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**PROGRAM
of
IMPLEMENTATION OF
NEW OFFICIAL GEODETICS DATUM AND MAP
PROJECTIONS IN CROATIA**

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On the half way

On August 4th 2004. the Government of the Republic of Croatia has adopted a governmental:

Decree on establishing new official geodetic datums and map projections for the Republic of Croatia !

Reasons of implementation of new ...

- Introducing unique croatian official geodetic datums and map projections based on modern achievement of science and according with european recommanditions and trends
- To remove existing obstacles toward more effecient use of modern measuring and GIS tehnologies and in that way offer the state, economy and citizens uniform, rational and simply applied referent system and frame,
- In a part that relates to space data to create prerequisites for development of information society in Croatia (e-government, one-stop-shop, ...),
- To make further development of geodesy and other geo-professions possible

Decree of establishing new official geodetic datums and map projections

- *Article I – Horizontal datum of the Republic of Croatia*
- European Terrestrial Reference System 1989,0 (abbreviated as ETRS89), is defined to be the official inalterable and time independent positional reference coordinate system for the Republic of Croatia.
- GRS80 ellipsoid with the size of large half-axis $a=6378137,00$ m and the flattening $\mu=1/298,257222101$ is determined to be the official mathematical model for the Earth's body in the Republic of Croatia.

Decree of establishing new official geodetic datums and map projections

- *Article I – Horizontal datum of the Republic of Croatia*
- Positional network that consists of 78 permanently stabilized geodetic control points having the coordinates determined by ETRS89, is determined to be the basis of positional reference coordinate system of the Republic of Croatia.
- Positional reference coordinate system of the Republic of Croatia containing the coordinates of 78 geodetic control points determined in the year 1996, is given the name Croatian Terrestrial Reference system for the Epoch 1995.55- abbreviated as HTRS96.

Decree of establishing new official geodetic datums and map projections

■ *Article II - Vertical datum of the Republic of Croatia*

- Geoid surface, defined on the basis of the mean sea level at five tide gauges in Dubrovnik, Split, Bakar, Rovinj and Kopar, is defined as the reference surface used for the computation of heights in the Republic of Croatia.
- Vertical network consisting of permanently stabilized benchmarks of the II. precise levelling the heights of which are determined in the system of (normal) Earth's gravity field is defined to be the basis of the vertical reference system of the Republic of Croatia.
- Vertical reference system of the Republic of Croatia that is determined on the basis of the mean sea level is given the name – Croatian Vertical Reference System for the Epoch 1971.5 - abbreviated as HVRS71

Decree of establishing new official geodetic datums and map projections

- *Article III - Gravimetric datum of the Republic of Croatia*
- The reference system for the determination of gravity the basis of which is the *International Gravity Standardization Network 1971 (IGSN71)*, is determined by gravimetric reference system of the Republic of Croatia.
- GRS80 ellipsoid with the belonging physical parameters $GM = 398600,5 \times 10^9 \text{ m}^3\text{s}^{-2}$ and with the angular velocity of the Earth rotation $\omega = 7,292115 \times 10^{-5} \text{ rad s}^{-1}$ is defined as the reference level-ellipsoid for the determination of normal gravity field in the Republic of Croatia.

Decree of establishing new official geodetic datums and map projections

- *Article III - Gravimetric datum of the Republic of Croatia*
- Basic gravimetric network that consists of 6 permanently stabilized points of absolute gravimetric network and 36 permanently stabilized gravimetric points of the I. order gravimetric network on which the gravity is determined in IGSN71, is being determined as the basis of the gravimetric reference system of the Republic of Croatia.
- Gravimetric reference system in which the gravity was determined at 42 points of the basic gravimetric network in 2003 is given the name Croatian Gravimetric Reference System 2003 - abbreviated as HGRS03.

Decree of establishing new official geodetic datums and map projections

- *Article IV - Map projections of the Republic of Croatia*
 - Coordinate system of the transverse aspect of Mercator's projection - abbreviated HTRS96/TM, with the mean meridian $16^{\circ} 30'$ and the linear scale on that meridian 0.9999, is defined to be the projection coordinate system of the Republic of Croatia for the field of cadastre and detailed state topographical cartography.
 - Coordinate system of the normal aspect of Lambert conformal conical projection - abbreviated as HTRS96/LCC, with standard parallels $43^{\circ} 05'$ and $45^{\circ} 55'$, is defined to be the projection coordinate system of the Republic of Croatia for the field of general state cartography.
 - Coordinate systems of map projections are based on Croatian terrestrial reference system defined in the item I. of this Decree.

Decree of establishing new official geodetic datums and map projections

- *Article IV - Map projections of the Republic of Croatia*
- To serve the needs of the Armed Forces of the Republic of Croatia, the projection coordinate system of Universal Transverse Mercator projection - UTM is adopted, pursuant to the Standardisation Agreement “STANAG 2211”, fifth edition, July 15th, 1991, of the NATO member states.

Decree of establishing new official geodetic datums and map projections

Article V.

- **New official geodetic datums and plane map projection will be implemented into the official use gradually.**
- **The director of the State Geodetic Administration is entrusted with the task of developing a program for implementing new official geodetic datums and map projections into the official use, within 6 months period upon publishing this Decree.**

Article VI.

- **State Geodetic Administration is entrusted with the task of implementing new official geodetic datums and map projections into official use until January the 1st 2010 at the latest.**

Article VII.

