

www.isogkp.mk

Yellow, Blue & Green
Institute in collaboration
with science and
engineering

ISOGKP- INSTITUTE

- Department for Earthquake Engineering
- Department for Environmental Hazards
- Department of Green Technology
- Laboratory for Monitoring Buildings & Environment

BASIC INFORMATION REPORT 2021/1

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Is bridging the gap between science and engineering.



**WE ARE COMPETENT TO
DESIGN AND CONSTRUCT
SEISMICALLY RESISTANT
STRUCTURES**

INTRODUCTION

History

Starting from the fact that "Euro Horizon Consulting" (EHC) is a consulting company specialized in solving construction problems related to the construction of seismically safe buildings (www.ehc.mk), the company decided to create a scientific institution that will establish a bridge between science and engineering.

The dominant research of the institute is the seismic safety of buildings and climate change, therefore the name of the institute is Institute for Seismic Resistant Structures and Climate Change (ISOGP).

In this report, the profile of the institute will be presented first. The centres,

the structure of the institute as well as the research areas will also be described. At the end of the brochure, the planned local and international cooperation of the institute will be described.

The location of the "Institute for Seismic Resistant Buildings and Climate Change" (ISOGCP), is in Skopje, in modern equipped premises on the boulevard "Boris Trajkovski" No. 19, Kisela Voda, Skopje.

The rooms are specially adapted and extremely suitable for teamwork. Within the space where the institute is located, there is a lecture room with a capacity for forty participants (www.isogkp.mk). Lifelong learning will be part of the program of the ISOGKP.

