

Survey Report
of the
Portuguese Bend Landslide Monitoring Survey
October 4, 2013 Full & April 7, 2014 Partial Monitoring
Revised May 24, 2014
for the
City of Rancho Palos Verdes
by
McGee Surveying Consulting

INDEX

Page	Subject
2	PROJECT OVERVIEW
2	HISTORY
3	PROJECT DATUMS, REFERENCE SYSTEM
4	FIELD SURVEYS, DATA COLLECTION, EQUIPMENT & PROCESSING
5	NETWORK
6	MAPS OF GNSS NETWORK
7	MONITORING POINT HISTORY & STATUS
8	ADJUSTMENTS & ANALYSIS
9	ACCURACY
10	QAQC ANALYSIS (QUALITY CONTROL - QUALITY ASSURANCE)
10	SUMMARY
11	RECOMMENDATIONS

APPENDIX

12	CONTOURS OF HORIZONTAL MOVEMENTS
13	AERIAL PHOTO AND OBLIQUE AERIAL VIEW OF MONITORING POINTS
14	MONITORING POINT STATUS
15	COORDINATE LIST- OCTOBER 4, 2013 (NAD83 GEODETIC & GRID COORDINATES, NAVD88 HTS)
17	ADDENDUM REPORT FOR THE APRIL 7, 2014 PARTIAL MONITORING SURVEY

ATTACHMENT: PORTUGUESE BEND LANDSLIDE MONITORING - MOVEMENT DATA POSTING
(Monitoring points: periodic and overall movements)

Survey Report
of the
Portuguese Bend Landslide Monitoring Survey
October 4, 2013 Full Monitoring
(See Page 17 for the April 7, 2014 Partial Monitoring)
Revised May 24, 2014
for the
City of Rancho Palos Verdes
by
McGee Surveying Consulting

PROJECT OVERVIEW:

McGee Surveying Consulting performed landslide monitoring and control surveys in October 2012 at Portuguese Bend in Los Angeles County, California on behalf of the City of Rancho Palos Verdes. The survey established positions on monitoring points to determine overall and periodic movements. The results of the survey are described in this Report and on an attached spreadsheet titled "Portuguese Bend Landslide Monitoring - Movement Data Posting" hereafter referred to as "Movement Data Posting".

The field survey was planned, coordinated and executed by Michael McGee, PLS3945 of McGee Surveying Consulting who was also responsible for the final processing of the observations, network adjustments, analysis and reports. The monitoring points cover a 1½ mile square area and are measured semi-annually to determine the rate and extent of ground movement. Global Navigation Satellite System (GNSS formerly referred to as GPS) technology was used to measure positions based on the North American Datum of 1983 (NAD83) and the North American Vertical Datum of 1988 (NAVD 88). This survey is referenced to the California CGPS (Continuous GPS) Stations in the region which are permanently mounted GPS receivers used for monitoring seismic activity. The CGPS in California are similar to the national CORS (Continuously Operated Reference Stations).

Points that move a few inches or less per year are required to meet an accuracy standard of one centimeter (0.033 feet) at the 95% Level of Confidence. In the active slide area where the movements exceed 0.5 feet per year (PB and UB points in the central area), the accuracy standard is two centimeters (0.066 feet). Field procedures are designed to accomplish this purpose and Quality Control-Quality Assurance (QAQC) processes discussed hereafter are incorporated to verify these accuracies are attained.

The movements reported between September 14, 2012 and October 4, 2013 (12.7 months) statistically attained an average accuracy of 0.02 feet at the 95% Level of Confidence. The actual accuracy of measurements held to the one centimeter standard are estimated to approach 0.01 feet as demonstrated by the vector residuals, repeatability of measurements at points considered stable, and the analysis of movement deflections. Refer to the sections titled ACCURACY and QAQC ANALYSIS in this Report for more information.

HISTORY

This monitoring survey is a continuation of a 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 history of the previous survey process between 1994 and 2007. See the subsequent annual Survey Reports for details of each monitoring campaign. Beginning with the 2012 rainy season (begins in September) full monitoring continued as usual and a partial monitoring was initiated in the spring.

PROJECT DATUMS, REFERENCE SYSTEM

Horizontal Datum: North American Datum of 1983 (NAD83) established by the National Geodetic Survey (NGS); **Epoch:** 2007.00 referred to as NAD83(2007); **Units:** Feet

Reference Network: The survey is referenced to the CGPS Stations (continuously operating GNSS receivers). For more information see NGS Data Sheets for the PID's listed below (no data sheet exists for PVE3). The positions listed below were obtained in September 2007 from the California Spatial Reference Center (CSRC). The CSRC provides CA Public Resources Code sanctioned positions for 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

* Not Operational During Survey

** 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) established by the NGS.

Geoid Model: Geoid 03; note Geoid09 became available from the NGS in 2009 and Geoid12A in 2012; however, Geoid03 is retained to be consistent with prior reported heights and the primary purpose of determining relative changes over time.

Reference Network: CGPS Station VTIS is also a Second Order leveled benchmark and the original basis for the heights by this survey (see NGS Data Sheets for PID's listed above)

CGPS	NAVD88 Ht (feet)	
PVE3	none	
PVHS	972.1	Based on a Refined Geoid Model
PVRS	316.37	Based on Second Order Leveling by CSRC
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 Coordinate Parameters follow: The average Scale Factor is 1.00007543, the 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 distances divide 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 $-0-12-30\pm$ (rotate left $0-12-30$).

Datum Stability: The NAD83(2007) Epoch 2007.00 adjustment is one of a series of adjustments of NAD83 since its adoption in 1986 and is the realization 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 ITRF08 N, E, Up velocities of the CGPS Stations listed below. These CGPS Stations provide a rigid reference frame for the Portuguese Bend Landslide Monitoring Program that is validated during each monitoring campaign. See the Adjustment results on Page 9 and the September 2007 Monitoring Survey Report by McGee Surveying Consulting for additional information.

Annual Velocities in Feet Reference Epoch 2013.75			
CGPS	North	East	Up
PVE3	0.064	-0.131	-0.002
PVHS	0.063	-0.130	-0.002
PVRS	0.062	-0.129	0.001
VTIS	0.064	-0.130	0.000

FIELD SURVEYS, DATA COLLECTION, EQUIPMENT & PROCESSING

Three Leica geodetic GNSS receivers/antennas listed below were mounted on two meter fixed height poles to collect and store satellite signal data. The GS15 receivers tracked Navstar GPS and GLONASS satellites. Prior to initiating the field observations a calibration of the fixed height poles was conducted with a theodolite to verify their heights 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.

Sixty-five monitoring points were occupied and reported in this survey. Site photographs and recovery sheets detailing the location, character of the monuments and obstructions were updated. See the Appendix for "Monitoring Point Status for 2014. Monument AB61, established in September 2007 on Portuguese Bend, is used as the primary base station because it sits on a stable basalt formation. AB61ECC serves as a reference to AB61. AB20 serves as a secondary base for the survey.

The field survey commenced each day by setting a Leica GS15 GNSS receiver on a fixed height pole on AB61 and AB20 while a third GS15 GNSS receiver roamed freely collecting observations on a fixed height pole at the other 63 points. All points were measured with two independent occupations resulting in four measured vectors to each point from AB61 and AB20. On each day over a six day period, vectors based on 4-11 hours of observations connected AB61, AB20 and the CGPS stations. Sixteen points, in the active areas, with annual movements greater than 0.3' (PB and UB areas) were single occupied. A linear comparison was made with movements from prior years to verify their accuracy met the 0.07 foot (2 cm) requirement. All other points were occupied twice under a different constellation of satellites on a different day. If the two measurements were within 0.03 feet (1 cm) horizontally they were accepted, otherwise a third measurement was obtained.

Many of the points are over-shadowed by mature trees and shrubberies which interfere with signals received from satellites and affect the quality of measurements. To obtain the best possible accuracies, the satellite constellation is compared with obstruction diagrams to estimate the best time for observing un-obstructed satellites. Satellites obstructed by foliage and trees are either turned off during the observation or noted for removal in post-processing. If six or more un-obstructed satellites with a GDOP (measure of the geometry of the constellation) of 4 or less are available, then the measurement commenced for a minimum of 15 minutes of data collection. If the geometry and number of satellites are insufficient then the receiver was moved to the next point and returned later when satellite availability improved.

Date of Survey: 10/01/13 to 10/06/13 (mean date 10/04/2013) between 0600-1800 PDST (+7 hrs for UTC).

GNSS Survey Parameters:

Constellation: 30 US NAVSTAR GPS satellites and 23 Russian GLONASS satellites.

Observables: GPS L1 & L2 Carrier Waves and Codes; GLONASS L1 & L2

Epoch Rate & Occupation Times: 10 seconds for 15 minutes and 4-11 hours for base stations

Satellites: 12-17; GDOP < 2.2; Elevation Mask for Data Collection 10° and Processing: 15°

Ephemeris: Rapid for Static Post-Processing for CGPS connections and Broadcast for onsite.

Weather: Generally clear skies, temperature 63°-91° F.

Space Weather: Boulder K Index was 1-3 except it reached 5 in the afternoon of 10/02/13 (gauges ionospheric activity on a scale of 0-9, <5 preferred).

Equipment:

GNSS Base Receiver Unit No.: M5, Operator: M. McGee, PLS; Station Occupied: AB61 (Base1)

Make & Model: Leica GS15; Antenna Leica GS15; Mount: Fixed Height Pole #1; Antenna Height: 1.803m

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

Make & Model: Leica GS15; Antenna Leica GS15; Mount: Fixed Height Pole #3; Antenna Height: 1.800m

GNSS Rover Receiver Unit No.: M7, Operator: M. McGee, PLS, Station Occupied: AB20 (Base2)

Make & Model: Leica GS15; Antenna Leica GS15; Mount: Fixed Height Pole #2; Antenna Height: 1.803m

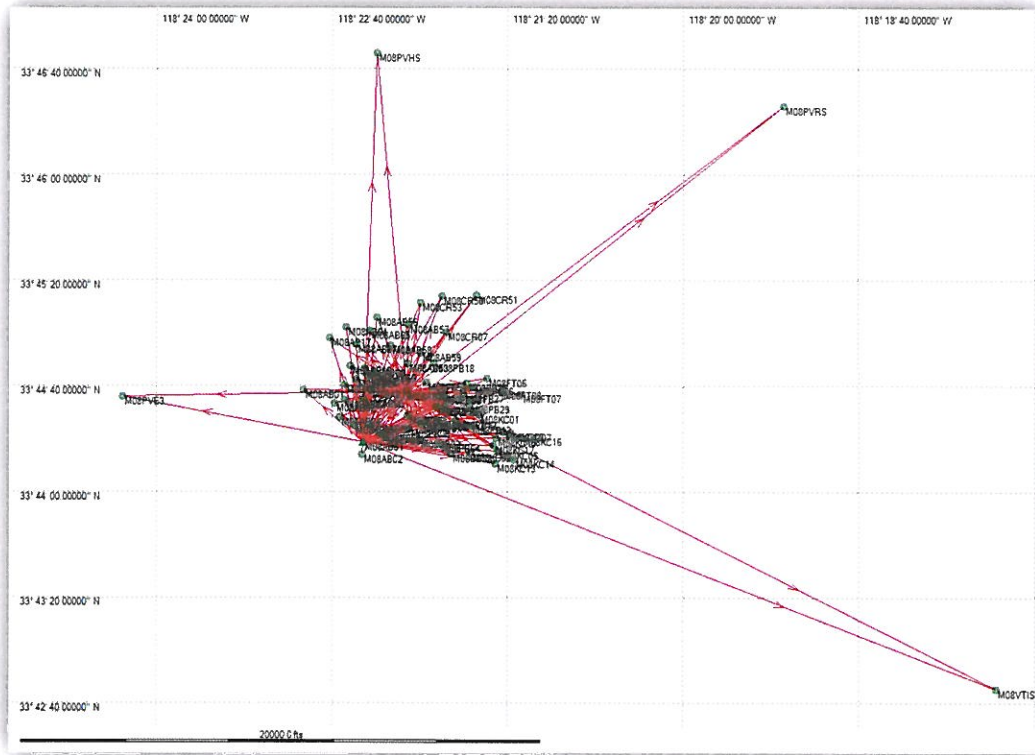
Vectors were processed using Leica LGO v8.1 post processing software. Analysis of residuals led to the rejection of 3 out of 50 vectors connecting the CGPS Stations to AB61 and AB20, and 10 out of 226 vectors connecting monitoring points. Network adjustments and analysis were performed with "Starnet-PRO" version 7.2.0.21 software. Rinex files of the satellite measurements for the CGPS Stations were downloaded from the SOPAC website. The Rapid Ephemeris and Absolute Antenna Models were downloaded from the NGS website.

