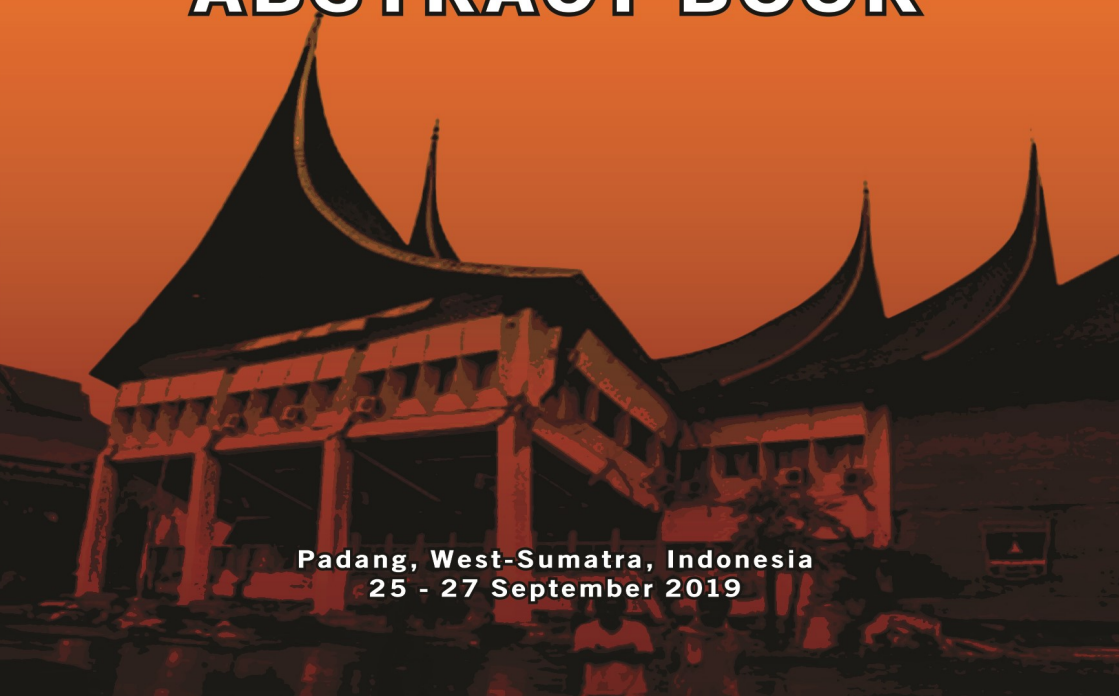
INTERNATIONAL CONFERENCE ON EARTHQUAKE ENGINEERING AND DISASTER MITIGATION

4TH ICEEDM 2019

Commemoration 10 years of the 2009 West-Sumatra earthquake

PROGRAM & ABSTRACT BOOK



Padang, West-Sumatra, Indonesia
25 - 27 September 2019

PROGRAM & ABSTRACT BOOK

4TH ICEEDM 2019

4TH INTERNATIONAL CONFERENCE ON EARTHQUAKE ENGINEERING & DISASTER MITIGATION (ICEEDM) 2019

GRAND INNA PADANG HOTEL
PADANG, WEST SUMATRA, INDONESIA
25-27 SEPTEMBER 2019

PROGRAM & ABSTRACT BOOK

4TH ICEEDM 2019

Editor:
Prof. Jafril Tanjung
Benny Hidayat, Ph.D
Masrilayanti, Ph.D
Jati Sunaryati, Ph.D
Willy Kurniawan
Lisa Rizka Amelia

The committees have been trying to check the typos and the contents of this program book before going to the book printing process. If there were still errors and omissions, then the committee will fix it in the digital version of this book which is stored on the website of the 4TH ICEEDM 2019 event.

Doc. Version: 9 | Date : 26/09/2019

Welcoming Remarks by Rector of Andalas University

On behalf of Andalas University, I am greatly honored and pleased to welcome you all to the fourth International Conference on International Conference on Earthquake Engineering and Disaster Mitigation or 4th ICEEDM 2019 in Padang.

It has been ten years since Padang and surrounding were struck by the Strong Earthquake on 30 September 2009. We were collapsed at the moment. But then we have been trying to build up together since then. As you can see, it hasn't finished yet, but it is we are now. There are still some things to do better than before.

Around the world, there are many strong earthquakes have occurred and caused many casualties and damages on the infrastructures and lifeline facilities. However, thought these disasters, we have learned and then developed a lot of advances in science and technology as well as disaster management to provide a better and safer living environment for humanity. This conference provides the opportunity for sharing the most recent findings related to earthquake engineering as well as disaster mitigation. It will be highlight researches in the engineering field, which might be adopted in the disaster mitigation policy and action. It is hoped that this conference will be the fresh-fruitful to disseminate and to discuss the knowledge, science, and technologies as well as management to safeguard against earthquake hazard and all of the hazards in general, as well as to promote disaster mitigation for risk reduction efforts worldwide.

The 4th ICEEDM 2019 is organized by The University of Andalas (Unand), the Institute Technology of Bandung (ITB), and AARGI (Asosiasi Ahli Rekayasa Gempa Indonesia) or the Indonesian Earthquake Engineering Association (IEEA), thanks to the all-conference committee. I would like to extend our gratitude to you all the speakers and attendants in this 4th ICEEDM 2019, as you are our distinguished guests. I would also like to extend our great gratitude, especially to all of our key-note speakers and invited speakers.

Welcome to 4th ICEEDM 2019.
Welcome to Padang, Welcome to the West Sumatra,
Welcome to Indonesia,

Prof. Dr. Tafdil Husni, SE, MBA
Rector of Andalas University

Welcoming Remarks by President of AARGI

Many earthquake disasters have occurred in the world for the past 3-4 years since our 3rd International Conference on Earthquake Engineering and Disaster Mitigation in Bali in 2016. Since then, many large earthquakes have hit many countries, causing thousands of people killed, among others are in Italy and Equador in 2016, Iran and Mexico in 2017, and Indonesia in 2018. In 2018, two earthquake disasters occurred in Indonesia, that is M6.9 Lombok earthquake in August 2018 that has caused 564 fatalities and M7.4 Palu earthquake in September 2018 that has caused 2080 fatalities and more than 1000 were missing mostly due to liquefaction. Flow liquefaction caused by Palu earthquake has been one of the most destructive liquefaction occurrences in history.

Indonesian Earthquake Engineering Association (AARGI - Asosiasi Ahli Rekayasa keGempaan Indonesia) has put some efforts to contribute to earthquake disaster risk reduction through various activities, particularly in the form of this international conference. We are pleased that we have organized the 4th International Conference of Earthquake Engineering and Disaster Mitigation (4th ICEEDM 2019) in Padang, at the same time for ten years commemoration of 2009 West Sumatra earthquake disaster. As part of our role to contribute in providing safe community against seismic disaster, we hope we are successful in gathering various stakeholders in Indonesia and our international colleagues to discuss recent findings in the earthquake engineering and disaster mitigation research and technology.

