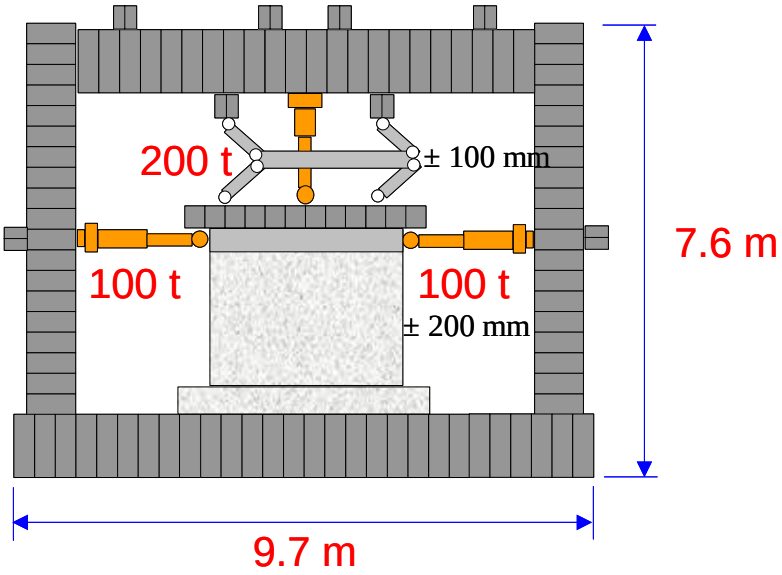
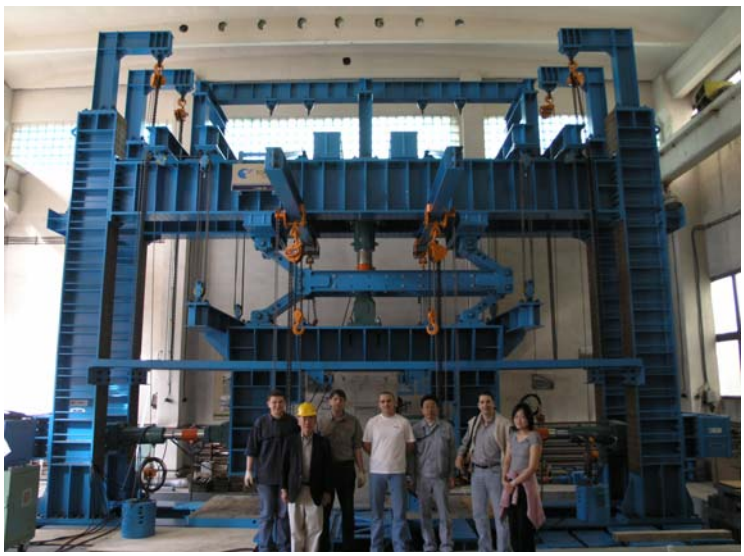
NEWSLETTER of NCSRR *Issue No. 4, September 2004*

Structural testing facility - Reaction frame and opening ceremony at *NCSRR* in *UTCB*

The structural testing equipments consist of a steel reaction frame, loading and data acquisition and processing systems. The reaction frame is similar to the one in *Building Research Institute*, Tsukuba, Japan.



Overall dimensions, force and stroke capacities of loading system



New Reaction Frame

The objectives of structural testing program are:

- ✓ Test of the representative vulnerable structural systems and components;
- ✓ Test of the efficient and innovative Japanese retrofitting techniques;
- ✓ Development of constitutive laws for vulnerable structural components.

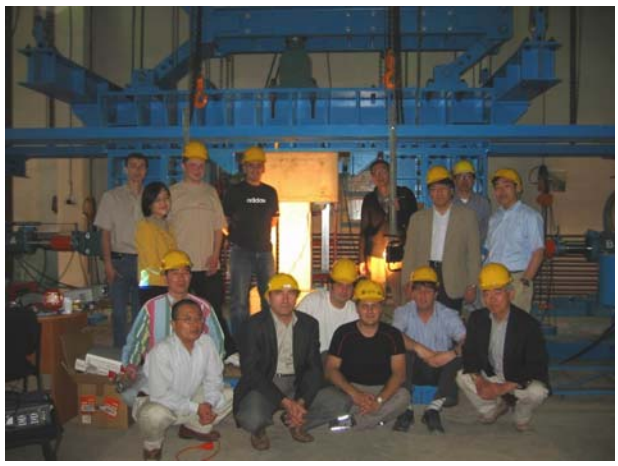
The hand-over and open experiment ceremony was held on May 21 with the attendance of His Excellency Mr. Naotoshi Sugiuchi, Ambassador of Japan in Romania, Mr. Mircea Geoana, Minister, *Ministry of Foreign Affairs* and Mrs. Ileana Tureanu, State Secretary, *Ministry of Transports, Constructions and Tourism*, MTCT. In the speech of the Japanese ambassador, full support of the Japanese government and humanitarian contribution of the project to the well-being of Romanian people were strongly expressed.