NETWORK

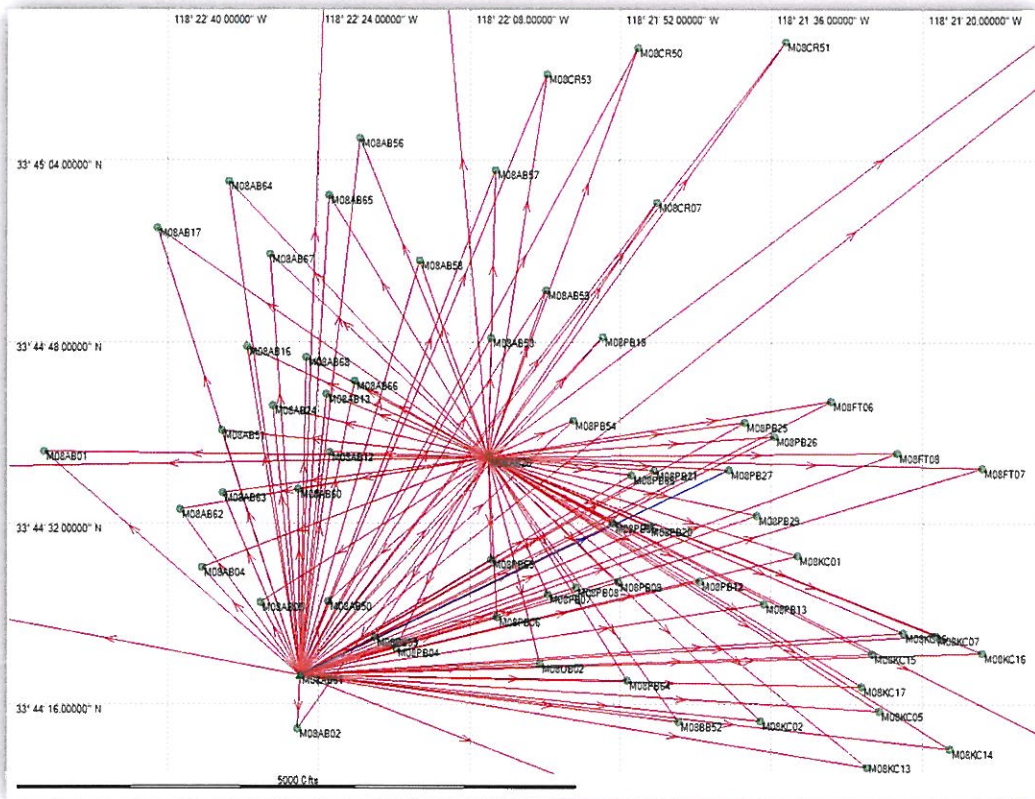
AB61, the primary Base Station, sits on Portuguese Bend and is the focal point of the static network connecting the monitoring points and CGPS Stations. AB20, the secondary Base Station is centrally located sitting on top of a high bluff overlooking Portuguese Bend. Sixty-five points and four CGPS Stations were connected with 263 redundant vectors. See the following Network Maps and the Aerial View in the Appendix.

The monitoring plan uses the CGPS Stations to verify the stability of the reference frame. The primary CGPS Station used to control this survey is PVE3 located just south of City Hall and 1.8 miles west-northwest of the Base Station AB61. CGPS Station PVHS is 2.8 miles north, PVRS is 3.9 miles northeast, and VTIS is 4.9 miles east-southeast of AB61, as shown on the Network diagram, are used to validate the stability of the network.

Monitoring Network with CGPS Stations (north up)



Monitoring Network (north up)



MONITORING POINT HISTORY and STATUS

For data management purposes during the field survey and data processing, the point names were prefixed with "M08" to distinguish between the different monitoring surveys i.e. AB61 was named M08AB61. M08 indicates this survey is the 8th monitoring since the initial September 2007 Monitoring Survey. The prefix is stripped in the COORDINATES LIST and MOVEMENT DATA POSTING.

Between 1994 and 2006, 149 monitoring points were established to monitor the Portuguese Bend Landslides, many of which were 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 points better suited for GNSS satellite measurements leaving 52 points monitored and reported 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 satellite observations. Eighteen new points were set in 2007 and had their movements reported for the first time in the following December 2008 survey. Therefore, in December 2008, 49 original and 18 new points were surveyed for a total of 67 monitoring points.

In the September 2007 Report, it was noted that KC01 was previously reported by others on 9/14/2006 to have moved N 29°E 1.24' from its 12/9/2005 position. In the 2008 survey, a buried partially illegible brass cap in concrete stamped "COUNTY ENGINEER RE8869 1956 STA ??IELDS" was found S31°29'W 1.48 feet from the 1" IP was used in the initial September 2007 and subsequent surveys. The original 1994 position of KC01 was re-referenced to the 1" IP, resulting in correct overall reported movements.

In the December 2008 Report, it was noted that AB05 had been 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 movement and historic data made it possible to estimate the disturbance to within 0.05'. The original 1995 position of AB05 was re-referenced S14°02'E 0.29' to be consistent with the disturbed position, resulting in correct overall reported movements.

In 2009, PB64 was set east of the Archery Range to replace PB63 (set 2007) which had become unsafe to access and was lost in 2010.

In 2010, points AB03 and BB25 were discontinued. AB03 is on the edge of a cliff 192 feet west-southwest of AB61 making it redundant, and BB25 is on an unstable rock disturbed by wave action. In the summer of 2010, PB62 was destroyed by road construction. In October 2010, PB65 was set 24' south-southwest of PB62 and reported for the first time in October 2011. The following points may have been disturbed prior to the October 2010 survey. AB05 appears to have been disturbed by mower machinery, AB15 (½" GIP in a meter box) is being driven over by vehicles occasionally accessing an adjacent field, and KC02 (½" GIP in a meter box) is occasionally parked on by vehicles accessing the beach.

In October 2011, new points AB62 and AB63 (initially referred to as AB62R and AB63R) were set to replace AB06 and AB07 which were hazardous to occupy due to their location near the traveled way of Palos Verde Drive South.

Prior to initiating the September 2012 survey, eight new monuments AB64, AB65, AB66, AB67, AB68, CR53, KC17 and PB66 were constructed to replace AB54, AB18, AB52, AB55, AB15, CR52, KC04 and PB53 respectively. The monuments were replaced because of poor sky visibility except for KC04 which was difficult to access and AB55 which was destroyed by trenching in the past year. Monuments were set with the following design. Monuments set in soil are 1" x 5' GIP driven flush with a 6" PVC pipe sitting on a concrete collar down about 18". Monuments set in asphalt are 1/2" x 2' rebar driven below the surface inside a free floating concrete collar.

In September 2012 points AB15, AB18, AB52, AB54, CR52, KC04 and PB53 were surveyed for the last time and discontinued in October 2013. In April 2014 point PB64 was surveyed for the last time and PB67 (a 5' t-bar steel post driven 3' into the ground) was set as a replacement about 300' northerly to be reported in the fall 2014 survey. See the "Monitoring Point Status for 2014 Prepared December 17, 2013" for the present status of monitoring points in the Appendix.

ADJUSTMENTS & ANALYSIS

Adjustment 1: Minimally Constrained Adjustment processed to develop NAD83 (2007) 2007.00 Epoch Geodetic, Ellipsoid and State Plane Coordinates.

Fixed Control: CGPS Station PVE3 was fixed at its published NAD83 (2007) position in a Minimally Constrained Adjustment to determine positions and verify its stability relative to other CGPS stations. PVE3 is located 2 miles west of and outside the influence of the slide area. 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 since 2007. The primary base station AB61 and three other CGPS Stations were measured relative to PVE3 and used to assess stability of the survey reference frame. The positions are based on 4 to 11 hour measurements collected on six consecutive days. The coordinate differences at the CGPS Stations from previous positions to the present are listed below in feet.

09/2012 Positions to 10/2013					9/2007 Positions to 09/2012				
Station	dN	dE	dZ		Station	dN	dE	dZ	
PVE3	0.000	0.000	0.000	< Fixed >	PVE3	0.000	0.000	0.000	
PVHS*	0.002	0.000	0.005						
PVRS	0.003	0.008	-0.052		PVRS	-0.003	0.013	0.039	
VTIS	0.004	0.007	-0.069		VTIS	-0.009	0.004	0.012	
AB61	-0.007	0.002	-0.034		<Base Station>	AB61	-0.011	0.006	-0.015
AB17	0.005	-0.012	0.013						
KC16	0.008	0.009	0.014						

* The position for PVHS is from November 2009.

The following is noted: (1) the two dimensional (2D) differences in the measured positions of the September 14, 2012 and October 4, 2013 of the three CGPS Stations range 0.002 to 0.008 feet and 0.007 feet at AB61; (2) the 2D differences of the CGPS Stations from the initial 2007 survey to the September 2012 survey range 0.010 to 0.013 feet and 0.012 feet at AB61; and (3) points AB17 and KC16 have a stable history when comparing their 2007 positions with this survey indicating a repeatability of approximately 0.01 feet as listed in the attached "MOVEMENT DATA POSTING". The vertical components are within 0.014 feet.

The vertical differences at PVRS and VTIS are larger than expected; however, AB17 and KC16 checks 0.014 feet indicating the vertical reference frame has been recovered on site. Equipment changes have occurred at the CGPS stations in the last year and may have contributed to the differences noted. At the next monitoring this issue will be investigated further.

The survey reference frame is deemed stable and successfully recovered at the level of 0.01 feet horizontally by 0.02 feet vertically as indicated. An adjustment constrained to the CGPS Stations is not preferred or necessary because the purpose here is to track their positions over time to test the stability of the reference frame. See the "COORDINATE LIST – October 4, 2013" in the Appendix for a list of coordinates resulting from this adjustment. See prior Survey Reports for coordinates resulting from earlier surveys.

Adjustment 2: Minimally Constrained Adjustment to develop Orthometric Heights (Elevations) in NAVD88
Fixed Control: The CGPS Station PVE3 was fixed horizontally and vertically at its NAVD88 orthometric height determined in the September 2007 survey. The 2007 height was based on the published 2nd Order NAVD88 Height of CGPS Station VTIS. This 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 the other CGPS Stations and the monitoring points. The differences for the CGPS stations from the previous survey to the heights determined in the present survey are listed below in feet.

09/2012 to 10/2013			10/2011 to 09/2012		
PVE3	-0.000	Fixed	PVE3	0.000	Fixed
PVHS	0.005				
PVRS	-0.052		PVRS	0.015	
VTIS	-0.069		VTIS	-0.005	

Note: As noted above the vertical differences at PVRS and VTIS will be investigated in the next monitoring; however, the differences at AB17 and KC16 verify the accuracy on site is at the level of 0.014 feet. See the "COORDINATE LIST – October 4, 2013" Survey" in the Appendix for a list of heights resulting from this survey.

ACCURACY

These surveys conform 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).

Vectors & Residuals: The number of vectors, vector lengths, two dimensional residuals and the absolute value of the vertical residuals resulting from Adjustment #1 are listed below in feet.

Network	No.	Vector Lengths		Two Dimensional Residuals			Vertical Residuals (absolute)		
		Vary	Average	Average	Std.Dev.	Maximum	Average	Std.Dev.	Range
Monitoring	216	479-7182	3168	0.008	0.005	0.029	0.013	0.013	-0.09 to +0.05
CGPS	47	9397-26102	18031	0.011	0.007	0.029	0.031	0.022	-0.09 to +0.07

Local Accuracy: The precisions and accuracy of vectors resulting from the minimally constrained adjustment at the 95% Level of Confidence are listed below in feet.

Network	PPM Precisions		Relative Distance Error		
	Average		Average	Maximum	Av. Precision
Monitoring	8.5 ppm		0.019	0.066	1: 167,000
CGPS	0.4 ppm		0.005	0.007	1:3,606,000

The precision ratio, based on the averages for all vectors connecting the Monitoring Points, exceeds the criteria for a First Order (C-1) by a factor of 1.7. The precision ratio for vectors connecting AB61, AB20 and the CGPS Stations exceeds the criteria for a B Order survey by a factor of 3.6 per the FGCS requirements for the former classification system.

Coordinate Accuracy: The Standard Deviations (68% Level of Confidence) of 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
Average Standard Deviation	0.008	0.008	0.036	0.003	0.003	0.010
Maximum Standard Deviation	0.021	0.024	0.101	0.003	0.004	0.012

Network Accuracy: The network accuracy (absolute 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 of 1988 orthometric heights resulting from Adjustment #2 are derived from the difference in ellipsoid heights combined with the Geoid 03 model and constrained to the height of PVE3 determined in 2007. The measured ellipsoid heights relative to PVE3 are expected to be less than 0.04 feet but may be greater at obstructed sites. The absolute accuracy of the heights relative to the datum is dependent on the published value on the CGPS Station VTIS.

Although relative elevation accuracies can be within 0.03 feet, up until October 2011 there were no requirements for vertical accuracies. In October 2011, a preference of 0.03 foot relative vertical accuracy was instigated for the following points: AB17, AB57, CR07, CR50 and CR51. In the September 2012 and subsequent surveys the criteria has been extended to all points.

Movement Accuracy: For this period, 49 points moved less than 0.30 feet with an average of 0.05 feet. The relative error at the 95% Level of Confidence averaged 0.020 feet with a standard deviation of 0.008 feet and a range of 0.005 to 0.054 feet. Overall, the estimated relative movement error averaged 0.022 feet with a standard deviation of 0.009 feet and a range of 0.005 to 0.054 feet. No movement is considered detected unless the movement exceeds the 95% Error for individual points. See Page 8 of the attached “MOVEMENT DATA POSTING” for the estimated relative movement errors at the 95% Level of Confidence for individual points for the period.

QUALITY CONTROL - QUALITY ASSURANCE (QAQC) ANALYSIS

To ensure the accuracy and validity of the measurement systems used in these GNSS monitoring 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. Comparing the results of the GNSS systems with conventional instrumentation found horizontal measurements agreed 0.01 feet on average. In November of 2011 the GNSS instruments and fixed height poles used in this survey were calibrated on the Santa Maria National Geodetic Survey Baseline and found to agree with published distances 0.003 to 0.006 feet.