AARGI has been a member of the International Association for Earthquake Engineering (IAEE) since its establishment in 1999. Previously, Indonesian Society of Earthquake Technology (ISET) has also been member of IAEE since 1986. On behalf of AARGI we would like to acknowledge the support of IAEE in every international conference that we have organized. IAEE has provided a link for our association to other international associations, earthquake engineers and researchers, from whom we have shared our knowledge and experiences for promoting earthquake resistance design and constructions in the world. As be member of IAEE, AARGI has taken a lot of advantages and benefit through dissemination of knowledge in this conference. The presence of Secretary-General of IAEE during this conference is highly appreciated.

On behalf of AARGI, we welcome all the participants in this conference. Thank you for all the keynote speakers and all the speaker for your paper contributions. Many

latest research and practice covering many aspects of earthquake engineering and disaster mitigation and management will be presented during the keynote speeches and parallel sessions. Please note that, in general, this conference is in line with the spirit of the many frameworks for disaster risk reduction, reinforcing many aspects of disaster risk-chain from hazard identification, mapping, code development, design and construction, post-disaster response and reconstruction. I hope that this wide range of topics would make this conference a valuable platform for all participants.

Contribution of all participants and sponsors are highly appreciated. All of the contributions and participations indirectly contribute toward our common goal to provide a safer community against seismic disaster. Thank you for support of all executive committee member of AARGI. Finally, on behalf of the Association, high appreciation on hard work of West Sumatra Chapter of AARGI and Andalas University, as the organizing committee of this conference.

Prof. Dr. I Wayan Sengara
President of AARGI

Welcoming Remarks by Chairman of 4th ICEEDM 2019

It is a great pleasure to welcome you to the 4th International Conference on Earthquake Engineering and Disaster Mitigation (4th ICEEDM 2019) at Hotel Ina Padang, in Padang City, the capital of West Sumatra Province, the land of Minangkabau. While much encouragement and progress on the earthquake engineering and disaster mitigation, they are still a huge global problem today. In more than 100 scientific papers will be presented in 4th ICEEDM 2019 related to earthquake engineering and disaster mitigation including case histories in earthquake engineering and construction, case histories in recent earthquake, geotechnical earthquake engineering, seismic micro-zonation, soil-structure interaction, performance-based design, retrofitting, rehabilitation and reconstruction, seismic hazard assessment and risk-targeted ground motion, seismic hazard and tsunami disaster mitigation and management, community-based disaster risk management, tsunami modelling, tsunami early warning system, and non-engineered buildings.

The conference is the program of Indonesian Earthquake Engineering Association (AARGI) which is held in Padang and host by Andalas University, ITB and AARGI. The conference will bring together leading researchers, engineers, architects, scientists, and other professionals in various disciplines of social science and engineering around the world related to earthquake engineering and disaster mitigation. We encourage you to participate in the discussion and hope the conference helps in the exchange of information and development of new collaborations among all stakeholders.

There are also some accompanying programs in this conference. First, the exhibition of the past earthquake in Indonesia by Dr. Teddy Boen followed by awarding him the lifetime achievement for his contribution in developing of earthquake engineering in Indonesia. Second, the short course and workshop of geotechnical engineering and structural engineering. Third, the geopark tour at Ngarai Sianok, Bukittinggi which is part of the Sumatra fault. We do hope you still extend your stay by discovering the treasury of the land and culture of Minangkabau.

We welcome you to an inspiring, educational, and enjoyable program.

Dr. Ir. Febrin Anas Ismail, MS.
Committee Chairman

ADVISORY COMMITTEES :

Tafdil Husni, Prof Dr., SE, MBA	(Andalas University)
Uyung Gatot S. Dinata, Dr. Ing. Ir., MT	(Andalas University)
Insannul Kamil, Ir. M.Eng.,Ph.D	(Andalas University)
Taufika Ophiyandri, S.T., MSc., Ph.D	(Andalas University)
Adang Surahman, Prof. Ir., MSc, Ph.D	(Bandung Institute of Technology)
Bambang Istijono, Prof., Dr.	(Andalas University)
I Wayan Sengara, Prof., Dr.	(Bandung Institute of Technology)
Krishna S Pribadi, Prof., Dr., Ir	(Bandung Institute of Technology)
Made Suarjana, Ir., MSc, PhD	(Bandung Institute of Technology)
Muslinang Moestopo, Ir., MSEM, Ph.D	(Bandung Institute of Technology)
Widiadyana Merati, Prof., Dr., Ir.	(Bandung Institute of Technology)

ORGANIZING COMMITTEE :

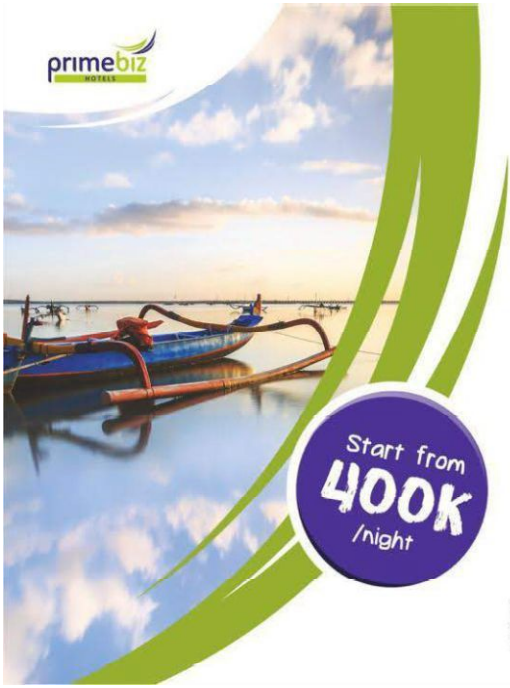
Chairman : Febrin Anas Ismail, Ir., MS., Dr.Eng.	(Andalas University)
Co-Chairman : Fauzan, ST, MSc. (Eng.), Dr. Eng.	(Andalas University)
Secretary : Jafril Tanjung, Prof. Ir., MT, Dr.Eng.	(Andalas University)
Rina Yuliet, ST, MT.	(Andalas University)
Treasurer : Nidiasari, ST, MT.	(Andalas University)
Members :	
Andriani, Dr., ST, MT.	(Andalas University)
Bayu Martanto Adji, ST, MT., Ph.D	(Andalas University)
Benny Hidayat, ST, MT., Ph.D	(Andalas University)
Dyah Kusumastuti, ST, MT., Ph.D	(Bandung Institute of Technology)
Erwin Lim, ST, MS., Ph.D	(Bandung Institute of Technology)
Elsa Eka Putri, ST, MSc. (Eng.), Ph.D	(Andalas University)
Jati Sunaryati, ST, MT., Ph.D	(Andalas University)
Mario Asneindra, ST, MT.	(Bandung Institute of Technology)
Masrilayanti, ST, MSc, Ph.D	(Andalas University)
Nurhamidah, Dr. Ir., MT., MEngSc	(Andalas University)
Patria Kusumaningrum, ST, Ph.D	(Bandung Institute of Technology)
Prasanti W. Sarli, ST, MT., Ph.D	(Bandung Institute of Technology)
Rildova, ST, MT., Ph.D	(Bandung Institute of Technology)
Sabril Haris H.G., S.T., MT., Ph.D	(Andalas University)
Silvester Sandy Mulyadi, ST, MT.	(Bandung Institute of Technology)
Titi Kurniati, ST, MT.	(Andalas University)
Yervi Hesna, ST., MT.	(Andalas University)
Putri Yolanda, SE	(Andalas University)

