

## **Aerial Photography & Image Acquisition Summary**

Orbis GIS, Inc. (“ORBIS”) collected the color aerial photography at a scale of 1”-800’ for Lake Keowee (Figure 1) March of 2005.

### **Aerial Photography Specifications**

The entire project area was photographed with an endlap of not less than sixty percent (60%). The overlap was monitored by the Track’Air system for the Leica RC-30 camera to ensure compliance. Sidelap was, in general, average thirty percent (30%). In all cases overlap and sidelap was sufficient to accommodate stereo coverage over the whole project area. A Camera Calibration Report of the RC-30 camera used in the project can be provided.

### **Camera station control with Airborne GPS**

Airborne Global Positioning System (ABGPS) was used on this project to further strengthen the analytical Aerial Triangulation Solution. Airborne (Kinematic) GPS positioning was used to provide accurate exposure station positions (X, Y & Z) data.

### **Ground Control and Digital Aerial Triangulation**

ORBIS designed a control network that will support the digital orthophoto mapping specifications for the 0.5 foot pixel resolution. Airborne GPS data was captured for the aerial triangulation in order to significantly reduce the number of ground control points.

All new horizontal control was established based on the NAD 1983 1991 adjustment South Carolina State Plane Coordinate System. All new vertical data was based on the NAVD88 datum. Only Dual Frequency Geodetic GPS Receivers were used to acquire data. All measurements were recorded in US Survey Feet. A final adjustment was performed on all surveyed points. After completion of the aerial photography ORBIS established photo-identifiable supplemental control points and tied them to the SC State plane Coordinate system.

### **Horizontal Control Surveys**

All new GPS surveys did comply with Geometric Geodetic Survey Standards on specifications for Geodetic Surveys using GPS Relative Positioning Techniques prepared by the National Geodetic Survey, NOAA. In addition the GPS work was done in accordance with the specifications of C- Order Class I standards as stated in the publication “Geodetic Accuracy Standards and Specifications for using GPS Relative Positioning Techniques, version 5.0”, published by the Federal Geodetic Control Subcommittee (FGCS).

### **Vertical Control Surveys**

All vertical information from GPS derived elevations were done in accordance with the specifications as defined by the FGCS in documents published in September, 1984 and August 1, 1989 and as referenced above for a Third Order Vertical Survey.

### **Scanning**

A high-resolution Z/I PS 2001 (Zeiss/Intergraph, <sup>TM</sup>) Image Scanner capable of scanning directly from the roll film negatives was used. Our standard scanning resolution for soft copy operations at that mapping scale is 14 microns. This provides **optimum resolution** for feature identification and positional accuracy (X, Y, Z) during the Digital Aerial **Digital Aerial Triangulation and Adjustment**

ORBIS used fully Digital Aerial Triangulation (DAT) methods in a softcopy environment to provide an accurate operational solution for production of the digital terrain model and the digital orthophoto, and used a simultaneous adjustment utilizing the airborne GPS solution with ground control survey data. Original film negatives will be scanned at **14 micron**. This provides **optimum resolution** for feature identification and positional accuracy (X, Y, Z) during the Digital Aerial Triangulation, DTM compilation, GIS update mapping and the ortho imagery production.

### **Digital Elevation Model**

By employing softcopy photogrammetric techniques we were able to perform digital stereo compilation to generate a Digital Elevation Model (DEM). The DEM will be used for the production of the digital orthophotos. The aerial photography and the results of the DAT are suitable to generate two (2) foot contours.

### **Digital Orthophoto Generation**

The generation of the digital orthophoto were carried out on the Z/I Digital Orthophoto System or the SocetSet photogrammetric workstation utilizing the scanned image, the orientation parameters and the available Digital Elevation Model. In general, a seamless digital orthophoto image database was created over the project area and digitally trimmed to the desired coordinates. To enhance the digital orthophoto image processing was used. Image processing utilizing sophisticated software such as OrthoVista allowing ORBIS to match and balance brightness from image to image, to tie (mosaic) images together seamlessly.

A complete differential rectification was achieved utilizing a specifically developed set of algorithms that remove image displacement due to topographic relief and the tip and tilt of the aircraft at the moment of exposure. This process is fully automatic and the differential orthophoto rectification software used for this project was capable of performing a **pixel-by-pixel** rectification for increased accuracy of the final digital orthophoto. The proposed scanning resolution of 14 micron will be used to produce the **0.5 foot** digital orthophoto pixel resolutions. Digital Orthophotos meet or exceed National Mapping Accuracy Standards for 1"=200' (1:2400) map scale.

Figure 1