To validate the radial survey method used in these surveys to position points from base stations AB61 and AB20, independent GNSS cross connections were measured and compared with the stand alone computed inverse distances in the 2007, 2008 and 2009 surveys. The results found the two dimensional accuracy to agree 0.01 feet on average, indicating the radial method of measurements is reliable and the additional labor cost of measuring cross connection between points is not warranted. See the “QAQC ANALYSIS” section of the September 2007 and the December 2008 Monitoring Survey Reports for detailed analysis.

Deflection Analysis is a method established by this surveyor to assess the consistency of the direction of movements reported from period to period. Assuming that movements are generally linear for points moving less than a ½ foot, the separation or the deflection between the direction of the previous and present periods taken over the moved distance implies the accuracy obtained with the equipment, methods and procedures. Analysis of individual deflections indicates that for points with multiple occupations the separations varied 0.01 to 0.02 feet.

SUMMARY

Prior to September 2007, successive coordinate differences were used to compute movements which did not provide statistical information about the relative movement accuracies. Beginning with the initial 2007 survey, field and office procedures were designed to assure the accuracy and reliability of measurements and provide for queries between epochs that include statistical information about the relative precisions of the reported movements. Thereafter, measurement of temporal movements are based on a rigorous simultaneous least squares adjustment of multiple observations at two different epochs for each point.

The results of the September 14, 2012 to October 4, 2013 monitoring period indicates the relative accuracy of the reported movements average 0.022 feet at the 95% Level of Confidence. Statistically, the probability at the 95% level of confidence is that movement (signal) has occurred at a point when the horizontal distance between two epochs is greater than the 95% Error (noise). See the “Movement Data Posting” for a listing of the 95% Error estimates (range 0.005 to 0.054 feet). Applying this criteria, 17 points have not moved.

Between September 14, 2012 and October 4, 2013 (12.7 months), the differences reported in the Portuguese Bend Landslide (PB points) were 0.10 to 25.81 feet; in the Abalone Cove Landslide (AB points) west of the Portuguese Bend Landslide were 0.01 to 0.10 feet; and in the Klondike Canyon (KC points) east of the Portuguese Bend Landslide were 0.01 and 0.09 feet. See the Contours of Horizontal Movement in the Appendix for a graphical representation of the movements across the site.

See the attached "MOVEMENT 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 (90° East, 180° South, 270° West). The overall movements are from the beginning position of each point which varies between 1994 and 2012.

The present listing and status of monitored points is provided in the Appendix under "Monitoring Point Status for 2014 Prepared 12/17/2013". 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 as an electronic file to the 2007 Report.

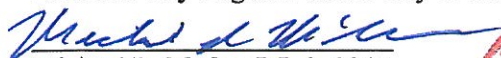
RECOMMENDATION

An ongoing re-location program for monuments has long term benefits resulting in better accuracy lower cost surveys due to improved sky visibility for tracking satellites. In this October 2013 survey, no monuments were re-located. Points AB16, AB24 and AB58 are becoming increasingly blocked by trees and should be considered for deletion or re-location in 2014. PB64 is in a precarious location and may not be accessible in 2014. In 2011, a program was proposed to set or replace monitoring points with deep set monuments (as much as 10 feet) to better detect sub-surface movements.

Attachment: The document "PORTUGUESE BEND LANDSLIDE MONITORING - MOVEMENT DATA POSTING" is attached to this Report and lists the coordinates, overall and periodic movements of monitoring point since 2007.

SURVEYOR'S STATEMENT

This Report on the criteria, procedures and results of the October 4, 2013 City of Rancho Palos Verdes Portuguese Landslide Monitoring Survey was prepared by me March 12, 2014 at the request of Ron Dragoo, Assistant City Engineer of the City of Rancho Palos Verdes.


Michael R. McGee P.L.S. 3945

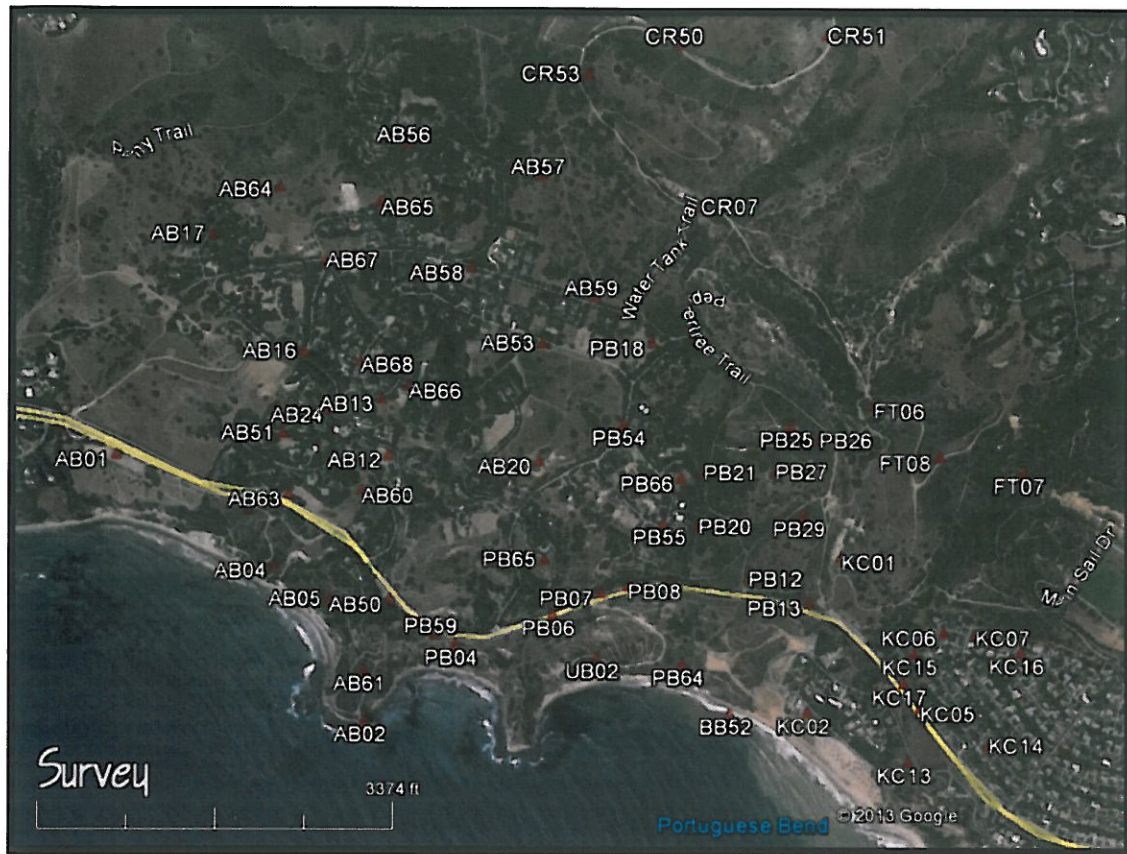


APPENDIX

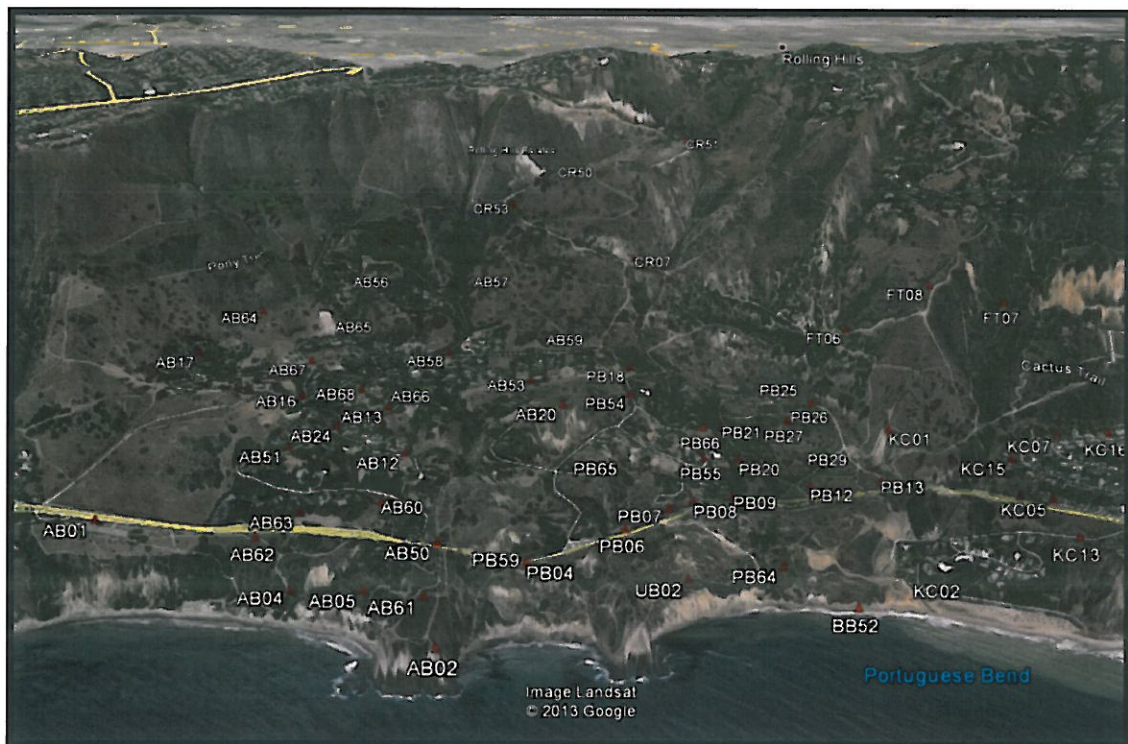
- 12 Contours of Horizontal Movements
- 13 Aerial Photo and Oblique Aerial View of Monitoring Points
- 14 Monitoring Point Status
- 15 Coordinate List- Sept. 14, 2012 Survey NAD83(2007) Geodetic, Grid Coordinates, NAVD88
- 17 Addendum Report for the April 7, 2014 Partial Monitoring Survey



Aerial View of Monitoring Points – (Photography Dated 04/16/2013) (north up)



Oblique Aerial View of Monitoring Points (looking north)



McGEE SURVEYING CONSULTING

RANCHO PALOS VERDES - PORTUGUESE BEND LAND SLIDE							
Monitoring Point Status for 2014 Prepared 12/17/2013 Revised 05/10/2014							
Prepared By MCGEE SURVEYING CONSULTING							
Notes:	162+/- Monitoring Points established since 1994						
09/01/07	71 Points Surveyed 60 old points found with 52 monitored plus 19 new points						
12/01/08	67 Points Surveyed AB09, KC11, PB51 discontinued; BB53 destroyed; AB05 disturbed						
11/01/09	68 Points Surveyed Set PB64 to replace PB63 destroyed subsequently						
10/01/10	65 Points Surveyed Discontinued AB03, BB25; set PB65 to replace PB62 destroyed by paving						
10/03/11	69 Points Surveyed; Set AB62 & AB63 to replace AB06 & AB07						
09/14/12	72 Points Surveyed; Discontinued AB06, AB07; AB55 destroyed by trenching; Added 8 new points						
10/06/13	65 Points Surveyed; Discontinued AB15, AB18, AB52, AB54, CR52, KC04, PB53						
04/07/14	27 Points Surveyed; 65 to survey in Sept. 2014						
Pt ID	Last Obs'd	Comments	GNSS	Pt ID	Last Obs'd	Comments	GNSS
AB01	10/4/2013	Base 1994-2006	G	FT07	9/14/2012		G
AB02	10/4/2013		G	FT08	9/14/2012		G
AB04	10/4/2013		G				
AB05	10/4/2013		G	KC01	9/14/2012	NE'ly of 2 pipes 1.5' apart	G
AB12	10/4/2013		G	KC02	9/14/2012		G
AB13	10/4/2013		F	KC05	9/14/2012		G
AB16	10/4/2013		P	KC06	9/14/2012		G
AB17	10/4/2013		P	KC07	9/14/2012		G
AB20	10/4/2013	NE'ly of 2 pipes	G	KC13	9/14/2012		G
AB24	10/4/2013		F	KC14	9/14/2012		G
AB50	10/4/2013		G	KC15	9/14/2012		F
AB51	10/4/2013		G	KC16	9/14/2012		G
AB53	10/4/2013		F	KC17	9/14/2012	Replaced KC04	G
AB56	10/4/2013		F				
AB57	10/4/2013		G	PB04	9/14/2012		G
AB58	10/4/2013		P	PB06	9/14/2012		G
AB59	10/4/2013		G	PB07	9/14/2012		G
AB60	10/4/2013		G	PB08	9/14/2012		G
AB61	10/4/2013	BASE since 2007	G	PB09	9/14/2012		G
AB62	10/4/2013	Replaced AB06	G	PB12	9/14/2012		G
AB63	10/4/2013	Replaced AB07	G	PB13	9/14/2012		G
AB64	10/4/2013	Replaced AB54	G	PB18	9/14/2012		G
AB65	10/4/2013	Replaced AB18	G	PB20	9/14/2012	S'ly of 2 pipes 5.3' apart	G
AB66	10/4/2013	Replaced AB52	G	PB21	9/14/2012		F
AB67	10/4/2013	Replaced AB55	G	PB25	9/14/2012		G
AB68	10/4/2013	Replaced AB15	G	PB26	9/14/2012		F
				PB27	9/14/2012		G
BB52	10/4/2013		G	PB29	9/14/2012		G
				PB54	9/14/2012		F
CR07	10/4/2013		F	PB55	9/14/2012		P
CR50	10/4/2013		G	PB59	9/14/2012		G
CR51	10/4/2013		G	PB64	9/14/2012	Replaced PB63	G
CR53	10/4/2013	Replaced CR52	F	PB65	9/14/2012	Replaced PB62	G
				PB66	9/14/2012	Replaced PB53	G
FT06	9/14/2012		G	PB67	4/07/2014	Replaced PB64	G
				UB02	9/14/2012		G
GNSS column indicates site is Good, Fair or Poor for Satellite Visibility Conditions							

