



IMPROVING DATA ACCURACY IN URBAN ZONING OF AGRICULTURAL LAND

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ABSTRACT

In the development of land construction projects for the allocation of agricultural lands to the urban area, among other things, the border lines between the Tashkent region and the city of Tashkent were topographically mapped, and vector layers were developed in the form of point layers and geovisualized in a field view. The total land area of the city of Tashkent was studied using a GPS satellite wave receiver. Field research works were vectorized in a field layer consisting of a total of 784 points on the Tashkent region and 776 points on the border of the city of Tashkent.

KEYWORDS: Land area, agricultural land, land development projects, GPS (Global Positioning System) - satellite wave receiver, electronic total station, topographic survey, point layers, vector layers, boundary lines.

INTRODUCTION

In our republic, comprehensive measures are being implemented in connection with the rational and effective use of land resources, proper organization of land formation and land monitoring, especially the allocation of agricultural land to urban areas, and certain results are being achieved. In the development strategy of New Uzbekistan for 2022-2026, paragraph 81 defines as important strategic tasks "...revision of the boundaries of land areas and making changes". In the implementation of these tasks, among other things, it is important to create a system that has an innovative effect on the activities of land users and to constantly improve it, to allocate agricultural land to the urban area, and to conduct scientific research on ensuring the stability of the agrarian sector and the food security of the country.

THE MAIN FINDINGS AND RESULTS

Decree of the President of the Republic of Uzbekistan of June 8, 2021 № PF-6243 "On measures to ensure equality and transparency of land relations, reliable protection of land rights and their transformation into a market asset", Decision of the President of the Republic of Uzbekistan № PQ-4575 of January 28, 2020 "On measures to implement the tasks set in the strategy for the development of agriculture of the Republic of Uzbekistan for 2020-2030", This scientific article serves to a certain extent the implementation of the tasks defined by the Cabinet of Ministers of the Republic of Uzbekistan, August 27, 2021, No. 543, "Administrative regulation on the allocation of land plots for permanent use for state and public needs" and other regulatory legal documents related to this activity.

The authors carried out the field research work on the allocation of land from agricultural land for residential areas with the help of several geodetic devices. Among them, it is possible to cite electronic tachymeter, GPS (Global Positioning System) and GNSS (Global Navigation Satellite System) geodetic devices.

Field topographic research was carried out to determine the amount of agricultural land based on the rectangular coordinate system using an electronic tachymeter geodetic device. In this case, land types and boundaries of administrative-territorial units were determined. Leica TS06 brand electronic tachymeter was used in the conducted field research, and the device serves to achieve results with an accuracy of 3 seconds.

With the help of GPS geodetic device, land users and types of arable land were mapped on the basis of field layers. A Stonex R7 GPS device was used in the conducted field research, and the device serves to achieve results with an accuracy of 7 seconds.

All field surveys carried out with the help of a GNSS geodetic device were used to increase the accuracy. The GNSS device of Chckaw i-70 brand was used in the conducted field research, and the device serves to achieve results with an accuracy of 2 seconds.



The main field work carried out in the study was topographical, taking into account the demarcation of agricultural and residential areas and the surrounding infrastructure (roads, irrigation networks, cropland, gas supply pipelines, electric power facilities and lines, and waste landfills). consists of creating a map (Fig. 1).

