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DEPARTMENT OF CIVIL ENGINEERING



Inside this issue:

Some Statistics of January 26, 2001 Earthquake for India	2
Recorded Earthquakes of Magnitude 7.0 and greater in 2001	2
Aspects of Mitigation	3
A Judicious Agenda- Need of Hour	4
Similarities of Damages during Earthquake 2001 in Pakistan and India	4

EDITORIAL

The second issue of Newsletter in hand reflects a continuity in the policy, which is reflective of the purpose of publishing this Newsletter. The main objective of creating awareness among all of us is being taken care of through a permanent feature on mitigation aspects, while other write ups and clippings substantiate the main objective.

The readers must have noted a significant change, which is attributable to Cowasjee Foundation. Cowasjee Foundation has been generous enough to support the cause for which Earthquake Centre was established, and, therefore, EESC has been renamed as Cowasjee Earthquake Study Centre NED (CESNED). The policy, aims and objectives of the Centre however, remain unaltered. It is hoped that the Newsletter would receive your personal attention and patronage.

EDITOR

COWASJEE EARTHQUAKE STUDY CENTRE NED NEWSLETTER

Department of Civil Engineering Holds Seminar on Earthquake 2001

Over 200 participants from various professional bodies, organizations, government agencies and NGO's from different parts of the Country along with students of NED University attended the Seminar on Earthquake 2001, on Saturday the 28th April 2001.

The Seminar cum Panel Discussion comprising of three sessions started at 9:00 a.m and finished at 4 p.m. and maintained enthusiasm all along. A poster exhibition, exhibiting earthquake phenomenon, damage patterns, causes and features of structural damage, mitigation techniques and similarities in damage pattern in Bhuj and Southern parts of Pakistan was one of the features, along with stalls of research publications, project reports and models related to the event. A demonstration desk for Bridge Data Monitoring System developed by the Department of Civil Engineering was also the centre of attraction.

The full day seminar focussed on the realities and concerns regarding earthquakes, subsequently leading to the identification of needs and possible answers to the needs. The first issue of biannually newsletter of the recently established Earthquake Engineering Study Centre (EESC), which now has been renamed as COWASJEE Earthquake Study Centre NED (CESNED) was also formally launched in the inaugural session. Prof. (Dr. Ing.) Jameel Ahmed Khan, Chairman Pakistan Engineering Council was the Chief Guest. Prof. Dr. SFA Rafeeqi highlighted the aims and objectives of (CESNED) stating that CESNED: 1) shall be a non-profit centre, which shall house national and global data pertaining to earthquakes and shall act as a clearing house for disseminating knowledge in the prescribed manner; 2) should have expertise in all areas of pre and post disaster mitigation; 3) should have the capacity and capability to identify research needs and conduct such research in collaboration with other organizations if needed; 4) should respond to emergency needs and should be able to provide guiding principles for post-disaster mitigation, to the agencies and authorities.

Technical sessions included presentations entitled "Seismic Risk and Earthquake 2001", "Influence of Local Soil Conditions on Ground Response and Damage Pattern due to Earthquake" presented by Prof. S. H. Lodi and Prof. Dr. A. S Khan respectively, which highlighted the importance of active protection measures to minimize



From L to R: Dr. A. Samad Khan, Dr. Ing. Jameel Ahmed Khan, Mr. Ardeshir Cowasjee, Engr. Abul Kalam and Prof. Fahim Ahsan



A section of participants of the seminar

the risks in the event of similar re-occurrence, which according to the presenters cannot be overruled.

Mr. Zafar Razzak, Associate Professor, Department of Civil Engineering, projected the research endeavours of the Department towards Earthquake Mitigation and briefed the participants of the efforts done and the results achieved regarding earthquake mitigation in various forms. An overview of Bridge Data Monitoring System (BDMS), developed by the Department of Civil Engineering was also presented along with the future research endeavours that the Department plans to undertake.

(Continued on page 2)

Earthquake Engineering Study Centre (EESC) renamed as Cowasjee Earthquake Study Centre NED (CESNED).

Some Statistics of January 26, 2001 Earthquake for India

Reported damages in Gujrat and adjoining areas, January 28, 2001 Earthquake. Cost figures are in Indian Rupees.

DAMAGE TO PROPERTY:

- 7904 villages affected in 182 talukas of 21 districts.
- Houses Fully Destroyed: 187,000 (Pucca); 167,000 (Kachcha); and 16,000 (huts)
- Houses Partially Destroyed: 501,000 (Pucca); 387,000 (Kachcha); and 34,000 (huts)

DAMAGE TO LIFE:

- 15.9 million out of 37.8 million population affected.
- 20,005 human lives were lost in Gujrat, 166,000 injured with 20,717 having serious injuries.
- Missing persons : 247 in Kachchh
- Cattle deaths reported as 20,717

DAMAGES TO SCHOOLS:

- 992 primary schools out of 1359 primary schools destroyed.
- 4179 classrooms completely destroyed.
- Out of 38 Secondary schools, 6 were completely destroyed, 14 suffered heavy damage and remaining 12 partially damaged. Only 6 were found in good condition.
- Out of 1288 Non-Government schools, 9 destroyed, 11 suffered heavy damage, 99 partially dam-

aged and only 9 are in good condition.