Mrs. Ileana Tureanu, State Secretary, *Ministry of Transports, Constructions and Tourism* delivering her speech during the opening ceremony (left). His Excellency, The Japanese Ambassador Mr. Naotoshi Sugiuchi, shaking hands with Mrs. Ileana Tureanu (right)

His Excellency Mr. Mircea Geoana, Minister, *Ministry of Foreign Affairs*, delivering his speech

Images from the opening ceremony

The following load combinations are possible with the provided equipment: 1) Bending with shear for beams testing, 2) Bending with shear and axial load for columns, shear walls and portal frames. The maximum weight of tested specimens is 7to and the maximum dimensions of the tested specimens are 2.5m by 3 m.The structural testing facility worthy of approximately USD 1 million was donated by *Japan International Cooperation Agency*, *JICA* to the *National Center for Seismic Risk Reduction*, *NCSRR* and installed in April/March 2004 at the *Technical University of Civil Engineering*, Bucharest, *UTCB.*



The *NCSRR* staff and Japanese experts during and after a specimen testing with the new reaction frame

This structural testing facility is used to support the seismic evaluation methods for structural systems with more reliable input data and develop cost-effective retrofitting methods. Data from the various structural experiments will be feed back to the seismic rehabilitation of vulnerable buildings at issue and as a result, would serve to mitigation of earthquake disaster

The *National Centre for Seismic Risk Reduction, NCSRR* seismic network

The National Center for Seismic Risk Reduction NCSRR seismic network was installed in 2003 by staff from NCSRR, UTCB and Japanese expert from JICA. The equipment was donated by JICA. All the stations are K2 and ETNA instruments from Kinemetrics and, for the moment, they are stand-alone stations.
Since it's installation, the *NCSRR* seismic network recorded signals from 9 earthquakes originating from Romania (Vrancea region) and Bulgaria. The distribution of records by earthquakes and by location of seismic stations is presented in the following table.

Table 1 - Statistics of earthquake records obtained by *NCSRR* seismic network

Date	Region	Origin time (UTC)	Coordinates		Depth (km)	Magnitude	Number of records		
							Location of seismic stations		
			Lat (^{o}N)	Lon (^{o}E)			Borehole/ free field in Bucharest	Free field outside Bucharest	Buildings in Bucharest
05/10/2003	Vrancea	21:38:18	45.57	26.46	143	m_b = 4.7 (USGS) M_W = 4.6 (INFP)	4	-	-
17/12/2003	Bulgaria	23:15:15	43.19	27.44	60	M_D = 4.5 (INFP)	3	-	-
24/12/2003	Vrancea	13:44:59	45.06	26.08	86	M_D = 3.8 (INFP)	-	-	1
21/01/2004	Vrancea	05:49:10	45.6	26.4	111	m_b = 4.7 (EMSC)	4	-	2
07/02/2004	Vrancea	11:58:22	45.72	26.64	145.8	m_b=3.9 (EMSC) M_w=4.4 (INFP)	2	3	2
30/04/2004	Vrancea crustal	09:19:36	45.60	27.13	18.1	m_b = 3.4 (MIX)	-	1	-
14/05/2004	Bulgaria	11:09:37	43.5	26.5	10	not reported	2	-	-
10/07/2004	Vrancea	00:35:01	45.52	26.49	118.9	m_b = 4.1 (LDG) m_b = 4.3 (MIX)	4	2	4
27/09/2004	Vrancea	09:16:23	45.69	26.32	146.1 (USGS)	M_w = 4.8 (USGS) M_D=5.2 (INFP) M_b=4.7 (EMSC)	5	6	4
Total number of records per location							24	12	13
Total number of records in NCSRR seismic network							**49**		