Muhammad Fahrid, MT.	(Andalas University)
Hafiz Oktaufiq	(Andalas University)
Kavyen Al Barqi	(Andalas University)
Lisa Rizka Amelia	(Andalas University)
Willy Kurniawan	(Andalas University)

REVIEWERS :

Abdul Hakam, Prof. Ir., MT., Ph.D	(Andalas University)
Andriani, Dr., ST, MT.	(Andalas University)
Andhika Sahadewa, ST, MSE, Ph.D	(Bandung Institute of Technology)
Aswin Lim, ST, MSc.Eng, Ph.D	(Parahyangan Catholic University)
Bayu Martanto Adji, ST, MT., Ph.D	(Andalas University)
Benny Hidayat, ST, MT., Ph.D	(Andalas University)
Budi Hasiholan, ST, MEng, Ph.D	(Bandung Institute of Technology)
Dedi Apriadi, ST, MT., PhD	(Bandung Institute of Technology)
Erwin Lim, ST, MS., Ph.D	(Bandung Institute of Technology)
Elsa Eka Putri, ST, MSc. (Eng.), Ph.D	(Andalas University)
Fauzan, ST, MSc. (Eng.), Dr. Eng	(Andalas University)
Febrin Anas Ismail, Ir., MT., Dr.Eng	(Andalas University)
Jafril Tanjung, Prof. Ir., MT., Dr.Eng	(Andalas University)
Jati Sunaryati, ST, MT, Ph.D	(Andalas University)
M. Bagus Adityawan, Dr., ST, MT.	(Bandung Institute of Technology)
Masrilayanti, ST, MSc, Ph.D	(Andalas University)
Mas Mera, Ir., MT., Ph.D	(Andalas University)
Nurhamidah, Dr. Ir., MT., MEngSc	(Andalas University)
Patria Kusumaningrum, ST, Ph.D	(Bandung Institute of Technology)
Prasanti Widyasih Sarli, ST, MT., Ph.D	(Bandung Institute of Technology)
Purnawan, Ir., MT., Ph.D	(Andalas University)
Revalin Herdianto, ST, MSc, Ph.D	(Padang State Polytechnic)
Rendy Thamrin, ST, MT., Dr.Eng	(Andalas University)
Ruddy Kurniawan, Dr. ST, MT.	(Andalas University)
Taufika Ophiyandri, ST, MSc., Ph.D	(Andalas University)
Yossyafra, ST, MSc, Ph.D	(Andalas University)
Yosritzal, ST, MSc, Ph.D	(Andalas University)
Zaidir, Prof. Ir., MS., Dr.Eng	(Andalas University)

primebiz HOTELS



EXCLUSIVE for DOMESTIC BOARDING PASS

Enjoy special discounts at **PrimeBiz Hotels** located in Java & Bali.
Simply present your domestic boarding pass at selected hotels
to enjoy our exclusive deals !

It's valid for 7 days from the date of travel

Period of Booking : Now - 23 Dec 2019
Period of Stay : Now - 25 Dec 2019

Package Include :
Breakfast for 2 persons
Late Check Out until 2pm (based on room availability)

Terms & Conditions apply
for further information please scan our QR Code :

Kuta I Surabaya I Tegal I Karawang I Cikarang

The Signature of Indonesian Hospitality

PRIME Plaza HOTELS | PRIME Plaza RESORTS | primebiz HOTELS

Jakarta Sales Office
Plaza 5 Pondok Indah Blok C No. 16,
Jl. Margaguna Raya, Jakarta 12420, Indonesia
+62 21 7279 9797 +62 21 7279 9595
info@jso.pphotels.com, www.pphotels.com

PRIME PLAZA Hotels & Resorts

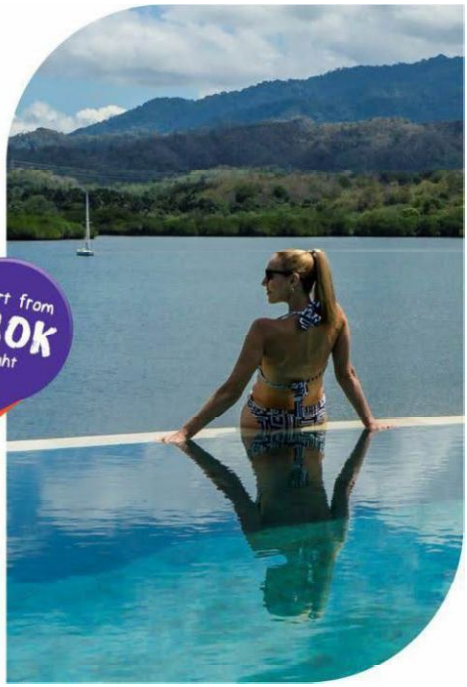
Enjoy **"Special Room Rates"** at **Prime Plaza Hotels & Resorts**
Located in Sumatera, Java, Bali, & Lombok.
Simply present your domestic boarding pass
to enjoy our exclusive deals !

It's valid for 7 days from the date of travel
Minimum 2 nights stay per booking

Period of Booking : Now - 23 Dec 2019
Period of Stay : Now - 25 Dec 2019

Package Include :
Breakfast for 2 persons
Late Check Out until 2pm (based on room availability)

Terms & Conditions apply
for further information please scan our QR Code :



Gili Trawangan I Sanur I Kuta I Seminyak I Bali Barat I
Jogjakarta I Purwakarta I Kualanamu