McGEE SURVEYING CONSULTING

October 4, 2013 COORDINATE LIST

Portuguese Bend Landslide 10/04/2013 Monitoring Survey

Prepared by McGee Surveying Consulting; Document Date: 12/31/2013

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 2007 and subsequent Survey Reports

Point	Latitude	Longitude	EH (ft)	North (ft)	East (ft)	OrthoHt(ft)	Description
AB01	33-44-38.30259	118-22-53.05136	60.026	1729427.558	6445709.599	178.508	Punched 1/2" GIP in meter box
AB02	33-44-13.84895	118-22-26.19236	-2.043	1726946.991	6447968.691	116.451	4" BC "SAN PEDRO 1936" on conc. block
AB04	33-44-28.09131	118-22-36.28705	-51.297	1728389.950	6447121.505	67.161	BC "CO ENG STA Q2.." on 2"GIP in mass of conc.
AB05	33-44-24.99009	118-22-30.09092	-37.986	1728074.488	6447643.627	80.460	BC "CO ENG STA Q3.." on 2"GIP in mass of conc.
AB12	33-44-38.27525	118-22-22.72074	164.818	1729415.182	6448271.061	283.163	BC "CO ENG STA 7A.." in mass of conc.
AB13	33-44-43.34544	118-22-23.16096	246.136	1729927.871	6448235.786	364.458	Punched 1/2" GIP in meter box
AB16	33-44-47.57963	118-22-31.51214	258.054	1730358.536	6447532.125	376.390	Punched 1/2" GIP in meter box
AB17	33-44-58.06061	118-22-41.08444	324.479	1731421.097	6446727.738	442.813	Punched 1/2" GIP in meter box
AB20	33-44-37.77509	118-22-05.96599	277.932	1729359.403	6449685.844	396.204	BC "CO ENG STA W. FIX 1956.." in mass of conc.
AB24	33-44-42.35402	118-22-28.79489	217.374	1729829.417	6447759.626	335.726	Cotton spindle in conc. In road
AB50	33-44-25.11149	118-22-22.94503	63.585	1728084.514	6448247.181	182.004	Nail & shiner in conc. collar of well
AB51	33-44-40.23009	118-22-34.15156	186.760	1729616.396	6447306.449	305.143	PK mag nail in plastic plug "LS6957" in 1"GIP
AB53	33-44-48.36836	118-22-05.69991	234.643	1730430.205	6449712.238	352.864	Chisled + on s edge conc. Vault
AB56	33-45-05.97007	118-22-19.59279	453.344	1732213.899	6448545.587	571.551	6" mag nail & washer in conc. in 2"x 36" GIP
AB57	33-45-03.17045	118-22-05.20535	446.619	1731926.409	6449759.483	564.775	6" mag nail & washer in conc. in 2"x 36" GIP
AB58	33-44-55.14435	118-22-13.27646	287.451	1731117.547	6449074.930	405.675	Punched RR spike on s side road
AB59	33-44-52.54120	118-21-59.79442	316.047	1730850.218	6450212.489	434.224	6" mag nail & washer in conc. in 2"x 36" GIP
AB60	33-44-35.04157	118-22-26.06506	60.958	1729089.336	6447987.412	179.334	6" mag nail & washer in conc. in 2"x 28" GIP
AB61	33-44-18.57302	118-22-25.95795	21.949	1727424.479	6447990.265	140.417	6" mag nail & washer in conc. in 2"x 24" GIP
AB62	33-44-33.23091	118-22-38.63194	24.541	1728910.260	6446925.419	142.980	6" mag nail & washer in conc. in 1"x 24" GIP
AB63	33-44-34.71851	118-22-34.12071	62.378	1729059.215	6447306.969	180.788	Punched 1/2 x 48" rebar
AB64	33-45-02.13640	118-22-33.46078	413.929	1731830.707	6447373.068	532.210	2" mag nail on NE side 2' conc. Collar/Well B12
AB65	33-45-00.93224	118-22-22.90399	340.295	1731705.657	6448264.086	458.537	2" mag nail & washer in conc. in 1"x 60" GIP
AB66	33-44-44.53549	118-22-20.14982	255.988	1730047.231	6448490.524	374.291	1/2" x 24" punched rebar 1" below AC conc. collar
AB67	33-44-55.71720	118-22-29.06604	287.023	1731180.399	6447741.764	405.314	1/2" x 24" punched rebar 1" below AC conc. collar
AB68	33-44-46.61271	118-22-25.31203	275.086	1730258.837	6448055.357	393.402	1/2" x 24" punched rebar 1" below AC conc. collar
BB52	33-44-14.45583	118-21-45.75365	-114.397	1726995.826	6451384.308	3.910	PK mag nail in drill hole top large rock mass
CR07	33-45-00.26946	118-21-48.09440	514.017	1731627.887	6451203.354	632.113	6" mag nail & washer in conc. in old 1" IP
CR50	33-45-13.97065	118-21-50.11933	754.585	1733013.572	6451037.372	872.641	Tack & shiner on lower rock wall
CR51	33-45-14.49678	118-21-34.43617	858.176	1733061.993	6452361.877	976.169	Tack & shiner on conc pad
CR53	33-45-11.63376	118-21-59.73918	662.624	1732780.286	6450224.193	780.726	2" mag nail & washer in conc. in 1"x 60" GIP
FT06	33-44-42.78600	118-21-29.58547	370.560	1729854.857	6452760.053	488.645	6" mag nail & washer in conc. in 2"x 36" GIP
FT07	33-44-36.87084	118-21-13.65881	470.587	1729252.123	6454102.963	588.630	6" mag nail & washer in conc. in 2"x 36" GIP
FT08	33-44-38.19522	118-21-22.57420	540.338	1729388.666	6453350.514	658.413	6" mag nail & washer in conc. in 2"x 36" GIP
KC01	33-44-29.13405	118-21-33.10831	194.108	1728475.829	6452457.616	312.284	6" mag nail & washer in conc. in old 1" IP
KC02	33-44-14.54770	118-21-37.05703	-104.564	1727002.472	6452118.844	13.704	Punched 1/2" GIP in meter box
KC05	33-44-15.37066	118-21-24.50953	109.258	1727081.886	6453178.881	227.459	Punched 1/2" GIP in meter box

McGEE SURVEYING CONSULTING

KC06	33-44-22.33196	118-21-21.96583	181.699	1727784.850	6453396.210	299.854	Punched 1/2" GIP in meter box
KC07	33-44-22.09041	118-21-18.55888	195.331	1727759.413	6453683.862	313.473	Punched 1/2" GIP in meter box
KC13	33-44-10.41192	118-21-25.78238	72.832	1726580.983	6453069.597	191.064	Cotton spindle in AC turnout
KC14	33-44-12.03482	118-21-17.07028	141.714	1726742.438	6453805.997	259.898	Punched spike in center road
KC15	33-44-20.39775	118-21-25.21700	168.855	1727590.293	6453120.935	287.034	Cotton spindle in cul-de-sac
KC16	33-44-20.55012	118-21-13.64593	208.756	1727602.240	6454098.244	326.884	Punched spike in intersection
KC17	33-44-17.55000	118-21-26.32410	97.038	1727302.743	6453026.409	215.236	2" mag nail & washer in conc. in 1"x 50" GIP
PB04	33-44-20.97817	118-22-15.80728	48.245	1727664.441	6448848.460	166.654	Nail & tag "RCE26120" in conc. in 3" pipe
PB06	33-44-23.68093	118-22-05.04995	58.782	1727934.326	6449757.988	177.128	Punched cap on 2" GIP
PB07	33-44-25.66517	118-21-59.68503	79.082	1728133.260	6450211.818	197.394	Brass tag "LA CO DPW" in conc. in 2" GIP
PB08	33-44-26.30674	118-21-56.71838	75.963	1728197.204	6450462.604	194.259	Punched cap on 2" GIP
PB09	33-44-26.77362	118-21-52.15057	70.310	1728242.999	6450848.549	188.583	Punched cap on 2" GIP in cable box
PB12	33-44-26.89232	118-21-43.45701	65.432	1728252.346	6451582.807	183.666	Punched cap on 2" GIP in cable box
PB13	33-44-24.81532	118-21-36.76755	88.303	1728040.349	6452147.013	206.517	Punched cap on 2" GIP in cable box
PB18	33-44-48.41035	118-21-53.76770	244.775	1730430.775	6450719.916	362.944	Punched 1/2" GIP in meter box
PB20	33-44-31.69153	118-21-48.91194	113.499	1728739.166	6451123.866	231.723	Punched cap on 2" GIP in cable box
PB21	33-44-36.64552	118-21-48.28393	153.795	1729239.778	6451178.715	271.993	Punched cap on 2" GIP in cable box
PB25	33-44-40.93188	118-21-38.74054	207.806	1729670.187	6451986.230	325.943	Punched cap on 2" GIP in cable box
PB26	33-44-39.63784	118-21-35.58676	164.765	1729538.417	6452252.102	282.894	Brass tag "LA CO DPW" in conc. in 2" GIP
PB27	33-44-36.67728	118-21-40.42470	152.661	1729240.596	6451842.455	270.825	Punched cap on 2" GIP in cable box
PB29	33-44-32.71481	118-21-37.45104	51.698	1728839.124	6452092.152	169.866	Brass tag "LA CO DPW" in conc. in 2" GIP
PB54	33-44-41.07936	118-21-56.95021	239.513	1729690.654	6450448.459	357.728	PK mag nail in plastic plug "LS6957" in 1"GIP
PB55	33-44-32.01393	118-21-52.73443	121.230	1728772.927	6450801.161	239.470	PK mag nail in plastic plug "LS6957" in 1"GIP
PB59	33-44-21.88771	118-22-18.05032	40.182	1727757.088	6448659.361	158.596	PK mag nail in plastic plug "LS?" in 1" GIP
PB64	33-44-18.13304	118-21-51.17100	-61.472	1727369.214	6450928.114	56.841	2" alum. cap "MCGEE SURVEYING.." on 1"x36"GIP
PB65	33-44-28.82032	118-22-05.66789	169.338	1728454.064	6449707.703	287.661	2" alum. cap "MCGEE SURVE.." on 5/8"x24"rebar
PB66	33-44-36.21154	118-21-50.75404	169.980	1729196.661	6450969.949	288.191	2" mag nail & washer in conc. in 1"x 60" GIP
UB02	33-44-19.55718	118-22-00.47391	-55.732	1727516.039	6450142.940	62.615	PK mag nail in plastic plug "?" in 1"GIP
PVE3	33-44-35.85329	118-24-15.26904	235.421	1729207.091	6438765.184	354.360	CGPS Pos. Fixed in 2007 and subsequent surveys
PVHS	33-46-46.02021	118-22-19.74134	854.039	1742328.084	6448570.489	972.054	CGPS Pos. Determined 10/04/2013 Survey
PVRS	33-46-25.89209	118-19-14.06711	198.583	1740239.308	6464237.897	316.290	CGPS Pos. Determined 10/04/2013 Survey
VTIS	33-42-45.48962	118-17-37.71219	197.456	1717933.681	6472307.232	315.202	CGPS Pos. Determined 10/04/2013 Survey

Portuguese Bend Landslide

April 7, 2014 Partial Monitoring Survey Addendum Report

Revised May 24, 2014

for the

City of Rancho Palos Verdes

by

McGee Surveying Consulting

Overview:

This Addendum Report describes a mid-year partial monitoring survey of a sub-set of 27 points in April 2014 at Portuguese Bend. This survey follows the procedures described in the above Report on the October 4, 2013 full monitoring. The results of this survey are reported on Page 9 of the attached spreadsheet titled "PORTUGUESE BEND LANDSLIDE MONITORING - MOVEMENT DATA POSTING" listing the coordinates, overall and periodic movements of points.

The movements reported between October 4, 2013 and April 7, 2014 (6.0 months) statistically attained an overall average accuracy of 0.02 feet at the 95% Level of Confidence as demonstrated by the measured vector residuals, repeatability of measurements at points considered stable, and the analysis of movement deflections. For a detailed history of the program and surveys see "History" above. The field survey took place April 6-9, 2014. The Field Surveys, Equipment, Data Collection and Network Design were as described in the above Report. The survey included 28 on site points and 3 CGPS Stations each connected with two to seven vectors. In April 2014 point PB64 was surveyed for the last time and PB67 (a 5' t-bar steel post driven 3' into the ground) was set as a replacement about 300' northerly to be reported in the fall 2014 survey.

The Adjustments followed the process as described in the above report with the following results.

Adjustment: Minimally Constrained Adjustment processed to develop NAD83 (2007) 2007.00 Epoch Geodetic, Ellipsoid and State Plane Coordinates in feet. CGPS Station PVE3 was fixed and the difference are listed in feet from the October 4, 2013 positions to the CGPS stations and points considered to mostly stable.

