

Legislative changes specifying the matters of survey sketch in the Slovak Republic

Silvia Gašincová¹, Juraj Gašinec¹, Gabriel Weiss¹ and Alexander Király²

The creation and processing of survey sketch are one of the most common activities with which a surveyor encounters in practice. A survey sketch in the Slovak Republic must be created in accordance with existing regulations to date: „Directive for measuring and executing changes in the file of geodetic information of the Cadastre of the real estates“ and „Directive for the creation of survey sketches and the setting-out of the boundary of a lot“. In the context with development of surveying technology and changes in legislation of the Department of Geodesy, Cartography and Cadastre, there were also several changes related to the creation and final processing of the survey sketches. For that reason, the Geodesy, Cartography and Cadastre Authority of the Slovak Republic released a series of guidelines, according to which it is now necessary to create survey sketches. The present paper is devoted to an overview of individual regulations in the period 2009-2014, under which it is necessary to submit a survey sketch in a complex form of the proof of authentication of survey sketch to the appropriate Cadastral Department of the district office.

Key words: Cadastre of real estates, survey sketch, vector geodetic data

Introduction

Works related to the arrangement of ownership to the land belong currently among the most common activities in the surveying practice. Survey sketches of the territory of the Slovak Republic shall be conducted in accordance with the earlier regulations in force: “*Directive for measuring and executing changes in the file of geodetic information of the cadastre of the real estates*” [10] and “*Directive for the creation of survey sketches and the setting-out of the boundary of a lot*” [9]. Relatively large part of these directives are, however, currently outdated. This fact is related to the legislative changes of the Cadastral Act and implementing decree in recent years, and of course, with the evolution of surveying technologies used in the geodesic practice. These changes are necessarily reflected in the final processing of elaborate survey sketches. Even though the above mentioned directives have not yet been innovated, the Geodesy, Cartography and Cadastre Authority of the Slovak Republic published and keep publishing a series of guidelines according to which the land surveyors in the processing resulting of elaborate shall proceed. The present paper deals with an overview of legislative changes and regulations in the sector of real estate cadastre in the time horizon 2009 - 2014 adjusting the elements of survey sketches within the meaning which the survey sketch by the complex form should be brought up to official control to the relevant Land Registry Department the district office.

Survey sketch

A survey sketch [11] is a graphical projection of immovables, incurred by their division, merging or by changes of their shape. It reflects the state of property and the rights binding to the real estate before changes and after the changes, including the existing and the new parcel numbers, acreage of lands and other types of data. A survey sketch also graphically depicts the easement to a part of the lot [1], [12].

Survey sketch passed long and complex developmental process, has been greatly affected by changes in the real estate and their appearance changed in the course of time. An important milestone within the context of the creation of survey sketch was the year 1883 when it was established reporting obligation whereby government authorities and courts have had to report any change each other. At this time a first survey sketch was created in consequence of needs of exact determination of geometric and planimetric registration data changes in stable cadastre. Two laws came into force within the context of survey sketch production: Act No.82/1883 and Act No. 83/1883 about registration of land taxes of the cadastre of Imperial Code of Laws (issued on May 23rd, 1883 comes into effect from June 6th, 1883).

The central government authority in the Slovak Republic becomes Geodesy, Cartography and Cadastre Authority of the Slovak Republic (hereinafter "Office"), since going into effect of Act No. 162/1995. In addition to other particulars that law in its version already clearly defines the survey sketch and its execution by a cadastral office or other person empowered to draw up. For this purpose, Geodesy, Cartography and Cadastre

¹ *assoc. prof. Silvia Gašincová, MSc., PhD., assoc. prof. Juraj Gašinec, MSc.,PhD. , Dr.h.c. prof. Gabriel Weiss, MSc., PhD.* Technical University of Košice, BERG Faculty, Institute of Geodesy, Cartography and Geographic Information Systems, Letná 9, 040 01 Košice, Slovak Republic, silvia.gasincova@tuke.sk, juraj.gasinec@tuke.sk, gabriel.weiss@tuke.sk

² *JUDr. Alexander Király, Ph.D. , Institute of Environmental Engineering, Faculty of Mining and Geology, VŠB Technical University of Ostrava, Stusedntská 11, 708 33 Ostrava – Poruba, alexander.kiraly1@vsb.cz*

Authority of the Slovak Republic issued guidelines [1], [10], [35] which are still a valid for the elaborators of a survey sketches, of course, with and acceptance the latest regulations and guidelines. In accordance these rules had a survey sketch following structure Fig. 1.

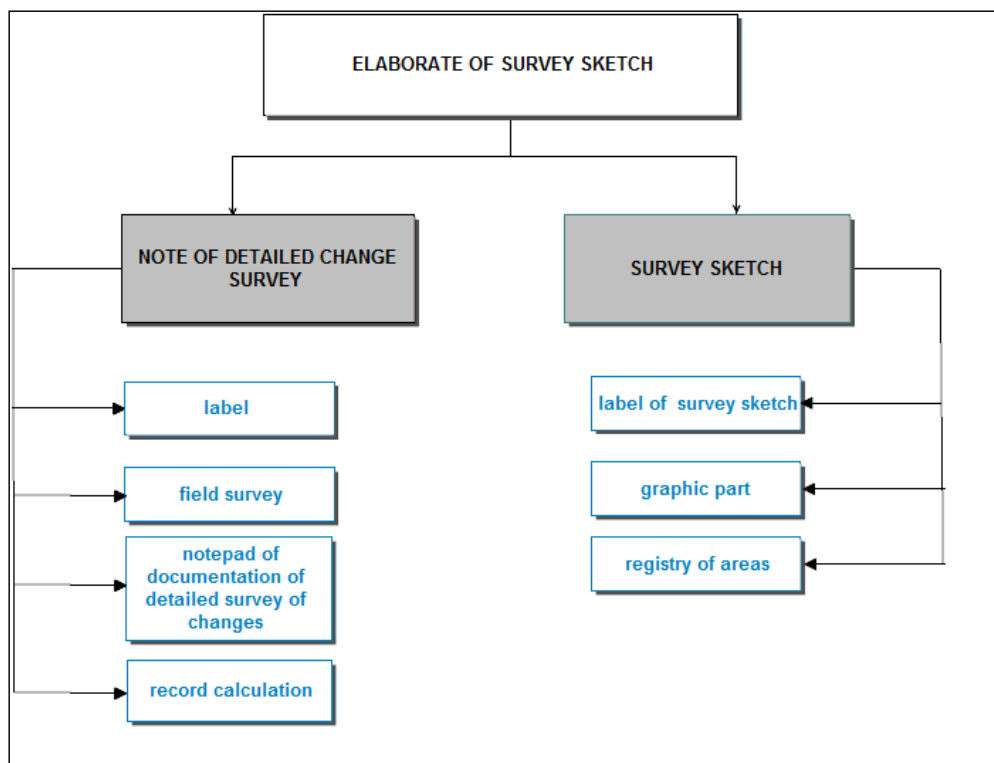


Fig. 1 Structure of survey sketch.

Survey sketch, which submitted for its control, consisting of:

- Authorization verified a survey sketch, at least up to four copies,
- Authorization verified documentation of a detailed survey of changes, if drawn up,
- Calculation of surface area of parcels and parts (of parcels); the calculation record was the results of the calculation of areas to write down of a form No. 6.55 / 1998 "Calculation of Parcels (Parts) Area". Currently "calculation record" is not part of the of survey sketches. Each of the survey sketches was at first made out only in analog form [34].

Within the context of the working out of survey sketches the first of the changes occurred by effect of Regulation No. 79/1996 [26] was that the survey sketch began to attach in electronic form in the exchange format * *vgi* for the purpose of its certification, of course, only in the cadastral territories in which the vector cadastral map was administered. There is a new codes of way of utilization and type of building structure (besides present verbal designation) in the column "Sort of Plot" inside the part of "New Condition" of "Land Area Statement" form, under the regulation of the Geodesy, Cartography and Cadastre Authority of the Slovak Republic No. KO -3613/2005, dated July 30th, 2005 [14], [15]. The code of *manner of the utilization* and the code of the *type of building* is inevitable statements. Explanation of the used codes is presented with a legend under the report of areas. Registration numbers of building are not separately listed inside of "Land Area Statement" form. The code of the way of the lot utilization and the code of the building type was being stated according to the decree number 647/2004 [27]. Previously mentioned codes utilized in the report of areas are stated in a new form after becoming operative of No. 461/2009 from the October 28th, 2009 [29].

In the context with a planned transition to the new application program of the Cadastre of Real Estates – „Multipurpose Cadastre“, the obligation to submit electronic forms of documents for the purpose of updating of cadastral documentation, in addition to analog form of survey sketch were imposed in all cadastral territories. "Registry of areas" in electronic form in the exchange format XML and "vector geodetic data" in format VGI are mentioned sources.

