

## THE METHOD OF FAVOURABLE PLACEMENT OF SATELLITE GEODESIC NETWORKS

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### ABSTRACT

*The importance of buffer zones in the establishment of satellite geodetic networks, the use of global navigation satellite systems in the maintenance of state cadastres, the importance of state geodetic networks in the cadastral system of Spain and Russia, satellite geodetic networks and their coverage in Uzbekistan, using electronic digital geoinformation systems in the establishment of geodetic networks. Scientific-practical studies were conducted to improve the accuracy of maps, and the territorial coverage of existing state geodetic networks was studied in the research area. On the basis of the studied territorial coverage, the areas not covered by the satellite geodetic networks were determined based on a special algorithm and the locations of their installation in the optimal place were determined.*

**KEYWORDS:** Buffer, Buffer Zone, Buffering, Buffer Analysis, State Geodetic Networks, Geoinformation Systems, Global Navigation Satellite Systems

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### INTRODUCTION

Establishing satellite geodetic networks in the world, carrying out purposeful scientific research aimed at achieving high efficiency by using them in conducting geodetic field research in residential areas and agricultural lands is one of the most urgent problems of today. Therefore, based on the field work carried out in the research area, the coverage of the area will be studied by first creating buffer zones for the establishment of satellite state geodetic networks in the area.

### METHODS

Developed foreign countries built their own geodetic networks, as well as urban geodetic reference points, based on GPS technologies. This, in turn, serves as a high-precision, widely useful geodetic basis for cadastral surveying of cities. In general, the main task of the automated system is to collect, store and process data on all land plots and real estate objects.

In Spain, cadastral data is compiled by the Spanish cadastral center. The main task of the center is to collect, process and update cadastral data. The essence of cadastral work consists mainly of creating cadastral maps on the basis of aerial and photogrammetric images, determining the boundaries of land plots, numbering them, finding and justifying the factors that increase property value. Involvement of private companies in the work of drawing maps and updating them has given good results. If the state spends 1 bln. If US dollars are spent, the income from the cadastre for the next 3 years will be 2.5 billion. is US dollars.

In recent decades, in Russia, as in many countries, a lot of information about land and other real estate has been collected, and the number of consumers is increasing day by day. Therefore, a land cadastral system was developed there. The system consists of three sections and includes technical, organizational and special issues.

## RESULTS

The accuracy of the buffer operation depends on the quality of the available spatial information. The quality of such information is affected by the accuracy of the source, that is, the accuracy of maps and space photographs. In addition, processes such as digitization, which is the process of obtaining and processing information, decoding images and changing the coordinates of cards, can also significantly affect the quality. The buffering operation can be performed on both raster and vector format cards. Buffer zones of 10 kilometers have been established. The project for state geodetic networks of the 1st class is considered. Based on 8 state geodetic networks in the region, a project of establishing densification networks was developed and analyzed by providing beferization every 4 km (Figure 1).