10/2013 Positions to 04/2014				
Station	dN	dE	dZ	
AB17	0.016	-0.002	0.061	
AB61	0.002	-0.002	0.023	<Base Station
CR50	0.021	-0.001	0.111	
KC16	0.001	-0.010	-0.014	
PVE3	-0.000	-0.000	-0.000	< Fixed
PVRS	-0.017	0.004	0.014	
VTIS	-0.020	0.007	0.121	

The adjustment was constrained as a standard procedure to the CGPS (continuous GPS) station PVE3 which finds CGPS stations PVRS and VTIS in agreement with the October 2013 positions at 0.02 feet. Previous surveys general have been in agreement less than 0.01 feet; however, the satellite data collected at these stations was noisy during this survey resulting in less precise solutions. SOPAC and the USGS are investigating the issue. AB61, AB17 and KC16 are historically stable and continue to be so. The survey reference frame was deemed stable and successfully recovered. The plus vertical differences at AB17, CR50 and others listed in the "MOVEMENT DATA POSTING" are unexpected; however, redundant survey measurements agree at 0.01 to 0.02 feet and all indications are the relative accuracy is 0.03 feet.

Summary of Movements: Between October 4, 2013 and April 7, 2014 (6.0 months) points in the Portuguese Bend Landslide (PB points) moved 0.03 to 16.69 feet; points in the Abalone Cove Landslide (AB points) west of the Portuguese Bend Landslide moved 0.02 to 0.04 feet; and points in the Klondike Canyon (KC points) east of the Portuguese Bend Landslide moved 0.03 and 0.16 feet.

PORTUGUESE BEND LANDSLIDE MONITORING - MOVEMENT DATA POSTING as of September 24, 2007												Page 1/9
Prepared by McGee Surveying Consulting												
MONITORING POINTS												
NAD83(2007) STATE PLANE COORDINATES & NAVD88 ELEVATIONS of Original Positions, 2007 & Post 2007 Positions												
Notes	#	Indicates stable points, not moving										
	*	Indicates no signal of horizontal movement detected in the last period at the 95% level of confidence										
	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										
	9/24/2007(1994)	Indicates the 2007 position was used for overall; see the 2011 Report for original 1994 positions										
Point	Date	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				
		North (ft)	East (ft)	Elev(ft)	North (ft)	East (ft)	Elev(ft)	North	East	Height	Azim.*	Dist.
AB01	12/1/1994	1729427.58	6445709.61	178.62	1729427.55	6445709.64	178.62	-0.03	0.03	0.00	138	0
AB02	9/24/2007(1994)	1726946.98	6447968.69	116.48	1726946.98	6447968.69	116.48					#
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	Disturbed between 2007-2008							
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	9/24/2007(1994)	1731421.12	6446727.77	442.80	1731421.12	6446727.77	442.80					
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					
AB62	11/13/2011	1728910.35	6446925.46	143.01	Replacement for AB06							
AB63	11/13/2011	1729059.30	6447307.03	180.84	Replacement for AB07							
AB64	9/14/2012	1731830.69	6447373.08	532.25	Replacement for AB54							
AB65	9/14/2012	1731705.67	6448264.07	458.53	Replacement for AB18							
AB66	9/14/2012	1730047.29	6448490.53	374.28	Replacement for AB52							
AB67	9/14/2012	1731180.41	6447741.76	405.33	Replacement for AB55							
AB68	9/14/2012	1730258.86	6448055.37	393.45	Replacement for AB15							
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	9/24/2007(1998)	1733013.62	6451037.38	872.66	1733013.62	6451037.38	872.66					
CR51	9/24/2007(1998)	1733062.03	6452361.86	976.25	1733062.03	6452361.86	976.25					
CR52	9/24/2007(1998)	1732867.58	6450239.32	779.63	1732867.58	6450239.32	779.63					
CR53	9/14/2012	1732780.28	6450224.19	780.72	Replacement for CR52							
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
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					
KC17	9/14/2012	1727302.76	6453026.42	215.25	Replacement for KC04							
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.

PORTUGUESE BEND LANDSLIDE MONITORING - MOVEMENT DATA POSTING as of December 10, 2008

Page 2/9

Prepared by McGee Surveying Consulting

FULL ANNUAL MONITORING

Notes:

Indicates stable points, not moving

* Indicates no signal of horizontal movement detected in the last period

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

Point	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						
	North (ft)	East (ft)	Elev(ft)	North	East	Height	Azim.*	Dist.	Note		North	East	Height	Azim.*	Dist.	95%Err	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	0.00	-0.01	-0.02	297	0.01	#		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	-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	0.02	
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	0.00	0.00	-0.01	194	0.00	#		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		-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	0.01	0.01	0.05	45	0.01			0.01	0.01	0.05	45	0.01	0.02	*
CR51	1733062.02	6452361.86	976.24	-0.01	0.00	-0.01	171	0.01			-0.01	0.00	-0.01	171	0.01	0.02	*
CR52	1732867.58	6450239.31	779.64	0.00	-0.01	0.01	258	0.01			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	-0.53	-0.38	-0.50	215	0.66	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	

PORTUGUESE BEND LANDSLIDE MONITORING - MOVEMENT DATA POSTING as of November 18, 2009

Page 3/9

Prepared by McGee Surveying Consulting

FULL ANNUAL MONITORING

Notes:

Indicates stable points, not moving

* Indicates no signal of horizontal movement detected in the last period

Point	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						
	North (ft)	East (ft)	Elev(ft)	North	East	Height	Azim.°	Dist.	Note		North	East	Height	Azim.°	Dist.	95%Err	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	0.02	#
AB02	1726946.97	6447968.68	116.460	-0.02	0.00	-0.02	198	0.02	*		-0.02	0.00	0.00	171	0.02	0.02	#
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	0.02	#
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.03	
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	0.02	*
AB17	1731421.11	6446727.77	442.800	-0.01	0.00	0.00	186	0.01	*		0.00	0.00	0.01	180	0.00	0.02	#
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	0.03	
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	0.01	
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	0.02	
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	0.02	
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	0.02	
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	0.03	
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	0.03	
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	0.03	*
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.00	#
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	0.02	
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	0.02	
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	0.02	
CR50	1733013.61	6451037.39	872.690	-0.01	0.01	0.03	118	0.01			-0.01	0.00	-0.02	162	0.02	0.02	*
CR51	1733062.01	6452361.87	976.220	-0.02	0.01	-0.03	155	0.03			-0.01	0.01	-0.02	143	0.02	0.02	*
CR52	1732867.56	6450239.31	779.730	-0.02	-0.01	0.10	217	0.02	*		-0.01	0.00	0.09	176	0.01	0.03	*
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	0.02	
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	0.02	
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	0.03	#
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.03	
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	0.02	*
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	0.02	*
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	0.02	*
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	0.03	
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	0.02	#
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.02	
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	0.03	
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	0.02	
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	0.03	
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	0.02	
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	0.03	
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	0.02	
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	0.02	
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	0.02	
PB64	1727466.29	6450946.95	72.760	Replacement for PB63													
UB02	1727527.87	6450141.46	62.920	-53.24	7.67	-4.23	172	53.79			-2.61	0.36	-0.08	172	2.64	0.02	

PORTUGUESE BEND LANDSLIDE MONITORING - MOVEMENT DATA POSTING as of October 25, 2010

Page 4/9

Prepared by McGee Surveying Consulting

FULL ANNUAL MONITORING

Notes:

* Indicates no signal of horizontal movement detected in the last period

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%Err	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	0.03	*
AB02	1726946.97	6447968.66	116.45	-0.02	-0.03	-0.03	243	0.03	*	0.00	-0.02	-0.01	270	0.02	0.02	*
AB03	Discontinued															
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	0.02	
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	0.03	
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	0.03	
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	0.03	
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	0.02	
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	0.02	
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	0.02	
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	0.03	*
AB17	1731421.10	6446727.76	442.80	-0.02	-0.01	0.00	205	0.02		-0.01	-0.01	0.00	217	0.01	0.02	*
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	0.03	
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	0.01	
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	0.02	
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	0.03	
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	0.02	
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	0.04	
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	0.03	
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	0.04	*
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	0.02	*
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	0.03	
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	0.03	
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	0.03	
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	0.03	
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	0.02	
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	0.00	*

PORTUGUESE BEND LANDSLIDE MONITORING - MOVEMENT DATA POSTING as of October 03, 2011

Page 5/9

Prepared by McGee Surveying Consulting

FULL ANNUAL MONITORING

Notes:

* Indicates no signal of horizontal movement detected in the last period

Point	Oct. 03, 2011 Positions			Overall Movements (US Feet)							Periodic (11.3 months) Movements (US Feet)						
	NAD83 SPC Zone 5 (Fe)			Original Position to Oct. 03, 2011							Oct. 25, 2010 Position to Oct. 03, 2011						
	North (ft)	East (ft)	Elev(ft)	North	East	Height	Azim.*	Dist.	Note		North	East	Height	Azim.*	Dist.	95%Err	Note
AB01	1729427.55	6445709.59	178.50	-0.04	-0.02	-0.12	213	0.04			0.02	-0.02	-0.02	313	0.02	0.03	*
AB02	1726946.97	6447968.70	116.45	-0.01	0.01	-0.03	124	0.01			0.01	0.04	0.00	81	0.04	0.02	
AB04	1728390.04	6447121.59	67.21	-1.95	-1.75	-0.36	222	2.62			-0.23	-0.20	-0.03	221	0.30	0.02	
AB05	1728074.57	6447643.73	80.49	-1.15	-1.45	-0.41	232	1.84			-0.09	-0.16	-0.04	240	0.19	0.03	
AB06	1729058.21	6446975.77	164.77	-1.53	-0.49	-0.51	198	1.60			-0.16	-0.06	-0.05	202	0.17	0.03	
AB07	1728981.13	6447357.52	159.24	-1.66	-0.89	-0.68	208	1.88			-0.15	-0.12	-0.06	218	0.19	0.04	
AB12	1729415.28	6448271.12	283.19	-1.21	-0.52	-0.24	203	1.32			-0.18	-0.08	-0.01	204	0.20	0.03	
AB13	1729927.36	6448235.79	364.50	-0.93	-0.25	-0.53	195	0.97			-0.12	-0.06	-0.03	205	0.14	0.03	
AB15	1730311.37	6448099.26	396.87	-0.72	-0.13	-0.41	190	0.73			-0.10	0.01	0.00	174	0.10	0.03	
AB16	1730358.55	6447532.15	376.44	-0.34	0.03	-0.18	175	0.34			-0.06	0.00	-0.02	185	0.06	0.03	
AB17	1731421.09	6446727.74	442.78	-0.03	-0.04	-0.02	228	0.05			-0.01	-0.03	-0.02	246	0.03	0.04	*
AB18	1731602.16	6448187.62	456.84	-0.46	0.13	-0.35	165	0.48			-0.06	0.01	0.01	173	0.06	0.03	
AB20	1729359.56	6449685.89	396.23	-1.07	-0.38	-0.20	200	1.13			-0.16	-0.06	0.00	199	0.17	0.03	
AB24	1729829.52	6447759.68	335.77	-0.84	-0.28	-0.15	198	0.88			-0.13	-0.04	0.01	200	0.13	0.02	
AB50	1728084.56	6448247.27	182.01	-0.44	-0.92	0.03	244	1.02			-0.06	-0.11	0.02	243	0.13	0.03	
AB51	1729616.46	6447306.45	305.17	-0.55	-0.09	-0.25	189	0.56			-0.10	-0.04	-0.07	200	0.11	0.03	
AB52	1730015.49	6448624.26	368.35	-0.61	-0.18	-0.26	197	0.64			-0.12	-0.04	-0.03	200	0.13	0.04	
AB53	1730430.36	6449712.24	352.87	-0.75	-0.13	-0.26	190	0.76			-0.14	-0.02	-0.04	189	0.14	0.03	
AB54	1731111.92	6447047.87	407.31	-0.02	0.01	0.00	164	0.03	*		0.00	0.01	-0.02	97	0.01	0.03	*
AB55	1731174.61	6447753.58	405.37	-0.15	0.02	-0.01	173	0.16			-0.04	0.00	-0.03	179	0.04	0.03	
AB56	1732214.00	6448545.55	571.57	-0.31	0.09	-0.08	164	0.32			-0.12	0.04	-0.06	162	0.12	0.03	
AB57	1731926.54	6449759.46	564.83	-0.37	0.09	-0.10	166	0.38			-0.14	0.03	-0.10	166	0.14	0.03	
AB58	1731117.67	6449074.94	405.64	-0.35	0.00	-0.03	179	0.35			-0.13	0.00	-0.05	178	0.13	0.04	
AB59	1730850.40	6450212.51	434.27	-0.47	-0.05	-0.10	186	0.47			-0.16	-0.01	-0.07	182	0.16	0.03	
AB60	1729089.38	6447987.45	179.39	-0.32	-0.12	-0.06	200	0.34			-0.15	-0.05	-0.03	199	0.16	0.03	
AB61	1727424.48	6447990.26	140.43	-0.02	0.00	-0.04	177	0.02	*		0.00	-0.01	-0.04	259	0.01	0.01	*
AB62	1728910.35	6446925.46	143.01	Replacement for AB06													
AB63	1729059.30	6447307.03	180.84	Replacement for AB07													
BB52	1726995.98	6451384.32	3.89	-0.38	-0.06	0.06	188	0.39			-0.15	-0.01	0.04	185	0.15	0.03	
CR07	1731628.00	6451203.34	632.26	-0.78	0.15	-1.02	169	0.79			-0.12	0.02	-0.07	171	0.12	0.03	
CR50	1733013.59	6451037.37	872.65	-0.03	-0.01	-0.01	197	0.03			0.00	-0.01	-0.02	254	0.01	0.03	*
CR51	1733062.00	6452361.87	976.18	-0.04	0.01	-0.07	164	0.04			-0.01	-0.01	0.00	216	0.01	0.03	*
CR52	1732867.53	6450239.26	779.68	-0.05	-0.06	0.05	232	0.08			-0.02	-0.05	0.02	247	0.05	0.05	
FT06	1729855.05	6452760.09	488.79	-0.55	-0.12	-0.27	192	0.57			-0.20	-0.04	-0.11	191	0.20	0.03	
FT07	1729252.33	6454103.33	588.72	-0.91	-1.42	-0.29	237	1.69			-0.43	-0.67	-0.13	238	0.79	0.03	
FT08	1729388.67	6453350.48	658.45	-0.01	-0.02	0.01	251	0.02	*		0.01	-0.03	0.02	293	0.03	0.02	*
KC01	1728475.98	6452457.69	312.35	-0.80	-0.54	-0.53	214	0.97			-0.14	-0.08	-0.03	211	0.16	0.03	
KC02	1727002.55	6452118.84	13.73	-0.34	-0.16	-0.11	205	0.38			-0.07	-0.02	0.01	199	0.07	0.03	
KC04	1727559.31	6452666.95	238.46	-0.25	-0.29	-0.38	229	0.38			-0.05	-0.06	0.02	230	0.08	0.03	
KC05	1727081.92	6453178.90	227.47	-0.08	-0.19	-0.39	248	0.21			-0.03	-0.02	0.00	210	0.04	0.03	
KC06	1727784.89	6453396.26	299.88	-0.02	-0.41	-0.47	268	0.41			0.01	-0.06	-0.01	277	0.06	0.03	
KC07	1727759.39	6453683.87	313.48	0.20	-0.05	-0.35	346	0.21			0.01	-0.01	0.01	315	0.01	0.03	*
KC13	1726581.05	6453069.58	191.13	-0.11	-0.05	-0.07	206	0.12			-0.04	-0.03	-0.05	222	0.05	0.03	
KC14	1726742.44	6453806.00	259.92	0.00	-0.05	-0.02	271	0.05			0.01	-0.02	0.02	288	0.02	0.03	*
KC15	1727590.34	6453120.97	287.06	-0.11	-0.13	-0.04	229	0.17			-0.04	-0.05	-0.04	233	0.07	0.03	
KC16	1727602.24	6454098.22	326.88	-0.01	-0.01	-0.02	233	0.02	*		0.01	-0.02	0.00	288	0.02	0.03	*
PB04	1727665.23	6448848.66	166.92	-10.71	-3.08	-3.60	196	11.14			-0.71	-0.21	-0.19	196	0.74	0.04	
PB06	1727935.82	6449758.16	177.36	-32.63	-3.68	-5.70	186	32.84			-1.44	-0.20	-0.22	188	1.45	0.04	
PB07	1728135.18	6450212.21	197.54	-40.74	-7.55	-2.67	190	41.44			-1.82	-0.37	-0.12	191	1.86	0.04	
PB08	1728199.00	6450462.93	194.19	-38.50	-6.87	0.51	190	39.11			-1.66	-0.31	0.03	191	1.69	0.04	
PB09	1728245.34	6450848.65	188.99	-43.24	-2.37	-3.53	183	43.30			-2.01	-0.13	-0.25	184	2.01	0.04	
PB12	1728257.11	6451584.30	184.73	-73.38	-20.27	-8.56	195	76.13			-3.39	-0.99	-0.57	196	3.53	0.04	
PB13	1728043.37	6452148.28	206.76	-42.60	-16.06	-3.78	201	45.53			-2.10	-0.89	-0.11	203	2.28	0.03	
PB18	1730430.95	6450719.94	363.04	-15.94	8.95	-4.54	151	18.28			-0.30	0.06	-0.06	169	0.30	0.03	
PB20	1728743.25	6451124.73	232.60	-69.51	-10.95	-10.95	189	70.37			-3.06	-0.60	-0.60	191	3.12	0.04	
PB21	1729242.22	6451178.53	272.35	-55.99	6.48	-7.67	173	56.37			-2.22	0.18	-0.25	175	2.23	0.04	
PB25	1729670.41	6451986.30	326.01	-31.90	0.65	-2.98	179	31.91			-0.27	-0.06	0.01	193	0.28	0.03	
PB26	1729538.62	6452252.15	282.96	-24.02	2.59	-2.38	174	24.16			-0.23	-0.02	-0.03	184	0.23	0.04	
PB27	1729245.47	6451842.40	271.66	-93.87	6.34	-12.76	176	94.09			-3.65	0.09	-0.51	179	3.65	0.06	
PB29	1728842.25	6452093.51	170.88	-46.69	-26.98	-15.05	210	53.93			-2.28	-1.02	-0.71	204	2.49	0.04	
PB53	1729217.92	6450754.81	290.10	-34.85	0.89	-7.65	179	34.86			-1.89	0.10	-0.57	177	1.89	0.05	
PB54	1729690.83	6450448.49	357.73	-4.07	-0.20	-0.89	183	4.08			-0.21	-0.06	0.00	197	0.22	0.03	
PB55	1728775.28	6450801.26	239.73	-37.00	-2.78	-6.60	184	37.11			-2.08	-0.19	-0.45	185	2.09	0.04	
PB59	1727758.34	6448659.68	159.21	-8.02	-1.99	-4.18	194	8.27			-1.04	-0.30	-0.48	196	1.09	0.04	
PB64	1727417.65	6450937.67	67.14	-48.64	-9.27	-5.62	191	49.51			-21.39	-4.40	-2.55	192	21.83	0.04	
PB65	1728454.34	6449707.76	287.70	-0.32	-0.06	-0.05	191	0.33			-0.32	-0.06	-0.05	191	0.33	0.03	
UB02	1727519.20	6450142.56	62.65	-61.91	8.78	-4.51	172	62.53			-3.57	0.44	-0.10	173	3.60	0.04	

PORTUGUESE BEND LANDSLIDE MONITORING - MOVEMENT DATA POSTING as of September 14, 2012															Page 6/9	
Prepared by McGee Surveying Consulting - Document Date: 09/30/2013																
Monitoring Point Movements																
FULL ANNUAL MONITORING																
Notes:																
* Indicates no signal of horizontal movement detected in the last period																
Point	Sept. 14, 2012 Positions			Overall Movements (US Feet)						Periodic (11.4 months) Movements (US Feet)						
	NAD83 SPC Zone 5 (FT)			Original Position to Sept. 14, 2012						Oct. 03, 2011 Position to Sept. 14, 2012						
	North (ft)	East (ft)	Elev(ft)	North	East	Height	Azim.*	Dist.	Year	North	East	Height	Azim.*	Dist.	95%Err Note	
AB01	1729427.54	6445709.59	178.54	-0.04	-0.02	-0.08	209	0.05	1994	-0.01	0.00	0.04	180	0.01	0.02	*
AB02	1726946.97	6447968.68	116.47	-0.01	-0.01	-0.01	221	0.01	2007	0.00	-0.02	0.02	270	0.02	0.01	*
AB04	1728389.97	6447121.52	67.21	-2.02	-1.82	-0.36	222	2.72	1994	-0.07	-0.07	-0.01	223	0.10	0.02	
AB05	1728074.51	6447643.66	80.50	-1.21	-1.51	-0.40	231	1.93	1994	-0.06	-0.06	0.01	225	0.09	0.02	
AB12	1729415.22	6448271.10	283.19	-1.27	-0.55	-0.24	203	1.38	1994	-0.06	-0.03	0.01	203	0.07	0.02	
AB13	1729927.91	6448235.78	364.47	-0.99	-0.25	-0.56	194	1.02	1994	-0.05	-0.01	-0.03	188	0.06	0.03	
AB15	1730311.31	6448099.25	396.83	-0.77	-0.13	-0.45	190	0.78	1994	-0.05	0.00	-0.04	183	0.05	0.03	
AB16	1730358.55	6447532.13	376.41	-0.33	0.01	-0.21	179	0.33	1994	0.00	-0.02	-0.03	281	0.02	0.02	*
AB17	1731421.09	6446727.75	442.80	-0.03	-0.02	0.00	219	0.04	2007	0.00	0.01	0.01	72	0.01	0.03	*
AB18	1731602.11	6448187.62	456.86	-0.52	0.13	-0.33	166	0.53	1994	-0.05	0.00	0.02	181	0.05	0.03	
AB20	1729359.49	6449685.87	396.22	-1.13	-0.39	-0.21	199	1.20	1995	-0.07	-0.02	-0.01	194	0.07	0.02	
AB24	1729829.45	6447759.65	335.75	-0.91	-0.31	-0.17	199	0.96	1997	-0.07	-0.04	-0.03	206	0.08	0.02	
AB50	1728084.54	6448247.22	182.03	-0.46	-0.96	0.05	244	1.07	1998	-0.02	-0.05	0.01	246	0.05	0.02	
AB51	1729616.41	6447306.43	305.16	-0.60	-0.11	-0.26	191	0.61	2002	-0.05	-0.02	-0.01	208	0.05	0.02	
AB52	1730015.44	6448624.25	368.33	-0.66	-0.19	-0.28	196	0.68	2002	-0.05	-0.01	-0.02	187	0.05	0.04	
AB53	1730430.28	6449712.23	352.86	-0.82	-0.14	-0.27	190	0.84	2002	-0.07	-0.01	-0.01	191	0.08	0.03	
AB54	1731111.89	6447047.88	407.38	-0.05	0.01	0.07	165	0.06	2007	-0.03	0.01	0.07	166	0.03	0.04	*
AB56	1732213.96	6448545.55	571.57	-0.35	0.09	-0.08	165	0.36	2007	-0.04	0.00	0.00	173	0.04	0.02	
AB57	1731926.47	6449759.45	564.78	-0.43	0.09	-0.15	169	0.44	2007	-0.06	-0.01	-0.04	187	0.06	0.02	
AB58	1731117.59	6449074.92	405.65	-0.43	-0.01	-0.02	181	0.43	2007	-0.08	-0.01	0.01	190	0.08	0.04	
AB59	1730850.31	6450212.50	434.26	-0.55	-0.06	-0.11	186	0.56	2007	-0.08	-0.01	-0.02	187	0.09	0.03	
AB60	1729089.34	6447987.41	179.37	-0.36	-0.16	-0.08	204	0.39	2007	-0.04	-0.04	-0.02	226	0.06	0.02	
AB61	1727424.49	6447990.26	140.45	-0.01	0.01	-0.02	145	0.01	2007	0.01	0.01	0.02	29	0.01	0.01	*
AB62	1728910.29	6446925.43	143.02	-0.06	-0.03	0.01	206	0.07	2011	-0.06	-0.03	0.01	206	0.07	0.02	
AB63	1729059.24	6447306.99	180.82	-0.06	-0.04	-0.02	214	0.07	2011	-0.06	-0.04	-0.02	214	0.07	0.02	
AB64	1731830.69	6447373.08	532.25	Replacement for AB54						2012						
AB65	1731705.67	6448264.07	458.53	Replacement for AB18						2012						
AB66	1730047.29	6448490.53	374.28	Replacement for AB52						2012						
AB67	1731180.41	6447741.76	405.33	Replacement for AB55						2012						
AB68	1730258.86	6448055.37	393.45	Replacement for AB15						2012						
BB52	1726995.94	6451384.30	3.87	-0.42	-0.08	0.04	191	0.43	2007	-0.04	-0.03	-0.02	214	0.05	0.03	
CR07	1731627.96	6451203.36	632.17	-0.82	0.17	-1.11	168	0.84	1994	-0.04	0.02	-0.09	153	0.05	0.03	
CR50	1733013.60	6451037.36	872.62	-0.02	-0.01	-0.04	218	0.02	1998	0.01	-0.01	-0.03	336	0.01	0.03	*
CR51	1733062.00	6452361.87	976.15	-0.03	0.01	-0.10	162	0.03	1998	0.01	0.00	-0.03	0	0.01	0.02	*
CR52	1732867.50	6450239.27	779.60	-0.08	-0.05	-0.03	212	0.09	1998	-0.03	0.01	-0.08	161	0.03	0.06	*
CR53	1732780.28	6450224.19	780.72	Replacement for CR52						2012						
FT06	1729854.97	6452760.07	488.72	-0.64	-0.14	-0.34	192	0.65	2007	-0.08	-0.01	-0.07	190	0.08	0.02	
FT07	1729252.18	6454103.12	588.67	-1.06	-1.63	-0.34	237	1.95	2007	-0.15	-0.21	-0.05	235	0.26	0.02	
FT08	1729388.67	6453350.49	658.44	-0.02	-0.01	-0.01	219	0.02	2007	-0.01	0.01	-0.01	122	0.01	0.02	*
KC01	1728475.91	6452457.65	312.34	-0.87	-0.58	-0.54	213	1.05	1994	-0.07	-0.03	-0.01	205	0.08	0.02	
KC02	1727002.51	6452118.83	13.73	-0.39	-0.16	-0.11	203	0.42	1995	-0.04	0.00	0.00	185	0.04	0.02	
KC04	1727559.28	6452666.96	238.43	-0.29	-0.28	-0.41	225	0.40	1995	-0.04	0.00	-0.03	178	0.04	0.02	
KC05	1727081.89	6453178.89	227.49	-0.11	-0.20	-0.37	242	0.23	1994	-0.03	-0.01	0.02	196	0.03	0.02	
KC06	1727784.85	6453396.22	299.88	-0.06	-0.45	-0.47	263	0.45	1994	-0.04	-0.04	0.00	228	0.06	0.02	
KC07	1727759.39	6453683.85	313.49	0.20	-0.06	-0.34	342	0.21	1994	0.00	-0.01	0.01	278	0.01	0.03	*
KC13	1726581.02	6453069.58	191.10	-0.14	-0.05	-0.10	201	0.15	2007	-0.03	0.00	-0.03	182	0.03	0.02	
KC14	1726742.42	6453805.98	259.91	-0.02	-0.07	-0.03	252	0.08	2007	-0.03	-0.02	-0.01	224	0.03	0.02	
KC15	1727590.32	6453120.95	287.06	-0.13	-0.14	-0.04	227	0.20	2007	-0.02	-0.02	0.00	216	0.03	0.02	
KC16	1727602.23	6454098.23	326.87	-0.01	0.00	-0.03	180	0.01	2007	0.00	0.01	-0.01	113	0.01	0.03	*
KC17	1727302.76	6453026.42	215.25	Replacement for KC04						2012						
PB04	1727664.82	6448848.57	166.81	-11.12	-3.17	-3.71	196	11.56	1994	-0.41	-0.09	-0.12	192	0.42	0.04	
PB06	1727934.92	6449758.07	177.24	-33.52	-3.77	-5.82	186	33.73	1995	-0.89	-0.09	-0.12	186	0.90	0.03	
PB07	1728134.07	6450211.98	197.49	-41.85	-7.78	-2.72	191	42.57	1995	-1.11	-0.23	-0.05	192	1.13	0.03	
PB08	1728197.95	6450462.75	194.24	-39.56	-7.05	0.56	190	40.18	1994	-1.05	-0.18	0.05	190	1.07	0.03	
PB09	1728244.01	6450848.59	188.79	-44.57	-2.44	-3.74	183	44.64	1994	-1.33	-0.07	-0.20	183	1.33	0.03	
PB12	1728254.64	6451583.54	184.21	-75.85	-21.03	-9.08	195	78.71	1994	-2.47	-0.76	-0.53	197	2.59	0.03	
PB13	1728041.82	6452147.64	206.67	-44.15	-16.70	-3.87	201	47.20	1995	-1.55	-0.64	-0.10	202	1.67	0.02	
PB18	1730430.87	6450719.92	363.01	-16.01	8.93	-4.57	151	18.33	1995	-0.07	-0.02	-0.03	197	0.08	0.03	
PB20	1728741.10	6451124.30	232.16	-71.67	-11.38	-11.38	189	72.56	1995	-2.15	-0.43	-0.44	191	2.20	0.03	
PB21	1729240.85	6451178.60	272.17	-57.37	6.55	-7.85	173	57.74	1995	-1.38	0.07	-0.18	177	1.38	0.03	
PB25	1729670.31	6451986.28	325.97	-32.00	0.63	-3.02	179	32.01	1994	-0.10	-0.02	-0.04	192	0.10	0.03	
PB26	1729538.54	6452252.11	282.93	-24.11	2.55	-2.41	174	24.24	1995	-0.09	-0.03	-0.03	202	0.09	0.04	
PB27	1729242.88	6451842.42	271.21	-96.46	6.36	-13.21	176	96.67	1995	-2.58	0.02	-0.45	180	2.58	0.06	
PB29	1728840.65	6452092.79	170.41	-48.30	-27.70	-15.52	210	55.67	1995	-1.60	-0.72	-0.48	204	1.76	0.03	
PB53	1729216.82	6450754.85	289.90	-35.95	0.93	-7.85	179	35.96	1997	-1.10	0.04	-0.20	178	1.10	0.05	
PB54	1729690.75	6450448.48	357.70	-4.15	-0.21	-0.92	183	4.15	1997	-0.07	-0.01	-0.02	191	0.08	0.02	
PB55	1728774.00	6450801.18	239.55	-38.28	-2.86	-6.78	184	38.39	1998	-1.28	-0.08	-0.18	183	1.28	0.03	
PB59	1727757.70	6448659.52	158.92	-8.66	-2.15	-4.47	194	8.93	2001	-0.64	-0.16	-0.29	194	0.66	0.03	
PB64	1727394.56	6450932.96	63.68	-71.73	-13.99	-9.08	191	73.08	2009	-23.09	-4.72	-3.46	192	23.57	0.03	
PB65	1728454.20	6449707.73	287.69	-0.47	-0.09	-0.06	191	0.47	2010	-0.14	-0.03	-0.01	191	0.14	0.02	
PB66	1729197.65	6450969.92	288.33	Replacement for PB53						2012						
UB02	1727517.18	6450142.82														