- M_w – moment magnitude; m_b – body wave magnitude; M_D – duration magnitude;
- *USGS* – United States Geological Survey; *INFP* – National Institute for Earth Physics (Romania);
- *EMSC* – European-Mediterranean Seismological Center; *MIX* – *EMSC* automatic hypocenter relocation;
- *LDG* – Laboratoire de Detection Geophysique (France)

The network has three components of instrumentation, as described below:

Seismic stations for ground motion attenuation analysis
Six *ETNA* stations were installed on the SW direction starting from Vrancea epicentral area toward Bucharest, in order to obtain data for ground motion attenuation analysis. All of them are in buildings with 1 or 2 storeys that is considered as a free field condition. Ground conditions are not known yet, but *NCSRR* will perform soil and geotechnical investigations at each site.

Seismic stations for site effects assessment
Inside Bucharest, *NCSRR* installed 7 stations with sensors at ground surface (free field conditions) and in boreholes at two levels of depth: the first at about –30m and the second between –50m and –153m.
At all the stations the soil profile of the boreholes is known. *NCSRR* and *Tokyo Soil* (Japan) performed down-hole tests at all the boreholes that were instrumented and the results will be soon published. Laboratory tests are underway.

Seismic stations for structural monitoring
Two residential buildings of different structural types located one near the other were instrumented in Central Bucharest. Two representative public buildings were also instrumented: The National Television Headquarters (that needs to be retrofitted) and the Headquarters of *BRD-Société Générale Bank* (a modern high-rise dual RC structure).

New Cone Penetrometer Technology (*CPT*) measurement in *NCSRR*

The new Cone Penetrometer Technology (*CPT*) provides cost-effective, real-time data for use in the characterization of the subsurface. Recent innovations in this baseline technology allow for improved access to the subsurface for environmental restoration applications.
The cone penetrometer consists of a steel cone that is hydraulically pushed into the ground while in situ measurements are continuously collected and transported to the surface for data interpretation and visualization.
The hydraulics are installed in a vehicle or nearby in a mobile unit. The ballast might be realized by anchoring system or by own weight of the truck.

CPT equipment (photo at *UTCB*)

Standard cone penetrometers collect stratigraphic information using sensors for cone tip pressure and sleeve friction. The ratio of the tip resistance to the sleeve friction provides information that can be used to classify soil type. Also other sensors available include two-axis inclinometers,

acoustic cone (for identification of soil type), temperature, pH, radioactivity (gamma), and geophones for measurement of P (pressure) and S (shear) waves (surface to borehole seismic).

CPT does not replace sampling and analysis for site characterization but provides a tool for rapid field screening during initial site characterization and continuity of measurement. One of the important uses of the *CPT* is to delineate the soil profile. This it can do with greater accuracy than can be achieved from conventional boring and sampling. The capacity of the thrust machine is 20 tones.

Electric cone *C10CFIP*

- The load cell signals can either be transmitted to the surface as an amplified analogue voltage signal via cable and converted to digital signal, or as a down hole converted digital signal which is then transmitted to the surface via cable (18 bit). The cones are equipped with tempered high quality steel parts and have state of the art load cells and electronic circuit boards. The complete product range complies with the *ISSMCE* and most other international standards.

NCSRR participation at 13th World Conference on Earthquake Engineering, Vancouver, B.C., Canada, August 1-6, 2004

Some papers written by the *UTCB*, *INCERC*, *MTCT* and *NCSRR* members received a substantial *JICA* support and were presented at 13-th *WCEE*, as follows:

1. REPREZENTATION OF SEISMIC ACTION IN THE NEW ROMANIAN CODE FOR DESIGN OF EARTHQUAKE RESISTANT BUILDINGS P100-2003 by Dan LUNGU, Cristian ARION, Alexandru ALDEA and Radu VACAREANU

2. SEISMIC VULNERABILITY OF RC BUILDINGS IN BUCHAREST, ROMANIA by Radu VACAREANU, Raluca RADOI , Caterina NEGULESCU , Alexandru ALDEA

3. DEVELOPMENT OF STRONG GROUND MOTION NETWORK IN ROMANIA AND BUCHAREST INSTRUMENTATION FOR SITE EFFECTS ASSESSMENT by Alexandru ALDEA, Dan LUNGU, Radu VACAREANU and Cristian ARION

4. JAPAN - ROMANIA KNOWLEDGE TRANSFER FOR EARTHQUAKE DISASTER PREVENTION PREPAREDNESS OF CITIZENS IN BUCHAREST by Emil-Sever GEORGESCU, Isao TOJO, Cristian STAMATIADE, Roxana IFTIMESCU, Cristina VLADESCU, Caterina NEGULESCU, Raluca RADOI.