Registry of areas of survey sketch is submitted in obligatory exchangeable format XML, which has denomination: XY9999.xml [16], where XY is a shortcut of cadastre unit, 9999 is the number of corresponding note of detailed change survey. Registry of areas of format XML is identified as valid when it structured is valid

and also comply with the requirements of the DTD template (Fig. 2). DTD template is a text file that defines the set of valid elements and attributes that may contain these elements and relationships between elements.

Registry of areas in format XML does not elaborate on the case of solutions of survey sketch to the establishment of easements. GIS have found good application in the field of the working out of survey sketches. Are support and standard for representing metadata about quality of VKM and method of working out of survey sketches [2], [3], [4], [36].

There are several softwares, developed specifically for the purpose of creation of registry of areas in electronic form at the present time, e.g. Geo Tab version 4, GEO-SK6 and of course GPL application, which is working under software KOKEŠ.

```
<?xml version="1.0" encoding="WINDOWS-1250" standalone="true"?>
<ROOT>
  <GP_POPIIS poznamka="" ozn_hrnic="kov_rurkou" ucel="na usporiadanie vlastnich vzťahov k pozemkom p.č. 412/3 a 412/6" gpc="3/2008" ctm="KOŠICE 5-2/1" zpmz="664" noko="Košice - okolie" cok="806" nku="Kysak" cku="830259"/>
  <VYHOTOVITEL_ema="Juraj.Gasinec@tuke.sk" tel="ico="41326466" nazov="doc. Ing. Juraj Gašinec, PH.D."/>
  <ADRESA_pcc="040 01" mesto="Košice" cislo="12" ulica="Hlinkov"/>
  <VYHOTOVIL_meno="Ing. S. Gašincová, PH.D." datum="12.9.2008"/>
  <VYHOTOVITEL"/>
  <AUT_OVER_ico="" meno="Vincent" datum="8.10.2008" cislo_opravnenia="160" titul_zs="PhD." titul_pred="prof. Ing." priezvisko="Jakub"/>
  <KU_cku="830259">
    <DS>
      <PARCELA_DS poznamka="" drp="2" vym="11468" pkv="" clv="0" cpa="412/1" drn="1"/>
      <PARCELA_DS poznamka="Stavba na p.č. 412/3 je vedená na LV č. 298" drp="2" vym="450" pkv="" clv="0" cpa="412/3" drn="1"/>
      <PARCELA_DS poznamka="" drp="2" vym="1243" pkv="" clv="418" cpa="500/4" drn="2"/>
      <PARCELA_DS poznamka="" drp="2" vym="1115" pkv="" clv="418" cpa="501/3" drn="2"/>
      <PARCELA_DS poznamka="" drp="2" vym="3130" pkv="" clv="710" cpa="502" drn="2"/>
      <PARCELA_DS poznamka="" drp="2" vym="850" pkv="" clv="419" cpa="503" drn="2"/>
    </DS>
    <ZMENY>
      <DIEL_vym="67" ns_drm="1" ns_cpa="412/3" ds_drm="2" ds_cpa="500/4" cdi="1"/>
      <DIEL_vym="95" ns_drm="1" ns_cpa="412/3" ds_drm="2" ds_cpa="501/3" cdi="2"/>
      <DIEL_vym="255" ns_drm="1" ns_cpa="412/3" ds_drm="2" ds_cpa="502" cdi="3"/>
      <DIEL_vym="283" ns_drm="1" ns_cpa="412/6" ds_drm="2" ds_cpa="500/4" cdi="4"/>
      <DIEL_vym="94" ns_drm="1" ns_cpa="412/6" ds_drm="2" ds_cpa="501/3" cdi="5"/>
      <DIEL_vym="150" ns_drm="1" ns_cpa="412/6" ds_drm="2" ds_cpa="501/3" cdi="6"/>
      <DIEL_vym="555" ns_drm="1" ns_cpa="412/6" ds_drm="2" ds_cpa="502" cdi="7"/>
      <DIEL_vym="225" ns_drm="1" ns_cpa="412/6" ds_drm="2" ds_cpa="503" cdi="8"/>
    </ZMENY>
    <NS>
      <PARCELA_NS poznamka="" drp="2" vym="10194" cpa="412/1" drn="1" plk="02100"/>
      <PARCELA_NS poznamka="" drp="13" vym="417" cpa="412/3" drn="1" plk="13100">
        <STAVBA_ds_cpa="412/3" popis="dom" drs="700" pec="388"/>
      </PARCELA_NS>
      <PARCELA_NS poznamka="" drp="2" vym="1307" cpa="412/6" drn="1" plk="02100"/>
      <PARCELA_NS poznamka="" drp="2" vym="893" cpa="500/4" drn="2" plk="0"/>
      <PARCELA_NS poznamka="" drp="2" vym="776" cpa="501/3" drn="2" plk="0"/>
      <PARCELA_NS poznamka="" drp="2" vym="2320" cpa="502" drn="2" plk="0"/>
      <PARCELA_NS poznamka="" drp="2" vym="625" cpa="503" drn="2" plk="0"/>
    </NS>
  </KU>
</ROOT>
```

Fig. 2. Registry of areas in the elektronical form.

By the above mentioned guidelines, has arisen duty to work out a vector geodetic data for updating of cadastral documentation in addition to survey sketch in analogue form and registry of areas in electronic form in cadastral units where the vectorial cadastral map was administered (Tab. 1). These records were an integral part of the survey sketch submitted for authentication and their structure depended on the type of vector cadastral map:

1. Numeric vectorial cadastral map was updated by the vectorial geodetic data, which contain measured state of things (**VGPMer**).
2. In case of updating of non-numeric vectorial cadastral map (VKMn), two geodetic bases create documentation of survey sketch:
 - **VGPMer** file - contains measured status of survey sketch and identical points (IDENT),
 - **VGPT** file - containing the proposed state, shown in VKMn (by transformation, eventually by constructing).
3. In the case that the vectorial cadastral map of the state documentation (VMUO) is updated inside of the corresponding cadastre unit, the documentation of survey sketch was composed of VGPUo file whose contents depends an new state VMUO, solved within the frame of survey sketch. In case that:
 - A present parcel of land entire vanish, it doesn't show in VGPUo. If vanish all solved parcels of the present state, the VGPUo isn't hand in and termination of plot (also in graphic: SGI file) becomes upon its null area in the registry of areas documentary. VGPUo contains only new state.

Tab. 1. Labeling of vector geodetic data.

Type of file	Labeling of vectorial geodetic data
Vectorial geodetic data measured (VGPMer)	XY9999kn_C_D.vgi
Vectorial geodetic data transformed (VGPT)	XY9999kn_t_C_D.vgi
Vectorial geodetic of documentation stated (VGPUo)	XY9999uo_C_D.vgi
Registry of areas in the elektronical form	XY9999.xml
<i>XY</i> - abbreviated title of cadastre unit <i>9999</i> - number of the Note of detailed change survey <i>C</i> - code for the quality of map <i>D</i> - scale of map	

Codes of quality of vector cadastral maps and codes of origin of the creation of the detailed survey point coordinates (G = 1, 2, 3) were established by the regulation of Office No. KO 1163/2004 [13].

Legislative prescriptions modifying requirements of the survey sketch in the time horizon since 2009 up to now