PORTUGUESE BEND LANDSLIDE MONITORING - MOVEMENT DATA POSTING as of April 18, 2013
 Prepared by McGee Surveying Consulting - Document Date: 09/30/2013 Revised 03/05/2014
 Monitoring Point Movements
 PARTIAL MID-YEAR MONITORING

Page 7/9

Notes:

* Indicates no signal of horizontal movement detected in the last period at the 95% level of confidence

Point	April 18, 2013 Positions			Overall Movements (US Feet)							Periodic (7.1 months) Movements (US Feet)						
	NAD83 SPC Zone 5 (Ft)			Original Position to April 18, 2013							Sept. 14, 2012 Position to April 18, 2013						
	North (ft)	East (ft)	Elev(ft)	North	East	Height	Azim.*	Dist.	Year		North	East	Height	Azim.*	Dist.	95%Err	Note
AB04	1728389.95	6447121.48	67.17	-2.04	-1.86	-0.40	222	2.76	1994		-0.02	-0.04	-0.04	246	0.04	0.01	
AB12	1729415.20	6448271.07	283.17	-1.29	-0.58	-0.26	204	1.41	1994		-0.02	-0.03	-0.02	232	0.03	0.01	
AB16	1730358.57	6447532.13	376.44	-0.32	0.01	-0.18	178	0.32	1994		0.01	0.00	0.02	8	0.02	0.02	*
AB17	1731421.09	6446727.75	442.78	-0.03	-0.02	-0.02	219	0.03	2007		0.00	0.00	-0.02	45	0.00	0.01	*
AB20	1729359.43	6449685.84	396.21	-1.19	-0.42	-0.22	200	1.26	1995		-0.06	-0.03	-0.01	205	0.07	0.01	
AB50	1728084.51	6448247.18	182.00	-0.49	-1.01	0.02	244	1.12	1998		-0.03	-0.04	-0.03	236	0.05	0.01	
AB59	1730850.25	6450212.49	434.24	-0.62	-0.07	-0.13	186	0.62	2007		-0.06	-0.01	-0.01	192	0.07	0.01	
AB60	1729089.33	6447987.40	179.32	-0.37	-0.17	-0.13	204	0.41	2007		-0.02	-0.01	-0.05	215	0.02	0.01	
AB61	1727424.49	6447990.26	140.41	-0.01	0.00	-0.06	135	0.01	2007		0.00	0.00	-0.04	338	0.01	0.00	*
AB65	1731705.66	6448264.06	458.53	-0.01	0.00	-0.01	194	0.01	2012		-0.01	0.00	-0.01	194	0.01	0.02	*
CR07	1731627.92	6451203.36	632.18	-0.86	0.17	-1.10	169	0.87	1994		-0.04	0.00	0.01	183	0.04	0.02	
CR50	1733013.59	6451037.36	872.66	-0.02	-0.01	0.00	214	0.03	1998		0.00	0.00	0.05	194	0.00	0.01	*
FT06	1729854.91	6452760.05	488.68	-0.70	-0.16	-0.38	193	0.72	2007		-0.06	-0.02	-0.04	201	0.07	0.01	
FT07	1729252.14	6454103.03	588.65	-1.10	-1.72	-0.36	237	2.04	2007		-0.04	-0.09	-0.02	246	0.10	0.02	
KC06	1727784.86	6453396.20	299.84	-0.05	-0.47	-0.51	264	0.47	1994		0.00	-0.02	-0.04	284	0.02	0.01	
KC07	1727759.41	6453683.87	313.46	0.22	-0.05	-0.37	346	0.23	1994		0.02	0.01	-0.02	31	0.02	0.01	
KC13	1726581.02	6453069.56	191.09	-0.14	-0.07	-0.11	208	0.16	2007		0.00	-0.02	-0.02	276	0.02	0.01	
KC16	1727602.23	6454098.23	326.88	-0.02	0.00	-0.02	188	0.02	2007		0.00	0.00	0.01	243	0.00	0.01	*
KC17	1727302.74	6453026.40	215.23	-0.02	-0.02	-0.02	229	0.03	2012		-0.02	-0.02	-0.02	229	0.03	0.01	
PB04	1727664.58	6448848.49	166.69	-11.36	-3.25	-3.83	196	11.82	1994		-0.24	-0.08	-0.12	198	0.25	0.02	
PB12	1728253.25	6451583.09	183.84	-77.23	-21.48	-9.45	196	80.17	1994		-1.39	-0.45	-0.37	198	1.46	0.01	
PB13	1728040.95	6452147.25	206.54	-45.02	-17.10	-4.00	201	48.16	1995		-0.87	-0.39	-0.13	204	0.95	0.02	
PB18	1730430.79	6450719.89	362.96	-16.09	8.89	-4.62	151	18.39	1995		-0.08	-0.03	-0.05	200	0.09	0.02	
PB26	1729538.46	6452252.09	282.90	-24.18	2.53	-2.44	174	24.32	1995		-0.07	-0.02	-0.03	197	0.08	0.01	
PB59	1727757.34	6448659.41	158.71	-9.03	-2.25	-4.68	194	9.30	2001		-0.36	-0.11	-0.21	197	0.38	0.07	
PB64	1727382.15	6450930.51	60.16	-84.14	-16.44	-12.60	191	85.73	2009		-12.41	-2.45	-3.53	191	12.65	0.02	
PB66	1729197	6450969.91	288.22	-0.64	-0.01	-0.10	181	0.64	2012		-0.64	-0.01	-0.10	181	0.64	0.01	

PORTUGUESE BEND LANDSLIDE MONITORING - MOVEMENT DATA POSTING as of October 4, 2013
 Prepared by McGee Surveying Consulting - Document Date: 12/18/2013
 Monitoring Point Movements
 FULL ANNUAL MONITORING

Page 8/9

Notes:

* Indicates no signal of horizontal movement detected in the last period at the 95% level of confidence

