EXHIBIT 18

# GEOPHYSICAL SURVEY REPORT
## *Electrical Resistivity Imaging for Evaluating Earthen Dam Materials Hidden Lakes Estates, Granite Bay, California*

*February 28, 2007*

Shaw™ Shaw Environmental, Inc.
1326 North Market Blvd.
Sacramento, California 95834

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## 1.0 Introduction

Geophysical surveys were performed for the Hidden Lakes Estates Homeowners Association (HLEHA) on November 16, 2006. The survey objective was to assess the subsurface conditions within the two earthen dams on the neighborhood ponds. The scope included an interpretation of the subsurface materials and possible physical characteristics such as saturated sediments. The technical approach for this investigation was utilizing multi-electrode resisitvity profiles over two areas with a high resolution, multi-channel resistivity system.

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## 2.0 Methodology and Instrumentation

The resistivity method was chosen for the investigation because resistivity data is very effective in assessing the subsurface conditions of earthen dams. The following paragraphs describe the general methodology and instrumentation employed.

***Resistivity Measurements*** - Rock and soil types have a wide range of properties (hardness/competency, composition, grain size, type and degree of fluid saturation, amount of fracturing/faulting, etc.) that influence their geo-electrical properties. Consequently, subsurface materials have a wide range of electrical resistivity values that represent various subsurface conditions. In general, coarse grained materials (sands, gravels, etc.) have a higher resistivity than fine grained materials (clays, silts, etc.). Highly competent rocks (lithified bedrock, etc.) typically have even a higher resistivity than sediments. The presence of water lowers the resistivity of earth materials significantly. Even small concentrations of water can lower the resistivity of earth materials an order of magnitude.

***Instrumentation*** - For acquisition of continuous 2-dimentional (2D) resistivity profile data, Shaw used an AGI 8-channel Super Sting Resistivity System. This system utilizes multiple electrodes and a complex data logger and electode switching system to introduce current into the ground and take multiple readings at different electrodes at the same time.

All resistivity methods employ an artificial source of current which is introduced into the ground through a pair of electrodes. This power source is applied by the data logger and usually provided by a high current source such as a deep cycle battery. The potential difference is measured in milliVolts (mV) between two other electrodes in the vicinity of the current flow. Apparent resistivity in ohm-meters (ohm-m) of the subsurface can be calculated with the ratio of the measured potential difference to the input current multiplying a geometric factor (specific to the array being used and the electrode spacing).

There are three basic modes of operation for resistivity methods: sounding, profiling and sounding-profiling. In sounding, the distance between the current electrodes or the distance between the current and potential dipoles is expanded in a regular manner between readings, which yields apparent resistivity as a function of depth. In profiling, the electrode spacing is fixed at a distance dependent on the desired depth of exploration and measurements are taken at successive intervals along a profile line to detect lateral anomalies. When both lateral and vertical information is desired, efficiency is increased by using a combination or sounding and profiling. The combined sounding and profiling methods were used on this project.

The dipole-dipole resistivity array was utilized at this site. The dipole-dipole array lends itself to a good approximation of subsurface resistivities and the configuration of those materials. The

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immediate product using this method is an approximation of the subsurface resistivities referred to as "apparent" resistivities (psuedosection). The psuedosection is then inverse modeled with numerous iterations creating a cross-section of "true" resistivities and their configuration. This final product is a 2D cross-section of resistivities and is used for interpretation.

Resistivity data using any kind of array can be processed with different commercial forward modeling and inversion programs. The measured apparent resistivity data are generally presented as 2D profiles of true resistivity. For this data EarthImager (A.G.I.) was used to model the data.

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## 3.0 Field Survey

The HLEHA provided plot maps, photos, approximate material type and approximate dam depth based on original topographic contours. Prior to going to the field, this information was used to run forward models in order to determine the number of electrodes and array configuration to best conduct the survey to achieve penetration below the earthen dams. The computer scenarios completed determined that 28 electrodes in a dipole-dipole configuration would be optimal.

Field activities began with southern dam of the southern lake (Figure 1). Due to the nature of the southern dam and limited accessible areas, the resistivity profile had to be curved to obtain data. Optimally, the survey profile should be straight. Slight curvature to the profile may result in slightly inaccurate depths or slightly different true resistivities. However, the detection of materials and their presence should not be affected. Any error that may be caused by the mild curvature of this profile is minor and would have little or no affect on the resultant data.

