

Establishment of Coordinate Based Cadastre in Negev Desert

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INTRODUCTION

- **Cadastre –**
 - system of land property registration and management including information about land parcels and ownership
- **Israeli cadastre today –**
 - based on block maps, mutation plans and parcel boundaries ground markings having legal validity
- **Aspiration –**
 - establishment of digital cadastre based on coordinates determined in accurate geodetic grid

CADASTRE FORUM IN SOI

→ 2008 - establishment of the Cadastre Forum in SOI

The main goals:

- Analysis of current experience gained during the series of pilot projects recently initiated by SOI
- General approach to establishment of coordinate based cadastre in Israel
- Plan of activities for the next decade concentrated on realization of general approach
- Initiation of wide scope practical project aiming at establishment of coordinate based cadastre in certain region

CADASTRE FORUM IN SOI

Comprehensive plan adopted by the Forum:

- Analysis and classification of original cadastral documents having legal validity for parcel boundaries restoration
- Identification of original parcel corner points (authentic ground marking) and their measurement
- Analysis of accuracy of old cadastral works (block maps, mutation plans)

CADASTRE FORUM IN SOI

- Preparation of national GIS, maintained in SOI, for check and storage of a new cadastral information
- Initiation of activity on parcel boundaries restoration of existing cadastral parcellation
- Intensification of R&D activity concerning cadastral routine procedures and establishment of coordinate based cadastre
- Initiation of juridical activity for a new cadastral legislation supporting the process of establishment of coordinate based cadastre

"CADASTRE NEGEV" PROJECT

Why in the Negev Desert?

- Lack of detailed cadastral information, excepting block maps 1:20,000
- Lack of parcel boundaries markings on the ground
- Project area is in the State possession
- Project area is about 50% of the territory of the State of Israel

"CADASTRE NEGEV" PROJECT

Project Goals:

- Transformation of existing parcellation in the non-built-up areas of the southern Negev into **analytical coordinate based continuity** holding strong topological compatibility between adjacent cadastral blocks
- Obtaining **optimal corner point coordinates** that eventually would be declared as those having juridical validity for parcel point's restoration

"CADASTRE NEGEV" PROJECT

Two kinds of cadastral information concerning project region maintained in SOI

- **Physical block maps** containing graphical description of parcel boundaries
- National GIS database including **digital cadastral data**

Two ways of solution:

- Digitizing of the cadastral maps, their subsequent connection into digital coordinate based continuity by adjustment of exterior boundaries

OR

- Fitting GIS digital cadastral continuity to physical block maps and adjustment constraints

PROJECT IMPLEMENTATION

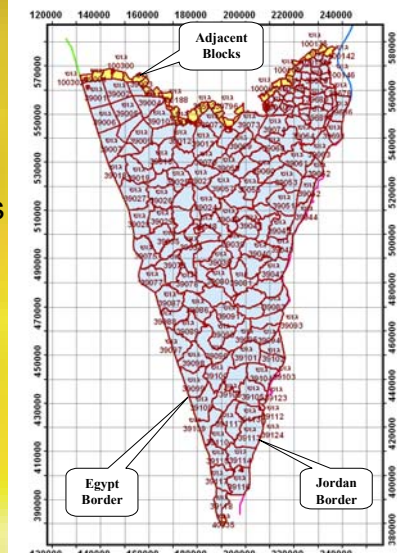


Project area:

- non-built areas including 220 cadastral blocks



- 130 adjacent blocks partly built-up



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PROJECT IMPLEMENTATION

Graphical Improvement of GIS Data

GIS cadastral layer originally created by digitizing the original block maps, suffers from mismatches compared to the block maps

- The goal – to use the cadastral layer of the national GIS as an initial dataset for the project
- The task – to fit **vector** cadastral data to geographically registered **scanned** original block maps

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PROJECT IMPLEMENTATION

Constraints for data adjustment

- Authentic parcel points ground marking
- Adjacent built-up cadastral blocks
- International borders

PROJECT IMPLEMENTATION

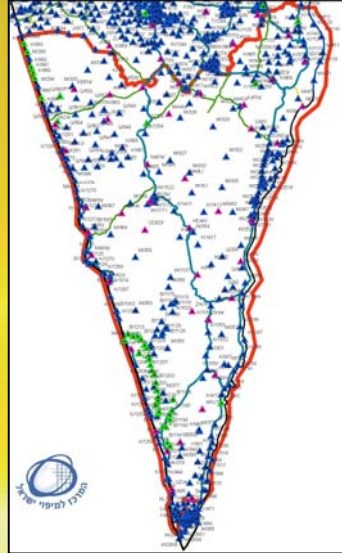
Authentic Point Identification

Two kinds – geodetic control points and points situated on margins of road parcels (or on road axis)

- The goal – to use the authentic points as the basis points for parcel boundaries adjustment
- The task – to identify the original parcel corner points on the ground and to precisely measure their coordinates

PROJECT IMPLEMENTATION

Authentic Control Points & Road Parcels



- approx. 200 control points
- thousands of points belonging to road parcels

PROJECT IMPLEMENTATION

Authentic Point Measurements

- Extensive use of satellite technology as a result of a large geographic scope of the project
- Performance in RTK mode by use of Permanent Reference Stations and VRS or private RTK
- Performance GPS measurements and following PP in the case of lack of cellular covering in remote areas of the desert region

PROJECT IMPLEMENTATION

Connection to Adjacent Areas

These areas have detailed cadastral information:
mutation plans, field books, computation
brochures and block maps

- The goal – to use the parcel corner points in adjacent areas as the outer frame of the project region
- The task – restoration of parcel boundaries according to the requirements of the Surveying Regulations

PROJECT IMPLEMENTATION

Connection to International Borders

The project area borders with two neighboring countries:

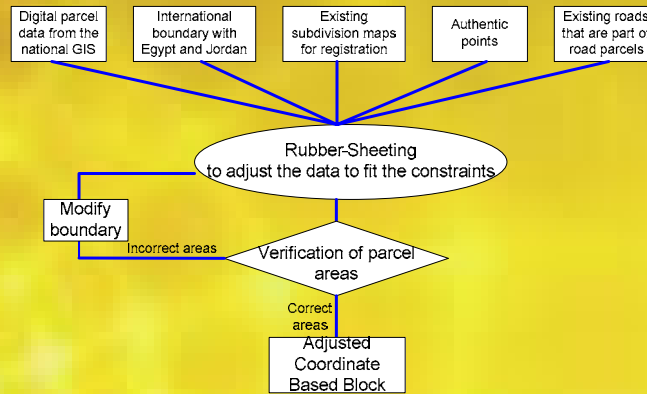
in the west - with Egypt

in the east - with Jordan

- The goal – to use the international borders as the outer frame of the project region

PROJECT IMPLEMENTATION

Data Adjustment



➔ The goal – achieving the required accuracy and combining of all available information

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RESULTS AND PRODUCTS

The contractor will provide to SOI:

- Coordinate based cadastral data in CAD format
 - Cadastral data (ASCII files) formatted according to the special pattern for computerized checking and loading to the cadastral layer of national GIS
- The new digital data regarding parcel boundaries will replace the existing GIS data containing numerous discrepancies and mismatches

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CONCLUSION AND FUTURE WORK

- The presented project is one of the most important projects initiated by SOI in the last decade aiming at implementing coordinate based cadastre in Israel
- The presented project is unprecedented by its geographic extent, spreading over the vast territory of the Negev Desert
- The experience obtained during performing of current project will be used in future projects of coordinate based cadastre

Thank You