

Analytical Cadastre Practical Aspects – Research Report

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Introduction

- About a decade ago the SOI (Israel Mapping Center) started to research and investigate possibilities of creating digital and analytical cadastre.
- A lot of experience achieved in our company in the last decade, actually we were pioneers in Israel in that area: investigating and creating Analytical cadastre. It began in researching the criteria for measuring and criticism for analytical cadastre on 5 registered blocks in Dalyat-El-Carmel (Haifa mountains in the north of Israel); Continued with calculating and defining analytical cadastre of 15 out of 60 registration blocks along the Mediterranean seashore; And now a days we accomplished a project of 39 out of 69 registration blocks at Lakhish district, in area characterized with hilly land, and mostly cultivated and with few agricultural settlements.

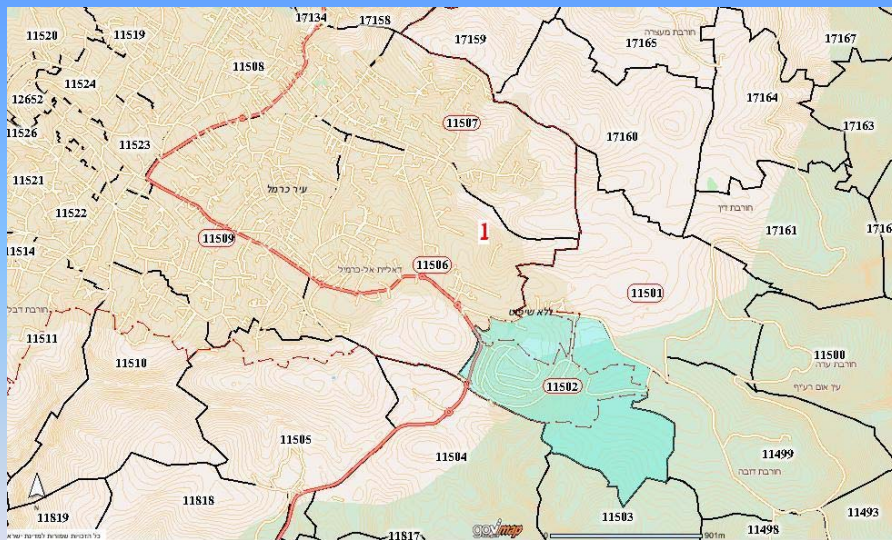
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Projects Locations

- 1. Dalyat El Carmel – 5 Blocks**
 - 1. Carmel Mountain
 - 2. Very dense village
- 2. North-West Part-15 Blocks**
 - 1. Mediterranean sea shore
 - 2. The city of Nahariya
- 3. Lachish District – 39 Blocks**
 - 1. Hilly and cultivated area
 - 2. Rural, country side area



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North-West of Israel

- Flat, sea shore area
- Most original field books not found
- To be transformed to the new 2005 network



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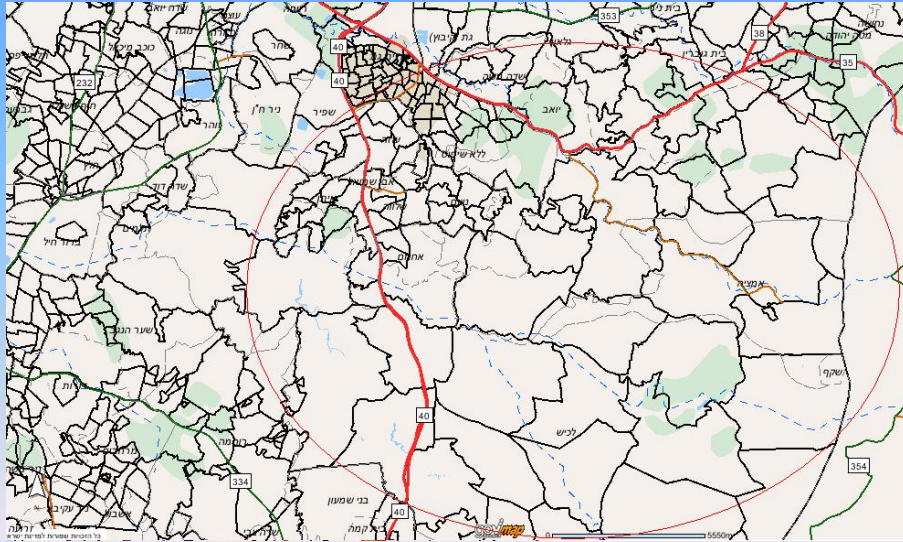
Nahariya

- Modern City
 - » Wide roads
 - » Fences and walls
 - » Many mutation plans
 - » Lost field books



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Lakhish District



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Lakhish Area

- **Hilly, mostly cultivated area**
- **39 blocks from different types**
- **Scakes from 1:625 down to 1:10,000**
- **Hundreds of control points**
- **Thousands of border corners**
- **Many Authentic points found on ground**

