



THEME: DEVELOPMENT OF A METHODOLOGY CREATION OF DIGITAL TOPOGRAPHIC PLANS OF TERRAIN INCLINATION

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Abstract:

Every year during the rainy season, large water flows accumulate on the streets of Samarkand city. This work is devoted to the methodology development for creating digital topographic plans of the terrain slope in order to identify the rainwater accumulation on the city streets. When creating digital topographic plans of the terrain slope, stereo topographic methods were used using data from remote sensing of the Earth.

The general technological scheme for creating plans based on Earth remote sensing data consists of the following stages: - editorial and preparatory work; - photogrammetric processing; - creation and updating of the terrain; - automated decryption and vectorization of data; - creation and updating of the terrain; - creation and updating of DTC and CPG baselines; - generalization of DTC and CPG to obtain derivatives (smaller) scales; - quality control and data correction; - placing DTC and CPG in a temporary archive; - updating the spatial database. Practical work was carried out at the object "Intersection of Dagbitskaya and Registan streets".

Based on the performed work results, a topographic plan of the slope area was drawn up, indicating where the seasonal rainwater accumulation begins.



KEYWORDS: Remote sensing, topographic maps, photogrammetry, decoding, photomaps, generalization, relief, transformation.

INTRODUCTION

When creating digital topographic slope plans stereo topographic methods were adopted with using Earth remote sensing data. When creating digital topographic maps and plans using stereotopographic survey methods, a set of office work is carried out, including: preparatory work, photogrammetric thickening of the geodetic reference network, production of photographic plans, decoding, stereoscopic photography of the relief, collection of information about contours from a photographic plan, single shots or stereopairs, editing of plans (maps) originals, presentation of maps and plans originals in digital and graphic forms.

Photo-topographic shooting is a topographic survey using photogrammetric images and photogrammetric methods of their processing.

Stereo phototopographic survey - phototopographic survey by measuring stereomodels of terrain, created from images on processing photogrammetric devices (analog, analytical, digital).

MAIN PART:

Technology implementation of the plans creation for the area slope. The general technological scheme for creating plans based on Earth remote sensing data (ERS) consists of the following stages: - editorial and preparatory work; - transformation of raster data (photogrammetric processing); - automated decoding and vectorization of raster data; - creation of digital topographic plans of basic scales; - creation and updating of the terrain; - construction of contour lines by DEMs and isolines by point objects;- processing and adjustment of altitude matrices; - formation of three-dimensional topographic maps of the area; - quality control and data correction. Practical work was carried out at the object "Intersection of Dagbitskaya and Registan streets".

Editorial and preparatory work

Satellite images obtained from Google Earth Pro 2021 Coogle Image Landsat/Copernicus software were used to create topographic slope plans. (Fig. 1). Transformation of raster data of digital topographic plans was carried out.



Fig.1. Space images used to solve the assigned tasks.

Photogrammetric processing of satellite images. Creation of digital topographic plans were created using the software GIS "Panorama" Map. GIS software "Panorama" The map is designed to solve a complex of geodetic calculations ("Processing of geodetic measurements", "Cadastral tasks") automated systems for processing geospatial data and the creation of digital terrain modeling. Automated decryption and vectorization of Earth Remote Sensing data (Fig. 2)

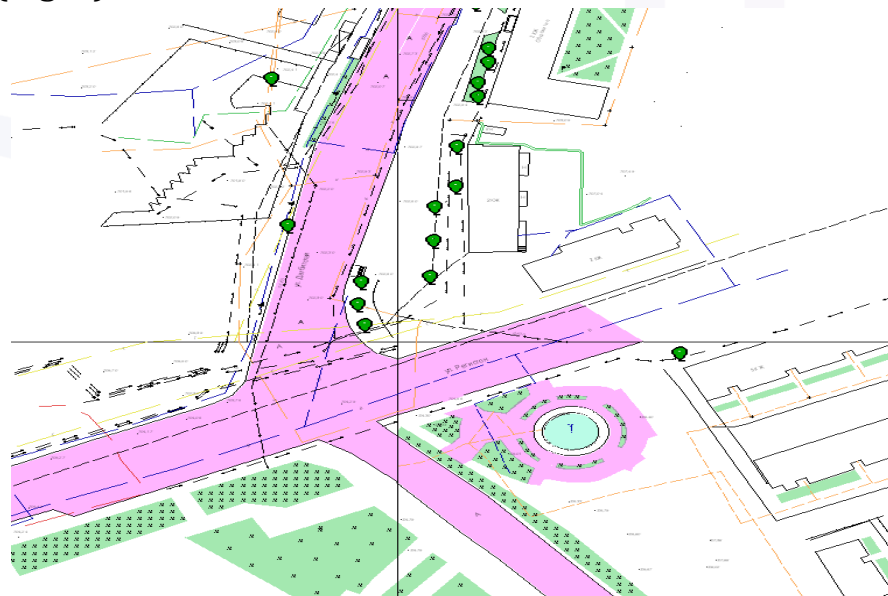


Fig. 2. Creation of digital topographic plans.

Matrix designs are represented by altitude matrices, quality matrices and geological layers matrices. Altitude matrices is a three-dimensional raster terrain model. Altitude matrices has a regular structure and contains elements whose values are the heights of the terrain. Each element of the matrix contains one height value (Fig. 3.). The structure of altitude matrices is similar to the structure of the digital elevation model DEM (Digital Elevation Model). Matrix maps include Matrix of qualities, Matrix of geological layers, matrix of layers with legend.