Point	October 4, 2013 Positions			Overall Movements (US Feet)							Periodic (12.7 months) Movements (US Feet)						
	NAD83 SPC Zone 5 (Feet)			Original Position to October 4, 2013							Sept. 14, 2012 Position to October 4, 2013						
	North (ft)	East (ft)	Elev(ft)	North	East	Height	Azim.°	Dist.	Year		North	East	Height	Azim.°	Dist.	95%Err	Note
AB01	1729427.56	6445709.60	178.51	-0.02	-0.01	-0.11	206	0.03	1994		0.02	0.01	-0.03	33	0.02	0.02	*
AB02	1726946.99	6447968.69	116.45	0.01	0.01	-0.03	34	0.01	2007		0.02	0.01	-0.02	37	0.02	0.02	*
AB04	1728389.95	6447121.51	67.16	-2.04	-1.84	-0.41	222	2.75	1994		-0.02	-0.02	-0.04	223	0.03	0.02	
AB05	1728074.49	6447643.63	80.46	-1.23	-1.54	-0.44	231	1.97	1994		-0.02	-0.04	-0.04	237	0.04	0.02	
AB12	1729415.18	6448271.06	283.16	-1.30	-0.58	-0.27	204	1.43	1994		-0.04	-0.03	-0.03	223	0.05	0.02	
AB13	1729927.87	6448235.79	364.46	-1.03	-0.25	-0.57	194	1.06	1994		-0.04	0.00	-0.01	177	0.04	0.02	
AB16	1730358.54	6447532.13	376.39	-0.35	0.00	-0.23	180	0.35	1994		-0.02	-0.01	-0.02	202	0.02	0.03	*
AB17	1731421.10	6446727.74	442.81	-0.02	-0.04	0.01	237	0.04	2007		0.01	-0.01	0.01	293	0.01	0.03	*
AB20	1729359.40	6449685.84	396.20	-1.22	-0.42	-0.23	199	1.29	1995		-0.09	-0.03	-0.02	197	0.10	0.01	
AB24	1729829.42	6447759.63	335.73	-0.94	-0.33	-0.19	200	1.00	1997		-0.03	-0.02	-0.02	217	0.04	0.02	
AB50	1728084.51	6448247.18	182.00	-0.49	-1.00	0.02	244	1.11	1998		-0.02	-0.04	-0.02	237	0.04	0.02	
AB51	1729616.40	6447306.45	305.14	-0.61	-0.09	-0.28	189	0.62	2002		-0.01	0.02	-0.02	122	0.03	0.02	
AB53	1730430.21	6449712.24	352.86	-0.90	-0.13	-0.27	188	0.91	2002		-0.08	0.01	0.01	173	0.08	0.04	
AB56	1732213.90	6448545.59	571.55	-0.41	0.13	-0.10	162	0.43	2007		-0.06	0.04	-0.01	150	0.07	0.02	
AB57	1731926.41	6449759.48	564.78	-0.50	0.12	-0.15	167	0.51	2007		-0.06	0.03	-0.01	153	0.07	0.02	
AB58	1731117.55	6449074.93	405.68	-0.47	0.00	0.00	180	0.47	2007		-0.04	0.01	0.03	167	0.04	0.05	*
AB59	1730850.22	6450212.49	434.22	-0.65	-0.07	-0.15	186	0.65	2007		-0.10	-0.01	-0.03	186	0.10	0.02	
AB60	1729089.34	6447987.41	179.33	-0.37	-0.16	-0.12	203	0.40	2007		-0.01	0.00	-0.04	166	0.01	0.02	*
AB61	1727424.48	6447990.27	140.42	-0.02	0.01	-0.05	152	0.02	2007		-0.01	0.00	-0.03	164	0.01	0.01	*
AB62	1728910.26	6446925.42	142.98	-0.09	-0.04	-0.03	204	0.10	2011		-0.03	-0.01	-0.04	200	0.03	0.02	
AB63	1729059.22	6447306.97	180.79	-0.08	-0.07	-0.05	218	0.10	2011		-0.02	-0.02	-0.03	229	0.03	0.02	
AB64	1731830.71	6447373.07	532.21	0.02	-0.01	-0.04	321	0.02	2012		0.02	-0.01	-0.04	321	0.02	0.02	*
AB65	1731705.66	6448264.09	458.54	-0.02	0.02	0.00	130	0.03	2012		-0.02	0.02	0.00	130	0.03	0.02	
AB66	1730047.23	6448490.52	374.29	-0.05	-0.01	0.01	186	0.05	2012		-0.05	-0.01	0.01	186	0.05	0.02	
AB67	1731180.40	6447741.76	405.31	-0.01	0.01	-0.01	153	0.01	2012		-0.01	0.01	-0.01	153	0.01	0.02	*
AB68	1730258.84	6448055.36	393.40	-0.02	-0.01	-0.04	204	0.02	2012		-0.02	-0.01	-0.04	204	0.02	0.02	*
BB52	1726995.83	6451384.31	3.91	-0.54	-0.07	0.08	187	0.54	2007		-0.11	0.01	0.04	173	0.11	0.04	
CR07	1731627.89	6451203.35	632.11	-0.89	0.16	-1.17	170	0.91	1994		-0.07	0.00	-0.06	184	0.07	0.02	
CR50	1733013.57	6451037.37	872.64	-0.04	0.00	-0.02	184	0.04	1998		-0.03	0.01	0.02	156	0.03	0.02	
CR51	1733061.99	6452361.88	976.17	-0.04	0.02	-0.08	159	0.04	1998		-0.01	0.01	0.02	149	0.01	0.02	*
CR53	1732780.29	6450224.19	780.73	0.01	0.00	0.00			2012		0.01	0.00	0.00	0	0.01	0.02	*
FT06	1729854.86	6452760.05	488.65	-0.75	-0.16	-0.42	192	0.77	2007		-0.11	-0.02	-0.08	190	0.12	0.02	
FT07	1729252.12	6454102.96	588.63	-1.12	-1.79	-0.38	238	2.11	2007		-0.06	-0.16	-0.04	249	0.17	0.03	
FT08	1729388.67	6453350.51	658.41	-0.02	0.01	-0.03	151	0.02	2007		0.00	0.02	-0.02	93	0.02	0.02	*
KC01	1728475.83	6452457.62	312.28	-0.95	-0.61	-0.60	213	1.13	1994		-0.08	-0.04	-0.05	205	0.09	0.02	
KC02	1727002.47	6452118.84	13.70	-0.42	-0.15	-0.14	200	0.45	1995		-0.03	0.01	-0.02	160	0.04	0.02	
KC05	1727081.89	6453178.88	227.46	-0.11	-0.21	-0.40	242	0.24	1994		-0.01	-0.01	-0.03	240	0.01	0.02	*
KC06	1727784.85	6453396.21	299.85	-0.06	-0.46	-0.50	263	0.46	1994		0.00	-0.01	-0.03	236	0.01	0.02	*
KC07	1727759.41	6453683.86	313.47	0.22	-0.06	-0.36	346	0.23	1994		0.02	0.01	-0.01	22	0.02	0.02	*
KC13	1726580.98	6453069.60	191.06	-0.17	-0.03	-0.14	191	0.18	2007		-0.03	0.02	-0.04	147	0.04	0.02	
KC14	1726742.44	6453806.00	259.90	0.00	-0.05	-0.04	268	0.06	2007		0.02	0.02	-0.01	41	0.03	0.02	?
KC15	1727590.29	6453120.94	287.03	-0.16	-0.16	-0.07	225	0.23	2007		-0.02	-0.02	-0.03	213	0.03	0.02	
KC16	1727602.24	6454098.24	326.88	-0.01	0.01	-0.02	121	0.01	2007		0.01	0.01	0.01	51	0.01	0.02	*
KC17	1727302.74	6453026.41	215.24	-0.02	-0.01	-0.02	216	0.03	2012		-0.02	-0.01	-0.02	216	0.03	0.02	
PB04	1727664.44	6448848.46	166.65	-11.50	-3.28	-3.87	196	11.95	1994		-0.38	-0.11	-0.15	196	0.39	0.03	
PB06	1727934.33	6449757.99	177.13	-34.12	-3.85	-5.93	186	34.34	1995		-0.60	-0.08	-0.11	188	0.60	0.02	
PB07	1728133.26	6450211.82	197.39	-42.67	-7.94	-2.82	191	43.40	1995		-0.81	-0.16	-0.09	191	0.83	0.02	
PB08	1728197.20	6450462.60	194.26	-40.30	-7.19	0.58	190	40.94	1994		-0.75	-0.15	0.02	191	0.76	0.03	
PB09	1728243.00	6450848.55	188.58	-45.58	-2.47	-3.94	183	45.65	1994		-1.01	-0.04	-0.20	182	1.01	0.03	
PB12	1728252.35	6451582.81	183.67	-78.14	-21.76	-9.62	196	81.11	1994		-2.29	-0.73	-0.54	198	2.41	0.02	
PB13	1728040.35	6452147.01	206.52	-45.62	-17.33	-4.02	201	48.80	1995		-1.47	-0.63	-0.15	203	1.60	0.02	
PB18	1730430.78	6450719.92	362.94	-16.11	8.92	-4.64	151	18.41	1995		-0.10	0.00	-0.06	183	0.10	0.02	
PB20	1728739.17	6451123.87	231.72	-73.60	-11.81	-11.82	189	74.54	1995		-1.94	-0.43	-0.44	192	1.98	0.02	
PB21	1729239.78	6451178.72	271.99	-58.44	6.66	-8.03	173	58.82	1995		-1.07	0.12	-0.18	174	1.07	0.02	
PB25	1729670.19	6451986.23	325.94	-32.13	0.58	-3.05	179	32.13	1994		-0.13	-0.05	-0.03	202	0.13	0.01	
PB26	1729538.42	6452252.10	282.89	-24.23	2.54	-2.45	174	24.36	1995		-0.12	-0.01	-0.03	184	0.12	0.02	
PB27	1729240.60	6451842.46	270.83	-98.74	6.39	-13.60	176	98.95	1995		-2.29	0.04	-0.39	179	2.29	0.02	
PB29	1728839.12	6452092.15	169.87	-49.82	-28.34	-16.06	210	57.32	1995		-1.52	-0.64	-0.54	203	1.65	0.03	
PB54	1729690.65	6450448.46	357.73	-4.24	-0.23	-0.89	183	4.25	1997		-0.10	-0.02	0.02	190	0.10	0.03	
PB55	1728772.93	6450801.16	239.47	-39.35	-2.88	-6.86	184	39.46	1998		-1.07	-0.02	-0.08	181	1.07	0.05	
PB59	1727757.09	6448659.36	158.60	-9.28	-2.31	-4.79	194	9.56	2001		-0.61	-0.16	-0.32	195	0.63	0.03	
PB64	1727369.21	6450928.11	56.84	-97.08	-18.83	-15.92	191	98.89	2009		-25.35	-4.84	-6.84	191	25.81	0.05	
PB65	1728454.06	6449707.70	287.66	-0.60	-0.12	-0.09	191	0.62	2010		-0.14	-0.03	-0.03	192	0.14	0.02	
PB66	1729196.66	6450969.95	288.19	-0.99	0.03	-0.13	178	0.99	2012		-0.99	0.03	-0.13	178	0.99	0.02	
UB02	1727516.04	6450142.94	62.62	-65.08	9.16	-4.54	172	65.72	1997		-1.14	0.12	-0.04	174	1.14	0.02	

PORTUGUESE BEND LANDSLIDE MONITORING - MOVEMENT DATA POSTING as of April 7, 2014
Prepared by McGee Surveying Consulting - Document date: 05/14/2014
Monitoring Point Movements
PARTIAL MID-YEAR MONITORING

Page 9/9

Notes:

* Indicates no signal of horizontal movement detected in the last period at the 95% level of confidence

Point	April 7, 2014 Positions			Overall Movements (US Feet)							Periodic (6.0 months) Movements (US Feet)						
	NAD83 SPC Zone 5 (Ft)		NAVD88 Elev(ft)	Original Position to April 7, 2014							October 4, 2013 Position to April 7, 2014						
	North (ft)	East (ft)		North	East	Height	Azim.°	Dist.	Year		North	East	Height	Azim.°	Dist.	95%Err	Note
AB04	1728389.93	6447121.48	67.19	-2.07	-1.87	-0.38	222	2.78	1994		-0.02	-0.03	0.03	232	0.04	0.02	
AB12	1729415.17	6448271.07	283.20	-1.31	-0.58	-0.23	204	1.43	1994		-0.01	0.01	0.03	138	0.01	0.02	*
AB16	1730358.55	6447532.14	376.47	-0.34	0.01	-0.15	178	0.34	1994		0.01	0.01	0.08	41	0.02	0.03	*
AB17	1731421.11	6446727.74	442.87	-0.01	-0.04	0.07	259	0.04	2007		0.02	0.00	0.06	353	0.02	0.04	*
AB20	1729359.39	6449685.84	396.23	-1.24	-0.43	-0.20	199	1.31	1995		-0.01	-0.01	0.02	215	0.02	0.01	
AB50	1728084.51	6448247.16	182.02	-0.49	-1.02	0.04	244	1.13	1998		0.00	-0.02	0.01	264	0.02	0.03	*
AB59	1730850.20	6450212.50	434.25	-0.67	-0.05	-0.12	184	0.67	2007		-0.02	0.01	0.02	142	0.02	0.02	*
AB60	1729089.34	6447987.40	179.36	-0.36	-0.17	-0.09	204	0.40	2007		0.00	-0.01	0.02	283	0.01	0.02	*
AB61	1727424.48	6447990.26	140.44	-0.02	0.01	-0.03	155	0.02	2007		0.00	0.00	0.02	315	0.00	0.01	*
AB65	1731705.65	6448264.08	458.55	-0.03	0.01	0.02	153	0.03	2012		-0.01	-0.01	0.02	218	0.01	0.02	*
CR07	1731627.89	6451203.36	632.19	-0.89	0.17	-1.09	169	0.91	1994		0.00	0.01	0.08	69	0.01	0.02	*
CR50	1733013.59	6451037.37	872.75	-0.02	0.00	0.09	191	0.02	1998		0.02	0.00	0.11	357	0.02	0.03	*
FT06	1729854.83	6452760.04	488.69	-0.78	-0.17	-0.37	192	0.80	2007		-0.03	-0.02	0.05	210	0.03	0.02	
FT07	1729252.10	6454102.96	588.67	-1.14	-1.79	-0.34	238	2.12	2007		-0.02	0.00	0.04	180	0.02	0.04	*
KC06	1727784.84	6453396.19	299.87	-0.07	-0.47	-0.48	262	0.48	1994		-0.01	-0.02	0.01	246	0.02	0.02	*
KC07	1727759.41	6453683.86	313.51	0.22	-0.05	-0.32	346	0.22	1994		0.00	0.00	0.03	153	0.00	0.03	*
KC13	1726581.00	6453069.59	191.10	-0.16	-0.05	-0.10	196	0.17	2007		0.01	-0.01	0.04	315	0.02	0.02	*
KC16	1727602.24	6454098.23	326.87	-0.01	0.00	-0.03	191	0.01	2007		0.00	-0.01	-0.01	275	0.01	0.03	*
KC17	1727302.74	6453026.38	215.23	-0.02	-0.04	-0.02	243	0.05	2012		0.00	-0.03	0.00	266	0.03	0.02	
PB04	1727664.28	6448848.42	166.62	-11.65	-3.32	-3.90	196	12.12	1994		-0.16	-0.04	-0.03	193	0.16	0.03	
PB12	1728251.48	6451582.51	183.42	-79.01	-22.06	-9.87	196	82.03	1994		-0.86	-0.30	-0.25	199	0.92	0.03	
PB13	1728039.80	6452146.77	206.46	-46.17	-17.57	-4.08	201	49.40	1995		-0.55	-0.24	-0.05	203	0.60	0.03	
PB18	1730430.76	6450719.91	362.98	-16.12	8.92	-4.60	151	18.42	1995		-0.01	0.00	0.04	189	0.01	0.02	
PB26	1729538.39	6452252.10	282.92	-24.26	2.54	-2.42	174	24.39	1995		-0.03	0.00	0.02	178	0.03	0.02	
PB59	1727756.85	6448659.33	158.51	-9.51	-2.34	-4.88	194	9.80	2001		-0.24	-0.03	-0.09	188	0.24	0.04	
PB64	1727352.77	6450925.28	55.04	-113.52	-21.67	-17.72	191	115.57	2009		-16.45	-2.84	-1.80	190	16.69	0.06	
PB66	1729196.34	6450969.95	288.15	-1.30	0.02	-0.18	179	1.30	2012		-0.32	0.00	-0.04	181	0.32	0.03	
PB67	1727638.73	6450858.18	76.01	Replacement for PB64						2014							