The Signature of Indonesian Hospitality

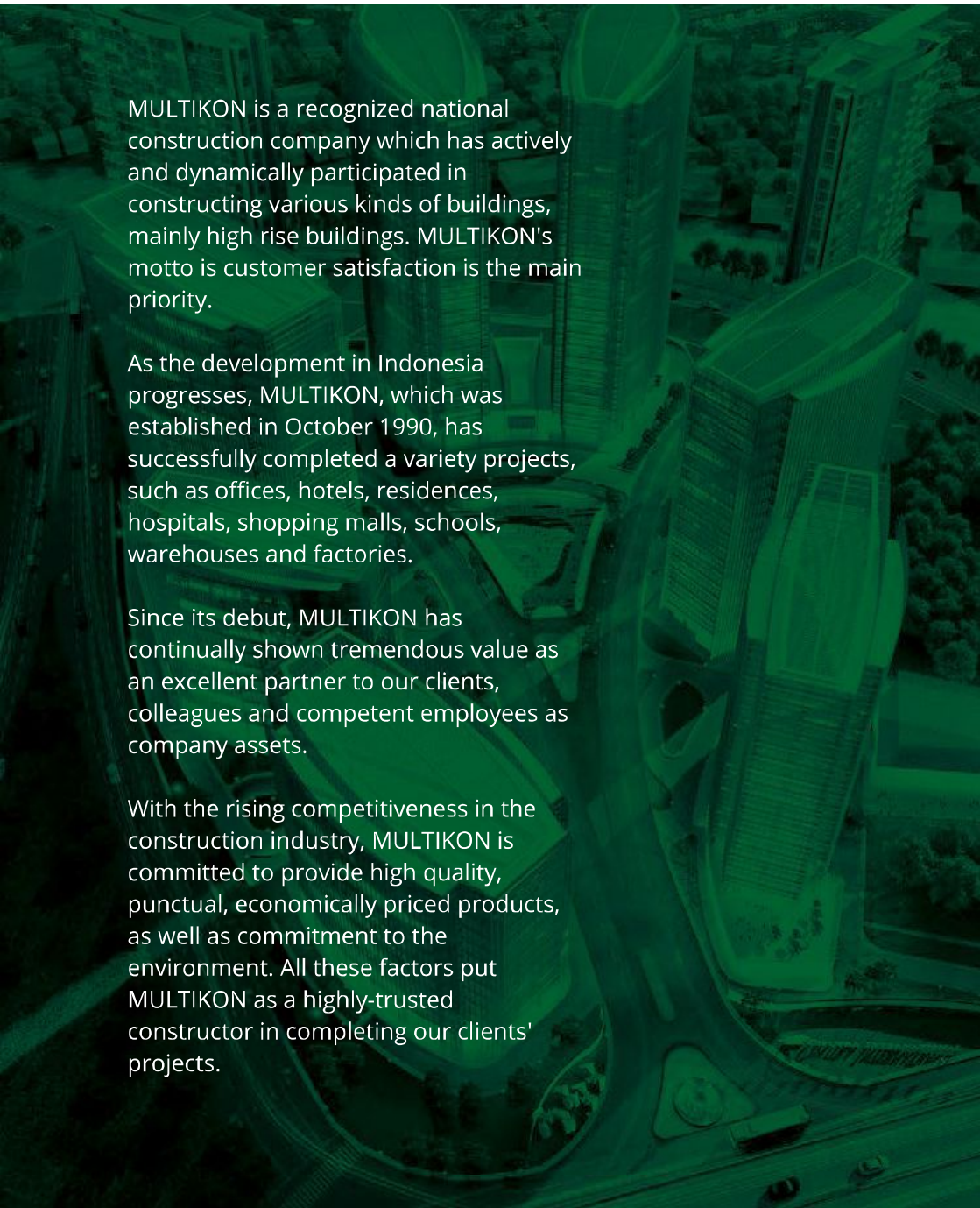
PRIME Plaza HOTELS | PRIME Plaza RESORTS | primebiz HOTELS

Jakarta Sales Office
Plaza 5 Pondok Indah Blok C No. 16, Jl. Margaguna Raya, Jakarta 12420, Indonesia
+62 21 7279 9797 +62 21 7279 9595
info@jso.pphotels.com, www.pphotels.com

PRIME PLAZA Hotels & Resorts

http://www.multikon.co.id

MULTIKON



MULTIKON is a recognized national construction company which has actively and dynamically participated in constructing various kinds of buildings, mainly high rise buildings. MULTIKON's motto is customer satisfaction is the main priority.

As the development in Indonesia progresses, MULTIKON, which was established in October 1990, has successfully completed a variety projects, such as offices, hotels, residences, hospitals, shopping malls, schools, warehouses and factories.

Since its debut, MULTIKON has continually shown tremendous value as an excellent partner to our clients, colleagues and competent employees as company assets.

With the rising competitiveness in the construction industry, MULTIKON is committed to provide high quality, punctual, economically priced products, as well as commitment to the environment. All these factors put MULTIKON as a highly-trusted constructor in completing our clients' projects.

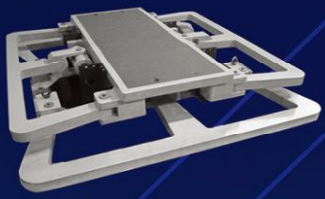
ISOSISM® RANGE

OUR SOLUTIONS FOR EARTHQUAKE PROTECTION : THE ISOSISM™ RANGE

From proposing an earthquake protection strategy geared towards specific structures through to delivering and installing systems that have been designed, manufactured, and tested in-house, Freyssinet's expertise in earthquake protection devices is fueled by the company's extensive track record to brings structural designers and clients practical solutions for minimizing their earthquake risks.

ISOSISM® PDS - DISSIPATION

ISOSISM® HDRB - ISOLATION



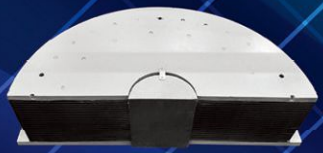
ISOSISM® DDD - DISSIPATION

ISOSISM® FD - DISSIPATION

ISOSISM® PS - ISOLATION

ISOSISM® SFX - JUNCTION

ISOSISM® STU - CONNECTION



ISOSISM® LRB - ISOLATION

ISOSISM® FS - ISOLATION

http://nindyakarya.co.id

Nindya Karya is a construction company with shareholdings held by the Republic of Indonesia and PT PPA (Persero). In addition to running a construction business, the Company also runs a business in the field of Engineering, Procurement, Construction (EPC) and investment.

As a construction company, Nindya has built a variety of building projects in various regions in Indonesia. The project includes construction of irrigation and dams, docks, industrial buildings and EPCs, airports, hospitals, apartments and hotels, commercial buildings, highways and highways, flyovers and bridges, sports buildings, educational buildings and various other commercial buildings.

These projects have directly and indirectly contributed to the country's economy. In its long journey as a construction company, Nindya Karya has built a number of monumental buildings that become landmarks in Indonesia. One of them is the development of the Gelora Stadium Bung Karno is included in one of the biggest soccer stadiums in the world.

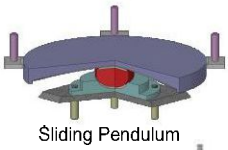
MAGDATAMA

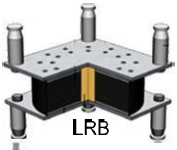
Bearings & Expansion Joints SOLUTION

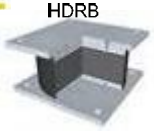
BEARING
Rubber Bearing Pad
Pot Bearing
Spherical Bearing

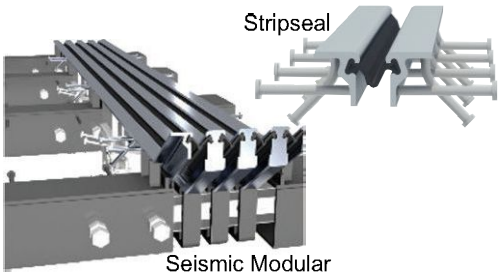
SEISMIC ISOLATOR
Sliding Pendulum
Lead Rubber Bearing (LRB)
High Damping Rubber (HDRB)