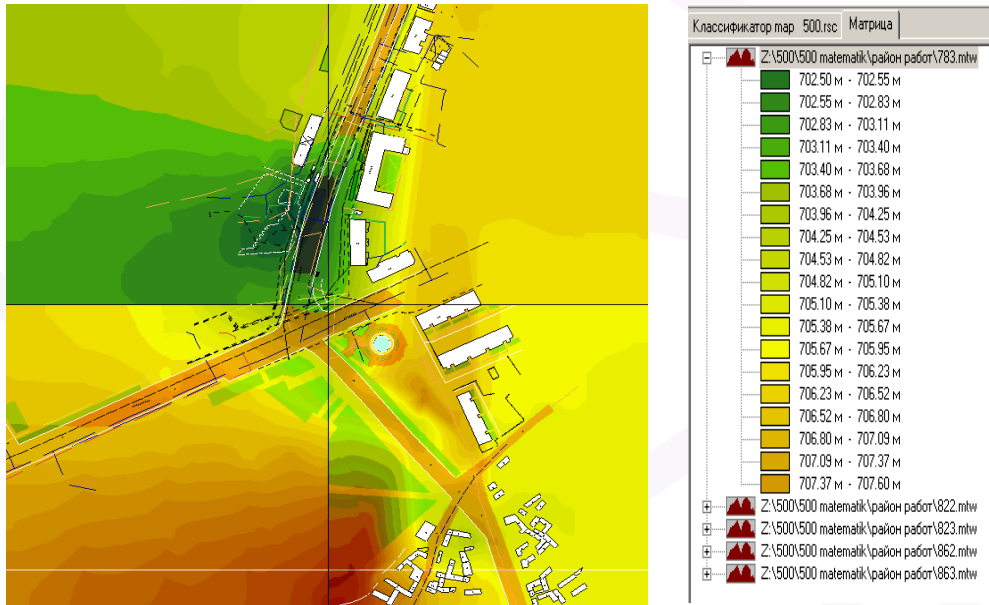


Fig. 3. Topographic slope plan in matrix view

Altitude matrices can be built in fast building mode or in normal mode. All matrix elements can be conditionally divided into two groups. The first group includes elements, which values are determined at the initial construction stage based on the information of map objects. The second group includes elements whose values are calculated using the nearest elements of the first group.

A three-dimensional terrain model in the GIS "Panorama" is (Fig. 4) a surface built taking into account the terrain, on which a vector image, raster or matrix plans can be superimposed, and three-dimensional objects located on it, corresponding to two-dimensional plans objects. It is a full-fledged three-dimensional plan that allows you to select objects on the model in order to request information about the object, edit their appearance and characteristics. On a three-dimensional model, you can see both ground and underground objects.

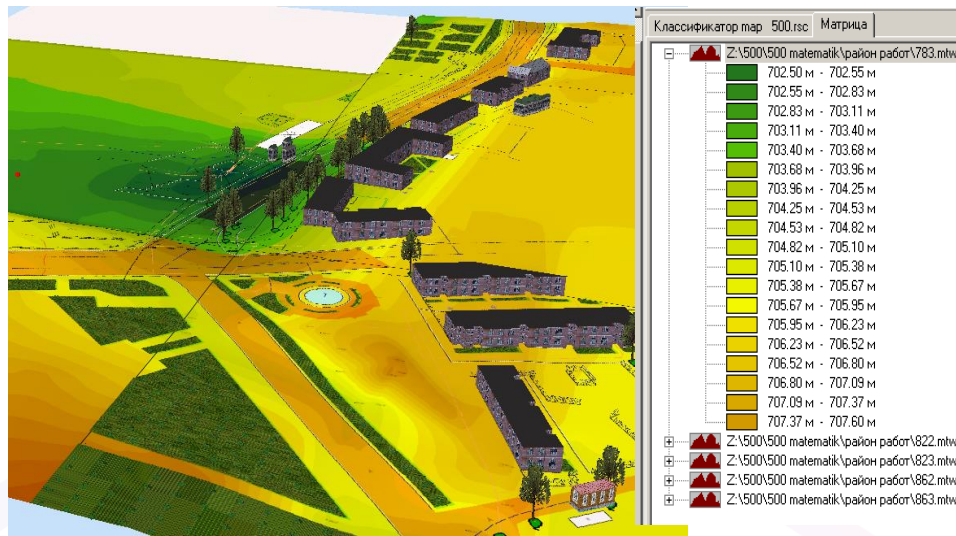


Fig. 4. 3D topographic plan:

CONCLUSION

Based on the results of the created topographic plan of the slope terrain, we can conclude:

- when creating digital topographic plans of the terrain slope, stereotopographic methods were adopted using Earth remote sensing data.
- a method for creating a topographic plan of the terrain slope has been developed;
- a topographic plan of the slope terrain was drawn up indicating where the accumulation beginning of seasonal rainwater flows;
- the accuracy of the topographic plan complies with the instructions for creating topographic plans;
- according to topographic plans, you can accurately determine the areas where the accumulation beginning of seasonal rainfall flows;
- based on the results of the work performed, a topographic plan of the slope area was drawn up, indicating where the accumulation beginning of seasonal rainwater flow.

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