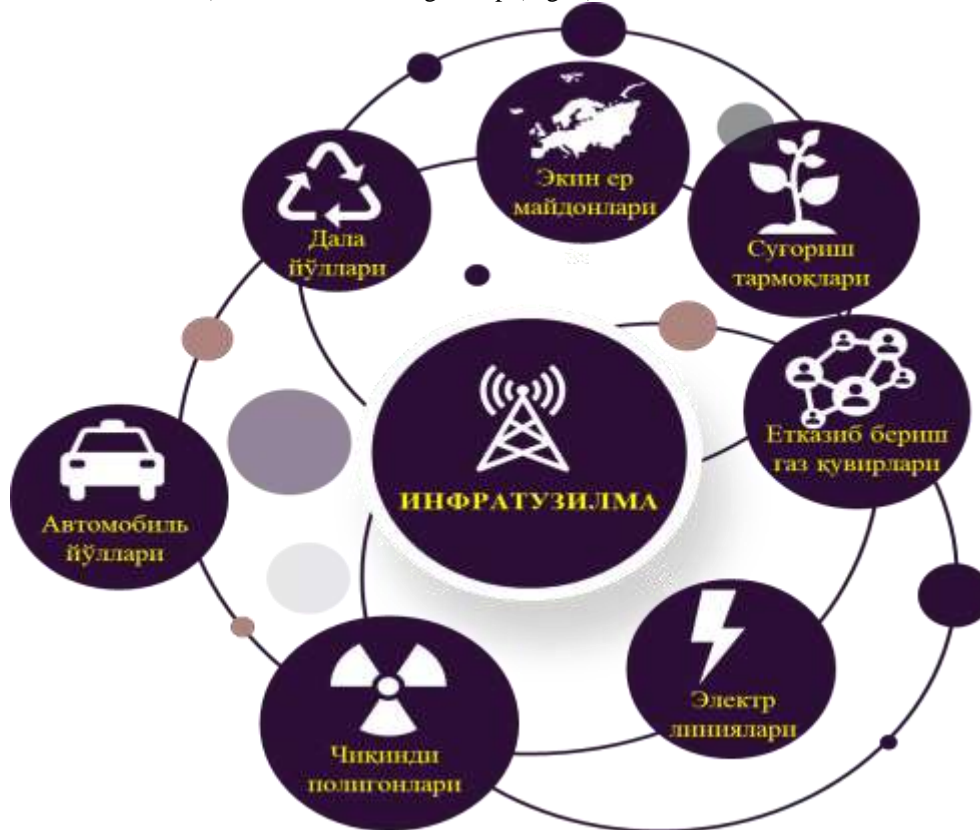


Figure 1. Scheme of consideration of infrastructure in conducting topographic field research.

Taking into account the infrastructure in the Tashkent region, the existing materials were first studied, and an outline was formed based on the information of “Openstreetmap”. The formed outline was used to study the coordinates of objects on the ground in the electronic tachymeter. Field research conducted on Leica TS06 electronic tachymeter was carried out based on the following sequence:

1. In order to study the designated area from a topographical point of view, first of all, reconnaissance (surveillance and/or reconnaissance) is carried out in the area, and an outline of the area is drawn.
2. After a complete survey of the area, the most suitable place for setting up the base was chosen. Most of the area should be visible when viewed from a suitable location. The types of survey were selected depending on whether the local (conventional) coordinate system or the state coordinate system was used when setting the base.
3. After choosing a suitable place for installing the base, a tripod is installed at this point. Tacheometer is attached to the tripod using a tripod. The device is centered on the geodetic mark with the help of a laser light coming from the tachymeter. The power and memory of the device can be controlled using a special info button. Sungra circular adilak bubbles are brought to the center.
4. From the main menu, the *Management* item is selected and the *Project* line is selected, then a new project is created. From the resulting window, the project is given a name based on the topic of the work and the enter button is pressed. As a result, press the F4 button twice on the next window that appears, and the words dannyi zapisano and proekt zaregistrovano will disappear on the display.
5. The data of this point is entered in the working window created by entering the point item from the main menu.
6. By pressing the F4 key, you will be asked to enter the data of the next point T2. If working on the basis of conditional coordinates, the point T2 is not entered and the window is exited by pressing the ESC key twice.
7. Enter the program line from the main menu, select the installation station line, and press the F4 key to save it.
8. From the next generated window, the orientation angle method was selected according to the survey method (since it is a conditional coordinate system), from the next row of stations by pressing the F2 key, the existing created point T1 in the list was downloaded using the F4 key.



9. h instrument height is measured and entered in meters. Using the F4 key, the dalee function is executed, and the horizontal angle h is set to zero, oriented relative to the north pole or a fixed object.

10. Then, using the F2 key, the function of ustanovka is performed, and the info is displayed under the inscription station landmark ustanovlena.

11. Entering the program item from the main menu, selecting the image line, and using the F4 key, the startup operation is performed.

12. The height of the reflector from the resulting window is entered and the desired points are determined using the reflector.

13. With the help of the device, the reflector is aimed at the reflector, and the data determination process is carried out by pressing the VSE button.

To complete the planting work and move to the next base point. By pressing the ESC key, the project is exited, and the accessory carriage is released from the tripod using the clamping screw and moves to the next observation point.

After moving to the next observation point, the tripod is fixed to the ground and the accessory is fixed to the tripod using a tripod.

14. Enter the Prog item from the main menu and select the preset station line. Press the F4 key to save. According to the method, a series of orient po coordinates (made based on the value of the coordinates determined in the existing conditional path) is selected.

15. From the next row, pressing the F2 key executes the list command, and the values of the found point are downloaded using the F4 dalee key.

16. The height of the instrument h is re-measured and entered, and once again the dalee operation is performed using the F4 key. As a result, a window will appear under the name *Vvedite tochku orientirovani*, according to which the number and values of the point to be oriented are found using the F2 key and downloaded using the F4 dalee key.

