Digital Orthophotos Of The Lower Mainland
Georgia Strait to Chilliwack

Thank you for purchasing the colour digital orthophotos of the Lower Mainland which have been produced as a joint venture between Triathlon Mapping Corporation and Selkirk Remote Sensing Ltd.. This document provides further information about the package. It describes the coverage of the digital orthophotos, the acquisition and timing of the aerial photographs, and the methods used to transform the photography into digital images. Further, it details the format and compatibility of the files found on the CD's

COVERAGE

The region covered by the digital orthophotos is the Lower Mainland from Georgia Strait to Chilliwack. This area includes the inhabited districts of the Greater Vancouver and Fraser Valley and is bounded to the east by the Chilliwack district boundary; to the west by Georgia Strait; to the North just short of the North and West Vancouver district boundaries; and finally, to the south by the Canada-USA border.

Vector files for Microstation (.DGN) and AutoCad (.DWG and .DXF) are included to show image tile locations. The tile corners in these files are precise and are NAD83 UTM coordinates. The linework delineating water and municipal boundaries were included for reference, and should be regarded as approximate only.

THE SOURCE PHOTOGRAPHY

The colour aerial photography was flown by Selkirk Remote Sensing Ltd., using a Wild RC-20 aerial camera equipped with forward motion compensation magazine and a 153mm focal length lens mounted in a twin engine Piper Navaho PA 31 aircraft. It was flown on May 14, July 12 and July 17, 1995. The altitude of the aircraft, 15,000 feet above mean ground, provided photography at a nominal scale of 1:30000.

The film used was Kodak 2445 Aerocolour Negative film. From this film, diapositives were produced on Kodak Vericolor Print Film 4111 (ESTAR Thick Base) using an electronic auto-dodge contact printer with a colour light source. Auto-dodging automatically corrects for changes in light conditions typically found between flight lines, frames, or within independent photo frames along a flight line. The quality and amount of information on these diapositives is far superior to that obtainable on paper prints. These diapositives were scanned as a part of the process in creating our digital orthophotos.

CONTROL

Control used in the production of the orthophotos was derived from the existing B.C. Government TRIM aerial triangulation database. The accuracy of the control was maintained so that our digital orthophotos would meet the 1:20000 scale horizontal specification accuracies.

DIGITAL ELEVATION DATA

The Digital Elevation Model (DEM) spacing was designed so that the orthophotos could be rectified to meet the 1:20000 scale accuracy. The DEM data, which is a series of {x,y,z} points within the area, was collected from the existing B.C. Government TRIM, 1:75000 scale, aerial photography database. The new DEM's were collected photogrammetrically using analytical, 1st order, high precision stereo plotters. To maintain accuracy, the DEM's were randomly spaced for conversion to the TIN model format. Average DEM point spacing is approximately 160 metres in areas of moderate relief, reducing to about 250 metres in flatter, low-lying areas. The DEM was designed for the sole purpose of meeting orthophoto accuracy requirements.

ORTHOPHOTO RECTIFICATION

The diapositives were scanned at Triathlon Mapping Corporation and converted to digital images on a Zeiss PS-1 Photoscan Linear Array scanner at a sample rate of 30 microns (846 dpi). The scanning produced a raw ground image pixel of nominally 0.9 metres in size. These digital images were oriented using the above mentioned control and rectified to remove distortions caused by variations in terrain elevation and perspective geometry. During the rectification process the image pixels were resampled using the cubic convolution algorithm to a one metre resolution. The final geo-referenced orthophotos have the same accuracy as a 1:20000 map. The reference system used for this project was the UTM NAD 83 horizontal datum and the Geodetic NAVD 27 vertical datum.

AUTOMATIC GEO-REFERENCING

There are 261 orthophotos on 16 CD's in the complete set. The automatic geo-referencing provided by Triathlon Mapping Corporation allows users with ArcInfo, MapInfo, Autocad/ Colorview software packages to view the orthophotos directly from disc in registration with other data sets. As a result, hundreds of hours are saved by not having to register the orthophotos manually.

For each TIFF image file on CD there are three ancillary geo-referencing files:

1. Image Report File   Provides the following technical details about individual TIFF files:
                -Pixel size
                -Number of rows and columns of pixels in the file
                -Angle of rotation of the images
                -Coordinates of the four corners of each image
                -Standard 3x3 transformation matrix

2. World File   A file format developed by ESRI for use with Arc/Info. It contains transformation matrix information required to register the TIFF file to Arc/Info coverage. The registration in this image is carried out using the

NAD 83 UTM datum as previously described.

Also for use with the ColorView software from Peak GeoDesigns which runs with AutoCad. It allows automation of the process of registering image data to vector information in AutoCad.

3. TAB File   For use with MapInfo. It allows automatic registering of the image to map data by providing geo-referencing information about the TIFF file relative to the datum used.

NAD 83 UTM georeferencing files for ArcInfo (.TFW) and MapInfo (.TAB) are provided in the root directory with the image files. In addition, complete sets of the lower mainland world and tab files are provided in UTM (NAD 27) and Geographic (NAD 27 and 83). These files are available on request from the staff at the Walter Hitschfeld Geographic Information Centre.

The world and tab files in the CDROM's root directory (directly associated with the individual orthophotos) are NAD 83 UTM. To use any other datum or coordinate system you must contact staff at the GIC.

Note that Intergraph can automatically read the transformation matrix embedded in the TIFF file. In this situation no operator intervention is required as the file will automatically register to a DGN file. The Units of Resolution (UOR's) used are metres with 100 UOR's per master unit. The Global Origin (GO) offsets are -21,474,836.48, -21,474,836.48,and -21,474,836.48. If your DGN file uses different settings for either of these parameters then the image will have to be manually or interactively placed.

Alternately, the file can be copied to your hard disk and the header can be edited to make the changes.

CD-ROM's FILE FORMAT

The orthophotos were written onto 16 compact discs, each comprised of sixteen 38MB tiles. The orthophotos are in TIFF format and are compatible with most image processing and GIS packages including ArcInfo, Intergraph, ColorView, MapInfo, and Erdas. To facilitate compatibility, the TIFF files have been created in a single tag per strip of pixels.

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