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**Republika e Kosovës**

**Republika Kosova - Republic of Kosovo**

**Qeveria - Vlada - Government**

**Ministria e Zhvillimit Ekonomik**

**Ministarstvo Ekonomskog Razvoja - Ministry of Economic Development**

**Minister of Economic Development,**

Pursuant to Article 18, paragraph 1.6 of Law No. 06/L-039 on Kosovo Geological Service (Official Gazette No. 6 / 3 May 2018), Article 8, sub-paragraph 1.4 of Regulation No. 02/2011 on the Areas of Administrative Responsibility of the Office of the Prime Minister and Ministries (Official Gazette No. 1 / 18 April 2011), as well as Article 38, paragraph 6 of Regulation No. 09/2011 on Rules and Procedure of the Government of the Republic of Kosovo (Official Gazette No. 15 / 12 September 2011),

Issues the following:

**ADMINISTRATIVE INSTRUCTION (MED) NO. XX/2019 ON MICROZONATION AND SPECIAL SEISMIC RISK STUDIES**

**Article 1**

**Purpose**

This Administrative Instruction defines the general criteria for seismic microzonation studies and special seismic risk studies, the conditions and manner of their performance, the implementation of the standards adopted by the Seismology Sector in accordance with Eurocode 8, the technical procedures, the method of classifying areas according to seismic hazard and the maintenance of their evidence.

**Article 2**

**Scope**

The provisions of this Administrative Instruction are binding on all natural and legal persons for all activities involving the specifics of seismic microzonation studies, seismic phenomena and activities in the compilation of microseismic maps, special studies at the local level, construction sites, buildings of special importance and those determined by special laws.

**Article 3**

**Definitions**

1. The terms used in this Administrative Instruction shall have the following meanings:

1.1. **Seismic hazard -** shall mean the probability that at a given point of the land surface and for a certain period of time, an earthquake with maximum intensity or maximum acceleration can be felt or observed;

1.2. **Seismic hazard map –** shall mean the map which is necessary for land use planning in assessing and eliminating the consequences of future earthquakes as well as for planning of preventive measures for minimizing and coping with material and human losses;

1.3. **Seismicity -** shall mean the earthquake activity in a given area;

1.4. **Seismic microzonation** - shall mean the submission of a detailed seismic study for the prevention of earthquake hazard and the assessment of seismic risk in site management, the design of buildings or structures and the planning of emergency;

1.5. **Seismic risk** - shall mean the damages expected from earthquake to a building, structure, infrastructure or any other entity, the potential economic, social and environmental consequences of hazardous events that may occur in a specified period of time;

1.6. **Amplification** - shall mean the increase of the level of vibrations in an area or zone, focusing on seismic energy, amplitude change, frequency and duration of seismic movement due to specific conditions of the area, ground, topography and geological formations;

1.7. **Seismic vulnerability** - shall mean the assessment of the possible damage to the structure, building or group of buildings as a result of the seismic event;

1.8. **HVSR -** shall mean the horizontal-to-vertical spectral ratio;

1.9. **Vs30 -** shall mean the average shear-wave velocity to a depth of 30 m;

1.10. **PGA -** shall mean the Peak Ground Acceleration;

1.11. **GIS -** shall mean the Geographic Information System - a computer system consisting of hardware, software, operator, data and methods for collecting, gathering, verifying, integrating, manipulating, analysing and presenting geographic data and information on geology, topography; tectonic faults, seismicity and seismic hazard for a certain area.

2. Other terms used in this Administrative Instruction shall have the same meaning as in the Law No. 06/L-039 on Kosovo Geological Service as well as the relevant legislation in force.

**Article 4**

**Seismic microzonation studies**

1. Seismic microzonation studies are mainly carried out for the development of new urban areas, for areas previously developed without proper seismic studies, for constructions of particular importance for the purpose of assessing the stability, seismic risk of existing and planned buildings, for the safety of citizens' lives and for reduction of the economic losses.

2. The general methodology in seismic microzonation studies of an area is based on:

2.1. Use of existing geological data at the national and regional level;

2.2. Geophysical research;

2.3. Geotechnical research;

2.4. Compilation of seismic microzonation maps.

**Article 5**

**Use of existing geological data at the national and regional level**

1. Existing geomorphologic, geo-engineering, geotechnical, geophysical, hydrogeological and seismological data at the national and regional level include the use of:
   1. . regional topographic and geographic digital maps at a scale over 1:50000;
   2. . existing geological regional data and documented structural geology data for general use for studying the area;
   3. . existing geo-engineering data of the relevant area pertaining to the foundation engineering and soil mechanics;
   4. . existing hydrogeological data of the relevant area;
   5. . existing seismic data, historical catalogues of strong earthquakes with a magnitude over 4.5 for the country and the region;
   6. . seismic hazard maps for the territory of Kosovo, for recurrence periods of 95 and 475 years (Vs30, PGA);
   7. . tectonic map for the territory of Kosovo;
   8. . map of the seismic source model.