The southern profile length was measured with a measuring tape to determine the best possible electrode configuration. The available survey length was slightly less than 300 feet in an arc that was concave to the north and followed the shoreline. Figure 1 shows the line location.

Forward modeling was then performed in the field on a laptop computer to establish the best possible survey type and design to maximize both signal to noise ratio and depth of penetration. A dipole-dipole survey with 3 meter electrode spacing using the 28 electrodes was determined to be the best solution for this area.

Metal electrode stakes were placed in the ground at 3 meters (10 feet) intervals between the fence and southern lakeshore. Each electrode was installed by first digging a small hole with a trowel and pounding a metal electrode stake approximately six inches into the ground into the center of that hole.

Two cables, each with 14 'takeouts' that connect together to make a single 28 electrode cable were utilized for this survey. The cable was positioned along the line of electrodes and each takeout was connected to a single electrode. Salt water was then poured in each electrode stake hole until it began to pool. The salt water accomplishes two tasks: 1) the salty solution provides free ions to increase conductivity from the metal stake to the ground; and 2) it packs the ground material closer to the stake after it settles, also increasing the conductivity of the contact between the electrode and ground.

The cables were then attached to the data collection unit and the contact resistance was tested by this unit for each individual electrode to determine that the current was propagating efficiently.

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After this test was completed successfully the resistivity data was collected, then downloaded to a laptop and preliminary processing was performed to verify that the data was of high-quality.

Once the southern line was completed, the equipment was moved to the northern side of the northern lake for the second survey (Figure 1). This area was surveyed in a similar method as the first survey. The only difference was the smaller profile length due to smaller dam size. The total length available was 43 meters (140 feet). Forward modeling indicated a dipole-dipole survey with electrode spacing of 1.5 meters (5 feet) and 28 electrodes was optimal for this location. The impact of the electrode spacing on the two profiles is evident on the figures. The wider spacing on the Southern Profile provides greater depth of penetration while the narrow spacing on the Northern Profile was sufficient to characterize the subsurface and provides higher resolution data along this line.

The overall quality of the resistivity data was excellent based on the Route Mean Square error calculation (RMS). The RMS for the Southern and Northern Profile was 4.82% and 2.13%, respectively. RMS values less than 10% in inverse modeling are considered excellent and these proved to be much lower.

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# 4.0 Results and Conclusions

The resulting cross-sections for the Southern Profile and Northern Profile are represented in Figures 2 and 3, respectively.

Figure 2 indicates resistivities that range from 1 Ohm-meter [(Ohm-m); blue colors] to several thousand Ohm-meters (orange and red colors). The profile indicates that most of the materials below the Southern Profile range from slightly less than 100 to a few hundred Ohm-m (green to yellow). These are considered "background" materials and are interpreted to likely be sediments with various degrees of water content. The western side of the profile indicates two anomalous zones. One zone is a high resistivity zone, which may be caused by relatively coarser materials or hard unweathered rock. If this zone consists of relatively coarser materials, they may be coarse sand or gravel that is primarily unsaturated. These resistivities are very high and as stated may also represent competent unweathered rock, which appears to be the more probable material.

The second anomalous zone on the west side of the Southern Profile is characterized by very low resistivities (less than 10 Ohm-m). Resistivities in this range are typically represented by very conductive clay or saturated sediments. The configuration of the anomalous zones may be slightly different due to the profile's slight curvature. However, the anomaly is more than 30 feet deep and well below the dam.

Figure 3 represents the Northern Profile. The color scale for this profile is the same as that in Figure 2. The "background" resistivities range from 60 to a few hundred Ohm-m (also green to yellow). There are two things to note on the Northern Profile. A very low resistivity zone occurs near the central portion of the profile that is characterized by resitivities from 10 to 20 Ohm-m. The low resistivity zone is contained in the central part of the profile and extends from approximately 4 feet below ground surface to a depth of approximately 25 feet. Due to the configuration, the low resistivities are likely caused by saturated sediments. The very high resistivity at the bottom of the profile is typical of hard unweathered rock (possibly granite bedrock). The remainder of the profile (intermediate resistivities) is interpreted to be sediments indicating various degrees of water content.