EXPANSION JOINT
Strip Seal Joint
Modular Joint
Seismic Modular Joint





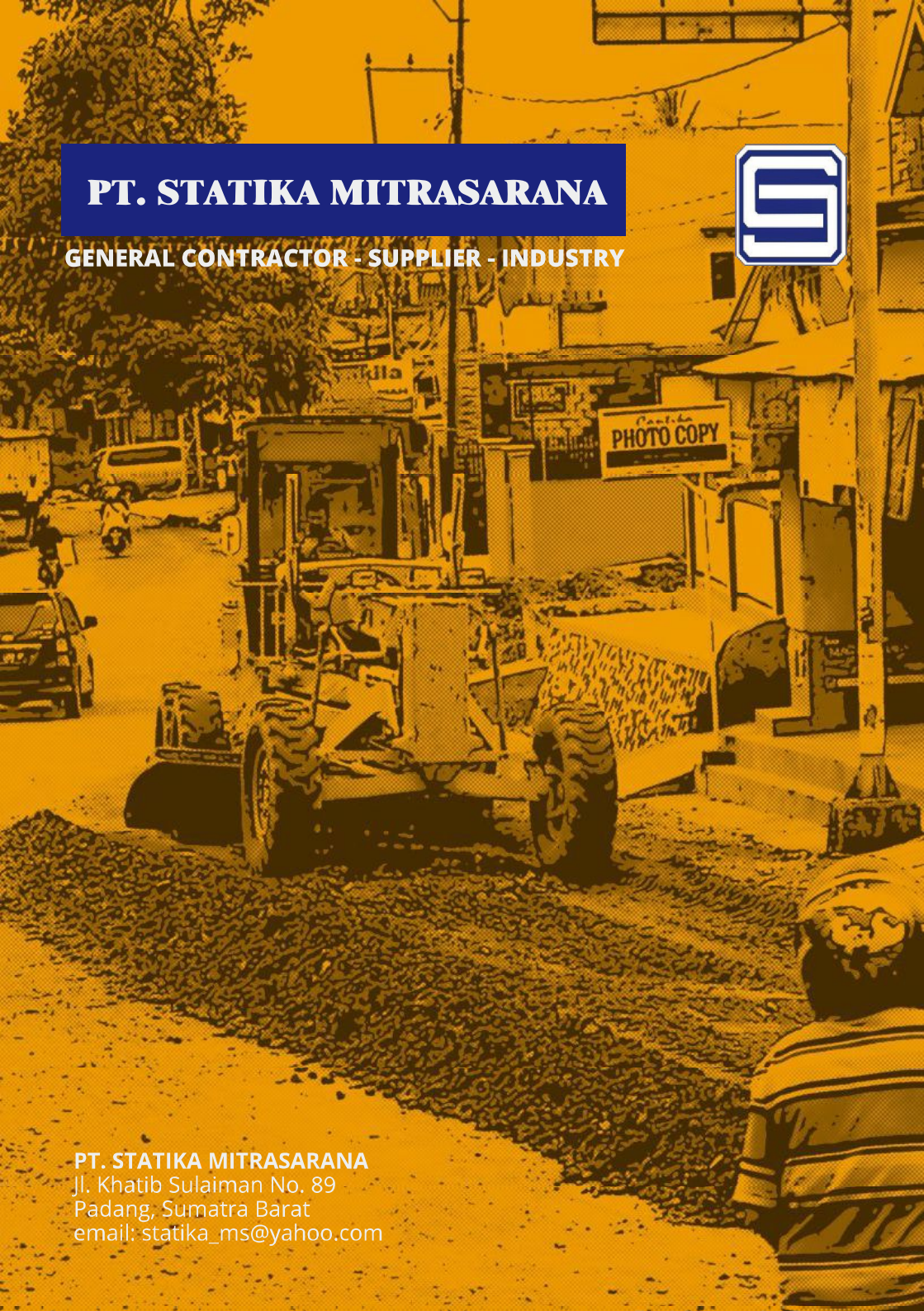




PT. MAGDATAMA MULTI INDUSTRI

PT. STATIKA MITRASARANA

GENERAL CONTRACTOR - SUPPLIER - INDUSTRY



PT. STATIKA MITRASARANA
Jl. Khatib Sulaiman No. 89
Padang, Sumatra Barat
email: statika_ms@yahoo.com

PRIDE AND EXCELLENCE IN CONSTRUCTION

TOTAL
BANGUN PERSADA

PT. TOTAL BANGUN PERSADA Tbk
Office: Jl. Letjend. S. Parman Kav. 106 Jakarta 11440, Indonesia, Phone: (021) 5666999, Fax: (021) 5663069
Homepage: http://www.totalbp.com, email: totalbp@totalbp.com

LLOYD
ELEVATED LIVING EXPERIENCE

LOW-RISE APARTMENTS
WITH 70% OPEN SPACE

FREE* KITCHEN SET by TOTO | AC | SMART HOME

LIMITED UNITS

*T & C apply

www.alam-sutera.com (021) 3110-3838

PENTA
ARCHITECTURE
A DIVISION OF PENTA REKAYASA

STRUKTUR

AGUNG PODOMORO LAND

GREEN BAY
PLUIT

JAYA
KONSTRUKSI

SCHEDULE

Wednesday 25th September 2019
09:00 – 17:00 *Special Lecture and Exhibition Event*

No.	Times	Detail
1	09:00 – 17:00	Registration (Divided into the Special Lecture, Conference, Workshop/Short Course)
2	13:30 – 13:45	Opening Remarks by the Rector of Andalas University
3	13:45 – 14:00	Opening Remarks by Chairman of AARGI
4	14:00 – 16:00	Special Lecture by Dr.Teddy Boen, Expert of Earthquake Engineering
5	16:00 – 17:00	Exhibition Visiting

SCHEDULE

Wednesday 25th September 2019
19:00 – 22:15 *Opening Ceremony and Honourary Speakers*

No.	Times	Detail
1	19:00-19:30	Welcome Ceremony
2	19:30-19:50	Opening Remarks by the Governor of Sumatera Barat (Flashback of the 2009 West Sumatera Earthquake)
3	19:50-20:00	Life Time Achievement Award to Dr.Teddy Boen by Chairman of AARGI
4	20:00-20:30	Welcome Dinner
5	20:30-20:40	Opening Remarks by the Rector of Andalas University
6	20:40-21:00	Keynote Speech by the Head of National Disaster Management Agency (BNPB)
7	21:00-21:30	Keynote Speech by the Minister of Public Works and Housing (PUPR)
8	21:30-22:00	Cultural Performance
9	22:00-22:15	Group Photo

SCHEDULE

Thursday 26th September 2019
08:00 – 17:00 *Conference Day 1*

No.	Times	Detail
1	07:30 – 08:20	Registration
2	08:20 – 08:30	Indonesian National Anthem
3	08:30 – 08:40	Opening Remarks by the Organizing Committee
4	08:40 – 08:50	Opening Remarks by Chairman of AARGI
5	08:50 – 09:00	Opening Remarks by Prof. K. Kusunoki, Secretary-General International Association for Earthquake Engineering
6	09:00 – 10:00	Keynote (Ashraf Habibullah) Moderator (Prof. I Wayan Sengara)
7	10:00 – 11:15	Keynote (Prof. Bambang Budiono; Prof. Shyh-Jiann Hwang; Prof. K.Kusunoki) Moderator (Prof. I Wayan Sengara)
8	11:15 – 11:30	Q&A
9	11:30 – 11:45	Coffee Break
10	11:45 – 12:35	Keynote (Prof.Ir. Dwikorita Karnawati, M.Sc., Ph.D.; Prof. Louise Comfort) Moderator (Prof., Dr., Ir. Krishna S Pribadi)
11	12:35 – 12:45	Q&A
12	12:45 – 13:30	Lunch Break
13	13:30 – 15:00	Parallel Session 1 in 4 Rooms
14	15:00 – 15:30	Coffee Break
15	15:30 – 17:00	Parallel Session 2 in 4 Rooms