17. The values entered are aimed at the point where the reference is being taken and the VSE button is pressed. A window of results will be created, and from it press the F4 key and execute *vycheslit coord. stantsii*.

18. Repeatedly pressing the F4 key, installation works are carried out. According to Ustanovka, the existing values of the reference point and the values of the re-reference point are compared. By pressing the F3 key according to the procedure, the extreme calculation of the values was downloaded.

19. As a result, the information *Stansia I orientatsiya ustanovlenq* appears on the display. Then, selecting the survey item from the main menu, the topographic survey work was continued by pressing the F4 key.

As a result of the above-mentioned sequences, topographic-geodetic field research in the regions was carried out, and the stage of equalization (reduction and distribution of centering errors) was carried out in special software.

After the completion of leveling works, a plan of the area based on the outline and the relief of the area will be constructed using the interpolation method. It also provides an opportunity to build a three-dimensional model based on the results of the work done in practice.

As a result of the field research carried out on the electronic tachymeter, the border areas between the Tashkent region and the city of Tashkent were topographically surveyed and the border areas were determined (Fig. 2).

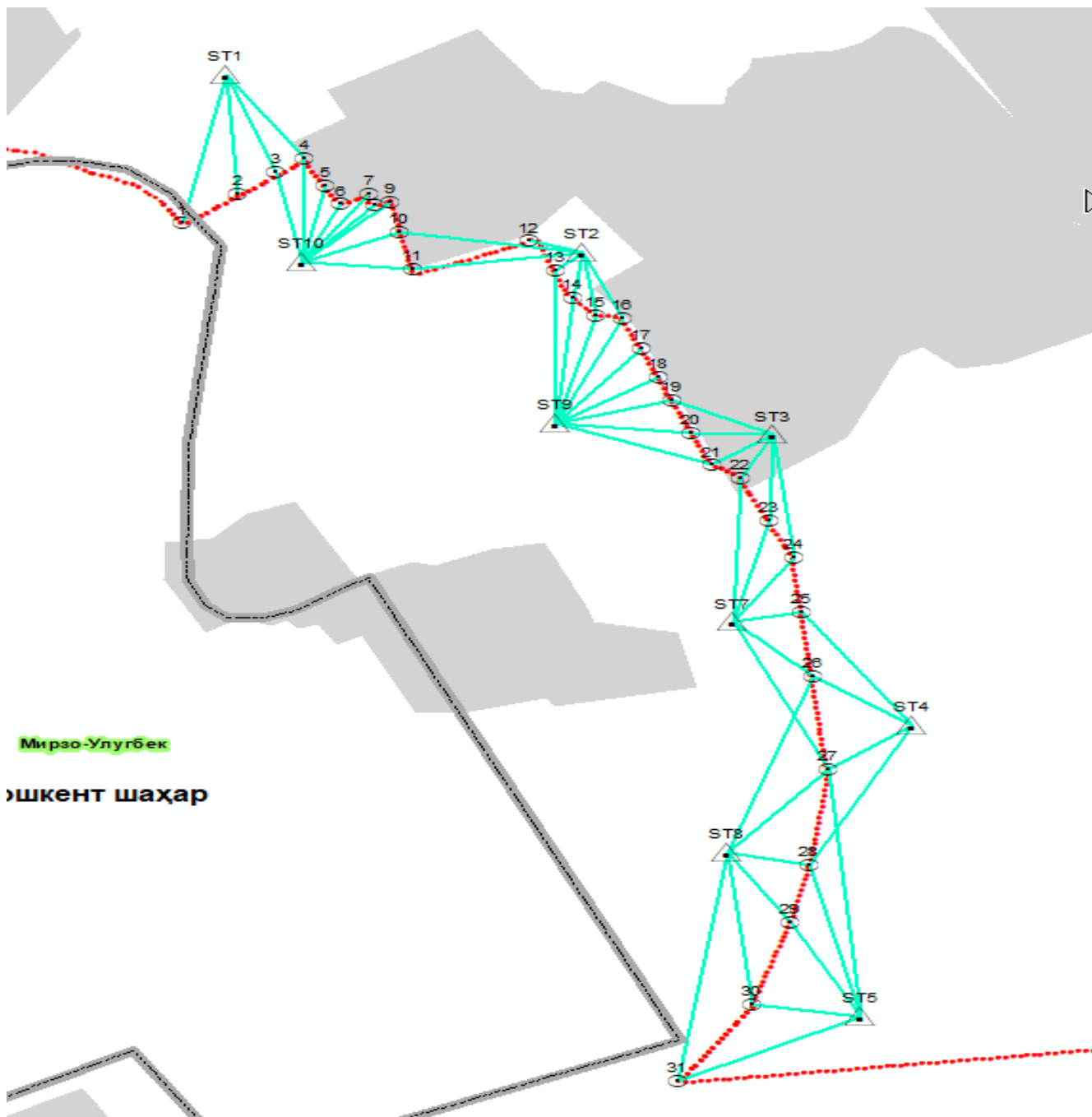


Figure 2. Field work carried out using an electronic tachymeter.