DAMAGES TO INFRASTRUCTURE

- Heavy damage to station buildings, station cabins, residential quarters, and bridges in the affected sections
- Signaling equipments at 25 stations and Control communications on Viramgram-Gandhidham section damaged
- 650 Kms of national highways were damaged, and 100 kms severely damaged.
- Most of the minor/major bridges were damaged.
- Optical Fibre systems Bhuj-Bhachau-Rajkot 140 Mbps (damaged at Bhachau)
- Overload Exchanges were choked due to heavy traffic (120,000 calls/hr)

COST OF DAMAGE:

- Personal Properties Rs. 3,870 million
- Household Properties Rs. 111,950 million
- Public Utilities Rs. 6,000 million.
- Public Infrastructure & Amenities Rs. 10,800 million.
- Industrial establishment Rs. 50,000 million.
- Commercial establishment Rs. 30,000 million.

Total estimated loss of damage Rs. 212,620 million.

Recorded Earthquakes of Magnitude 7.0 and Greater in 2001

	Year	Month	Day	Time UTC	Depth (km)	Magnitude	Region
1	2001	1	1	06:57:04.17	33	7.5	Mindanao, Philippines
2	2001	1	9	16:49:28	103	7.0	Vanuatu Islands
3	2001	1	10	16:02:44.23	33	7.1	Kodiak Island Region, Alaska
4	2001	1	13	17:33:32.38	60	7.7	Off Coast of Central America
5	2001	1	26	03:16:40.5	16	7.7	India
6	2001	2	13	19:28:30.26	36	7.4	Southern Sumatera, Indonesia
7	2001	2	24	07:23:48.73	35	7.1	Northern Molucca Sea

Cost of Damage to Railways

- Track Rs. 350 millions.
- Signal & Telephones Rs. 150 millions.
- Electrical Rs. 70 millions.
- Misc. Rs. 30 millions.
- Total Rs. 600 millions.

Estimated cost of damage to Telecommunication network Rs. 2000 million.

Source: Ministry of Agriculture, Government of India

Department of Civil Holds...

(Continued from page 1)

The last session, which comprised of a Panel Discussion included prominent professionals, heads of various government departments, representatives of ABAD, researchers, university professors, and NGO's who presented their views on the theme put forward by Prof. Dr. SFA Rafeeqi as panel moderator. Prof. Rafeeqi briefed the audience about the theme of Panel Discussion. The theme was:

- 1. Realities and Concerns regarding earthquake with special reference to Sind.
- 2. Identification of needs and possible answers to needs.
- Strategies for Government-Industry-University Liaison with regard to Earthquakes.

All the panellists lauded the efforts done by the Department of Civil Engineering, NED University of Engineering and Technology in organizing a very informative and valuable Seminar and complimented the Department of timely establishment of the CESNED. Unanimity of views was observed on issue of joint efforts by all concerned regarding mitigation and strong Industry-University Liaison. Each part of the theme was discussed in detail by the panellist culminating in a joint declaration. In the end Prof. Dr. Rafeeqi thanked all participants and the organising committee of Seminar.

Aspects of Mitigation

(Continued from page 3)

and one merely based on experience of local masons, and skilled and semi skilled workers. Since scientific consideration is absent, such constructions lack seismic load resistance. The next issue of Newsletter, therefore, would take up aspects in planning and design of such

Aspects of Mitigation

page of the Newsletter would be permanently devoted to apprise public of different aspects of mitigation. The very first issue highlighted different aspects through a flowchart and from now onwards each aspect would be taken up in the following issues of the Newsletter. For obvious reasons the best choice is to start with engineering aspects and further more with initial emphasis on pre-disaster mitigation.

The main flow chart, therefore, could further be expanded as follows:

The shaded boxes define the route to the outlined box, which would be the focus of discus-

From the very beginning it was decided that one sion for some of the following issues of this Newslet- nological and scientific transference, they ter.

> At least 75 countries have suffered loss of life in the last century due to earthquakes. Reports indicate their elders, to make their houses stronger and clearly that the principal cause of loss of life may be durable. At times, therefore, one may find attributed to collapse of man-made structures. It is novel ways of indigenous applications, which also on record that earthquake prone rural areas of needs a bit of fine-tuning for up gradation to the developing world suffered more wide spread damage. The reason lies not only in the choice of material and methods of construction, but also in the opposed to ENGINEERED CONSTRUCskill, experience and the know-how of the rural residents. It should also be kept in mind that as the popu- structed without state-of-the-art application lation of these areas at large is deprived of the tech-

have no other choice except to use their best judgment in the light of the experience of seismic resistant construction.

NON-ENGINEERED CONSTRUCTION as TION may be defined as buildings con-

(Continued on page 2)



A Judicious Agenda ...