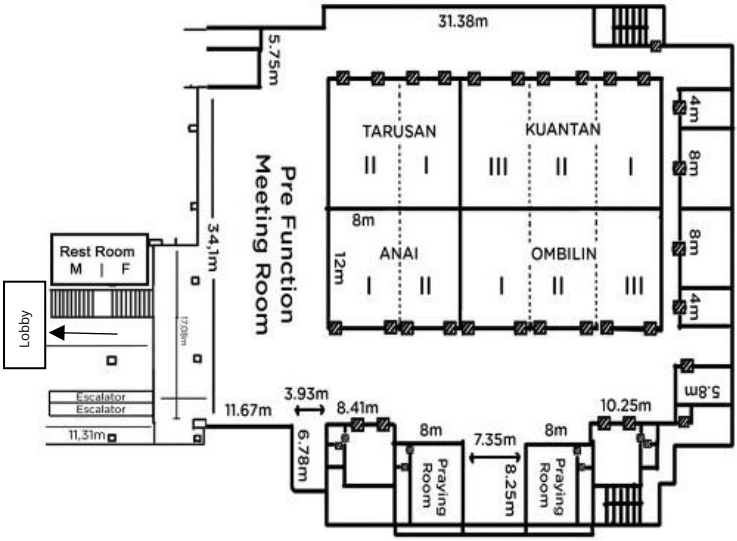
SCHEDULE

Friday 27th September 2019
08:00 – 17:00 *Conference Day 2*

No.	Times	Detail
1	08:00 – 08:45	Registration
2	08:45 – 10:00	Keynote (Prof. Wayan Sengara; Prof. Abdul Hakam; Prof. Jin Hung Hwang) Moderator (Prof. Iswandi Imran)
3	10:00 – 10:10	Q&A
4	10:10 – 10:25	Coffee Break
5	10:25 – 11:40	Keynote (Prof. Tony Yang; Prof. Indra Djati Sidi; Dr.Teddy Boen) Moderator (Dr. Febrin Anas Ismail)
6	11:40 – 11:50	Q&A
7	11:50 – 13:30	Lunch Break
8	13:30 – 15:00	Parallel Session 3 in 4 Rooms
9	15:00 – 15:30	Coffee Break
10	15:30 – 17:00	Parallel Session 4 in 4 Rooms
11	17:00 – 17:15	Closing Ceremony (Closing Speech, Best Paper Awards, Group Photo

MAP OF CONFERENCE ROOMS

LAYOUT PADANG CONVENTION CENTER GROUND FLOOR



GEOPARK TOUR

Geopark is single, unified geographical areas where sites and landscapes of geological significance are managed with a holistic concept of protection, education, and sustainable development. It uses its geological heritage, in connection with all other aspects of the area's natural and cultural heritage, to enhance awareness and understanding of critical issues facing society, such as using our Earth's resources sustainably, mitigating the effects of climate change and reducing the impact of natural disasters.

Sianok Valley (Ngarai Sianok) located at Bukittinggi City, the city where our founding father, Dr. Bung Hatta was born, (approximately about 100 km from the capital city of Padang) is one of the Geoparks that recently got a certificate as National Geopark. In this occasion, all interested conference participants will be set to enjoy a one-day geopark tour at the end of the conference within and surrounding of the valley, including visiting biological and cultural diversity. Visiting traditional shopping market, including culinary, is the moment that everybody will love it. Further detail of the tour will be announced later.

ABSTRACT & PRESENTATION SCHEDULE

4th ICEEDM 2019 abstracts are also available at the conference's website at the following address:

http://conference.ft.unand.ac.id/index.php/iceedm/2019

4TH ICEEDM 2019 SCHEDULE

THURSDAY, 26th September 2019 (Conference Day 1)

4TH ICEEDM 2019 SESSION 1 : STRUCTURAL ENGINEERING
VENUE : ROOM 1 (ANAI ROOM)
TIME : 13.30 WIB – 15.00 WIB
SESSION CHAIR : FAUZAN, ST., MSC. (ENG.), DR.ENG.

INVITED SPEAKER : MADE SUARJANA, IR., MSC, PH.D
TITLE : POST PADANG BUILDINGS DAMAGE SURVEY AND THEIR VULNERABILITY MODEL DEVELOPMENT

THURSDAY, 26th September 2019 (Conference Day 1)

4TH ICEEDM 2019 SESSION I : GEOTECHNICAL ENGINEERING
VENUE : ROOM 2 (OMBILIN ROOM)
TIME : 13.30 WIB – 15.00 WIB
SESSION CHAIR : IR. FRITZ NABABAN, MT

THURSDAY, 26th September 2019 (Conference Day 1)

4TH ICEEDM 2019 SESSION 1 : SEISMIC ENGINEERING
VENUE : ROOM 3 (TARUSAN ROOM)
TIME : 13.30 WIB – 15.00 WIB
SESSION CHAIR : MASRILAYANTI, ST, MSC., PH.D

INVITED SPEAKER : PROF. DR. IR. IMAN SATYARNO M.E.
TITLE : INFLUENTIAL PARAMETERS IN TIME HISTORY SEISMIC ANALYSIS

THURSDAY, 26th September 2019 (Conference Day 1)

4TH ICEEDM 2019 SESSION 1 : DISASTER MITIGATION
VENUE : ROOM 4 (KUANTAN ROOM)
TIME : 13.30 WIB – 15.00 WIB
SESSION CHAIR : BENNY HIDAYAT, ST, MT., PH.D

INVITED SPEAKER : PROF. DR. IR. KRISHNA S PRIBADI
TITLE : LOMBOK EARTHQUAKE, ONE YEAR LATER: HOUSING SECTOR RECOVERY

THURSDAY, 26th September 2019 (Conference Day 1)

4TH ICEEDM 2019 SESSION 2 : STRUCTURAL ENGINEERING
VENUE : ROOM 1 (ANAI ROOM)
TIME : 15.30 WIB – 17.00 WIB
SESSION CHAIR : ERWIN LIM, ST, MS., PH.D

THURSDAY, 26th September 2019 (Conference Day 1)

4TH ICEEDM 2019 SESSION 2 : GEOTECHNICAL ENGINEERING
VENUE : ROOM 2 (OMBILIN ROOM)
TIME : 15.30 WIB – 17.00 WIB
SESSION CHAIR : ANDRIANI, DR., ST, MT.

THURSDAY, 26th September 2019 (Conference Day 1)

4TH ICEEDM 2019 SESSION 2 : SEISMIC ENGINEERING
VENUE : ROOM 3 (TARUSAN ROOM)
TIME : 15.30 WIB – 17.00 WIB
SESSION CHAIR : RUDDY KURNIAWAN, DR., ST, MT.