In the conducted field research, a total of 3,700 meters of distance between Qibray district of Tashkent region and M.Ulugbek district of Tashkent city was studied, and a total of 9 base stations were established (Table 1).

Table 1
Coordinate directory of base stations

S/n	Type	Name	Geographical latitude	Geographical distance
1	Base	ST10	69,398828	41,363297
2	Base	ST9	69,404993	41,359146
3	Base	ST7	69,409325	41,354008
4	Base	ST8	69,409136	41,348082
5	Base	ST5	69,412357	41,343865
6	Base	ST4	69,413672	41,351354
7	Base	ST3	69,41032	41,358821
8	Base	ST2	69,40568	41,363541
9	Base	ST1	69,396979	41,368121

On the basis of the base stations, 31 marking points were made, and a topographic plan of the border line of the land areas planned to be transferred from Qibray district of Tashkent region to M.Ulugbek district of Tashkent region was created (Table 2)..

Table 2
Catalog of coordinates of marks

S/n	Type	Name	Geographical latitude	Geographical distance
1	Mark	1	69,395893	41,364321
2	Mark	2	69,39724	41,365078
3	Mark	3	69,398201	41,365619
4	Mark	4	69,398864	41,365992
5	Mark	5	69,399416	41,365264
6	Mark	6	69,399771	41,364796
7	Mark	7	69,400452	41,365058
8	Mark	8	69,400603	41,364764
9	Mark	9	69,400965	41,364853
10	Mark	10	69,401212	41,364078
11	Mark	11	69,401517	41,363123
12	Mark	12	69,404396	41,363833
13	Mark	13	69,405041	41,363074
14	Mark	14	69,405431	41,362356
15	Mark	15	69,405988	41,361897
16	Mark	16	69,40667	41,361845
17	Mark	17	69,40712	41,361049
18	Mark	18	69,407526	41,360325
19	Mark	19	69,407858	41,359733
20	Mark	20	69,408337	41,35888
21	Mark	21	69,408801	41,358053
22	Mark	22	69,409518	41,357726
23	Mark	23	69,410207	41,356619



24	Mark	24	69,410801	41,355664
25	Mark	25	69,411005	41,354272
26	Mark	26	69,411246	41,352619
27	Mark	27	69,411607	41,350227
28	Mark	28	69,411151	41,347765
29	Mark	29	69,41064	41,346275
30	Mark	30	69,409708	41,344186
31	Mark	31	69,407886	41,342223

At the same time, a catalog of coordinates in the geographic coordinate system of base stations and waypoints was created (Table 1).

As a result of topographic surveying of the boundary line between Tashkent region and Tashkent city using an electronic tachymeter, vector layers were formed in the form of dotted layers. In order to geovisualize these vector layers in a field view, the researchers conducted field research using a GPS satellite wave receiver.

Field survey work was carried out using the method of field layer vectorization based on the Stonex R7 GPS satellite wave receiver. A total of 434292665.69 square meters of the territory of Tashkent city was surveyed using GPS satellite wave receiver. Including the 101006.61 meter part of Tashkent region bordering the city of Tashkent. Field research works were vectorized in a field layer consisting of a total of 784 points for the city of Tashkent. This indicator was 776 according to the existing Tashkent city border. In terms of area, it was 329531521.35 square meters. Therefore, this value shows an excess of 104761144.33 sq.m. based on the current project, in relation to the border area of the implementation (Fig. 3).

