

# Saitama University

# Newsletter

International Graduate Program on  
Civil & Environmental Engineering

Issue No. 18 2013

## Japan Sasago Tunnel Disaster

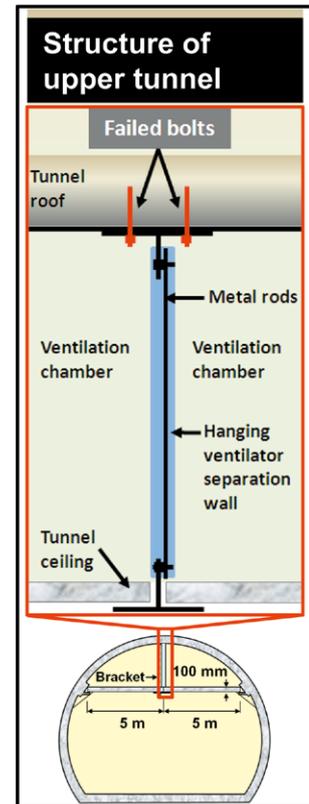
The 4.7 kilometer-long Sasago tunnel is about 80 kilometers west of Tokyo in Yamanashi prefecture. The tunnel opened in 1977 and links the capital with Komaki, Aichi prefecture. Nine people were killed when concrete ceiling panels fell from the roof of the outbound tunnel on December 2, 2012. According to the investigators, aging bolts could be blamed for the deadly collapse of the tunnel. The tunnel collapse is a wake-up call to all nations whose aging infrastructure is in terrible need of renovation.

According to Central Japan Expressway Co., an estimated 270 concrete panels, each weighing 1.4 metric tons, were suspended from the arch roof of the Sasago tunnel (see the figure). The panels, measuring about 5 × 1.2 meters and 8 centimeters thick, were installed when the tunnel was constructed. The Sasago tunnel's routine inspection in September showed no problems. However, inspectors did not tap bolts with a hammer, a way of detecting irregularities that cannot be spotted by the eye. Also, the bolts did not appear to have been replaced since the highway tunnel first opened in 1977. A 4.9-magnitude quake struck near Tokyo several days before the disaster exerting even more pressure onto the metal parts. Eventually, tons of concrete panels fell onto cars in the tunnel, crushing and trapping vehicles and their occupants underneath. The exact cause of the collapse is not yet known, however, an initial investigation has found decay in the fixtures that held the concrete panels to the roof of the tunnel. The government ordered immediate inspections of all structures with the same design, and Japanese police began a criminal investigation with an eye to bringing negligence charges. On February 3, 2013, the Central Japan Expressway Co. opened the side of the Sasago tunnel that collapsed to the media for the first time since the fatal partial cave-in took place in early December.

The incident sent jitters throughout Japan, one of the most engineered countries in the world, which saw a huge

infrastructure boom in the decades after World War II. The tunnel collapse was not the first time a lack of inspection has caused problems. The most deadly disaster in recent years was in 1996 when a massive rock tumbled into the Toyohama tunnel, killing 20 people. According to officials, of the 155,000 major bridges in Japan, more than half of them will be over 50 years old by 2030. The aging infrastructure has become a nagging worry for Japan after the construction boom of the '60s and '70s.

The ministry estimates it needs to spend 190 trillion yen (\$2.3 trillion) over the next five decades just to maintain the infrastructure it already has. The recent tunnel accident has triggered the public's awareness about the issue and placed pressure on authorities in all nations whose infrastructure is in need of an update.



## Message from the Head of the Foreign Student Office

I am very happy to announce to you that the International Graduate Program on Civil and Environmental Engineering restarts from 2013 to 2018. The same international graduate programs supported by Monbukagakusho were reduced to half the original number after a severe evaluation. The new program offers six doctoral scholarships and two master's scholarships. The master's scholarships can be extended to doctoral degrees based on the candidates' scholastic abilities. All interested candidates are welcome to apply for Monbukagakusho scholarships as well as ADB and WB scholarships.



Saitama University has decided to enhance the international activities for undergraduate students as well as graduate students. Since many Saitama graduates are working actively in different areas of the world, I hope that international exchange becomes more active by inviting foreign students and researchers to Saitama Univ. and by sending Japanese students to foreign countries with your cooperation.

Good luck to all of them.