Progression of the legislative changes of the department of real estate cadastre

- Amendment of the Cadastral Act No. 162/1995 shall enter into force by the Act No. 304/2009, which came into effect on September 1st, 2009 [33].
- Decree No. 300/2009 of the Office, dated July 14th, 2009, implementing the Act of the National Council of the Slovak Republic No. 215/1995 about geodesy and cartography [28].
- Decree no. 461/2009 of the Office, dated October 28th, 2009, implementing the Act of the National Council of the Slovak Republic No. 162/1995 about the Cadastre and registration of ownership and other rights (Cadastral Act) [29].
- Decree No. 74/2011 of the Office, dated March 15th, 2011, which amends and refill the Decree of Office No. 461/2009, implementing the Act of the National Council of the Slovak republic No. 162/1995, about the Cadastre and about registration of ownership and other rights in immovable property (Cadastral Act), as amended [31].
- Decree No. 75/2011 amending and supplementing Decree No. 300/2009 of which is implementing Act No. 215/1995 about geodesy and cartography of the National Council of the Slovak Republic [30].
- Guideline of the Office No. P-2946/2011, dated April 26th, 2011, which provides for the use of map symbols in the cadastral map and in documentation of survey sketch (the map symbol key) [18].
- Guideline of the Office No. P - 2410/2011, dated April 1st, 2011, establishing electronic documents for updating the cadastral documentation [17].
- **Decree no. 87/2013 of Office amending and supplementing Decree No. 461/2009 implementing the Act of the National Council of the Slovak Republic No. 162/1995 about the Cadastre and registration of ownership and other rights in immovable property (Cadastral Act), as amended, as amended by Decree of Office No. 74/2011 [32].**
- **Decision of the President of the Office No. P-666/2013 about the establishment of Transformation Services, dated January 30th, 2013 [1].**
- **Guideline of Office No. USM_UGKK SR_9/2013 by which establishes the content and form of documents to update the file of survey data of Cadastre inside cadastral units, in which is managed a numerical vector cadastral map, dated April 19th, 2013 [21].**
- **Guideline of Office No. USM_UGKK SR_10/2013 by which establishes the content and form of documents to update the file of survey data of Cadastre inside cadastral units, in which is managed a non-numerical vector cadastral map, dated April 19th, 2013 [19].**
- **Guideline of Office No. USM_UGKK SR_11/2013 establishing electronic documents to update the file of descriptive information, dated April 19th, 2013 [22].**
- **Guideline of Office No. USM_UGKK SR_12/2013, establishing a method for labeling vector cadastral map files, dated April 19th, 2013 [19].**
- **Guideline of Office No. USM_UGKK SR_13/2013, establishing the use of map symbols in cadastral map, inside the taken over survey files and the survey sketch documentation (the map symbol key), dated April 23rd, 2013 [23].**
- **Guideline of Office No. USM_UGKK SR_26/2013 establishing a way of connecting multiple files of the vectorial cadastral map into a single file, dated July 17th, 2013 [24].**
- **Guideline of Office No. USM_UGKK SR_27/2013, establishing the contents of the base when updating multiple vectorial cadastral maps, within a one survey sketch documentation, dated June 17th, 2013 [25].**

Comment:

Highlighted legislation is required (including relevant directives) at the moment.

Decree No. 300/2009 [28] which, among other requirements specified in § 1, regulates the obligatory geodetic systems in Slovakia and manners of authorization and official authentication of selected geodetic and cartographic activities, represented a significant change.

The entry into force of the Decree No. 300/2009 and Decree No. 461/2009 [29] significantly affect the processing of survey sketches, because for the land surveyors arise obligation to use GNSS technology using SKPOS service, for example in [5], [6], [7]. Protocol of the method of determination of GPS coordinates has become a part of the note of the detailed change survey. For the purpose of connection GNSS observed coordinates with map content are used so called identical points. Section 57 of Decree no. 461/2009 defines survey net (points of geodetic control, detailed survey points or auxiliary survey points), accuracy of field survey

works and the method of verifying the accuracy of surveying work. The content and structure of vector geodetic data remained unchanged, with the exception of survey sketches for the easement, which are plotted in the layer “encumbrances” in the vectorial cadastral map. Rightful implementation of coordinate system S-JTSK became its national realization JTSK03, by the entry into force Decree No. 75/2011. This fact is significant reflected into the processing of survey sketches, as the results of surveying works had to be submitted and processed in the national implementation JTSK03. The accuracy of the surveying work and way of verifying the accuracy is defined by Decree No. 74/2011. By entry into force of the said decree, the notebook of a detail survey of changes was renamed to a technical report, however, without no clearly defined structure. Only one tool which deals with the technical report was published in Geodetic and Cartographic Bulletin No. 1/2011.

In addition to the survey sketch in analog form, each elaborator had to submit the following documents:

- Registry of areas in electronic form in the format XML (structure of XML file remained unchanged),
- Vector geodetic data (graphics files in *.vgi structure, set by guideline No. P-2946/2011)
 - a) Vectorial geodetic data transformed (VGPt), which includes a new state of the vectorial cadastral map, but in a coordinate system S-JTSK (this file served to the actualization of vectorial cadastral map registered in the documentation of cadastre). VGPt contains data on vector cadastral maps which are not concerned with change and data from VGPmer, i.e. contains a new state of the vectorial cadastral map obtained by construction or by transformation of VGPmer files into a new state of cadastral map.
 - b) Vectorial geodetic data measured (VGPmer), which included boundaries of immovables, points of the boundary determined at JTSK03 and information about observing identical points in the form of point objects. All data measured in national implementation JTSK03 were registered in the layer HRPAR.
 - c) Vectorial geodetic of documentation stated (VGPuo) is used to update the map of the stated documentation.

Tab. 2. Labeling of vector geodetic data.

Type of file	Labeling of vectorial geodetic data
Vectorial geodetic data measured (VGPmer)	03XY9999kn.vgi
Vectorial geodetic data transformed (VGPt)	XY9999kn t C D.vgi
Vectorial geodetic data of stated documentation (VGPuo)	XY9999uo C D.vgi

XY- abbreviated title of cadastre unit
9999- number of the Note of detailed change survey
C – code for the quality of map
D – scale of map

The structure of the vectorial geodetic data measured (VGPmer) shows Fig. 3. It was measured break points a new lot (No. 931/2) and also break points of the original plot (No. 931) and other identical points. The numbers of points are from 7901310001 to 7901310017 within the assigned number of the note of the detailed change survey. Points with the number 7901310016, 791310017 and 7901310013 were after verification marked as nonidentical- they will not mention in VGPmer. Identical points will be displayed as points with symbol S=6. The item numbers are under note of the detailed change survey. Code of quality of detailed survey point is T = 1. VGPmer contains one object - plot 931/2 in layer HRPAR and its structure is identical with the object in layer KLADPAR.

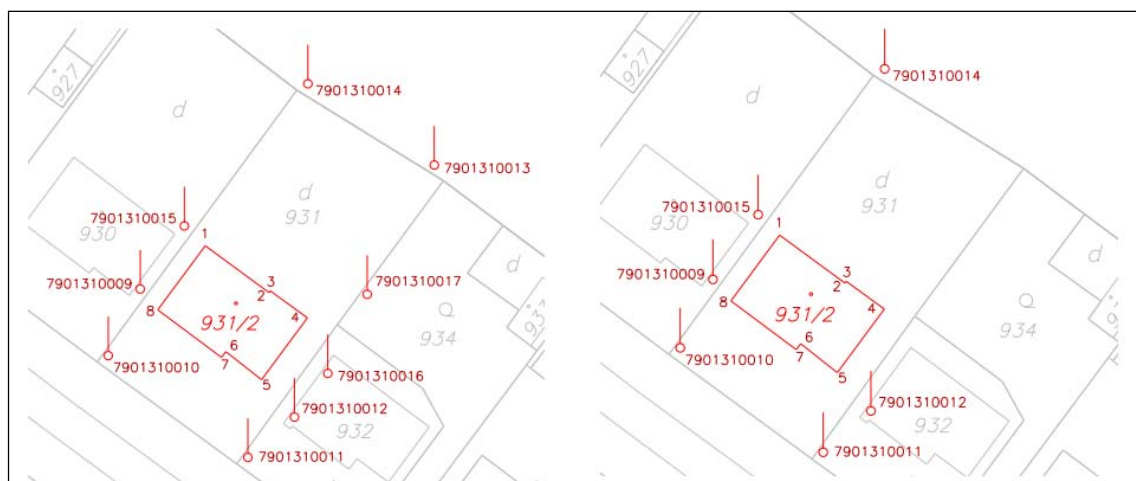


Fig. 3. Vectorial geodetic data measured [17].

```

&V 0351131 YX CM 0 0
&R 1110000.00 150000.00 1350000.00 600000.00 1000
&O HRPAR 1
&A PARCIS=931.000
&L P 566878.07 1239226.94 B=790131 C=1 K=1
  L 566870.71 1239232.33 C=2
  L 566870.57 1239232.13 C=3
  L 566866.28 1239235.24 C=4
  L 566871.57 1239242.36 C=5
  L 566875.69 1239239.12 C=6
  L 566876.19 1239239.79 C=7
  L 566883.55 1239234.32 C=8
  L 566878.07 1239226.94 C=1
&T 566874.96 1239234.98 '931/2' D=5 F=1 H=1.6 K=1
&L P 566874.53 1239233.56 K=1 S=45
&O HRPAR 2
&L P 566885.56 1239231.93 B=790131 C=9 K=1 S=6
  P 566880.47 1239224.67 C=15 K=1 S=6
  P 566873.15 1239251.31 C=11 K=1 S=6
  P 566889.25 1239239.59 C=10 K=1 S=6
  P 566866.22 1239208.31 C=14 K=1 S=6
  P 566867.77 1239246.67 C=12 K=1 S=6
&K
    
```

Code quality of the detailed point

The object parcel 931/2 in structure the object in a layer KLADPAR

The object with individual identical points

Fig. 4. Vectorial geodetic data measured - text form [17].