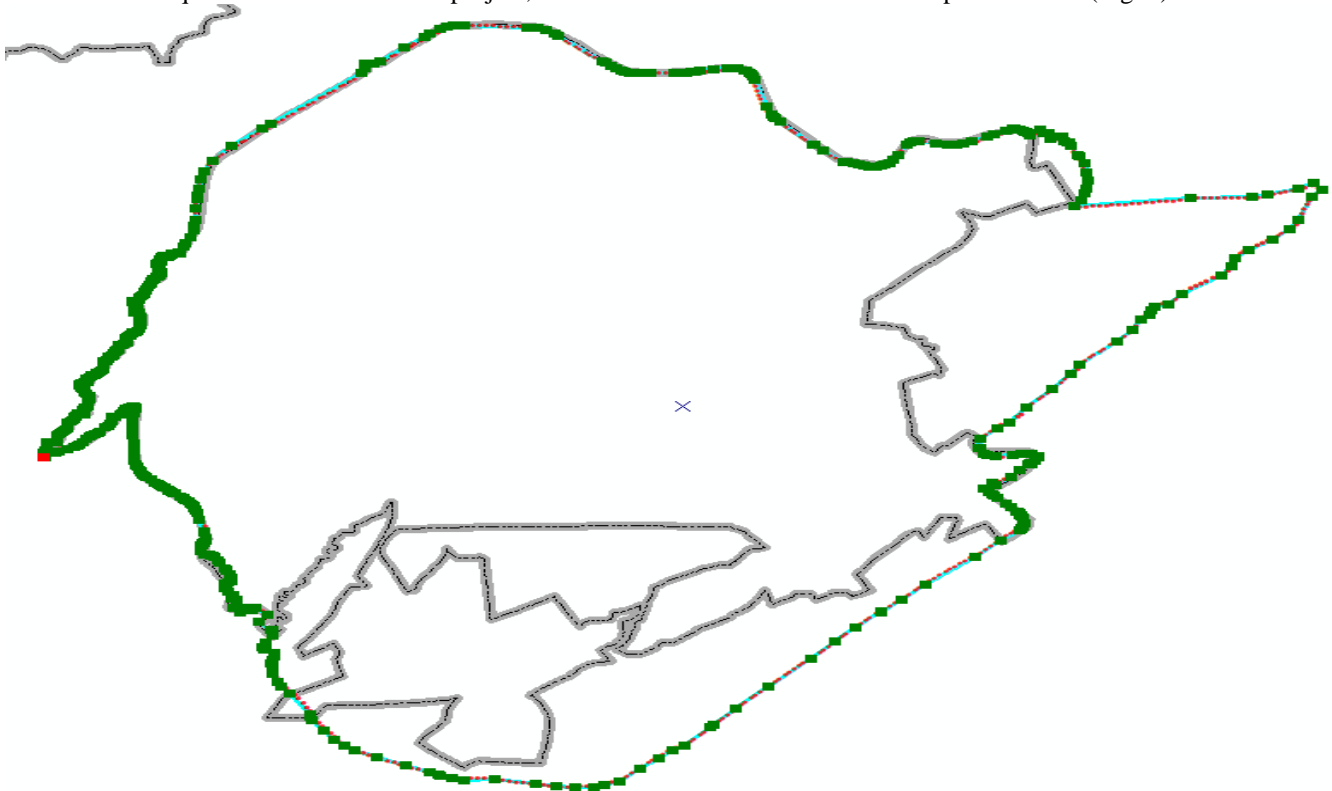


Figure 3. The results of recording the changes in the border area of Tashkent city with the Tashkent region on the GPS device.

In order to increase the accuracy of the results of the conducted field research, researchers in the GNSS satellite system used a geodetic device and carried out geodetic leveling based on the differential satellite geodetic network. The total number of differential satellite geodetic networks in our republic is 50, and there are continuously working geodetic stations.

There are a total of 4 differential satellite geodetic networks in the research area, their classification is given in Table 3.



Table 3

Тошкент вилояти ва Тошкент шаҳридаги мавжуд дифференциал сунъий йўлдош геодезик тармоғлари таснифи

S/n	The name of the area	Location address	Abbreviated name in database
1	Tashkent region and Tashkent city	Boka district	BUKD
		Yangiyul district	YAN1
		Chirchik sh.	CHIR
		Tashkent sh.	MAGK

To use this differential satellite geodetic network, register using the web address 195.158.30.3/sbc. Renix allows you to download files with a membership fee upon registration. In the study, the authors downloaded Renix files from the database and linked them to the coordinate values obtained for field alignment, bringing all field surveys to within 2 seconds of accuracy. As a result, the boundary lines of land areas passing from the territory of Tashkent region to the territory of Tashkent city were geovisualized with high accuracy using modern geodetic methods (Fig. 4).



Figure 4. A high-resolution map of the land areas passing from the territory of Tashkent region to the territory of Tashkent city created in the software (in the example of Qibray district).

It is recommended by the authors to transfer agricultural land areas and residential areas in the study area from one type of land to another.

CONCLUSION

In the allocation of agricultural land to the urban area, modern techniques and technologies are a programmatic practice in the project works to achieve high-precision results. By using GPS and GNSS geodetic devices, it is possible to create a high-resolution topographic map, taking into account the infrastructure in the environment, to determine the boundary line of agricultural and residential areas in the effective conduct of field research in the separation from agricultural land to urban areas.

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