THURSDAY, 26th September 2019 (Conference Day 1)

4TH ICEEDM 2019 SESSION 2 : DISASTER MITIGATION
VENUE : ROOM 4 (KUANTAN ROOM)
TIME : 15.30 WIB – 17.00 WIB
SESSION CHAIR : RANNY G. KUSUMAWARDHANI, ST, MSC., PH.D

FRIDAY, 27th September 2019 (Conference Day 2)

4TH ICEEDM 2019 SESSION 3 : STRUCTURAL ENGINEERING
VENUE : ROOM 1 (ANAI ROOM)
TIME : 13.30 WIB -15.00 WIB
SESSION CHAIR : JATI SUNARYATI, ST, MT., PH.D

FRIDAY, 27th September 2019 (Conference Day 2)

4TH ICEEDM 2019 SESSION 3 : GEOTECHNICAL ENGINEERING
VENUE : ROOM 2 (OMBILIN ROOM)
TIME : 13.30 WIB – 15.00 WIB
SESSION CHAIR : TITI KURNIATI, ST, MT.

FRIDAY, 27th September 2019 (Conference Day 2)

4TH ICEEDM 2019 SESSION 3 : TSUNAMI
VENUE : ROOM 3 (TARUSAN ROOM)
TIME : 13.30 WIB – 15.00 WIB
SESSION CHAIR : YERVI HESNA, ST, MT.

INVITED SPEAKER : Dr. Eng HAMZAH LATIEF, M.Si
TITLE : TSUNAMI INUNDATION MODEL IN PADANG CITY BY CONSIDERING SPATIALLY VARIED MANNING ROUGHNESS COEFFICIENT

FRIDAY, 27th September 2019 (Conference Day 2)

4TH ICEEDM 2019 SESSION 3 : DISASTER MITIGATION
VENUE : ROOM 4 (KUANTAN ROOM)
TIME : 13.30 WIB – 15.00 WIB
SESSION CHAIR : ELSA EKA PUTRI, ST, MSC. (ENG.), PH.D

FRIDAY, 27th September 2019 (Conference Day 2)

4TH ICEEDM 2019 SESSION 4 : STRUCTURAL ENGINEERING
VENUE : ROOM 1 (ANAI ROOM)
TIME : 15.30 WIB – 17.00 WIB
SESSION CHAIR : PATRIA KUSUMANINGRUM, ST, PH.D

FRIDAY, 27th September 2019 (Conference Day 2)

4TH ICEEDM 2019 SESSION 4 : GEOTECHNICAL ENGINEERING
VENUE : ROOM 2 (OMBILIN ROOM)
TIME : 15.30 WIB – 17.00 WIB
SESSION CHAIR : RILDOVA, ST, MT., PH.D

FRIDAY, 27th September 2019 (Conference Day 2)

4TH ICEEDM 2019 SESSION 4 : STRUCTURAL ENGINEERING
VENUE : ROOM 3 (TARUSAN ROOM)
TIME : 15.30 WIB – 17.00 WIB
SESSION CHAIR : SABRIL HARIS HG, ST, MT., PH.D

FRIDAY, 27th September 2019 (Conference Day 2)

4TH ICEEDM 2019 SESSION 4 : DISASTER MITIGATION
VENUE : ROOM 4 (KUANTAN ROOM)
TIME : 15.30 WIB – 17.00 WIB
SESSION CHAIR : DYAH KUSUMASTUTI, ST, MT., PH.D

KEYNOTES AND INVITED SPEAKERS

RAPID SCREENING PROCEDURE FOR BUILDINGS DAMAGED BY EARTHQUAKES: THE NEED FOR RETROFITTING

Teddy Boen

CSI Indonesia, Prisma Kedoya Plaza C7-8, Jakarta, Indonesia
✉ tedboen@cbn.net.id

ABSTRACT

Right after an earthquake disaster, many universities and or "experts" were performing rapid screening of buildings / facilities damaged during the earthquake. Many of the buildings, houses, were tagged with red labels, which means that those buildings are dangerous, cannot be occupied and should be demolished. Demolishing buildings without thorough analysis is an irresponsible act. The rapid screening of buildings damaged by earthquakes shall be done repeatedly by experts with track records in the field of structural earthquake engineering, utilizing the same criteria and subsequently converting the findings into a well-established scoring system. The damaged buildings must be evaluated, analyzed by acknowledged structural earthquake engineers with track records prior to the final decision. If the analysis showed positive results, the buildings should be retrofitted, and not demolished. Retrofitting of buildings damaged by earthquakes shall be made a culture in Indonesia.

A NEW STRUCTURAL HEALTH MONITORING SYSTEM FOR REAL-TIME EVALUATION OF BUILDING DAMAGE

Koichi Kusunoki

Earthquake Research Institute, the University of Tokyo, 1-1-1, Yayoi, Bunkyo Ku, Tokyo, JapanIndonesia
✉ kusunoki@eri.u-tokyo.ac.jp

ABSTRACT

The author has developed a new method for evaluating the seismic performance of existing structures from measured accelerations based on the capacity spectrum method. This involves comparing the performance curve, which is the equivalent nonlinear behavior of a simplified single-degree-of-freedom system, and the demand curve, which is the relationship between the response acceleration and displacement spectra. Two telecommunication towers in Japan were instrumented in 2016, and their responses during several

earthquakes have been recorded. This paper discusses the evaluation of damage during the two earthquakes. Moreover, parameters such as the predominant period and the required performance are discussed. The proposed system evaluated both towers as being "elastic." The damping ratios of the towers are very low, which caused the oscillations to continue for more than 5 min after the mainshock of each earthquake because of long-period components of the seismic motion.

NEW 2019 RISK-TARGETED GROUND MOTIONS FOR SPECTRAL DESIGN CRITERIA IN INDONESIAN SEISMIC BUILDING CODE

I Wayan Sengara[1], Masyhur Irsyam[1], Indra Djati Sidi[1], Andri Mulia[2], Muhamad Asrurifak[3], Daniel Hutabarat[4], and Windu Partono[5]

[1]Professor, Civil and Environmental Engineering Faculty, Institut Teknologi Bandung, Bandung - Indonesia
[2]Researcher, Geotechnical Engineering Laboratory, Engineering Center for Industry, Institut Teknologi Bandung, Bandung – Indonesia
[3]Faculty of Civil Engineering and Planning, Institut Sains dan Teknologi Nasional, Jakarta – Indonesia
[4]UC Berkeley College of Engineering, California.
[5]Civil Engineering Department, Diponegoro University
✉ wayansengara@yahoo.com

ABSTRACT

Indonesia has followed development of new seismic design criteria in the new seismic building codes, from hazard-based in the former SNI-03-1726-2002 to the current risk-based SNI-1726-2012. The major changes in SNI-1726-2012 are using Risk-Targeted Maximum Considered Earthquake (MCER) Spectral Response Acceleration maps. Five years later (2017), the seismic hazard maps have been updated adopting the most recent data and current state of knowledge in probabilistic and deterministic seismic hazard assessment methodologies. To establish the New 2019 Risk Targeted Ground Motion (RTGM) of spectral acceleration (Ss and S1), and risk coefficients (CRS and CR1), for both short (T=0.2s) and 1-second (T=1s) periods, respectively have been developed based on the 2017 Indonesian hazard maps. The RTGM was calculated as the spectral value resulting in 1% probability of building collapse in 50 years through numerical integration of hazard curves and structural capacity. The log-normal standard deviation (□) of the structural capacity

envelope has been revised from 0.70 to 0.65. This paper presents the new resulted RTGM maps. Furthermore, the paper also presents revision of seismic amplification factors for 0, 0.2, and 1 second periods (FPGA, Fa, and, Fv) to generate ground surface maximum and design spectra associated with the site-classifications.