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# *Figures*

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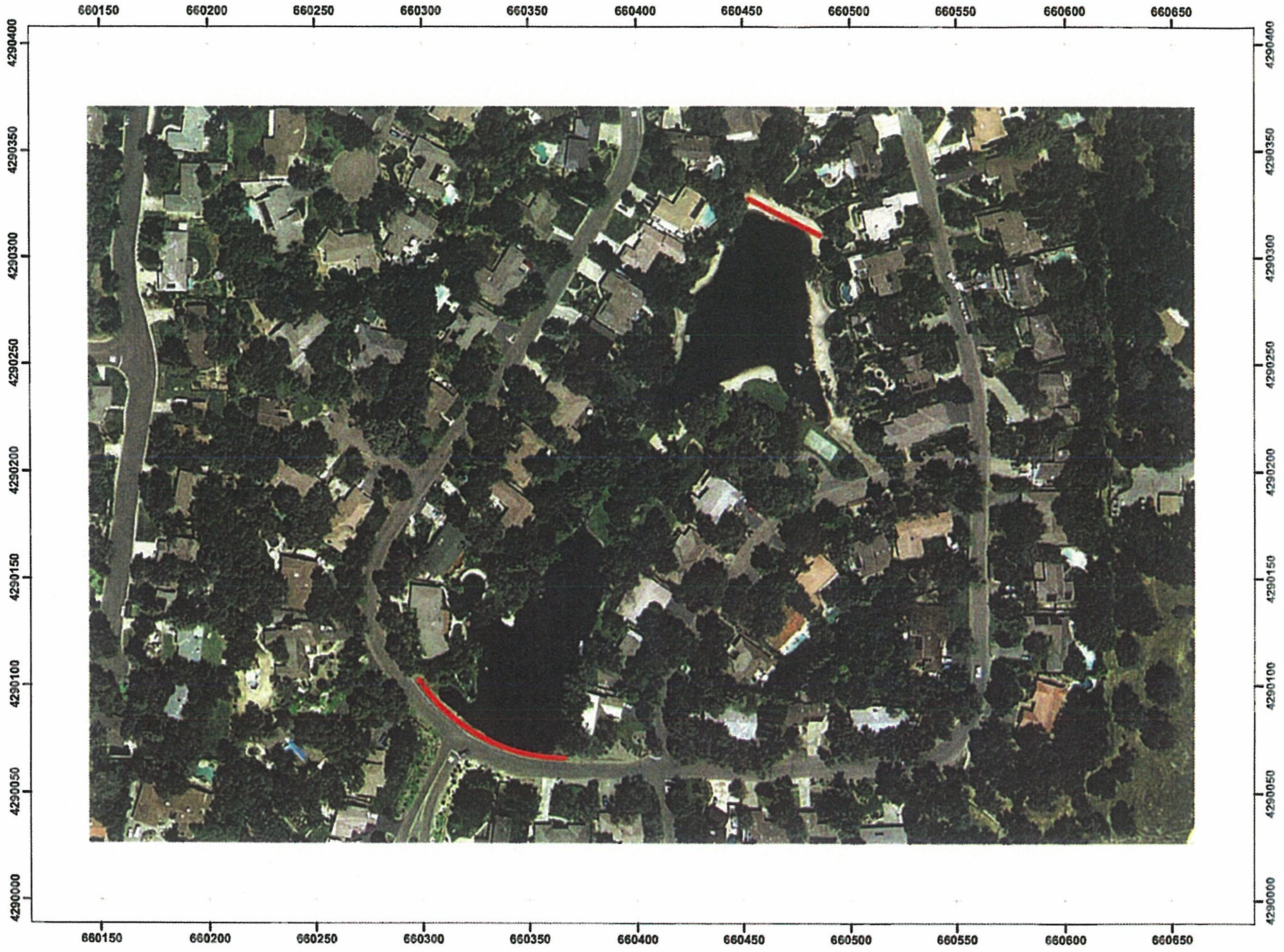
| OFFICE | DRAWN BY | | DRAWING NUMBER | |
|---|---|---|---|---|
| SAC | JF | 11/29/06 | | *hidden_lakes.mxd* |