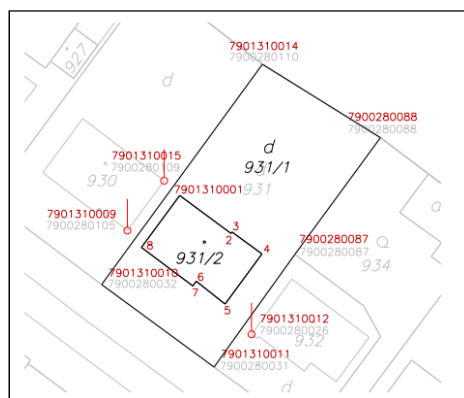


Fig. 5. Vectorial geodetic data transformed [18].

VGPT includes a new state of vectorial cadastral map (VKM), i.e. new state of plot 931 divided on parcels 931/1 and 931/2 and the identical points, which are not a part of new objects (they are outside solved objects). Points that were not identical and are part of the new object have the original point number (from VKM) and the original code of detailed survey point (T = 3) - are taken from the current state. Identical points 9, 12 and 15 are in the layer HRPAR.

```

&V 51131 YX CM 0 0
&R 1110000.00 150000.00 1350000.00 600000.00 1000
&O HRPAR 1
&L P 566886.84 1239232.66 B=790131 C=9 K=1 S=6 T=1
  P 566869.05 1239247.40 C=12 K=1 S=6 T=1
&L P 566881.57 1239225.59 B=790131 C=15 K=1 S=6 T=1
&O KLADPAR 2
&A PARCIS=931.000
&L P 566867.50 1239209.04 B=790131 C=14 K=1 T=1
  L 566850.59 1239219.46 B=790028 C=88
  L 566862.85 1239236.04 C=87
  L 566874.43 1239252.04 B=790131 C=11 T=1
  L 566890.53 1239240.32 C=10 T=1
  L 566867.50 1239209.04 C=14 T=1
  NL 566879.35 1239227.67 C=1 T=1
  L 566884.83 1239235.05 C=8 T=1
  L 566877.47 1239240.52 C=7 T=1
  L 566876.97 1239239.85 C=6 T=1
  L 566872.85 1239243.09 C=5 T=1
  L 566867.56 1239235.97 C=4 T=1
  L 566871.85 1239232.86 C=3 T=1
  L 566871.99 1239233.06 C=2 T=1
  L 566879.35 1239227.67 C=1 T=1
  NL 566867.50 1239209.04 C=14 T=1
&T 566866.48 1239222.80 '931/1' D=5 F=1 H=1.6 K=1
&L P 566866.62 1239221.61 K=1 S=431 T=1
&O KLADPAR 3
&A PARCIS=931.000
&L P 566884.83 1239235.05 B=790131 C=8 K=1 T=1
  L 566879.35 1239227.67 C=1 T=1
  L 566871.99 1239233.06 C=2 T=1
  L 566871.85 1239232.86 C=3 T=1
  L 566867.56 1239235.97 C=4 T=1
  L 566872.85 1239243.09 C=5 T=1
  L 566876.97 1239239.85 C=6 T=1
  L 566877.47 1239240.52 C=7 T=1
  L 566884.83 1239235.05 C=8 T=1
&T 566876.24 1239235.71 '931/2' D=5 F=1 H=1.6 K=1
&L P 566875.81 1239234.29 K=1 S=45 T=1
&K
    
```

Implicitly set code for quality T = 3

The object of identical points

The object parcel 931/1

Points that were taken over from the original vector map have the original code number quality of the detailed bodu

Points with coordinates in the JTSK03 have code for quality of the detailed point T = 1

The object parcel 931/2

Fig. 6. Vectorial geodetic data transformed - text form.

Entry into force of Decree No. 87/2013, appeared again further changes in the processing of survey sketch. Section 56, of the above mentioned Decree, defines identical points, provides a method of verifying the accuracy of surveying works in cadastral unit where is administer a non numerical or numerical vectorial cadastral map. Office subsequently issued a series of guidelines [19], [20], [21], [22], [23], [24], [25].

Vectorial geodetic data used to update the file of survey data of cadastre are prepared according the Guidelines of Office No. 9/2013 and No. 10/2013. The benefit is that the a part of both the guidelines not only show the structure and content of the VGP, but also complex processing the note of the detailed change survey together with the technical report. A significant change for elaborator of survey sketch is the fact that the results of measurements and vector geodetic data are submitted in S-JTSK, not in the national implementation JTSK03. The following tables show the manner of updating of cadastral documentation in cadastral units with a numeric vectorial cadastral map and non-numeric vectorial cadastral maps.

Tab. 3. Update a numeric vectorial cadastral map (VKMč).

Δp [m]	Type of file	Labeling of vectorial geodetic data
$\Delta p \leq 0.24$ m	Vectorial geodetic data measured (VGPmer)	XY9999kn_m.vgi
$\Delta p > 0.24$ m	Vectorial geodetic data measured – transformed (VGPmt)	XY9999kn_mt.vgi
XY- abbreviated title of cadastre unit		
9999- number of the Note of detailed change survey		

- VGPmer is formed by the complete content of the entire new and changed objects VKMč (VGPmer objects are submitted in layers KLADPAR and ZAPPAR not in layer HRPAR)..
- The coordinates of the new detailed survey point determined by means of Global Navigation Satellite Systems (GNSS) in JTSK03 respectively ETRS89 are transformed by the basic transformation into coordinate system S-JTSK. The transformation can also be done directly in the environment GNSS if the receiver is able to achieve the same result as from the Resort Transformation Service. Information on the manner of use the basic transformation is introduced in a technical report of note of the detailed change survey.
- VGPmt is formed by the complete content of the new and changed objects VKMč and layer BODY.
- The coordinates of the new detailed survey points, determined by means of GNSS at coordinate system JTSK03 respectively ETRS89 are for the purpose of cadastre transformed by the basic transformation to coordinate system S-JTSK and they are contained in the layer BODY.
- Layer BODY contains the identical points with the newly determined coordinates. Remark "IB" is marked identical points in a technical report and these points aren't more renumbered. Layer BODY contains intersections with the original border (mathematically defined points of intersections of the original and new borders). All the points in the layer BODY are assigned by code quality T = 1 and symbol S = 1310. In one VGPmt points are joined into a single line with the connection type "P". Subsequently, the new coordinates of detailed survey points are transformed through the identical points using a local transformation.
- If it is not possible to clearly establish identical points (for example owners boundaries are not marked in the near or displacement vectors at identical points have not a systematic nature), the basic transformation is used. Any errors in the documentation will correct Cadastral Department on the basis of measured data. In all cases is handing over only one VGP in environment VKM.

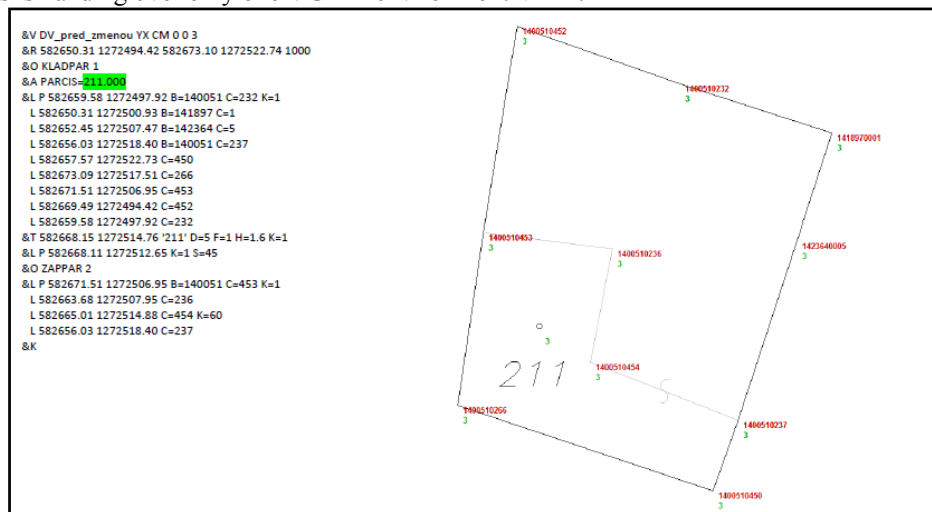


Fig. 7. Vectorial cadastral map numerical before change [21].