**Article 6**

**Geophysical research**

1. Geophysical research by area category and level of study is carried out based on these research phases:

* 1. . Selection and determination of the size of the area, the research network and the number of geophysical profiles based on the seismic hazard and the nature of the heterogeneity of the geological formations;
  2. . Compilation of topographic digital map for the relevant area at a scale up to 1:5,000;
  3. . Conduct of the instrumental seismological field study for the estimation of the surface effect of earthquakes through measurements of ground acoustic impedance and the microtremor method for estimating the dominant frequencies in the soil profiles;
  4. . Mathematical modelling for analytical estimation of strong vibrations expressed through such physical parameters such as acceleration, velocity, displacement, and their response spectra;
  5. . Geophysical and geotechnical research for evaluating the spatial variation of VS30 share-wave velocity and profiles through geophysical studies, geotechnical borehole logging, and HVSR modelling to develop a database of shallow subsurface stratigraphy information;
  6. . Geophysical research with seismic methods of reflection and refraction of seismic waves to identify the dynamic properties of geological formations;
  7. . Study of the seismic ground response through the theoretical and numerical modelling of wave propagation to identify amplification effects associated with near-surface ground motions from alluvial deposits during an earthquake;
  8. . Geophysical study based on spectral analysis of surface waves and multichannel analysis of surface waves, as an essential parameter for evaluating the dynamic properties of the soil in the shallow subsurface;
  9. . Determination of the ground response spectrum, duration and the time history of earthquake inputs;

1.10. Assessment of seismic stability and estimation of permanent ground deformation within geological formation, as well as the site classification on the basis of the shear wave velocity model, and the geotechnical assessments.

**Article 7**

**Geotechnical research**

1. Geotechnical research, by area category and study level, is carried out based on the following phases:

1.1. Determination of drilling network;

1.2. Geomechanical research;

1.3. Determination of the geotechnical characteristics of the location.

2. The drilling network is determined according to the following criteria:

2.1. For high and industrial structures, the drilling network should be at a distance of 20 m to 40 m;

2.2. For large area structures, the drilling network should be at a distance of not more than 60 m;

2.3. For linear structures, roads, railways, canals, pipes, tunnels, retaining walls, the drilling network should be at a distance of 25 m to 200 m;

2.4. For special structures, bridges, pillars, machine foundations, the drilling network should be at a distance of two to six investigational points for foundation;

2.5. For dams, the drilling network should be at a distance of 20 m to 60 m, along with the vertical sections.

3. Geomechanical research includes:

3.1. Determination of drilling network based on heterogeneity and homogeneity of the area by reference to the geological map;

3.2. Drilling to over 30-meter depth;

3.3. Determination of surface for geotechnical data creation, which moves from 0.1 km to 0.5 km for heterogeneous areas, and from 0.5 km to 2 km for homogeneous areas;

3.4. Determination of field test methods including standard penetration test, cone penetration test, and share wave velocity data for evaluating the deformations and for classifying and evaluating characteristics of soils in sliding areas and liquefaction areas;

3.5. the topographic digital map provided for in paragraph 1.2 of Article 6 of this Administrative Instruction.

4. Determination of the geotechnical characteristics of the location by analysing the complex geological, geophysical and geomechanical data, as well as the refractions, reflection and microtremors, according to the:

4.1. Determination of field geotechnical structure through values of physical-mechanical characteristics of geological formations;

4.2. Determination of the field geological profiles;

4.3. Determination of geodynamic models for the analysis of the influence of the ground local conditions on seismic displacements;

4.4. Determination of lithophysical parameters with geomechanical research, of the values of seismic velocities, longitudinal waves and transverse waves, of the dynamic values of elastic geomechanical parameters, of the elastic modulus, hardness modulus, modulus of pressure change in volume compression and density;

4.5. The static values of geomechanical parameters determined in conjunction with the data from geomechanical and laboratory tests as well as the existing data.

**Article 8**

**Compilation of seismic microzonation maps**

1. The compilation of seismic microzonation studies is based on real results obtained from geophysical, geotechnical and geological research as well as the existing and documented parameters in literature. The compilation is based on three phases:

1.1. Harmonization of all data and parameters from existing documented research;

1.2. Preparation of maps by areas with values of seismic acceleration and spectral;

1.3. Integration into the GIS of all sources and information on geology, topography, tectonic faults, seismicity and seismic hazard for the area.

2. Harmonization of all data and parameters from the research, creating the database and presenting in textual and tabular form as well as in the form of profiles, diagrams and graphs:

2.1. The geological data of each 1D profile;

2.2. The data of refracted and reflected seismic velocities of any 1D profile;

2.3. The data of tectonic faults from the 1D reflected seismic profiles;

2.4. The parameters obtained from the calculations;

2.5. The data from microtremor research on values of the predominant period;

2.6. The geodynamic parameters;

2.7. The seismic tomography presented in 2D and 3D;

2.8. The data from the seismic tests up, down and in junction of the drilling;

2.9. The data from the Standard Penetration Test and the Cone Penetration Test;

2.10. The data from the Spectral Analysis of Surface Waves;

2.11. The data from the Multichannel Analysis of Surface Waves;

2.12. The data on soil amplification values for each location.

3. Seismic maps by areas with values of seismic acceleration and spectral are compiled as:

3.1. Maps of peak ground acceleration at foundation depth (-2.0 m) for 95 years and 475 years;

3.2. Maps of peak ground acceleration at foundation depth (-2.0 m) for 475 years;

3.3. Map of distribution of spectral acceleration Sa, for T=0.2 sec. 95 years;

3.4. Map of distribution of spectral acceleration Sa, for T=0.5 sec. 95 years;

3.5. Map of distribution of spectral acceleration Sa, for T=1.0 sec. 95 years;

3.6. Map of distribution of spectral acceleration Sa, for T=0.2 sec. 475 years;

3.7. Map of distribution of spectral acceleration Sa, for T=0.5 sec. 475 years;

3.8. Map of distribution of spectral acceleration Sa, for T=1.0 sec. 475 years;

4. All seismic maps of zones of peak acceleration and seismic spectrum are compiled at a scale of 1:5000.

5. Results obtained through all phases according to this Administrative Instruction are worked with software that corresponds to the GIS.

**Article 9**

**Entry into force**

This Administrative Instruction enters into force seven (7) days after being signed by the Minister and being published in the Official Gazette.

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Valdrin LLUKA

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