***Legend***

🟥 Resistivity Profiles

100 50 0 100 200 300 Meter

REFERENCE/PROJECTION: WGS84, UTM Zone 10N, meters

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**FIGURE 1**

**Resitivity Profile Locations**

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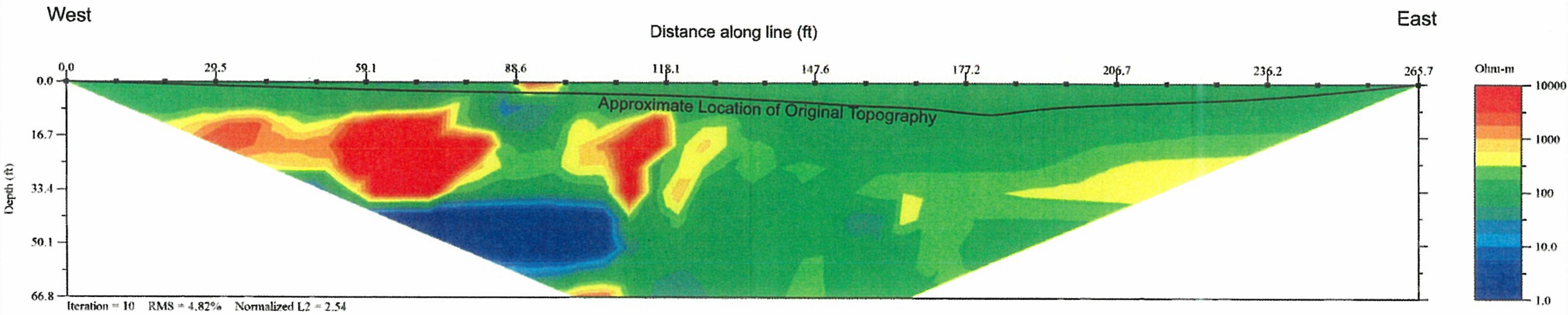

Iteration = 10 RMS = 4.82% Normalized L2 = 2.54

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**FIGURE 2**

**Subsurface Resistivity Profile Model**

Southern Profile

| OFFICE | DRAWN BY | | DRAWING NUMBER |
|---|---|---|---|
| SAC | JF | 2/20/07 | hidden_lakes_dip-S.mxd |

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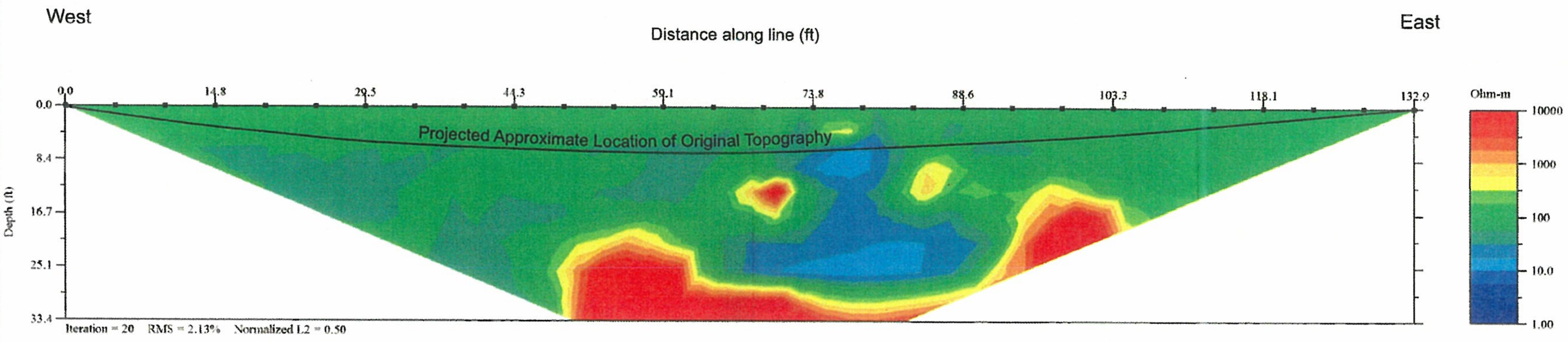

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**FIGURE 3**

**Subsurface Resistivity Profile Model**

Northern Profile

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|---|---|---|---|
| SAC | JF | 2/20/07 | *hidden_lakes_dip-N.mxd* |

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