

Proposed Scheme – EOI

Expressions of Interest (EOI), according to the following scheme [managed to be limited up to max. 3 pages]:

I. Research group heading/name & full address/affiliation.

FIELD MONITORING AND LABORATORY TESTS OF FOUNDATIONS ON EXPANSIVE SOILS

UTP University of Science and Technology in Bydgoszcz
Faculty of Civil and Environmental Engineering and Architecture
Department of Geomatics, Geotechnics and Spatial Economy

II. Name of the group's leader with a short BIO (CV).

dr inż. Aleksandra Gorączko

EDUCATION:

October 2007

PhD in Technical Sciences in the field of Construction entitled
AN INVESTIGATION OF VERTICAL MOVEMENTS OF EXPANSIVE SOIL IN
BYDGOSZCZ FOR SELECTED OBJECTS.

EXPERIENCE:

March 2000-untill now

University of Science and Technology in Bydgoszcz
Faculty of Civil and Environmental Engineering and Architecture Department of
Geomatics, Geotechnics and Spatial Economy

Position: Assistant Professor (since March 2007, previously assistant)

Responsibilities:

- courses in geology, soil mechanics and foundation engineering,
- scientific activities including experimental work and publications in the field of engineering geology, geotechnics, regional building.

January 2010

Head of EXPANSIVE SOIL LABORATORY: Laboratory of Soil and Environmental
Protection, Regional Center of Innovation at the UTP.

III. Names of the group's members and their research areas/interests.

dr inż. Aleksandra Gorączko

soil mechanics,

(expansive clays, clay microstructures, foundations on expansive soils)

dr inż. Adam Bujarkiewicz

engineering geodesy
(measurement of the building geometry, determination of displacements and deformations of the structure)

dr inż. Jacek Sztubecki
engineering geodesy
(measurement of the building geometry, determination of displacements and deformations of the structure)

dr inż. Szymon Topoliński
geotechnics and engineering geology
(weak soil stabilization)

IV. Leading research topic of the group.

- Monitoring of soil-structure interaction of foundations on expansive soils.
- Laboratory and field tests of expansive soils.
- Long-term monitoring of building objects.
- Integrated cyclic measurements of building geometry with the use of geodetic methods.
- Application of GIS to store and analyze spatial information about building objects.

V. Best realizations of the main research topic (brief characteristics or description).

- Long term monitoring program of numerous building failures caused by expansive neogenic clays in Bydgoszcz area - systematic measurements of vertical displacements.
- Developing the methodology used in the long-term geotechnical monitoring.
- Measurement of displacement of engineering structures using Laser Measurement Station.
- Measurement and analysis of cable-stayed bridge movements in variable load conditions.
- Research of deformation of steel construction under varying load conditions.

VI. General expression of interests.

Expansive soils are characterized by their moisture sensitivity. Such soils will expand when given access to moisture and shrink when dry out.

Because of their swell-shrink behavior expansive soils are a worldwide problem, causing extensive damage to civil engineering structures. For example

shallow foundation of light structures will have during rainy season, then settle during the drought if the clays dry out. This causes cycles of up and down movement of the foundation, causing cracking and fatigue to the structure. Consequently, after identifying a soil formation as being expansive, a reliable estimate of its potential heave is essential for the selection of treatment technique to minimize the volume change or the proposition of foundation system to accommodate the anticipated vertical ground movement.

Measurements of vertical movement of many structures in Bydgoszcz founded on expansive soils have been recorded. In situ study of soil deformation due to water content changes have been made. It was found that the degree of structure damage is closely correlated with the size of the displacement of these objects and the type of construction. Past observations point to the need for systematic monitoring of such facilities, including surveying.

VII. Specific interests and additional topics of extended interest.

dr inż. Aleksandra Gorączko

Traditional rural architecture made of limestone. The impact of environmental conditions on changing the properties of subsoil made of expansive soil.

dr inż. Adam Bujarkiewicz

The impact of environmental conditions on the displacement of buildings.

The use of artificial intelligence in the process of determining the displacement of the structure. Applications of GIS in energy-efficient buildings.

dr inż. Jacek Sztubecki

The impact of environmental conditions on the displacement of buildings.

The use of artificial intelligence in the process of determining the displacement of the structure. Applications of GIS in energy-efficient buildings.

dr inż. Szymon Topoliński

The use of industrial waste for weak soil stabilization. Exploitation of unconventional hydrocarbon deposits in Poland.

VIII. Other important characteristics of the group.

The research group includes individuals involved in issues allowing to explain the causes and consequences of the negative impact of the expansive soil on the building foundation. The Group comprises specialists in evaluation of the quality of the ground, monitoring foundation of buildings, monitoring the building geometry and methods of structure protection in terms of its foundation, which minimize the formation of failure.

IX. Main group's achievements.

dr inż. Jacek Sztubecki

dr inż. Adam Bujarkiewicz

The research voucher: *Understanding the measurement technology of building facades with the use of motorized total station, 2013.*

Research: Analysis of cable-stayed bridge movements under varying load conditions, 2016.

dr inż. Aleksandra Gorączko

Research: Long term monitoring program of numerous building failures caused by expansive neogenic clays in Bydgoszcz area - systematic measurements of vertical displacements.

X. Max. 5 selected publications and/or other relevant accomplishments.

Gorączko A. Monitoring uszkodzeń budynku posadowionego na łożach ekspansywnych. Zesz. Nauk. Polit. Śląskiej Nr 1644, Budownictwo Z. 102 (2204)147-154

Gorączko A., Gadomski J., Gorączko M., Charakterystyka przemieszczeń budynków posadowionych na podłożu ekspansywnym na przykładach z Bydgoszczy, w: Problemy geotechniczne i środowiskowe z uwzględnieniem podłoża ekspansywnych, Wyd. UTP, Bydgoszcz 2009, s. 335-342.

S. Topoliński, M. K. Kumor, Możliwości zastosowania analizy tomograficznej w geotechnicznej ocenie gruntów, TTS Technika Transportu Szynowego 12, 2015, s. 1551-1555

J. Sztubecki, A. Bujarkiewicz, M. Sztubecka, Badanie przemieszczeń obiektów inżynierskich z wykorzystaniem współrzędnościowej stacji laserowej, Civil and Environmental Engineering Reports, 2016 (2017)

A. Bujarkiewicz, J. Sztubecki, M. Sztubecka, Badania przemieszczeń konstrukcji mostowych (Research of displacement of bridge construction) Czasopismo: Materiały Budowlane 503, 2014, s. 50-51