Hiroshi Mutsuyoshi  
Vice President, Professor and Head of the Foreign Student Office  
Saitama University

## Graduation Time Congratulations

September 2012

Ms. Shiromi Himalika Dissanayaka from Sri Lanka was awarded her Ph.D. degree under the guidance of Prof. Kawamoto. Her doctoral thesis was on the “Thermal properties for peaty soil under variable saturation and their correlation to mass transport parameters in gaseous and aqueous phases”.

Mr. N. A. K. Nandasena from Sri Lanka was awarded his Ph.D. degree under the guidance of Prof. Tanaka. His doctoral thesis was on the “Boulder transport by high-energy (Tsunamis): model development for threshold entrainment and transport”.

Mr. Shaphal Subedi from Nepal was awarded his Ph.D. degree under the guidance of Prof. Kawamoto. His doctoral thesis was on the “Development of hydrophobic capillary barriers for landfill covers system: Assessment of water repellency and hydraulic properties of water-repellent soils”.

Ms. Abeysekara Pathirana Subhashini from Sri Lanka was awarded her M.Eng. degree under the guidance of Prof. Kawakami. Her master’s thesis was on the “Study on usability of COULWAVE model to analyze tsunami run-up and inundation”.

Mr. Zafar Abbas from Pakistan was awarded his M.Eng. degree under the guidance of Prof. Kawamoto. His master’s thesis was on the “Characterization of methane oxidation and gas transport parameters in capping geo-materials”.

Mr. Oscar Gilbert Mlekwa from Tanzania was awarded his M.Eng. degree under the guidance of Prof. Tsunokawa. His master’s thesis was on the “Appropriate road maintenance management of low volume rural roads: a case of local government road departments in Tanzania”.

Mr. Dinesh Shrestha from Nepal was awarded his M.Eng. degree under the guidance of Assistant Prof. Tachibana. His master’s thesis was on the “Effects of compaction energy application process on mechanical properties of clay”.

## Research Profile Series (17) Geosphere Research Institute

The Geosphere Research Institute of Saitama University (GRIS) has been working for almost 12 years to find new ways to minimize the effects of natural disasters on infrastructures and human life. The research fields which are associated with this institute are Geotechnical Engineering, Geotechnical Earthquake Engineering, Mechanics of Geo-materials, Ground Water Engineering, Rock Mechanics, and Rock Weathering and Geomorphology. GRIS has two divisions to manage the above-mentioned research fields, namely the Research Division for Earthquake Disasters and the Research Division for the Geosphere Environment. Prof. H. Kawakami and Prof. J. Kuwano are handling the Earthquake Disaster Division with the support of Asst. Prof. S. Tachibana, and Prof. K. Watanabe is managing the Geosphere Environment Division with the support of A/ Prof. M. Osada and A/Prof. C. Oguchi.

A variety of high-quality research work is under way in both the divisions of GRIS and it is not possible to discuss all of them together in this year’s research profile series. The selected article is on the performance of screw and straight piles. This research work has been supervised by Prof. J. Kuwano. The various aspects of the research work are described in the following paragraphs.

The screw pile is one of the new developments in deep foundation, which is growing tremendously fast because of its quick installation technique, less noisy operation, no wastage of material and the involvement of minimum manpower. The screw pile consists of a steel shaft with one or more helices whereas the straight pile has a steel shaft of uniform diameter. Torque and pressure is used to install the screw pile whereas hammering, pressure and vibration is required to install the straight pile. As the installation mechanism is different, the soil disturbance is also different. In this study, a performance comparison is made between these piles through a model scale of testing under a compressive load. As the installation mechanism of these piles is different, soil beneath the pile tip is compacted first in the model container, then the surrounding soil is placed and compacted to achieve the same ground conditions. The experimental setup and model piles are shown in the photo.



A series of pile load tests was performed on model ground and it was observed that the ultimate pile capacity of screw piles is 20-25% less than the straight piles under the same tip diameter. However, screw piles having a larger tip diameter and smaller shaft diameter than straight piles showed higher ultimate pile capacity. It was also observed that the wing plate thickness significantly reduces the pile capacity of the screw pile if it is deformed or deflected. Therefore, further study is needed to investigate the effect of wing plate deformation on the end-bearing capacity of the screw pile. A series of model experiments has been planned in the near future to achieve this goal.

To achieve goals of high quality, it is very important to work in a friendly environment with teamwork. GRIS provides the students a very friendly environment so that they can work in a team under the guidance of expert supervisors to achieve their goals.

