NATIONAL REPORT OF ESTONIA

Karin Kollo[1]

In the field of geodesy the Estonian Land Board is responsible for the organisation, planning and co-ordination of works necessary for the development of national and local networks, controlling and accepting the works done in that field as well as for the creation of geodetic database.

Currently the following projects ordered and financed by the Land Board are ongoing:

- Establishment of densification networks on the islands of West-Estonia
- Improvement of vertical network
- Performance of absolute measurements on the points of gravimetric networks
- Geodetic database

I and II Order Horizontal Network

I order horizontal network consists of 13 points, the coordinates of which were measured during the EUREF-EST 97 campaign. The distance between points is 70-110 km, the mean square error of points is ± 1 cm and the relative error is 1:7 000 000. The results of the I order network correspond to the B class standard (EUREF classification).

II order network is based on the points of the I order network; the points are spread out homogeneously all over Estonia. Network consists of 199 points, the distance between points being about 15 km. The mean square error of points is ± 1 cm and the relative error is 1:1 500 000.

III Order Horizontal Network

Further densification of the horizontal geodetic network is done by the establishment of so-called densification networks. The densification network consists of pair points; one point pair per 16-25 km², and the distance between points in pair is about 500 m. The number of points is about 4300. The mean square error is about ± 1 ... 3 cm and the relative error for point pairs is 1:250 000 and between points in pair 1:50 000.

The establishment of densification networks on the mainland of Estonia is finished. Thereafter the densification networks will be re-adjusted on the basis of I and II order

horizontal network points. For the re-adjustment it is necessary to measure additionally about 160 vectors at the borders of different objects. As a result of the final adjustment the points of densification networks will be provided with co-ordinates in the co-ordinate system in use, i.e. L-EST co-ordinate system. The current status of densification networks is depicted in Figure 1.

Densification networks have been established in different times, the quality control and determination of the real accuracy of the densification network are necessary. For that purpose the distance between 100 points in pair should be measured with electro-optical tachometers.

In 2001, the establishment of densification network will continue on islands of West-Estonia. Currently 4250 km² are under construction. The establishment of densification networks in Estonia must be completed by the end of 2001.

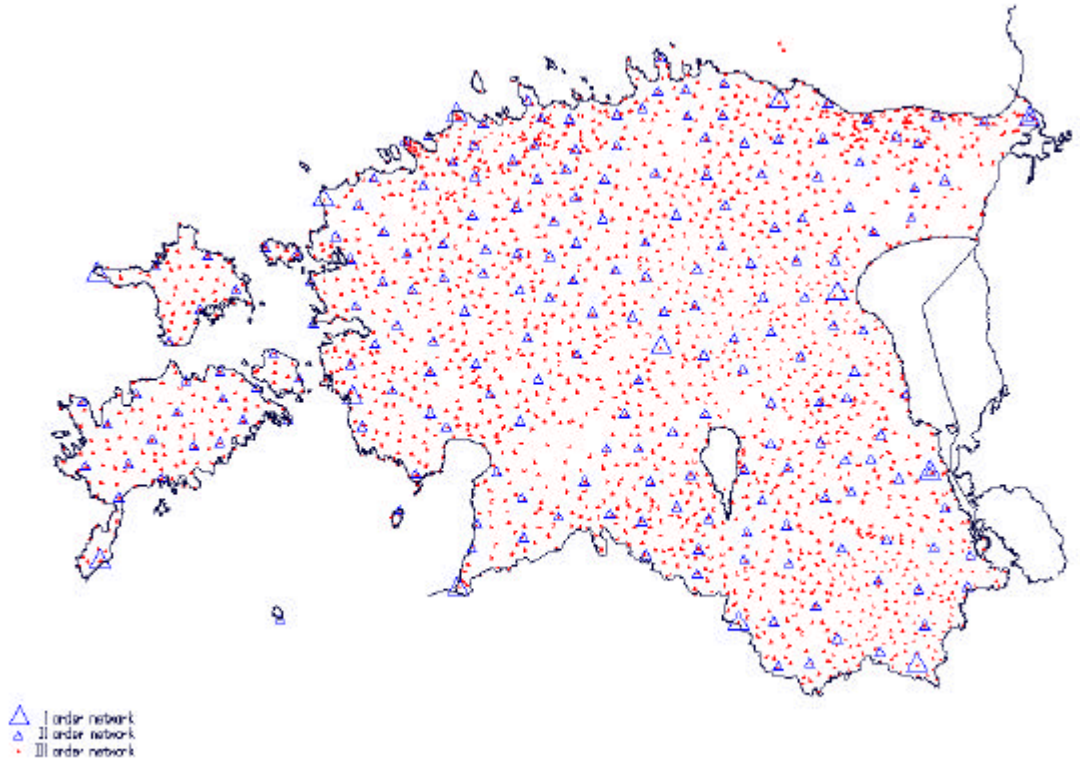

Figure1. I, II and III order horizontal network.