Attendance to training courses in Japan

Several members of NCSRR attended the *IISEE* Training Courses in Tsukuba, in other companies and research centers, or are still there for training, as follows:

Field	Name	From	To
IISEE Training Course	M. Pavel	2003/8/26	2004/7/18
IISEE Training Course	N. Poiata	2004/9/20	2005/9/10
Input Earthquake Ground Motion Draft manual	C. Negulescu	2004/8/21	2004/12/18
Indoor Soil Testing & Investigation	C. Arion	2004/1/18	2004/6/29
Indoor Soil Testing & Investigation (EQ response, Zonation)	R. Radoi	2004/8/21	2004/12/18

In the period of June 21 to July 1, 2004, some young colleagues of the *NCSRR* (Elena Andreea Calarasu – INCERC/NCSRR, Cristian Neagu – NCSRR, Basarab Chesca – NCSRR), attended the Third Country Training Program on Earthquake Engineering organized at *ITU* Istanbul by ITU - Istanbul Technical University and Japan International Cooperation Agency – *JICA*. They received Certificates of Course completion.

Short-term experts from Japan

In this period, 3 short-term experts for Division 1 and 3 visited *NCSRR*, as follows:

- Dr. Taiki Saito, in the field of "Seismic code, disaster recovery and structural testing", May 9 to 25, 2004;
- Dr. Hiroshi Fukuyama, in the field of "Seismic Evaluation and Retrofitting", May 12 to 29, 2004;

- Prof. Dr. Masaomi Teshigawara, in the field of "Seismic Retrofitting Technique", Sep. 9 to 20, 2004.

The Japanese experts participated in Seminars for Romanian specialists and citizens in *MTCT* and *UTCB* and presented scientific papers.

Other 3 short-term experts, all from Tokyo Soil visited the Divisions 2 and 3, as follows:

- Mr. Toshiyuki Takahasi , in the field of "Soil testing and investigation (Microtremor array measurement)", June 14 to July 30, 2004. During his stay field measurements were performed at *EREN* and *INCERC* site, and the staff of Division two was trained in analyzing array microtremor data for evaluating the shear wave velocity profile at a site.
- Mr. Masaaki Taguchi, in the field of "Soil testing and investigation (drilling and sampling)", July 4 to 30, 2004;
- Mr. Naoto Takehara, in the field of "Indoor soil testing (In-situ soil testing)", Sep. 8 to Oct. 30, 2004.

Thank you, Dr. HURUKAWA

Dr Nobuo Hurukawa ended his successful mission as long-term expert in NCSRR in September 2004. We express our thanks for his expertise and friendship.

Welcome for Mr. Takashi KAMISONO

NCSRR welcomes the arrival of the new Japanese Long-term Expert **Mr. Takashi Kaminosono,** as a chief advisor of the project on seismic risk reduction, on leave from the National Institute for Land and Infrastructure Management (*NILIM*), Ministry of Land, Infrastructure and Transport (*MLIT*), where he was a Research Coordinator for Disaster Mitigation of Buildings.

Mr. Kaminosono received the degree of Bachelor （1975） and Master Degree （1977） of Engineering, at Yokohama National University, his major subject being reinforced concrete building structures.

His major areas of experience and past positions include scientific work as senior researcher in housing construction division, head of division on vibration, head of division on construction techniques, Coordinator for International Research Cooperation, Association Director for International Codes and Standards Codes and Evaluation Research Center in *BRI* and *NILIM*.

He has experience to travel abroad in seismic countries, such as USA, Mexico, Peru, India, Turkey, Chile, Colombia etc.

National Center for Seismic Risk Reduction
Address: Sos. Pantelimon, nr. 266, sector 2, Bucharest, Romania
Phone/Fax: + 40-21-255.16.67
Fhone: + 40-21-255.10.64
E-mail: radu@cnrrs.ro; kaminosono@pcnet.ro; ssever@cons.incerc.ro
Web site: www.utcb.ro/cnrrs_en/cnrrs.html