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ORTHOPHOTO MAPPING

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ABSTRACT

An orthophoto map is defined as a photographic reproduction prepared from a perspective photograph in which the displacement due to tilt and terrain relief is corrected. So that it has the same metric properties as map.

For the production of orthophoto maps different types of equipment can be used. These are classified into three groups

- Orthophoto producing equipment attached to an existing stereoplotter
- Autonomous on-line systems
- Off-line systems.

Eventhough the orthophoto mapping is part of photogrammetry different departments like ground survey, cartography and reproduction are involved for the completion of the work .

The possibility of using orthophotomaps as a substitute for conventional line maps for various applications has developed in the Ethiopian Mapping Authority. Our experience to date has confirmed that the production and use of orthophoto map at suitable scales , can be a fast and economical solution for providing the required information in all urban application involving different types of land use and terrain conditions. In comparison with linemaps of the same scales the method has proved to result in a reduction of production time and cost.

ORTHOPHOTO MAPPING

Photogrammetry is an art, a science and a technology of obtaining reliable measurements by means of photographs. The best know application of photogrammetry is in the field of topographic surveying and mapping. It is the means of performing the actual delineation of the map details, and also minor control points can be established by using aerotriangulation method; this reduces the total labor for field surveys. Photogrammetric techniques are used to bring forth an almost endless variety of useful products that convey information about given surfaces or objects. One of these products is orthophoto map. An orthophotomap has the basic attributes of a map, a known scale and a known orientation system. It may be cartographically enhanced by adding standard map symbols, names and other datas as required by the user.

Nowadays, the orthophoto technique has developed to the extent that any type of terrain can be represented accurately and economically in the form of orthophoto maps. The new computer supported ortho-projectors allow fast and efficient orthophoto mapping through high quality optical means with the maximum output speed of 55mm/s and slit width ranging from 2mm to 16mm. Depending on the size of the sheet a complete orthophoto cycle requires between 20 to 509 minutes.

Orthophoto map and a line map are both orthogonal projections on a reference plane and have the same geometric property including a known scale. Details on a line map are plotted symbolically and some are not shown on the map whereas all features on the terrain are clearly depicted on the orthophoto map. Areas which are densely populated will take a lot of plotting and editing time. This time consumption will increase the production cost.

Many contrives have used orthophoto maps for different purposes such as map revision, civil engineering projects, cadastral and urban applications and also as a base map for preparation of line maps.

When we compare orthophotomap with a line map there are certain similarities as well as differences. The similarities are:- both have the same geometric properties. Both are orthogonal projections; all map information such as contours, grids, names, symbols and manmade features are shown in both cases.

Besides the similarities exhibited by both kinds of maps there are also differences which indicate the advantages of orthophotomaps;

- Orthophotomap shows the natural representation of the area. The following types of information generally are more fully shown on orthophotomaps. The drainage patterns are more complete, vegetative cover is more accurate, cultivated areas are evident, field lines are shown and all features are shown in their true positions; there are no displacements due to cartographic symbolization.
- Due to the omitting of the plotting time consumed for dense planimetric details the production is very fast.
- Plotting time has a direct effect on the cost of mapping so that orthophoto map of big cities with crowded details are much cheaper than a line maps.
- Area like deserts and lakes are better identified on an orthophoto map than a line map where it is difficult to located the position because of very little topographic features.

- An orthophotomap is a simple Interpretable guide for map users. All details on the map has their natural features, they are not represented by symbols as in a line map. This avoids the additional study of the legends to identify each represented symbol on the map.
- Orthophoto map can be produced as fast as possible for immediate use of different studies such as urban planning, change of environments. etc.

Due to the above mentioned advantages and the rapid change of technology the Ethiopian Mapping Authority has introduced orthophoto mapping technology since 1991.

To start with, EMA has one analytical plotter with a package software for the primary data acquisition and on computerassisted wild avioplan OR1 for the orthoproduction. Training on the system for EMA personnel was given for a period of one year. At present, the Authority is working on its first project to cover Addis Ababa at the scale of 1:10,000 on a sheet size of 50x80cms. The whole of Addis Ababa can be covered by 21 sheets and to-date EMA has produced 12 sheets and the remaining 9 sheets are on progress.(Annex 1)

Besides this project, the Authority is ready to offer orthophoto maps for different users according to their interest. The Ethiopian Mapping Authority is going to produce orthophotomaps from SPOT at the scale of 1:50,000. This will be much cheaper and faster than those produced from aerial photographs. Due to the large coverage of the scene it is possible to cover more areas in shorter time.

The application of maps and especially orthophoto maps for various studies is not widely popular in developing countries and this affects the expansion of the technology and also limits its production. Informing map users what is available in the Authority will be of advantage to all concerned.