Geodetic Networks in Urban Areas

For the time being local geodetic networks have been established in 7 towns and settlements of Estonia. In connection with transference to the uniform cadastral information system, it is necessary to transform the existing local networks to the national

coordinate system. This work was started last year, when transformation parameters were determined and coordinates recalculated for local networks in 41 towns and settlements.

In 2001 these works will continue and the local geodetic networks of another 46 settlements will be transformed into L-EST coordinate system. A more profound establishment and improvement of local networks will be started next year.

Vertical Network

In 2000, together with the staff of the Estonian Hydrological Institute tide gauges were inspected in Estonia. The results of the tide gauge inspection have been used in the development of the project for the improvement of Estonian vertical network. This year the inspection of the I order levelling network will be carried out. Furthermore, the reconstruction of 68.1 km of I order levelling lines will be carried out next year.

Gravimetric Network

For now, the work of the re-adjustment of gravimetric networks has been completed. Currently the database of regional gravimetric network is corrected and new data (results of re-adjustments) are input. Also the analysis of adjustment methods, accuracy and software will be carried out. For 2001, absolute measurements on the points of gravimetric network are planned.

Geodetic Database

Last year the design and installation of Internet interface Volts was completed in the framework of cooperation between ELB and KMS. Volts is a WEB-based program for the establishment of public access to data via Internet, and it is based on the Informix database. Both Volts and the Informix database are the results of a several year long cooperation between the Estonian Land Board and the National Survey and Cadastre of Denmark (KMS).

The adjustment of Volts (KMS similar program called Valdemar) into Estonian conditions was started in the autumn of 1999, it was followed by a visit of the Land Board's and Map Centre's specialists to Denmark in the spring of 2000 with the aim of getting acquainted with the final version. In December 2000, the final version of Volts was installed by the Danish specialists.

In December 2000 ELB, Estonian Map Centre and KMS conducted EstGeo Database course, which treated the design and functionality of EstGeo database, as well as the data

processing programs. In April this year the course was followed up by training in Denmark, which treated the theoretical principles of databases.

Further work related to databases includes the analysis of the structure and functionality of the existing databases, checking of the existing data, formatting of data for input, analysis and digitising of point schemes.

Reconnaissance and coordination of the Struve Geodetic Arc

The International Institution for History of Surveying & Measurement has initiated a campaign to include the preserved points of the Struve Meridian Arc in the UNESCO World Heritage List.

The intention was to include in the List 2-3 points from every country the Struve Arch was passing through. In Estonia there are 22 points of which we recommended to include in the List the Tartu Observatory and the end stations of baseline situated in Simuna, Lääne-Viru county.

The initial point in the Tartu Observatory was situated at the centre of the observatory's cupola. The NW end station of Simuna (Katko) - Võivere baseline is monumented with a 1.15-m high granite obelisk under which the marker is situated. Up to now it was thought that the marker of SO end station in Võivere had been destroyed, but it was found with the help of instruments. The marker is a big granite stone with a bored hole in the centre and it is located in the soil at the depth of 20 cm.

The coordinates of all three points were determined by GPS and terrestrial measurements and forwarded to the representatives of the International Institution for History of Surveying & Measurement.

Re-measuring of calibration baseline in Vääna

In October 2000 the re-measuring of calibration baseline in Vääna took place with the help of the Finnish Geodetic Institute. The baseline was measured in all combinations and results as well as the Certificate of Calibration were sent to the Estonian Land Board at the end of the year 2000.

[1] Karin Kollo, Estonian Land Board Mustamäe tee 51 Box 1635 10602 Tallinn, Estonia; Tel.:+3726650619, Fax: 3726650604; e-mail: karin.kollo@maaamet.ee