	198.63	1740239.290	6464237.888	316.30	CORS, (Ortho Ht 316.31 in 2008)
VTIS	33-42-45.48958	118-17-37.71229	197.52	1717933.677	6472307.223	315.26	CORS, (Ortho Ht 315.26 in 2008)