## (5) Aerial Triangulation and Digital Plotting in BiH

Referred data: Photo data and control point data of the sample areas

The referred data of the sample areas were of Derventa sheet (Block4) and Bijeljina sheet (Block8). Bijeljina' s data was used only for ortho - photo generation. (See Figure 2 - 15.)



Figure 2 - 15 Areas of Training Material

The general flow of the training sessions were as is the following diagram:



Figure 2 - 16 General Flow of Traning Sessions

### a. Aerial Trinagulation

Summit Evolution software was used for measurement of control points and tie points, and In Block software was used for Bundle block adjustment calculation. The number of photos and control points used are:

Aerial photos - - - - - - 16 photos in 3 courses Horizontal and vertical control points - - - - - - 5 points Vertical control points - - - - - 63 points

Distribution of principal points of photos and XYZ - control points are shown in Figure 2 - 17.



Figure 2 - 17 Principal Points of Photos and XYZ - control Points

Processing of point measurement by Summit Evolution software

- i. Import of photo images
- ii. Generation of camera file
- iii. Generation of control point file
- iv. Interior orientation
- v. Measurement of tie points
- vi. Measurement of control points
- vii. Export the measurement coordinates and control point data to In Block software

Processing of block adjustment calculation by In Block software

i. Setting

Setting of camera parameter and GPS sensor Definition of work unit and weight

- ii. Import of data Import of the measurement coordinates, control point data and Airborne GPS data
- iii. Block adjustment calculation Calculation of approximation, Bundle block adjustment calculation
- iv. Analysis of calculated results
- v. Export of calculated results Export of the exterior orientation elements to PAT - B format
- b. Digital plotting

The 3d data extraction was performed using Summit Evolution software and Autodesk MAP through the following processes.

- i. Generation of project file
  - Setting of camera file, photo images and control point file
- ii. Import of the exterior orientation elements Import of the exterior orientation elements calculated by triangulation
- iii. Setting stereo model
- iv. Generation of symbols for plotting
  - Definition of layers, colors, line types and symbols by Autodesk MAP according as the map symbol regulation.
- BUILDINGS HYDR UTILITY/Misc VEGETATION TOPOLOGY EDITING UstnV8 rev7/03 Building urkline srust rkline Break Label Pt2Pt Line Stream filter Sreak Jell to .bndno .rehyc Field Field .nterp Mark Church Dam atten V Label Site Line Set Ci Text sec 6.0 hand Attrib Last ircula ridge uyan lonst Gate hang Cultivati Drain Lock crem Bldg .) Bldg rent Attrib Jaht pole Aailb) Mar Shot beigh ial Bldo Lake/Pond Coline clip Comm MB Pad Edu anhol Pipe Deck ulver Mud rchard intero Cutline Bldg OMH line Pin Curb Factory Post Pole Jelete atem line Swamp Set Z line oil 0 offse ď Delete Last Industri LTM Lline **Bas** JWe Bldg Rei Line NV. offse tation undry DTM Edit , lace Tree afine lace ance House arid Edit Station shape Fence Jiking Jign TM TM ock Jinit ree collect at Joinit osque ollect \* Edge Label Last Jarade ank Water -TM . ank , ree sum ...ove Shed atterr San Offset Oil O DTM Cell xyz Circ ove vertex Z ank Water \_TM ree Scale Free-Jeph afin Line distribu pt/cell Sar iwe ove idal ove artia airs -..... ...ipor emple iten Flat X Land xyz xyz XY XYZ ilit ove vertex XY Jldg ...d XY Obi Ci Dn Ci Up Waterline Pole doffse rotate Wall Mark vertex bida ove vertex XYZ ....beli JNWY nw Liaht \_ridit untro .rko Road Paved Hange ovet 10
- Generation of Keypad for Summit Evolution software

# Figure 2 - 18 Example of Keypad Menu

- v. Data extraction by 3 dimensional plotting
  - Extraction of roads, rails, etc.
  - Extraction of rivers, water body, etc.

- Extraction of built up areas, building, etc.
- Extraction of vegetation and vegetation boundaries
- Extraction of contour lines
- Extraction of spot heights
- vi. Saving of extracted data

The extracted data were saved as DXF format and used in the next processes, namely the digital map symbolization or the preparation of GIS data.

c. Generation of DTM and contour lines

DTM and contour lines were generated using Summit Evolution software and MATCH - T & Capture Contour software in the following conditions.

- Break line acquisition
- Grid interval: 20 m



Contour interval: 10 n

Figure 2 - 19 DTM and Break Line

d. Generation of ortho - photos



Figure 2 - 20 Contour Lines Generated Using DTM and Break Line

Generation of ortho - photos was performed using OrthoMaster software and OrthoVista software in the following process.

OrthoMaster software

- i. Import of the project file of Summit Evolution software
- ii. Import of DTM data
- iii. Definition of an area for ortho photo generation
- iv. Setting of pixel size, output file type, etc.
- v. Generation of ortho photos

#### OrthoVista software

- i. Selection of images for mosaic processing
- ii. Definition of mosaic area
- iii. Setting parameter of color valance etc.
- iv. Execution of mosaic processing



Figure 2 - 21 Ortho - photo around Bijeljina City Prepared by the Counterparts

## e. Additional Training of digital plotting

During the field completion process, in response to the request from the BiH side, the Team gave supplementary instructions on digital plotting to the BiH counterparts in Sarajevo and Bijeljina in November 2004. After the instruction, they tried to complete the sheet of Banja Luka.