Mr. Prem Shah from Nepal was awarded his Ph.D. degree under the guidance of Prof. Tanaka. His doctoral thesis was on the “An experimental study on refugia condition for invertebrate (*Isonychia Japonica*) by bluff bodies and its stability on the river bed”.

Mr. Bhuyan Md. Habibullah from Bangladesh was awarded his M.Eng. degree under the guidance of Prof. Kuwano. His master’s thesis was on the “Earthquake induced soil liquefaction assessment and hazard zonation in GIS environments”.

Mr. Hiniduma Liyanage Damith Nandika from Sri Lanka was awarded his M.Eng. degree under the guidance of Prof. Kawamoto. His master’s thesis was on the “Characterization of compaction and gas transport properties for solid waste samples”.

Mr. Frengki Hariara Pardede from Indonesia was awarded his M.Eng. degree under the guidance of Associate Prof. Osada. His master’s thesis was on the “Study on fluid containing micro-bubbles flowing through fractured diatomaceous mudstone specimens”.

Mr. Md. Aftabur Rahman from Bangladesh was awarded his M.Eng. degree under the guidance of Assistant Prof. Taniyama. His master’s thesis was on the “Analysis of buried pipeline under earthquake fault movement: A DEM and FEM simulation”.

Mr. Shahzad Saeed from Pakistan was awarded his M.Eng. degree under the guidance of Prof. Yamaguchi. His master’s thesis was on the “Sensitivity of modal damping to corrosion damage in concrete beams”.

Mr. Basit Sarfaraz from Pakistan was awarded his M.Eng. degree under the guidance of Associate Prof. Maki. His master’s thesis was on the “Dynamic response behavior of reinforced concrete column under water”.

Mr. Satya Narayan Sharma from Nepal was awarded his M.Eng. degree under the guidance of Prof. Matsumoto. His master’s thesis was on the “An investigation of annoyance caused by combined exposures to traffic vibration and noise in residential environment”.

Ms. Alina Shrestha from Nepal was awarded her M.Eng. degree under the guidance of Prof. Kawakami. Her

master’s thesis was on the “Simplified data accessing interface for fire spreading simulation in urban areas”.

Mr. Tin Win Htut from Myanmar was awarded his M.Eng. degree under the guidance of Prof. K. Watanabe. His master’s thesis was on the “Groundwater evaporation and unsaturated flow model for different types of soil”.

Mr. Kyaw Phone Lwin from Myanmar was awarded his M.Eng. degree under the guidance of Associate Prof. Osada. His master’s thesis was on the “Evaluation of mechanical properties of rock fall debris based on wave velocity measurement”.

Mr. Han Ziyu from China was awarded his M.Eng. degree under the guidance of

Prof. Yamaguchi. His master’s thesis was on the “Study on finite element analysis model of a steel Langer bridge and the application of model updating”.

Ms. Suu Mon Yee from Myanmar was awarded her M.Eng. degree under the guidance of Associate Prof. Osada. Her master’s thesis was on the “Variation in physical property and drying-induced deformation with depth in successive formations”.

Ms. Zhi Yan from China was awarded her M.Eng. degree under the guidance of Prof. Okui. Her master’s thesis was on the “Study on ultimate strength of stiffened plates and unstiffened plates considering SBHS”.

## Welcome New Students

### October 2012



Afreen Sazia  
Bangladesh, Doctor



E. A. A. Dilrukshi  
Sri Lanka, Doctor



Ganila Nuwan Paranavithana  
Sri Lanka, Doctor



Malik Adnan Anwar  
Pakistan, Doctor



Y. N. S. Wijewardana  
Sri Lanka, Doctor



Phusing Daraporn  
Thailand, Doctor



I. S. K. Wijayawardane  
Sri Lanka, Doctor



Ali Murtaza Rasool  
Pakistan, Master



Wang Tianyu  
China, Master

### April 2013



Baniya Arjun  
Nepal, Master



Doan Van Binh  
Vietnam, Master



Dongol Narendra  
Nepal, Master



Hein Zaw Htet  
Myanmar, Master



Iqbal Muhammad Rashid  
Pakistan, Master



Joshi Nirmal Raj  
Nepal, Master



Naqvi Umair Ali  
Pakistan, Master



Perera Gonaduwege Lasitha  
Sri Lanka, Master



Rehmat Sheharyar  
Pakistan, Master



Salihi Samandar  
Afghanistan, Master

## News

### New Appointments

Dr. Ji Dang was appointed as an assistant professor of Structural Engineering Laboratory in April 2013. His research interest is structural engineering, earthquake engineering and structural dynamics.