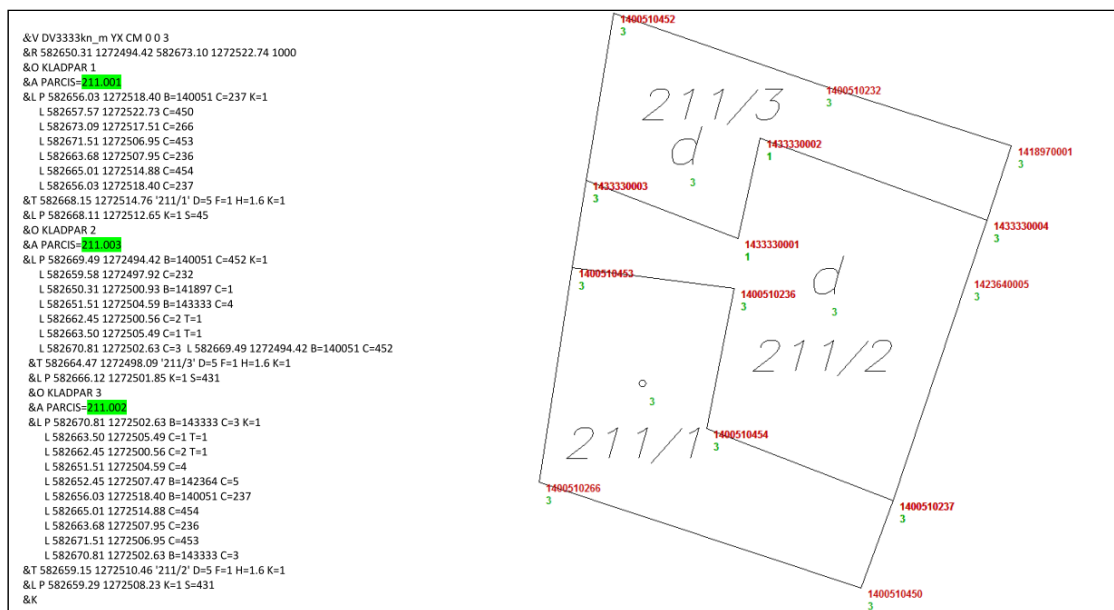


Fig. 8. Vectorial geodetic data measured [21].

VGPmt contains measured points after a basic transformation (layer BODY), original situation VKMč and the new points after the basic and local transformation into VKMč.

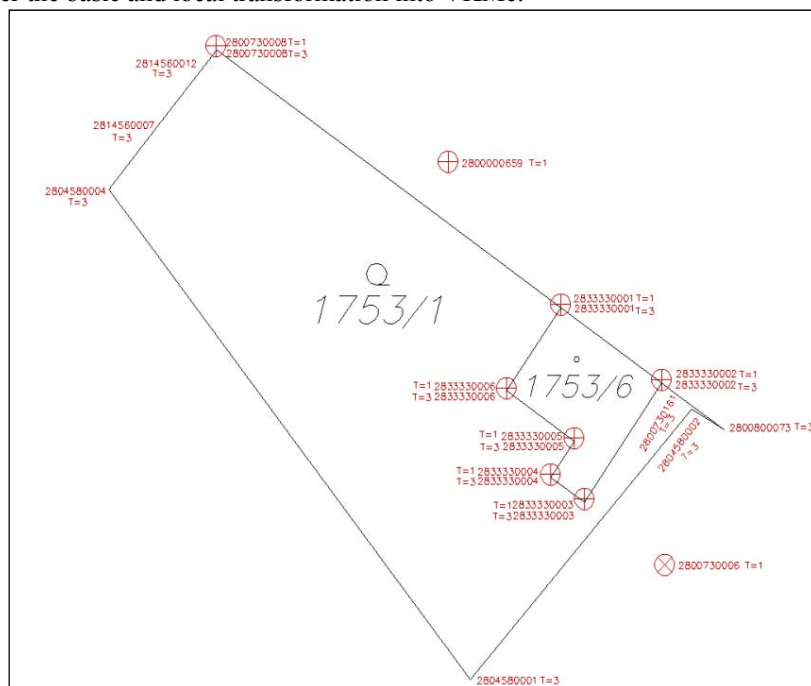


Fig. 9. Vectorial geodetic data measured transformed [21].

Non-numeric vectorial cadastral map arises by vectorization of non-numeric cadastral maps. It is transformed into S-JTSK.

By updating process *Non-numeric vectorial cadastral map* are divided into:

- **VKM_i** - implemented vectorial cadastral maps; The numerical results of measurements are implemented into them such that the position of new detailed survey points in map responsible to the position of points given by measurement and present state of the map is connected at these points. The map contains numerically determined detailed survey points (with their numbers and with code quality T=1, T=2 or T=3) and not numerically detailed determined survey points (without their numbers and with code quality T=5). It is updated on the basis of the vectorial geodetic data, which includes original condition designed to measured data - VGPI [21].

- **VKMt** - transformed vector cadastral maps; Maps, in which the numerical results of measurements are taken over such that location of new detailed points on the map not corresponding to their position determined by measuring and these points are designed into the current state of the map. The map contains detailed points, which were not being solved numerically with code quality T=5. It is updated on the basis of vector geodetic basis, which contains projected data into the current state of map – VGPt.

Tab. 4 .Update a non-numeric vectorial cadastral map (VKMn).

Type of file	Labeling of vectorial geodetic data
Vectorial geodetic data measured (VGPM)	XY9999kn_m.vgi
Vectorial geodetic data transformed (VGPT)	XY9999kn_t.vgi
Vectorial geodetic data implemented (VGPI)	XY9999kn_i.vgi
Vectorial geodetic data of stated documentation (VGPUO)	XY9999uo.vgi
<i>XY</i> - abbreviated title of cadastre unit	
<i>9999</i> - number of the Note of detailed change survey	

VGPM is formed by the entire content of whole new and changed objects of non-numeric VKM. VGPM shall be made within the scope of the parcels subject to the new state of register C KN (**Except if separated plot is less than 1/20 from the plot, which is less than 1 ha, or in case that from the plot larger than 1 hectare is separated plot less than 1/5 of the original area**). All points VGPM are numerically determined and have a quality code 1 or the 3.

VKMt is formed by the entire content of the whole new and changed objects of non-numeric *Non-numeric vectorial cadastral map*, i.e. contains new detail points from VGPM, designed into the original state of the map. All points included in VGPT are unnumbered, with code quality T=5.

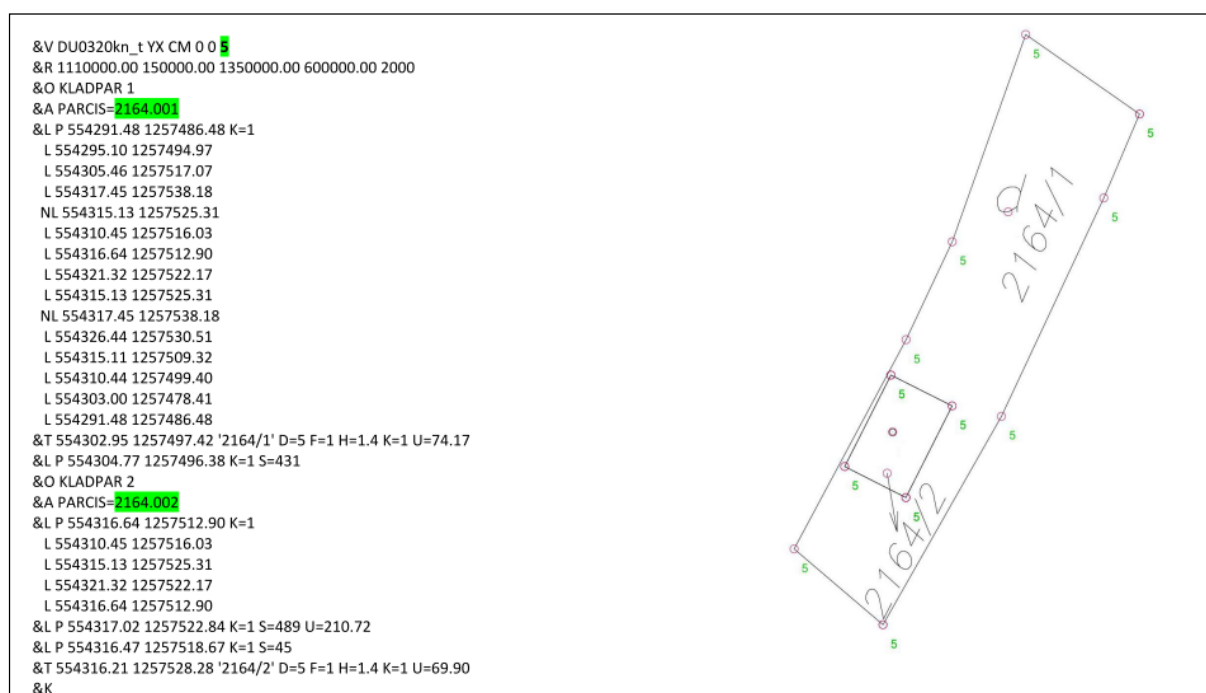


Fig. 10. Non numerical vectorial cadastral map before change [19].

VKMi is formed by complete contents of whole and unchanged objects of nonnumeric VKM. VGPI is made within the scope of the parcels which are the subject of a new state of registry CKN.

The numerical results of measurements are implemented such that the position of new detailed points on the map correspond to the position of the measurement points and the original state of the map is connected to these points. The map contains numerically determined detailed points with their numbers; code quality T=1–3 and detailed points which have not been determined numerically, without numbers; code quality T=5.