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From Analogue to Digital

- 1. Gathering all the background information about the registration blocks, such as original field books which contain the authentic measurements and observations took on the act of registration, field sheets that contain direct measurements and corrections of wrong boundaries, registration maps and mutations, block sheets, control net points and so on.**
- 2. Calculating and adjusting authentic measurements in the original control network and approximate transforming to the new control network.**
- 3. Field measurements, usually GPS measurements of authentic preserved border marks and control network points.**
- 4. Accurate transforming to the Israeli datum and control network, while joining all blocks together.**
- 5. Quality control checks.**
- 6. Final definition of the cadastre (with full reports from all stages), and assimilate it in the national geographic information system.**

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Projects Scopes

- 2 Research Projects and 1 applied project**
- From very large to very small scales**
- Characterize different types of Blocks**
- Trying to find best model for each case**
- Solving transformation problems**
- Development of many algorithms and tools for building the Database**

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Control Network

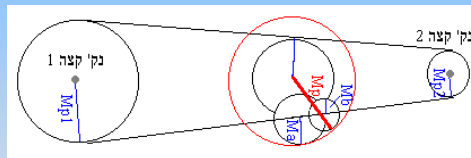
- From Gauss-Krueger to WGS84 Datum
- From Cassini-Soldner mathematical projection to UTM geometrical one.
- From optical and manual measurements to electronic and automatic data recorders
- From hanged traverses to individual GPS control points

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Error propagation

- Run-Offset errors superposition

$$Mp = \sqrt{Ma^2 + (\sqrt{(Mp_A^2 + Mp_B^2)}/2 + Mb)^2}$$

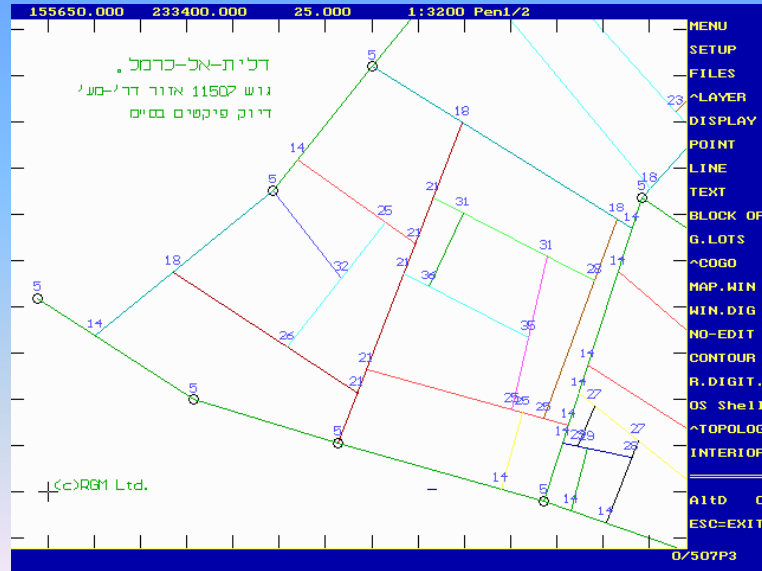


- Spread of errors rule in measurement lines

$$Mp = \sqrt{Ma^2 + Mb^2 + [(1 - \frac{a}{l})^2 + (\frac{b}{l})^2]Mp_A^2 + [(\frac{a}{l})^2 + (\frac{b}{l})^2]Mp_B^2}$$

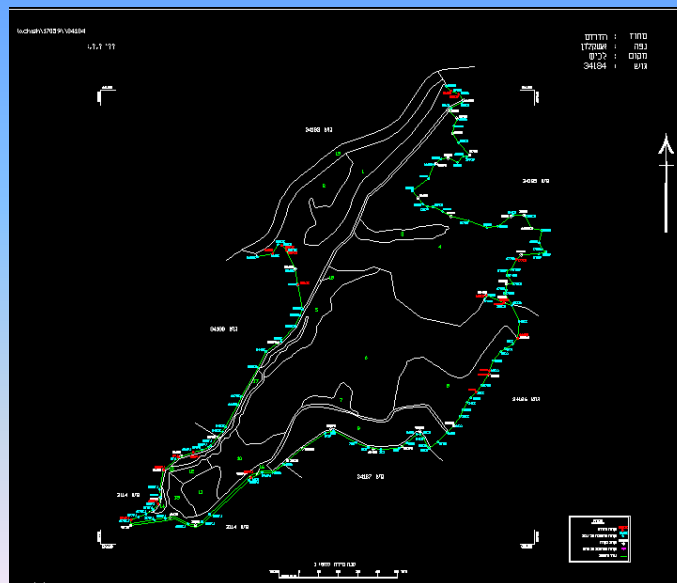
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Error propagation in chain surveying



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Tips and Anecdotes



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