In Ethiopia town planners, civil construction companies, foresters, mine and farm developers, etc, are a few of the potentially many possible users of the orthophotomaps. The needs and demands of these customers might differ one from another, but each could be met on cost and time-effective basis upon detail exchange of opinion and understanding between the client and EMA some sample orthophoto maps prepared and exhibited by the organization are listed in Annex 2.

Annex 2

List of sample orthophoto maps

No	Name of map	Scale	Purpose
1	Bole Airport	1:2,000	Civil engineering work
2	Ziway	1:2,000	Town Planning
3	Salen Chaka	1:5,000	Forestry
4	Melka Werer	1:2,000	State Farm

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ADDIS ABABA PROJECT PROGRESS CHART

SC. 1:200,000



LEGEND



COVERED BY ORTHO
PHOTO MAP



OP. MAP ON
PROGRESS



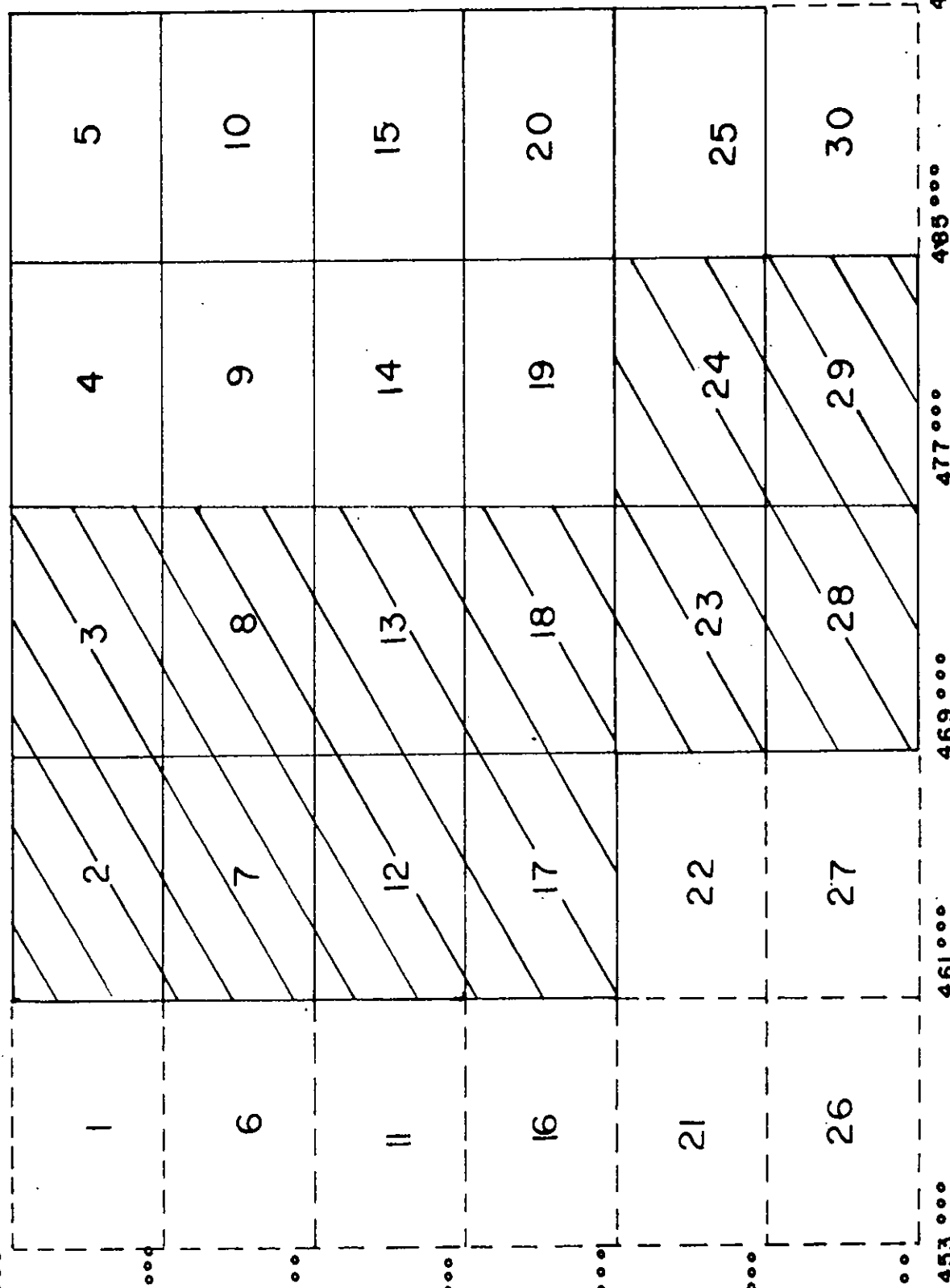
COVERED BY AERIAL
PHOTOGRAPHS

PHOTOSCALE 1:32000

OP. SCALE 1:100000

NO. OF SHEETS - 21

SHEET SIZE 50X80



DATE 22/01/93