ISOGKP

STRUCTURE AND RESEARCH AREA



STRUCTURE/1

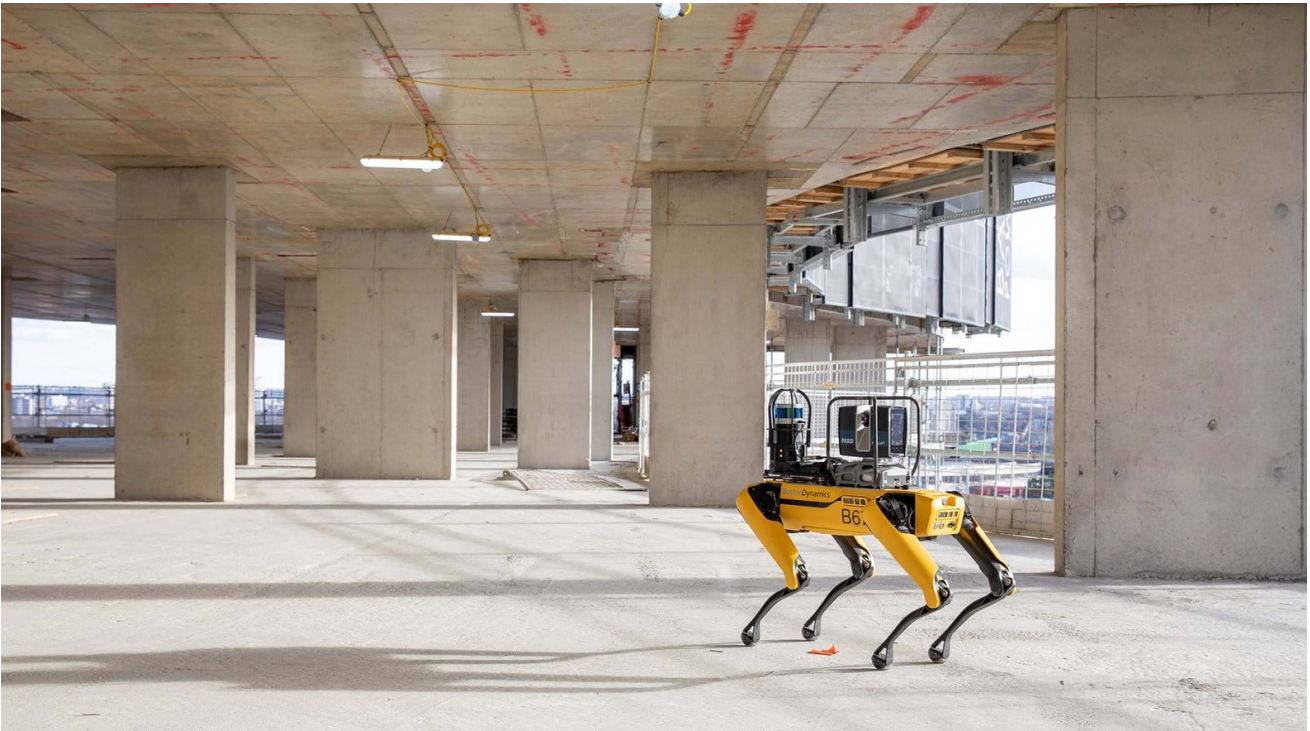
of the institute

At the last two world conferences organized by UNISDR, (in Kyoto 2005) and (Sendai 2015), two documents were adopted, entitled: (1) Hyogo Framework for Action and (2) Sendai Framework for Disaster Risk Reduction, which outlined the guidelines to reduce the consequences of natural and man-made disasters. ISOGKP is integrated institute composed of four multidisciplinary departments. ISOGKP

investigates mainly in two areas,(1) earthquake engineering and (2) climate change. Both areas of research are of exceptional importance for R.N. Macedonia. Following the resolutions of Kyoto and Sendai the institute is exploring hazards phenomena and at the same time works to reduce the risks and consequences of them using engineering tools,

STRUCTURE/2

of the institute



THE INSTITUTE WILL SIGN A MEMORANDUM OF COOPERATION WITH UNDRR AND EUROPA-MAJOR HAZARDS AGREEMENTS

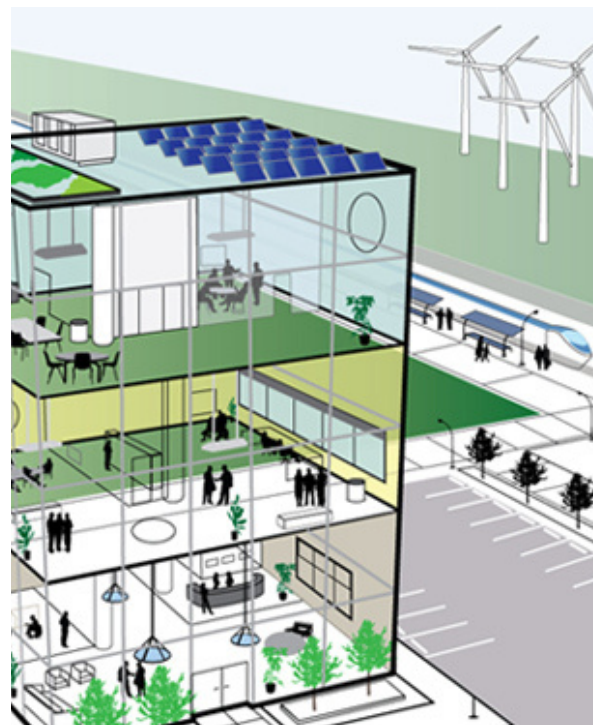
As can be seen from the very name of the institute "Institute for Seismic Resistance Buildings and Climate Change", the primary area of research is the field of earthquake engineering. The main goal of ISOGP is to create a seismically safe region. In addition to the **Department for Earthquake Engineering** in the "Institute for Seismic Resistance Buildings and Climate Change", the departments for:

- **Ecological Hazards**
- **Green Technologies**

as well as

- **laboratory for monitoring buildings and the environment**

are established, too.