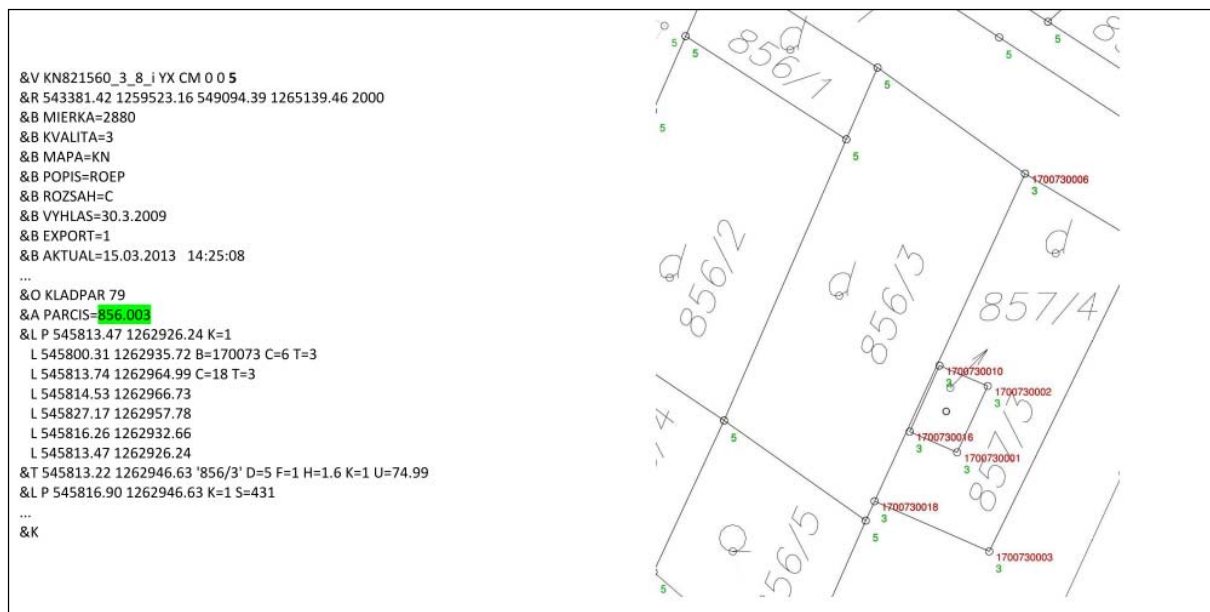


Fig. 11. Vectorial geodetic data transformed [19].

VGPI - JA0100kn_i.vgi containing all measured points and the affected parcels (objects) that are attached to the measured state.

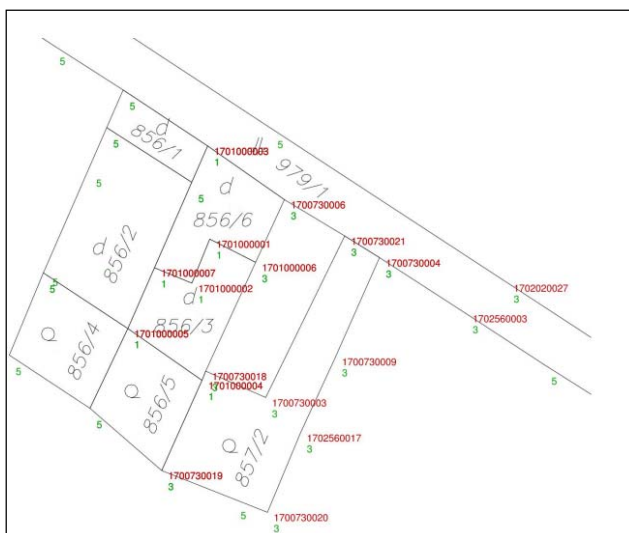


Fig. 12. Vectorial geodetic data implemented [19].

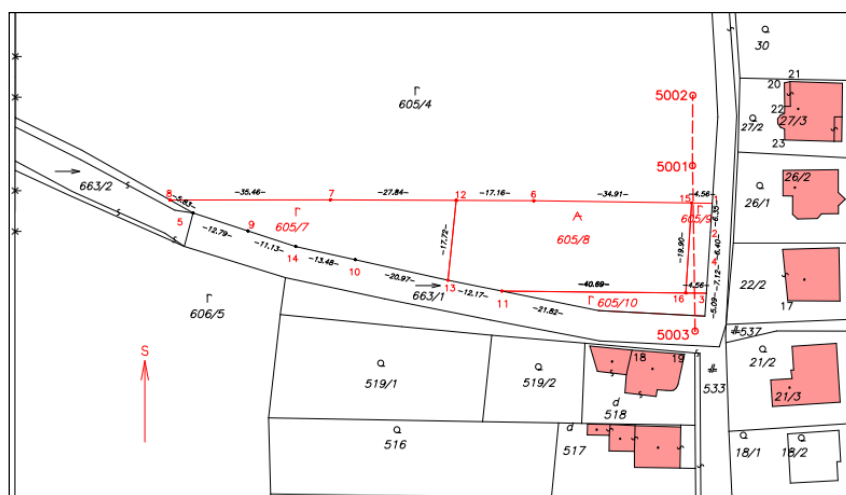


Fig. 13. Sample of the field survey.

Figure 13 shows a sample sketch documentation for a survey sketch for arrangement property rights in plots 605/7 and 605/8. This is a cadastral unit with listed non-numeric vector cadastral map and a map of intended documentation, on which are depicted the parcels of registry E of cadastral documentation. The accuracy of the surveying work has been evaluated on seven identical points, 17-23. The identity of these points was determined according to § 56 paragraph 3 of the Decree of the Geodesy, Cartography and Cadastre Authority of the Slovak Republic No. 461/2009.

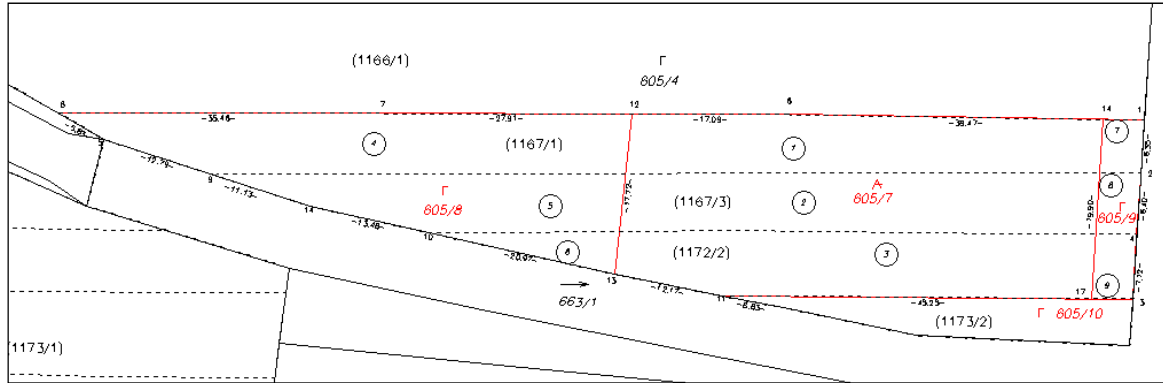


Fig. 14. Sample of the survey sketch.

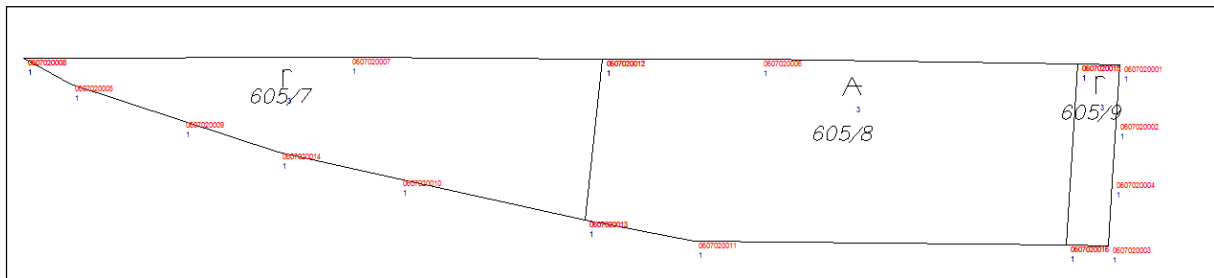


Fig. 15. Vectorial geodetic data measured - Bi702kn_m.vgi.

Vectorial geodetic data measured (VGPmer) in this case consists of three objects of type parcel, in layer KLADPAR, with code quality of the detailed points $T = 1$. The plot 605/10 is not part of the drawing, because it was not directly measured in the field.