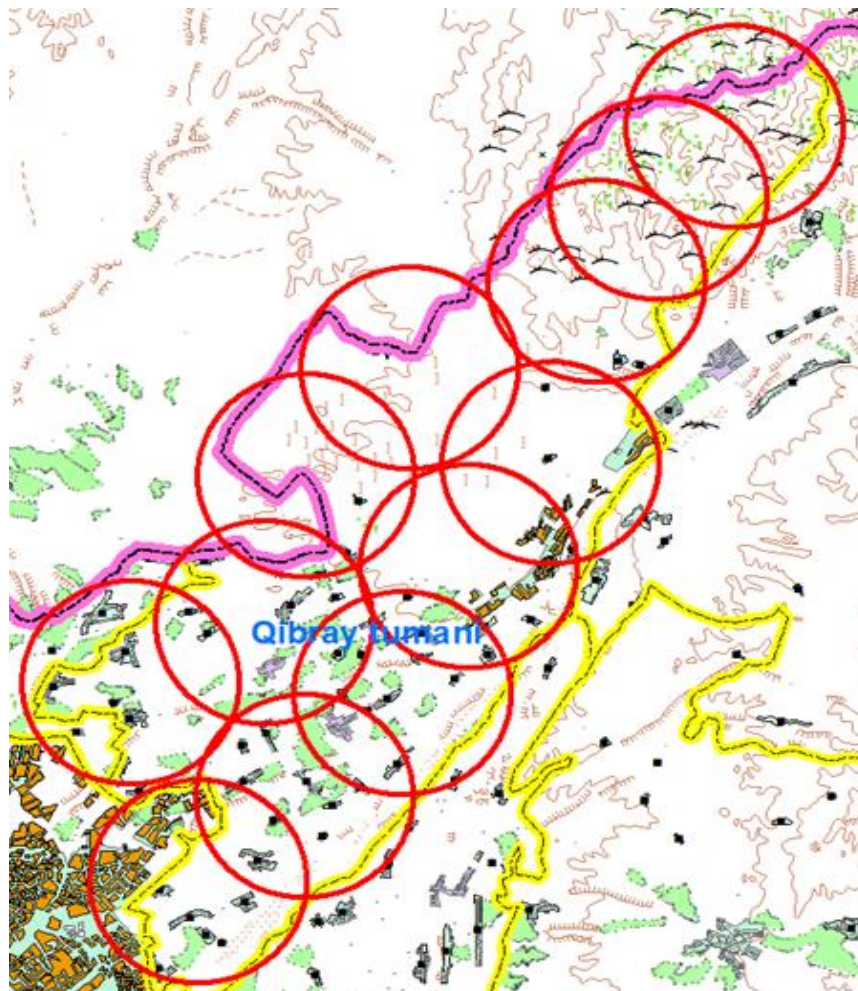


Figure 1: Scheme of Densification of State Geodetic Networks in Qibray District.

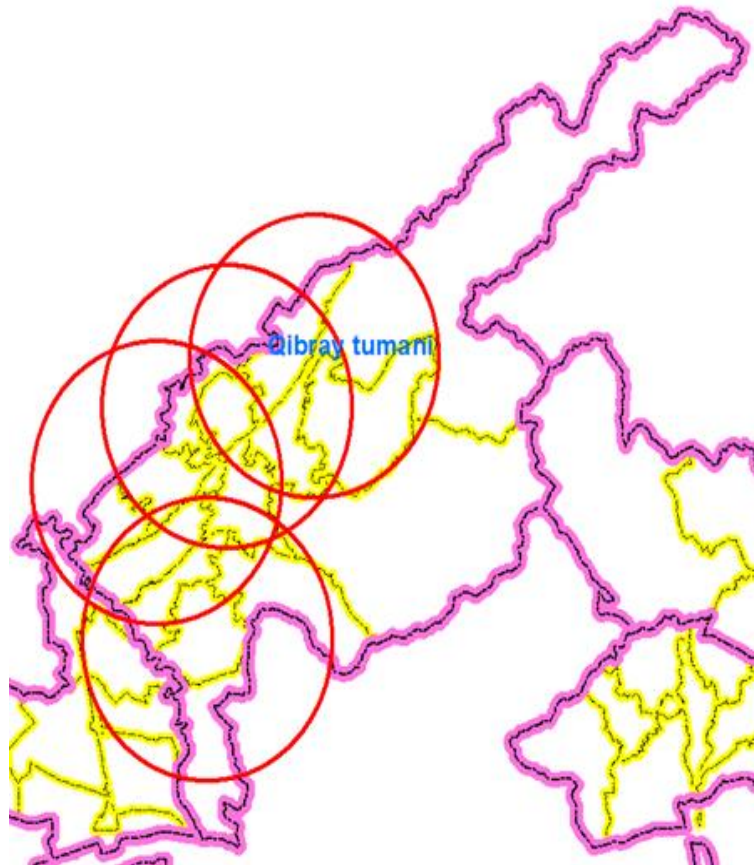
A project was developed by densification of state geodetic networks in the research area, and as a result, it was recommended to establish a total of 12 densification networks. Then there will be 20 state geodetic networks in total, 8 working state geodetic networks and 12 consolidation networks. Control of satellite geodetic networks is required to be periodically checked and leveled on the basis of these state geodetic networks.

There are 4 such satellite geodetic networks in Tashkent region, they are installed in Boka district, Yangiyol district, hirchik city and Tashkent city (Table 1).

**Table 1: Existing Satellite Geodetic Networks in Tashkent Region**

№	Region Name	Districts and Cities	The Name of the Items
1	Tashkent region	Boka district	BUKD
		Yangiyol district	YAN1
		Chirchik city	CHIR
		Tashkent city	MAGK