EARTHQUAKE ENGINEERING

Department



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Earthquakes are one of the greatest natural hazards affecting humanity. They happen unexpectedly, i.e. without any warning. They create a huge loss of human lives and material damage. For example, since the 2010 earthquake in Haiti, there have been 222,500 deaths. The department pays great attention and works on engineering problems related to the seismic safety of buildings and other civil structures. One of the goals of ISOGKP is the introduction of European norms for the design of buildings under the action of seismic forces (important for our EU membership) in our country, along with training of engineering staff for their use. Modern Earthquake Engineering is a relatively new discipline and innovative

research is generally considered to have begun in the 1960s. Similarly, in our country and in Europe also, intensive research was started after the catastrophic earthquake in Skopje in 1963. The Balkans, where the territory of R.N.Macedonia is located is a seismically active area. Catastrophic earthquakes that occurred on the territory of the Republic of Northern Macedonia, Pehchevo-Berovo (1904), Valandovo (1931), as well as the recent earthquakes that occurred on the territory of the former Yugoslavia, Banja Luka (1969) and Montenegro (1978), the earthquakes that occurred in Durrës (2019), Albania and Croatia (2020), clearly indicate the need for such research.

ENVIRONMENTAL HAZARDS

Department

To adapt to climate change, we first need to understand what changes will occur due to global warming, as well as the dangers that can be posed. In R. N. Macedonia, ISOGKP is an institute that, in addition to research in the field of seismic-resistant structures, exclusively investigates the issues related to climate change that occurs as a consequence of global warming. The institute explores environmental hazards connected with climate change and pollution. There are a number of natural hazards and they can be classified into three categories:

(1) Hazards (avalanches, earthquakes, coastal erosion, volcanic eruption, landslide); (2) Meteorological Hazards (snowstorm, drought, heatwave, storms (ice, cyclonic, hail), tornado); (3) Hydrological hazards (Floods), as well as fires and diseases that are also natural hazards that can be caused by human factors. This center has explored those hazards where the intensity and their frequency is directly related to climate change. Catastrophic floods occurred in: Croatia, BiH and Serbia in 2014. The main



WE STUDY, HOW FLOODING IS DEVELOPED FROM HEAVY RAINFALL AND RAPID SNOWMELT AS WELL AS FROM THE DAM AND EMBANKMENT FAILURE, ICE JAMS, AND CHANNEL MIGRATION

flood region was the Sava River basin, which forms the border between BiH and Croatia, flows into Serbia and the Danube near Belgrade. These floods bring enormous material damage and human lives in most regions in BiH and Serbia. We witnessed the rapid sudden flood that

occurred at the foot of Skopska Crna Gora (2016), we also witnessed the drought that affected our entire country and which led to an enormous decrease in water levels in natural and artificial lakes. The frequency of catastrophic floods, in 2019, has become characteristic of these regions.

GREEN TECHNOLOGY

Department

To adapt to climate change, we first need to understand what changes will occur due to global warming, as well as the dangers that can be posed. Climate change affects the entire globe.

The centre will mainly focus on research that will basically lead to a drastic reduction of CO₂, ie it will work on an economy and society based on renewable and green (clean) energy. The key to

reducing these gases is the so-called green, ie eco-technology. The center works on reducing the use of fossil fuels and introducing electricity production through the use of solar rays, wind forces and the use of hydro potential. The energy efficiency of buildings is also, an area in which the institute has directed its research.



OUR COMMITMENT IS TO WORK ON ZERO-CARBON SOLUTIONS

Analysis of the use of fossil fuels in the Republic of Northern Macedonia, with an examination of the amount of greenhouse gas emissions as a result of the use of these fuels. Exploration of the current state of application of renewable sources for electricity production.

The center will develop an energy analysis for a near Zero Energy (nZEB) and Zero Carbon Emissions building. **Energy efficiency, which indirectly affects global warming, is also one of the primary areas in which the institute has focused its research.**

MONITORING BUILDINGS AND ENVIRONMENT

Laboratory



Develops non-destructive techniques for determining the strength characteristics of concrete and the exact number, distance and diameter of the built-in reinforcement. Develops sensors and in situ techniques for determining the dynamic characteristics of structures

Develops and performs measurements of the energy efficiency of buildings with the help of thermal cameras. Uses methods to measure pollutants.