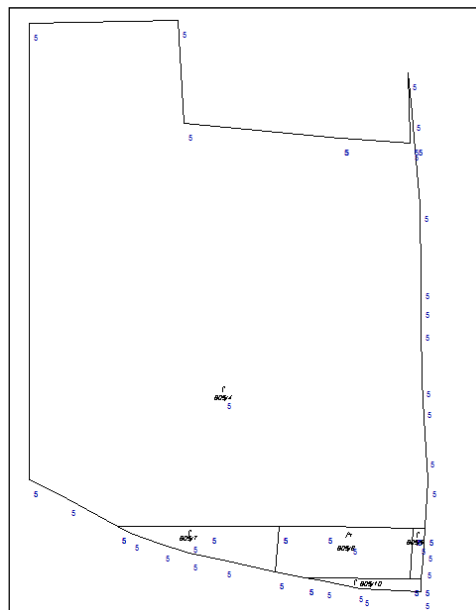


Fig. 16 Vectorial geodetic data transformed - Bi702kn_t.vgi.

Vectorial geodetic data transformed (VGPt) consists of five objects. There are newly separate plots 605/7, 605/8 and 605/9 and a rest of plot 605/4, together with newly created parcel 605/10, code quality of detailed points is $T = 5$.

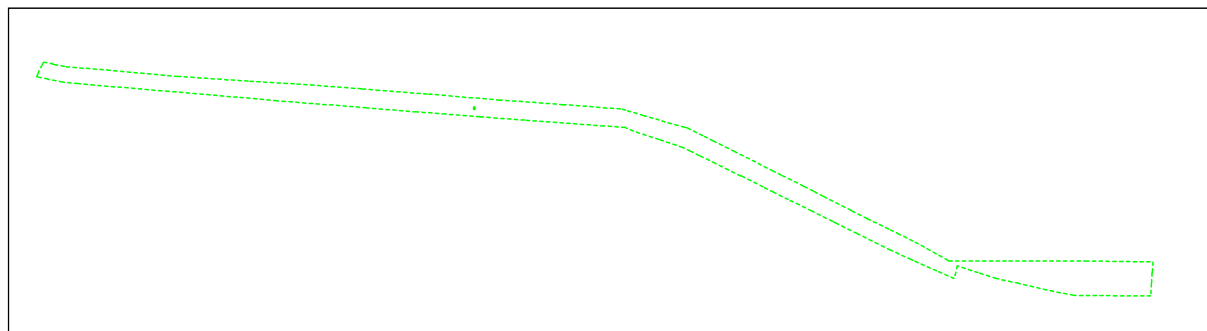


Fig. 17. Vectorial geodetic data of stated documentation - Bi702uo.vgi.

```
<?xml version="1.0" encoding="UTF-8" ?>
<ROOT>
  <OP_FO131 opn_trazna="kolkom, ocefovými klincami" ocol="usporiadanie vlastnických práv k pozemkom p.č. 605/7,605/8 a 605/9" ocp="2/2013" dnm="Vranov n Topľou 9-9/11" zpnz="702" nck="Košice - okolie" csk="806" nku="Bidovec" cku="802875"/>
  <VYHOTOVITEL tab="1" naz="nazov" doc.Ing. Juraj Gašinec, PhD./>
  <ADRESA psc="04001" mesto="Košice" cislo="12" ulica="Hlinkova"/>
  <VYHOTOVIL meno="doc. Ing. Silvia Gašincová, PhD." datum="8.1.2014"/>
  <VYHOTOVITEL/>
  <AUT_OVER meno="Čudovít" datum="9.1.2014" cislo_opravnenia="875" tbul_zs="PhD." tbul_pred="Ing." priezvisko="Kovanič"/>
  <KU cis="802875" />
  <ID3>
    <PARCELA_DS drp="2" vvm="710" dvm="1412" cpa="1167/1" dm="2"/>
    <PARCELA_DS drp="2" vvm="574" dvm="1412" cpa="1167/3" dm="2"/>
    <PARCELA_DS drp="2" vvm="425" dvm="1412" cpa="1172/2" dm="2"/>
    <PARCELA_DS drp="2" vvm="153" dvm="0" cpa="1173/2" dm="2"/>
    <PARCELA_DS drp="2" vvm="27789" dvm="0" cpa="605/4" dm="1"/>
  </ID3>
  <ZMENY>
    <DIEL vvm="375" na_dvm="1" na_cpa="605/7" da_dvm="2" da_cpa="1167/1" cdi="1"/>
    <DIEL vvm="210" na_dvm="1" na_cpa="605/7" da_dvm="2" da_cpa="1167/3" cdi="2"/>
    <DIEL vvm="50" na_dvm="1" na_cpa="605/7" da_dvm="2" da_cpa="1172/2" cdi="3"/>
    <DIEL vvm="331" na_dvm="1" na_cpa="605/8" da_dvm="2" da_cpa="1167/1" cdi="4"/>
    <DIEL vvm="342" na_dvm="1" na_cpa="605/8" da_dvm="2" da_cpa="1167/3" cdi="5"/>
    <DIEL vvm="300" na_dvm="1" na_cpa="605/8" da_dvm="2" da_cpa="1172/2" cdi="6"/>
    <DIEL vvm="27" na_dvm="1" na_cpa="605/9" da_dvm="2" da_cpa="1167/1" cdi="7"/>
    <DIEL vvm="21" na_dvm="1" na_cpa="605/9" da_dvm="2" da_cpa="1167/3" cdi="8"/>
    <DIEL vvm="33" na_dvm="1" na_cpa="605/9" da_dvm="2" da_cpa="1172/2" cdi="9"/>
  </ZMENY>
  <NS>
    <PARCELA_NS drp="2" vvm="33" cpa="1167/1" dm="2" pkk="0"/>
    <PARCELA_NS drp="2" vvm="18" cpa="1167/3" dm="2" pkk="0"/>
    <PARCELA_NS drp="2" vvm="18" cpa="1172/2" dm="2" pkk="0"/>
    <PARCELA_NS drp="2" vvm="25668" cpa="605/4" dm="1" pkk="1"/>
    <PARCELA_NS drp="2" vvm="644" cpa="605/7" dm="1" pkk="32"/>
    <STAVBA da_cpa="0" dvm="0" pcc="1"/>
    <PARCELA_NS/>
    <PARCELA_NS drp="14" vvm="1033" cpa="605/8" dm="1" pkk="1"/>
    <PARCELA_NS drp="2" vvm="91" cpa="605/9" dm="1" pkk="1"/>
    <PARCELA_NS drp="2" vvm="153" cpa="605/10" dm="1" pkk="1"/>
  </NS>
</ROOT>
```

Fig. 18. Registry of areas in the elektronical form – Bi702.xml.

Conclusion

The submitted report was dedicated to legislative prescriptions related to processing of survey sketch. In the work, there is outlined the very expeditious time sequentiality of the published regulations, according to which it is necessary to proceed while processing the final elaborate. Each survey sketch is specific and practitioner has often dealt with the problem which requires an individual solution in cooperation with laborers of cadastral department. It would be possible to avoid situations similar to this, if all the executed changes during their progression were included in the new actual directions, and survey sketches were being progressed according to uniform template supplemented with both, ideal and specific examples. The paper pointed out the fact, that there is necessity of publishing new directions for processing survey sketches.

References

- [1] Gašinec, J., Gašincová, S., Pukanská, K., Labant, S.: Geometrický plán (Survey sketch). 1st edition, Košice, FBERG TU, 2011. 78 p.. ISBN 978-80-553-0643-8.
- [2] Gergelová, M., Kuzevičová, Ž., Kuzevič, Š.: A GIS based assessment of hydropower potential in Hornád basin. *Acta Montanistica Slovaca*. 18, 2013, 2, 91-100. ISSN 1335-1788. Available at: <http://actamont.tuke.sk/pdf/2013/n2/4gergelova.pdf>.
- [3] Gergelová, M., Kuzevičová, Ž., Kuzevič, Š., Sabolová, J: Hydrodynamic modeling and GIS tools applied in urban areas. *Acta Montanistica Slovaca*. 18, 2013, 4, 226-233. ISSN 1335-1788. Available at: <http://actamont.tuke.sk/pdf/2013/n4/3gergelova.pdf>.
- [4] Kuzevičová, Ž., Gergelová, M., Naščáková, J., Kuzevič, Š.: Proposal of methodology for determining of potential residual biomass for agriculture and forestry in Slovak republic. *Acta Montanistica Slovaca*. 18, 2013, 1, 9-16. ISSN 1335-1788. Available at: <http://actamont.tuke.sk/pdf/2013/n1/2kuzevicova.pdf>.
- [5] Labant, S.: Deformation analysis of stability area. 1st edition, Miskolc, Bibor Publisher, 2013. 96 p.. ISBN 978-963-9988-57-6.
- [6] Labant, S., Kalatovičová, L., Kukučka, P., Weiss, E.: Precision of GNSS instruments by static method comparing in real time. *Acta Montanistica Slovaca*. 14, 2009, 1, 55-61. ISSN 1335-1788. Available at: <http://actamont.tuke.sk/pdf/2009/n1/8labant.pdf>.