(Continued from page 4)

such as Lahat Datu in Sabah. As such, he said active protection measures to minimize the risks in the event of such a possibility are being taken by the Government. He said local research on seismic hazard assessment for local conditions have been initiated with a focus on studying the structural performance under low intensity earthquake effects. It is also important to search for suitable materials to reduce the effects by exploiting our very own natural rubber and to promote steel as a construction material. He said the Malaysian Rubber Board has been actively promoting research and development of natural rubber bearings. Two years ago it was jointly involved in the construction of a three-storey building in Lahat Datu, which sits on natural rubber bearings. The success of the above base isolation projects has ensured that Malaysia is in a position to compete and undertake effectively base isolation projects worldwide. Samy Vellu said in the wake of the Gujarat earthquake early this year, the Rubber Board has sent two delega-

tions to India to promote the product (natural rubber bearings). Closer to home, he said the Public Works Department would also spearhead and work with professional organizations and other Government agencies on the steps that needs to be taken to mitigate earthquake risks. Samy Vellu also said that once capable enough, local experts could venture overseas to apply their professional skills and construction capabilities, especially in earthquake prone areas such as India, Pakistan, Indonesia and the Philippines." (Nelson Fernandez-New Straits Times)

This, indeed, depicts a true picture of a sensible thinking and a perceptive agenda. Though the dangers, in Malaysia, are for very feeble shocks but they are planning to prepare themselves not only for their own people but also for other parts of the world. They are also probing new markets for their products, thus not only buying a good name and reputation for country but

probably precious foreign exchange as well. Now there could be two questions, which may arise. Firstly, were we prepared on January 26, 2001? Secondly, are we ready for a similar occurrence in future? As far as first question is concerned, the answer definitely is negative. For the second it appears that we are not ready to take any lesson for future either. The Seminar at NED University on Earthquake 2001 highlighted salient features of the affects of earthquake in Southern Pakistan and the comparison of affects in Bhuj, clearly demonstrate that, had there been similar habitation as that in Bhuj we would have experienced the same devastation. By looking at the seismic provinces of Pakistan and especially the faults around Karachi, the likelihood of future major earthquake cannot be overruled. Now, it is real time for us to realize the responsibility and need to start thinking the way Malaysians think, after all we are at much more risk than Malaysia.

RESOURCE PERSON:

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Information, news items, short notes on research findings are invited from across the globe.

A Judicious Agenda-Need of Hour

Natural hazards and calamities in most of the cases are violent and devastating. But they also provide new horizons of thinking for those who take pride and satisfaction in serving and protecting human life. Wise nations very rightly try to learn lessons from such disasters and evaluate short comings in the existing system and provide better means and ways, to combat any future danger, in the light of new experiences. Academic institutions are meant to produce research and experts who devise methods and models to help minimize the risk and threat posed by these calamities. The industry and government lends support and funding to these institutions to enable them to provide the rationale for carrying out these activities.

It is not necessary that the experts of a particular region specializing in a specific area benefit human civilization only in their region. On the contrary, it is also possible that the region they belong to never faces that danger, but their experience and expertise could be of global value in terms of helping humanity facing such threat anywhere else.

Earthquake is also one such natural hazard, which may arrive unannounced. It is an established fact that pre-disaster mitigation is the only way to reduce damages of an earthquake. Mitigation is possible through general awareness and continuous efforts towards educating relevant people and adapting existing models. Models existing in other regions, however, must only be taken as a guideline rather adopting them exactly in their existing forms because of vast differences in a large number of factors like environment, culture, socio-economic conditions, religion, etc between the two regions. It is imperative, too, to realize the importance of the use of indigenous material in these mitigation models. This can not only make these models feasible and economically viable but also at the same time provide new directions to the researchers. A report from Malaysia can provide an example of the attitude and thinking of prudent nations.

"The possibility of Malaysia experiencing a major earthquake is real despite the country

Similarities of Damages during Earthquake 2001 in Pakistan and India



Pakistan: View of Liquefaction damages in Badin, Pakistan



Pakistan: Huge craters in land were caused by Liquefaction in Badin.



Pakistan: Typical Pan cake failure of Ghosia Apartment building in Hyderabad



India: Land damaged due to Liquefaction in Gujarat, India



India: Similar view of craters in land in Gujarat



India: Similar failure of four storied building in Gujarat

being situated on a stable tectonic plate. Works Minister Datuk Seri S. Samy Vellu said recent unexpected large earthquakes have struck areas in other parts of the world, which had no active faults and were considered safe. He said more frightening was that an earthquake could also strike cities hundreds of kilometers away from epicenters, citing the 1985 devastating earthquake in Mexico City as an example.

Due to the apparent low seismicity and lack of catastrophic damages caused by past earthquakes, Malaysians have developed a sense of complacency regarding this natural disaster, he said when opening a Seismic Risk seminar in Subang near *Petaling Jaya* on *September 25, 01*. The seminar was organized by the Malaysian Board of Engineers and participants included foreign delegates from the World Seismic Safety Initiative. Samy Vellu said Malaysia lies close to the Sumatran and the Philippines subduction zones and this was a source of concern, especially in vulnerable areas *(Continued on page 3)*