WE STUDY, HOW THE STRUCTURES VIBRATE IN REALITY AND WHAT MEASURES SHOULD BE TAKEN IF THEIR PERFORMANCE SHOWS SOME IMPERFECTION

reduction of CO₂, the Center for Climate Change works on the economy and society based on renewable and green (clean) energy.

Research at the Center for Climate Change is dedicated to reducing the use of fossil fuels and introducing an electricity

generation through the use of solar radiation and wind power. **Energy efficiency, which indirectly affects global warming, is also one of the primary areas in which the institute has focused its research.**

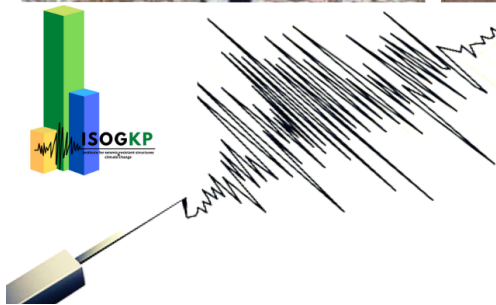
SHORT-TERM AND LONG-TERM PROJECTS

Below is the title of the ongoing scientific research project:

- **Improving seismic culture by deepening knowledge about historical earthquakes** -The Institute is currently developing a new original method of "back to the future" or a technique we named "Do You Remember it" (DYRI). The technique started by the ISOGP institute is extremely effective and useful data can

be obtained about the catastrophic earthquakes of the past, the damage to the buildings and the psychological condition of the people who experienced them, as well as project that will be carried out at the Department for Earthquake Engineering:

- **Implementation of European norms for the design of buildings under the action of seismic forces (EURO CODE 8 together with EUROCODE 2 and EUROCODE 7).**



Հարցաթերթ 1988թ.-ի երկրաշարժի վերաբերյալ

ՀԻՇՈՒՄ ԵՔ ԱՅՆ?

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THE **DYRI** TECHNIQUE IS BASED ON THE ASSUMPTION THAT THE MEMORIES OF PEOPLE WHO SURVIVED CATASTROPHIC EARTHQUAKES ARE NEVER ERASED

A joint project of the Department for Earthquake Engineering and the Department for Green Technology:

- **Application of new insulation materials for energy efficiency of seismically safe high-rises buildings** (The research will create a database of buildings that are seismically safe and where it is economically viable to

*perform thermal insulation in order to achieve energy efficiency.).***Thermal camera will be used to promote the energy efficiency of buildings.**

Another project will be worked on by these two departments:

- **Design of windmills under the action of seismic and wind forces.**

**MPS
MIST
MIS2**

**SEISMICALLY UNSAFE
BUILDINGS, BEAMLESS
STRUCTURE (BE CAREFUL)**



COOPERATION WITH INDUSTRY

ISOGKP is bridging the gap between science and engineering. ISOGKP is a unique institute that uses scientific knowledge and turns them into attractive engineering solutions. Our experience in designing civil engineering structures is vast. In addition to using state-of-the-art software for structural analysis and then designing using regulations from different countries,

we are ready to perform design at a higher level using analysis that is more advanced than required by the provisions. Our expert teams are composed of proven scientists, young researchers, and experienced engineers. Our team members have Category A authorizations of design, inspection, and supervision. By Article 4a of the Construction Act, the ISOGKP has a right to issue an opinion on the projected degree of mechanical strength, stability, and seismic protection of the construction. Experts who go to the field to issue MIS1 (Quality control of the structure at 50% of the construction) and MIS2 (Quality control of the construction at 100% construction) have exceptional experience in testing the quality of embedded materials in the structure for which an opinion should be issued.

THE MACEDONIAN NATIONAL THEATER WAS DESIGNED BY A MEMBER OF OUR INSTITUTE





KALEIDOSCOPE OF OUR SERVICES