- [7] Labant, S., Staňková, H., Weiss, R.: Geodetic determining of stockpile volume of mineral excavated in open pit mine. *GeoScience Engineering*. 59, 2013, 1, 30-40. ISSN 1802-5420. Available at: <http://gse.vsb.cz/2013/LVIX-2013-1-30-40.pdf>.
- [8] Rozhodnutie predsedníčky ÚGKK SR č. P-666/2013, zo dňa 30.01.2013 o zriadení Rezortnej transformačnej služby. (*Decision of the President of the Office No. P-666/2013 about the establishment of Transformation Services, dated January 30th*)
- [9] Smernice na vyhotovovanie geometrických plánov a vytyčovanie hraníc pozemkov (S 74.20.73.43.00) ÚGKK SR z 28.11.1997, č. NP-3595/1997, účinnosť 20.7.1998. (*Directive for the creation of survey sketches and the setting-out of the boundary of a lot*).
- [10] Smernice na meranie a vykonávanie zmien v súbore geodetických informácií katastra nehnuteľností (S 74.20.43.20.00). Bratislava, ÚGKK SR, 1999. (*Directive for measuring and executing changes in the file of geodetic information of the cadastre of the real estates*).
- [11] Sokol, Š.: Geometrický plán ako podklad pre súdnych znalcov. *Projekt a stavba*. 4, 2002, 9, 9-13. ISSN 1335-5007.
- [12] Sokol, Š., Bajtala, M., Ježko, J., Krištofiková, M.: Meranie a vyhotovenie účelovej mapy pre rekonštrukciu železničných tratí. XIX. konferencia SDMG. Sborník referátů. Jihlava, 10.-12.10.2012. Ostrava, VŠB-Technická univerzita Ostrava, 2012. p. 162-169. ISBN 978-80-248-2824-4.
- [13] Usmernenie Úradu geodézie, kartografie a katastra Slovenskej republiky č. KO 1163/2004, zo dňa 29.3.2004, ktorým sa stanovuje kód kvality vektorových máp a dopĺňa sa kód pôvodu vzniku súradnic bodu.
- [14] Usmernenie Úradu geodézie, kartografie a katastra Slovenskej republiky č. KO 2704/2005, zo dňa 30.05.2005, na označovanie vektorových geodetických podkladov.
- [15] Usmernenie Úradu geodézie, kartografie a katastra Slovenskej republiky č. KO 3613/2005, zo dňa 30.07.2005, ktorým sa dopĺňa výkaz výmer geometrického plánu.
- [16] Usmernenie Úradu geodézie, kartografie a katastra Slovenskej republiky č. KO 1587/2008, zo dňa 12.03.2008, ktorým sa stanovujú podklady na aktualizáciu katastrálneho operátu.
- [17] Usmernenie Úradu geodézie, kartografie a katastra Slovenskej republiky č. P 2410/2011, zo dňa 01.04.2011, ktorým sa ustanovujú elektronické podklady na aktualizáciu katastrálneho operátu.
- [18] Usmernenie Úradu geodézie, kartografie a katastra Slovenskej republiky č. P-2946/2011, zo dňa 26.04.2011, ktorým sa ustanovuje používanie mapových značiek v mape katastra a v operáte geometrického plánu (značkový kľúč).
- [19] Usmernenie ÚGKK SR č. USM_UGKK SR_10/2013, zo dňa 19.04.2013, ktorým sa ustanovuje obsah a forma podkladov na aktualizáciu súboru geodetických informácií katastra nehnuteľností v katastrálnych územiach, v ktorých je spravovaná nečíselná vektorová katastrálna mapa.
- [20] Usmernenie ÚGKK SR č. USM_UGKK SR_12/2013, zo dňa 19.04.2013, ktorým sa ustanovuje spôsob označovania súborov vektorových máp katastra.
- [21] Usmernenie ÚGKK SR č. USM_UGKK SR_9/2013, zo dňa 19.04.2013, ktorým sa ustanovuje obsah a forma podkladov na aktualizáciu súboru geodetických informácií katastra nehnuteľností v katastrálnych územiach, v ktorých je spravovaná číselná vektorová katastrálna mapa.
- [22] Usmernenie ÚGKK SR č. USM_UGKK SR_11/2013, zo dňa 19.04.2013, ktorým sa ustanovujú elektronické podklady na aktualizáciu súboru popisných informácií.
- [23] Usmernenie ÚGKK SR č. USM_UGKK SR_13/2013, zo dňa 23.04.2013, ktorým sa ustanovuje používanie mapových značiek v mape katastra, v súbore prevzatých meraní a operáte geometrického plánu (značkový kľúč).
- [24] Usmernenie ÚGKK SR č. USM_UGKK SR_26/2013, zo dňa 17.07.2013, ktorým sa ustanovuje spôsob spojenia viacerých súborov vektorových máp katastra do jedného súboru.
- [25] Usmernenie ÚGKK SR č. USM_UGKK SR_27/2013, zo dňa 17.07.2013, ktorým sa ustanovuje obsah podkladov pri aktualizácii viacerých vektorových máp katastra v rámci jedného operátu geometrického plánu.
- [26] Vyhláška č. 79/1996 Z. z., Úradu geodézie, kartografie a katastra Slovenskej republiky z 8. februára 1996, ktorou sa vykonáva zákon Národnej rady Slovenskej republiky o katastri nehnuteľností a o zápise vlastníckych a iných práv k nehnuteľnostiam (katastrálny zákon).
- [27] Vyhláška č. 647/2004 Úradu geodézie, kartografie a katastra Slovenskej republiky z 10. novembra 2004, ktorou sa mení a dopĺňa vyhláška Úradu geodézie, kartografie a katastra Slovenskej republiky č. 79/1996 Z. z., ktorou sa vykonáva zákon Národnej rady Slovenskej republiky o katastri nehnuteľností a o zápise vlastníckych a iných práv k nehnuteľnostiam (katastrálny zákon).
- [28] Vyhláška č. 300/2009, Úradu geodézie, kartografie a katastra Slovenskej republiky zo 14. júla 2009, ktorou sa vykonáva zákon Národnej rady Slovenskej republiky č. 215/1995 Z. z. o geodézii a kartografii v znení neskorších predpisov.

- [29] Vyhláška č. 461/2009 Úradu geodézie, kartografie a katastra Slovenskej republiky z 28. októbra 2009, ktorou sa vykonáva zákon Národnej rady Slovenskej republiky č. 162/1995 Z. z. o katastri nehnuteľností a o zápise vlastníckych a iných práv k nehnuteľnostiam (katastrálny zákon) v znení neskorších predpisov.
- [30] Vyhláška č. 75/2011 ÚGKK SR, ktorou sa mení a dopĺňa vyhláška ÚGKK SR č. 300/2009 a ktorou sa vykonáva zákon Národnej rady Slovenskej republiky č. 215/1995 Z.z. o geodézii a kartografii v znení neskorších predpisov.
- [31] Vyhláška č. 74/2011 ÚGKK SR, Úradu geodézie, kartografie a katastra Slovenskej republiky z 28. októbra 2009, ktorou sa vykonáva zákon Národnej rady Slovenskej republiky č. 162/1995 Z. z. o katastri nehnuteľností a o zápise vlastníckych a iných práv k nehnuteľnostiam (katastrálny zákon) v znení neskorších predpisov.
- [32] Vyhláška č. 87/2013 ÚGKK SR, ktorou sa mení a dopĺňa vyhláška ÚGKK SR č. 461/2009 Z.z., ktorou sa vykonáva zákon Národnej rady Slovenskej republiky č. 162/1995 Z. z. o katastri nehnuteľností a zápise vlastníckych a iných práv k nehnuteľnostiam (katastrálny zákon) v znení neskorších predpisov v znení vyhlášky ÚGKK SR č. 74/2011 Z.z.
- [33] The Act No. 162/1995 on the Real Estate Cadastre and the Entries of Ownership and Other Rights to the Real Estates (The Cadastre Act).
- [34] Zákon NR SR č. 215/1995 Z.z. o geodézii a kartografii.
- [35] Weiss, E., Hajduová, Z., Zuzik, J., Mixtaj, L., Gergel'ová, M., Labant, S.: Proposal of a six sigma project economic effectiveness evaluation model. *Metalurgia international*. Vol. 19, no. 5 (2014), p. 34-37. - ISSN 1582-2214
- [36] Weiss, R., Labant, S., Zuzik, J., Mixtaj, L.: Application of GNSS and GIS in mining tourism. *Acta Montanistica Slovaca*. 18, 2013, 4, 234-238. ISSN 1335-1788. Available at: <http://actamont.tuke.sk/pdf/2013/n4/4weissr.pdf>.