- **The decision referring to method and dynamics of implementing map projection from the item IV, section 4 of this Decree, will be made by the Minister of Defence.**

Program of implementation of official geodetic datums and map projections

■ **Program define:**

- **Necessary activities and tasks to implementation new geodetic datums and map projections in official use**
- **Modes and due dates of their performance**
- **HOLDERS and subjects of their performance**
- **Activities and measures that is to undertake SGA in direction of implementation new geodetic datums and map projections in general use for all space information users with special accent on government bodies and public systems**

Program of implementation of official geodetic datums and map projections

The purpose of Program is to:

- Introduce the new geodetic datums and the map projections in practical use on the all Croatian territory, in all official registries and data bases and execution of work from SGA responsibility
- Ensure the frame of geodetic referent system of the Republic of Croatia for NSDI establishment
- Create necessary prerequisites and ensure support to implementation of official geodetic datums and map projections in all official space referencing registries and data bases of governmental bodies and authorities

Program of implementation of official geodetic datums and map projections

The purpose of Program is to:

- Create necessary prerequisites and ensure support to implementation official geodetic datums and map projections for economy and citizens,
- Elaborate adoptions and use necessary rules, standards and technical specifications for Program execution,
- Elaborate system of education and training that is to ensure Program's execution

Program of implementation of official geodetic datums and map projections

- Program will be achieved by realising chain of tasks divided in few round legislative, technological and organisation unit:
 - Fundamental geodetic works and state border survey
 - Topographic survey and state maps manufacturing
 - Real estate Cadastre
 - Registry of space units
 - Installations cadastre, engineering geodesy jobs
 - Education and technical standard legislation

Program of implementation of official geodetic datums and map projections

Fundamental geodetic works

- **Establishing of permanent GNSS-network of the Republic of Croatia - CROPOS (A1)**
- **Elaborating of unity transformation model HTRS96/HDKS (A2)**
- **Elaborating of new geoid model (A3)**
- **Renewal and establishment system of maintaining ordinary geodetic sites of basic horizontal geodetic networks (A4)**
- **Control measure of basic network (A5)**

Program of implementation of official geodetic datums and map projections

Fundamental geodetic works:

- **Reconstructing fundamental vertical network and in its frame by establishing new figures its geometric configuration will adjust to the state territory and systematic gravimetric survey will be undertaken.(A6)**
- **Elaborating of unity transformation model Trst/HVRS71 (A7)**
- **Completing of basic gravimetric network (A8)**
- **Establishing of second order gravimetric network (A9)**
- **Measurement and determining of state border's side pillars coordinates (A10)**

Program of implementation of official geodetic datums and map projections

Topographic survey:

- Topographic data base transformation into the new projection coordinate system - HTRS96/TM and production of new sheets of topographic map TK25 (B1)
- Digital orto-foto data base transformation into the new projection coordinate system – HTRS96/T (B2)
- Transformation of croatian base map (scale 1:5000) data base into the new projection coordinate system - HTRS96/TM and production of new sheets HOK5 (B3)
- Setting up the terms (detailed algorithms for calculating and determined division by sheets) for constructing topographic maps in other official scales directly into the coordinate system of new cartographic projection (B4)

Program of implementation of official geodetic datums and map projections

Real estate cadastre:

- Generating conditions to performance of new cadastre survey exclusive in the new official geodetic referent system (C1)
- Cadastre maps transformations of cadastre surveys that have carried trough the frame of Program of state survey and real estate cadastre for period 2001.-2005. into new projection coordinate system - HTRS96/TM. (C2)
- Transformation of cadastre maps that were elaborated in Gauss-Kruegger projection into new projection coordinate system - HTRS96/TM. (C3)
- Transformation of cadastre maps that were elaborated by graphical method of survey into new projection coordinate system - HTRS96/TM. (C4)

Program of implementation of official geodetic datums and map projections

Central registry of space units:

- **Raster and vector data transformation of central data base of space unit into the new projection coordinate system HTRS96/TM. (D1)**
- **Substitution of existing raster data TK25 with appropriate data from topographic data base (D2)**

Program of implementation of official geodetic datums and map projections

Installations cadastre, engineering geodesy

- **Informing the public by organizing seminars on national level (annually) and regional level about introducing and implementing new geodetic datums and map projections. (E1)**
- **Science-professional support to all governmental bodies, institutions and public systems in transformation their georeferencing space evidence into new geodetic referent system (E2)**
- **To ensure of conditions for performance all geodetic works into the new official geodetic referent system (E3)**

Program of implementation of official geodetic datums and map projections

Education and technical standards legislation:

- Informing expertises and the public through the existing publications (Geodetic informantor and Catalogue of SGA products), as well as in th special broshures about introducing and implementing new geodetic reference system. (F1)
- Development and installation of implementation and application of new geodetic referent system modules into the system of education and training for geodetic professionals, GIS and other professionals (F2)
- Completing the book of rules to way of fundamental geodetic works performance that will be support new geodetic referent system together with new acceptable and efficient metods of fundamental geodetic works performance (F3)
- Completing technical specifications of new map projections – HTRS96/TM for practical use (F4)

Program of implementation of official geodetic datums and map projections

- Holders of Program performance are State Geodetic Administration
- Program has been executing through Annual programme of State Geodetic Administration
- Participants in Program's performers besides SGA are:
 - Croatian geodetic institut
 - Faculty of Geodesy of University
 - Company licensed to practice jobs of state survey and real estate cadastre
 - International institutions and authoritative organisations of other country

Conclusion

- For the Republic of Croatia new official geodetic datums and its realisations have been defined
- Its implementation will be high tasking, complexing and long-tasking work
- All together, implementation represents a big challenge, abut also a big chance for SGA and all croatian surveyers to prove that we can build new and modern geodetic referent system that will enable the completion of all users requests

Thank you for your attention!