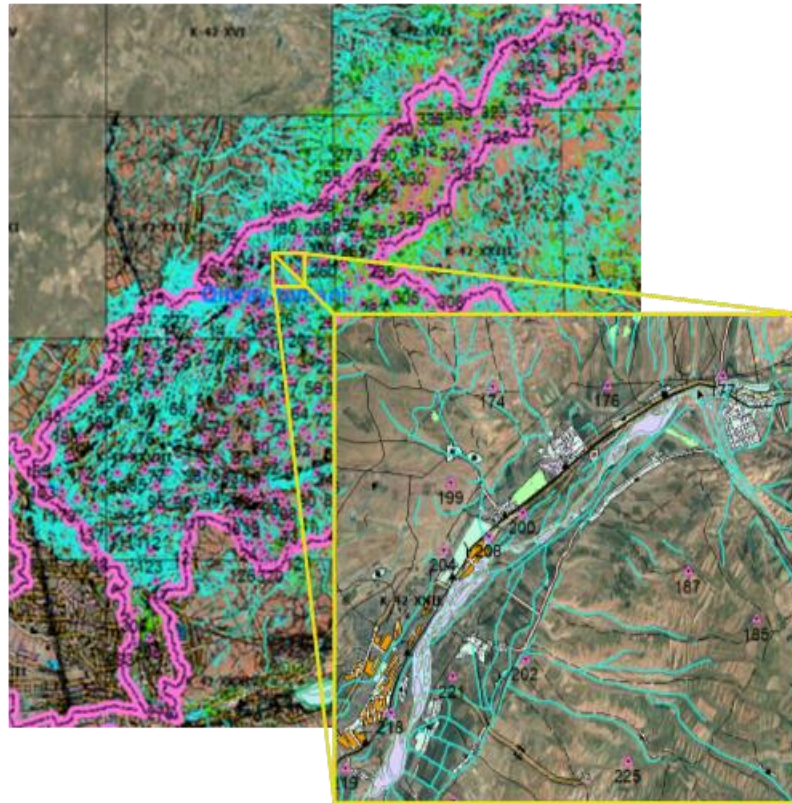
According to the analysis, the coverage of the satellite geodetic networks installed in Boka district, Yangiyol district, Chirchik city and Tashkent city cannot cover the entire Tashkent region. (Figure 2)



**Figure 2: Coverage of Satellite Geodetic Networks in the Tashkent Region within a Radius of 40 km.**

As the total coverage is on average 40 km, it is not possible to cover some areas. In addition, it is recommended by the dissertation student to reduce the coverage distance to 20 km based on foreign experiences. Based on the above analysis, we will start the initial practical processes in the research work by creating thematic layers in the geodatabase. Vector layers were formed on the basis of linear, area and point layers for thematic layers. In this way, highways, field roads, residential areas, crop types, ecoregions and, most importantly, existing state geodetic networks were formed.

Initially, space photographs were used to create an electronic digital map of the area on a scale of 1:50,000. Cosmographs were downloaded to a computer using a special SASPlaneta program and digitized based on the created thematic layers. The attributes of the digitized layers were assigned themes. The vector layers, which became the theme layer, were subjected to conditional labeling according to the DATA+ database (Figure 3).



**Figure 3: The Process of Creating Digital Cards based on Cosmographs.**

Existing state geodetic networks were included in the resulting electronic digital card. Then a total of 4 existing satellite geodetic networks for the Tashkent region were included in the geodatabase. As a result of the research in the regions, in order to fill the areas not covered by the satellite geodetic networks, a project of installing a total of 14 satellite geodetic networks was developed in Tashkent region, taking into account the coverage of the radius of 20 km.

The project of locating satellite geodetic networks with a coverage of 20 km in the Tashkent region. As a result of the project, satellite coverage was provided to all regions of Tashkent region. If the placement of satellite geodetic networks is carried out according to the proposed coverage project, we would increase the accuracy and efficiency of future geodetic field surveys.

To date, the geodetic field survey work carried out in the preparation of the topographic plan of the object is carried out on an electronic tachometer, and in order to make a 1:1000 scale plan of 1 hectare of land, which is of medium difficulty, 3 experts are required to conduct field survey work for 2-3 days. With the help of satellite geodetic networks proposed on the basis of the project, 1 specialist is required to conduct field research work for a maximum of 1 day to make a 1:1000 scale plan of 1 hectare of land, which is of medium difficulty. This, of course, has a negative impact on work productivity and serves to achieve high results in the creation of the topographic base of our republic on a scale of 1:1000.

## CONCLUSIONS

After refining the method of placing satellite geodetic grids in an optimal place, the following conclusions were reached:

- The existing satellite geodetic networks in the world were studied and the necessary experiences were obtained, and it was recommended by the researchers to set the coverage area of the networks as 20 km.
- The method of creating an electronic digital map of the territory using space photographs has been improved.
- It was recommended to assign conditional marks to thematic layers using the DATA+ database.
- The project of establishing 14 satellite geodetic network in Tashkent region was developed.
- On the basis of the developed project, the efficiency of geodetic field research has doubled, and the level of measurement accuracy has increased.

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