Dr. Kazuaki Okubo was appointed as an assistant professor of Design and Planning Laboratory in April 2013. His research interest is transportation planning and reverse logistics.

### Faculty on Move

Prof. Koji Tsunokawa of Design and Planning Laboratory retired from Saitama University in March 2013 and became an emeritus professor.

### Faculty Promotion

Dr. Ken Kawamoto was promoted to Professor of Soil Mechanics Lab. in April 2013. His research field is geoenvironmental engineering and solid waste management in developing countries.

Dr. Yasunao Matsumoto was promoted to Professor of Structural Engineering Lab. in April 2013. His research field is structural dynamics and human response to vibration.

Dr. Kiichi Suzuki was promoted to Professor of Soil Mechanics Lab. in April 2013. His research field is constitutive models and liquefaction analysis.

Dr. Shingo Asamoto was promoted to Associate Professor of Structural Material Engineering Lab. in April 2013. His research field is concrete engineering.

### Alumni Promotion

Dr. Thirugnanasuntharan Aravinthan was promoted to Professor of the University of Southern Queensland (USQ) in Australia in January 2012. He graduated from Saitama Univ. in March 1999.

## Awards

Prof. Norio Tanaka and Assist. Prof. Junji Yagisawa were awarded in October 2012 by Foundation of River & Watershed Environment Management (FOREM) with the Best Research Output Award from the foundation's research fund for the topic of "Indicators for classifying a forest role and stability at a flood event in a river from the point of woody debris production or trap of the debris".

Prof. Jiro Kuwano was awarded the best paper award of the Japanese Geotechnical

Society in June 2013 for the paper, "Evaluation of extent of damage in geogrid reinforced soil walls subjected to earthquakes", Soils and Foundations, Vol. 51, No. 5, pp. 929-943, 2011.

Mr. Bhuyan Md. Habibullah was awarded the best presentation prize at 47th National Conference on Geotechnical Engineering held in Aomori in July 2012, for the paper

"Liquefaction risk analysis using multiple criteria".

Mr. Satya Narayan Sharma was awarded the best presentation prize in the 6th NEA-JC symposium held at Univ. of Tokyo in December 2012, for the paper "Characteristics of vibration and noise in residential environment induced by road traffic and railway".

### Message from Alumni

It is my great pleasure to share my experience studying in the International Graduate Program on Civil and Environmental Engineering at Saitama University. Under this program, I earned my Master's degree in March 2010. The two years of my study time passed quickly, but at the same time, it was a valuable two years of my life in terms of academic achievement.



Moreover, in addition to my professional enhancement, studying in Japan has enabled me to learn the Japanese language, and also, to make new friends, associate with people from different backgrounds and exchange our cultural and traditional values. With the unique blend of Japan's tradition of elegance, strong sense of commitment, current state-of-the-art facilities, the opportunity to conduct research with some of the best professors and researchers and practical-oriented teaching in a friendly atmosphere, the Department of Civil and Environmental Engineering at Saitama University, in which I have been hugely impressed, stands as one of the best places to study at.

Currently, I am working as a lecturer in the Civil Engineering Department at Bandung State Polytechnic (Politeknik Negeri Bandung - POLBAN) in Bandung, Indonesia. I hope to develop physical infrastructures that serve the development of my country and to share it with my students. I am glad that my education at Saitama University has enabled me to contribute to the development of my country and make a positive difference in my own small ways.

With all best wishes and warmest regards,

Rahmita Sari Raffdinal  
Civil Engineering Department  
Bandung State Polytechnic- Indonesia

## Message from the Foreign Student Office

How have you been? It has been a long time. We hope you are doing well.

By the way, are you interested in Kabuki? The newly rebuilt Kabukiza Theater officially opened in Tokyo's Ginza district on April 2, 2013. Many Kabuki fans have been waiting for its reopening for three years since April 2010.

As you know, Kabuki is a traditional Japanese entertainment which originated early in the Edo period and is performed by men only. The Kabuki stage is very gorgeous and it is still popular in today's age. Please enjoy a Kabuki performance if you get a chance. The theater will hold

a special performance for a year to celebrate its reopening.

This year we have welcomed ten new Master's students. We would strongly like to ask you to promote our graduate program. We are looking forward to your reply. Please take good care of yourself.

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