HIGHER TECHNICAL INSTITUTE

CIVIL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

PRODUCTION OF A TOPOGRAPHICAL MAP

CI977

BY
POLYCARPOU MARIOS
&
POUPAS ANDREAS

JUNE 2003

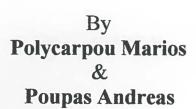
HIGHER TECHNICAL INSTITUTE

CIVIL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

PRODUCTION OF A TOPOGRAPHICAL MAP

C/977



JUNE 2003

HIGHER PROJECT NO.
TECHNICAL 3388

PRODUCTION OF A TOPOGRAPHICAL MAP

By
Polycarpou Marios
&
Poupas Andreas

Project report submitted to

The Civil Engineering Department of
Higher Technical Institute

Ĭ

Nicosia - Cyprus

In partial fulfillment of the requirements for the Diploma of TECHNICIAN ENGINEER

In Civil Engineering

June 2003



CONTENTS

		Page
	Acknowledgements	V
	Summary	VI
	Introduction	1
1	DETAIL SURVEY	4
1.1	Introduction	4
1.2	Equipment used in detail survey	4
1.3	Basic surveying rules	5
1.4	Errors	5
1.5	Methods of setting out a third point to two known points	6
1.5.1	Using ties	7
1.5.2	Using offsets	7
1.6	Field work	8
12	TRAVERSE SURVEY	10
2.1	Introduction	10
2.2	Types of traverses	10
2.2.1	Open traverse	10
2.2.2	Close traverse	11
2.3	The theodolite	11
2.4	Setting up the instrument	12
2.5	The total station	13
2.6	Problems and errors occurred with the total station	13
2.7	Basic principles of traversing	13
2.8	Measurement of horizontal angles	14
2.9	Errors affecting angular measurements	14
2.10	Bearings	15
2.10.1	Types of bearings	16
2.11	Latitudes and departures	17
2.12	Misclosure and adjustments	17
3	LEVELLING	19
3.1	Introduction	19
3.2	Definitions	19
3.3	The level	20
3.4	Types of levels	20
3.4.1	The dumpy level	20
3.4.2	The tilting level	21
3.4.3	The automatic level	21

3.5	Setting up the level	22
3.6	Levelling up the level	22
3.7	Surveyors staff	23
3.8	Booking and reducing	23
3.8.1	Rise and fall method	23
3.8.2	Height of collimation method	24
3.9	Uses of levelling	24
3.10	Check on adjustments on a level (two peg test)	25
3.11	Errors in leveling	26
3.11.1	Gross errors	26
3.11.2	Constant errors	26
3.11.3	Random errors	26
3.12	Contours	27
3.12.1	Grid method of contouring	27
3.13	Uses of contour plans	27
4	TOPOGRAPHIC MAPS	28
4.1	Introduction	28
4.2	Topographic map	28
4.3	Reading a topographic map	29
4.4	Information shown on a topographic map	30
4.5	Topographic symbols	31
4.6	Plotting methods	33
5	NEW TECHNOLOGY	34
5.1	Introduction	34
5.2	Laser level	34
5.3	Global positioning system (GPS)	35
5.3.1	GPS elements	35
5.3.2	Satellites in space	37
5.3.3	Ground control stations	38
5.3.4	Receivers	38
6	RESULTS & CONCLUSIONS	39
6.1	Results	39
6.2	Conclusions	64
7	PHOTOGRAPHS TAKEN ON SITE	65
	References	71
	Appendix A	72
	Appendix B	76
	Maps	77

ACKNOWLEDGEMENTS

Our sincere thanks to everyone who helped us carry out this project.

Dr. Chrysostomou Christis, lecturer of Civil Engineering Department of H.T.I., supervisor of this project, for his guidance and advice during the whole process of this project.

Mr. Ioannis Economides, lecturer of Civil Engineering Department of H.T.I., for his guidance and assistance in the procedure of the misclosure and adjustment stage.

The H.T.I. superiors and lab assistance's for providing us all the equipment used and for trusting us to be in capable hands during the whole process of the project.

Athinodorou Athinodoros, friend and student of the H.T.I. Mechanical Department, for his assistance during the levelling stage of the project.

SUMMARY

The object of this project was to produce a topographical map of an area chosen in Strovolos, behind the new Pagkypria Stadium (GSP).

An investigation survey was made as so that the boundaries and stations to be used to be chosen. Six stations were chosen with a middle point helping us for the different checks around the traverse.

The area was detailed at first using the double line booking method, which was then finished off with the method of tacheometry. Levelling was done using the grid method.

The instruments used during the whole traversing and levelling procedure were: a theodolite, a total station with its prisms and an automatic level with a staff. Levelling was carried from independent stations that covered the whole area.

Finally four maps were produced. A traverse map, which shows nothing but the stations chosen, a detailed map, which shows the details of the area, a contour map showing clearly the grid and contour lines observed and the final topographic map, which shows all traverse, details and contour lines.