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IPL Project Proposal Form 2017

1. Project Title:

General approach to landslide research and stabilization in Bosnia and Herzegovina

Main Project Fields

(3) Capacity Building

A. Enhancing Human and Institutional Capacities

B. Collating and Disseminating Information/ Knowledge

(4) Mitigation, Preparedness and Recovery

A. Preparedness, B. Mitigation, C. Recovery

2. Name of Project leader: *Sabid Zekan*

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Core members of the Project

– Univ. prof. Mato Uljarević, University of Banja-Luka, Faculty of Architecture, Civil Engineering and Geodesy

– Univ. Prof. Azra Špago, University of "Džemal Bijedić" Mostar, Faculty of Civil Engineering

– Univ. prof. Maja Prskalo, University of Mostar, Faculty of Civil Engineering

3. Objectives:

Harmonization activities for landslides investigation and stabilization have to establish the basic elements for more economical and efficient stabilization of landslides and to ensure that the sufficient degree of safety has been applied in the slopes. It must be the set of simple principles, understandable to the wide audience, that result from research and knowledge on landslides.

4. Background Justification:

The landslides, which occurred in the period from 2010 to 2016, caused a few casualties and severe damages to housing facilities and infrastructure. The state of Bosnia and Herzegovina invests very little in landslides stabilization.

The legal regulations for landslides investigation and stabilization are not articulated nowadays. There is no methodology to be followed by investors, researchers, designers and contractors, and there is no state's strategy for governing semi-stable slopes processes.

5. Study Area:

Project will be conducted to area of Bosnia and Herzegovina, but would potentially be applicable to the rest of the world.

6. Project Duration:

Project has been lasting since the idea in 2014 up today, and will be lasting in future without time limitation.

7. Resources necessary for the Project and their mobilization:

It has been enrolled 4 universities from Bosnia and Herzegovina. Just, we have staff capacity. In general, there is no financial support for the project. In 2016, it had been started with first preparatory phase of the project. Government have supported the project with small amount of money approx. 1.500,00 USD. In the year, 2017, it has been continued to make connection with public institutions, which will be enrolled to the project. Law regulation between all government institutions would be the part of the same project. There is possible, that project would be disseminated to region or internationally.

Also, strengthening co-operation with international research centres, organizations and universities would be part of the project. Especially, Tools of Implementing and monitoring of ISDR-ICL SENDAI partnership would be support of the project.

8. Project Description:

Harmonization of the activities, recognizable by investors, researchers, designers and contractors, have to provide an effective system of control in slope processes, investigation and stabilization of unstable slopes in order to ensure safety of people and property with as less as possible financial expenditures. These project activities should be divided in several categories that are to be developed in detail:

- Slope and urban-planning processes' management;*
- Pre-investigation and investigation activities on semi-stable and unstable slopes;*
- Stabilization and post stabilization activities.*

The management of the slope and urban-planning processes should be narrowly related to the definition of the term: stable – semi-stable - unstable. The following basic elements of the methodology for the control of the slope processes are suggested:

- systematization of slope processes;*
- assessment of economic interest in the slope process;*
- assessment of safety interest in the slope process;*
- quantitatively defined terms: stable, semi-stable and unstable;*
- stress-strain investigation of the slope in the pre-sliding phase;*
- kinematics and sliding dynamics;*
- water-permeability and water-containing of soil - rock (quantitative evaluation);*
- draining and reduction in pores pressures.*

Pre-investigation and investigation activities that may be classified into the following categories:

- Investigation of interaction: structure-unstable slope;*
- Definition of the stress-strain status of landslide in the pre-sliding, sliding and post sliding phases;*
- Definition of the kinematic parameters during landslide's movement,*
- The scope of field investigation and procedures, as an alternative to the laboratory tests;*
- Compliance of laboratory and field investigation tests, scope and type of investigation;*
- Advantages and disadvantages of drilling sets and core quality;*
- The role of geophysical investigation methods;*

- *Duration of the investigation and the season;*
- *The amount of investigation activities;*
- *Phase procedures in investigation;*
- *The gradual nature of geospatial investigation from global to local.*

Stabilization and post-stabilization activities

- *The possibility of soil strengthening instead of structures supporting;*
- *Development in the production of new materials that are to be used for stabilization;*
- *Establishing the term: Interest towards risk;*
- *Defining the possibility of stabilization in phases;*
- *Reactivation of landslide and legal procedure to establish responsibility;*
- *Post-stabilization observation and monitoring of landslides and semi-stable slopes.*

9. Work Plan/Expected Results:

1st year: Development of 1st phase: *slope and urban-planning processes*

2nd-3rd year: Development of 2nd phase: *Pre-investigation and investigation activities*

4th year: Development of 3rd phase: *Stabilization and post stabilization activities*

5th year: *Finalization of the project*

10. Deliverables/Time Frame:

Results of the project will produce next:

- *more safety and cheaper management of semi-stable and unstable slopes*
- *better understanding between investors, investigators, designers and construction companies*
- *improvement of urban planning on slopes, especially semi-stable slopes*

11. Project Beneficiaries:

All people-institutions conducted to slopes management such as: municipalities, institutes, universities, construction companies, government agencies, urban planning sectors.

12. References (Optional):

S. Zekan at al. (2015), Bosnian Landslide Investigation and Stabilization Method (BLISM), Proceedings: GEO-EXPO 2017, Zenica, BiH