POST PADANG BUILDINGS DAMAGE SURVEY AND THEIR VULNERABILITY MODEL DEVELOPMENT

Made Suarjana[1,2], Wayan Sengara[1,2], Mark Edwards[3], Febrin Ismail[4], and Abdul Hakam[4]

[1]Civil Engineering Study Program, Institut Teknologi Bandung, Indonesia
[2]Research Center for Disaster MitiSgation, Institut Teknologi Bandung, Indonesia
[3]Section Leader, Risk and Impact Analysis Group-Geoscience Australia
[4]Civil Engineering Study Program, Andalas University, Indonesia
✉ msuarjana@gmail.com

ABSTRACT

The amount of potential investment in Padang City since 2017 attracted many investors to invest in this city. One of the investments is a 12-story hotel that will be constructed in By Pass Street of Padang city, Indonesia. Due to the hotel is located in a high seismic zone area, seismic base isolation has been proposed to be used in the hotel building. The main aim of using seismic base isolation device is to reduce the inertia forces introduced in the structure due to earthquake by shifting the fundamental period of the structure out of dangerous resonance range and concentration of the deformation demand at the isolation system. An analytical study on the Reinforced Concrete (RC) hotel building with and without rubber bearing (RB) base isolation is carried out using the response spectrum method. The effect of seismic base isolation on the hotel building is discussed in this paper.

LOMBOK EARTHQUAKE, ONE YEAR LATER: HOUSING SECTOR RECOVERY

Krishna S Pribadi, Rani G Pradoto, Eliya A Hanafi, and I Made Adhi Bayu Rasmawan.

Construction Engineering and Management Research Group, Faculty of Civil and Environmental Engineering, Bandung Institute of Technology, Jl. Ganesha 10 Bandung 40181, Indonesia

✉ kspribadi@gmail.com

ABSTRACT

The series of strong earthquakes that hit the province of West Nusa Tenggara (NTB) on 29 July 2018 (M6.4), 5 August 2018 (M7.0), 9 August 2018 (M6.2) and 19 August 2018 (M6.5 and M6.9) has caused many casualties, injuries as well as damages in the housing sector. The disaster emergency was stated on July 29th, 2018 and was extended several times up to August 25th, 2018. A transition period from an emergency situation to recovery was declared starting from August 26th, 2018 to February 26th, 2019, while the rehabilitation and reconstruction (R & R) phase was started from February 27th. , 2019. In the R & R program, the Government has established a policy of building earthquake-resistant houses with a self-managed system through the formation of community groups (POKMAS) consisting of house owners, supported by technical and administrative facilitators. There are many models of earthquake resistant houses, both those proposed by the government and the private sector that are approved by the government. A Presidential Instruction (Inpres) Number 5 Year 2018 was issued on 23 August 2018 to provide guidance on the housing sector reconstruction. An investigation to study and document the lessons learnt from the housing reconstruction process is conducted in Lombok Island, covering the issues of program management, institutional set up and coordination, project administration, technical design, quality assurance and community participation. It was found that there were so many house building models proposed to the community by various sponsors, which cause confusion to the affected community. The study also found that the house reconstruction program has been delayed during the process, as one year after the earthquake, there were only about 52 thousands houses which have been completed, and 80 thousands other are still in progress, compared to the total of more than 237 thousand affected houses to be repaired and rebuilt. The study is expected to reveal various impeding issues and propose solutions for expediting the process. It is also expected that the result of the study can be used as a reference for future post-disaster housing sector recovery program in other places.

TSUNAMI INUNDATION MODEL IN PADANG CITY BY CONSIDERING SPATIALLY VARIED MANNING ROUGHNESS COEFFICIENT

Hamzah Latief and Shahasrakiranna

Faculty of Earth Sciences and Technology, Institute of Technology Bandung, Jalan Ganesha 10 Bandung 40132
✉ hamzah@fitb.itb.ac.id

ABSTRACT

Tsunami inundation model for Padang City has been developing since declared by scientist the prediction of massive accumulated potential slip in Mentawai Segment will release in few decades. In effort to create a more realistic tsunami inundation model, this study considers land cover contribution as important it is represented by Manning roughness coefficient (n). Six scenarios were simulated by using both homogeneous and inhomogenous of n spatially. Land cover data are available from OSM, Google Earth, Landsat 8 Satellite while manning roughness coefficient used in this study refer to few literatures.

These models are simulated by COMCOT Ver.1.7, the result of models show that tsunami wave reaches 5.38 m in height and has 31.45 minutes of estimation time arrival (ETA). Mean value for run up heights and inundation distance are 4.92 m and 1.08 km respectively. The best roughness map in this study is the one which assimilated OSM and Google Earth Satellite. It is consider as the most similar configuration in reality which the shoreline area are dominated by permanent buildings (n=0.4) and streets (n=0.031). Simulation result shows n variations can reduce inundation distance and area up to 22.3% from the scenarios which is using homogeneous n=0.08 distribution. It comes with the consequences of flow depth increment near the shoreline for up to 2.54 m. From this study, varying manning roughness coefficient spatially is considered as simple and effective method to create a realistic inundation model.

4TH ICEEDM 2019 ABSTRACTS

ICEEDM-777

GROUND MOTION PREDICTION EQUATION FOR WEST SUMATRA DUE TO DISTANT SHALLOW CRUSTAL, INTERFACE, AND INTRASLAB EARTHQUAKES.

Sidiq Hargo Pandadaran, George Francisco Augusto Muabuay, Sigit Eko Kurniawan and Muhamad Fadhilah

Meteorological, Climatological, and Geophysical Agency,10720 Kemayoran, Jakarta Pusat, Indonesia
✉ sidiqargo@gmail.com

ABSTRACT

Ground motion prediction equation (GMPE) is an important component for seismic hazard study to minimize the casualty from earthquake especially in building collapse. This study presents ground motion prediction equation for West Sumatra due to distant shallow crustal, interface, and intraslab earthquakes. The data sets consist of 375 strong motion data that are recorded by Meteorological, Climatological, and Geophycical Agency's (BMKG) accelerograph sensors that are located in West Sumatra, earthquake parameter data are from BMKG's earthquake catalog with the range moment magnitude of 4.0-6.4 and recorded at sites with hypocentral distance of 17 – 1000 km, focal mechanism data are from Global Centroid Moment Tensor (GCMT), and use site classification to enhance the quality of the results. This study shows good results with standar deviation of residual value of 0.23 for shallow crustal, 0.29 for interface, and 0.49 for intraslab earthquakes.

ICEEDM-785

MITIGATION OF THE WONOREJO ACTIVE FAULT ON THE PROBOLINGGO-BANYUWANGI TOLL ROAD

Reza Kazhimi

Technical Division, PT Jasamarga Probolinggo Banyuwangi , Indonesia
✉ rezakazhimi@gmail.com

ABSTRACT

As the world's largest archipelago, Indonesia sits between the world's most active seismic region. This situation led Indonesia to be part of the region that has the highest seismic potential in the world. In recent years, one of the infrastructure that experienced significant development is the toll road. With

the condition of Indonesia which located in active tectonic areas, it is certainly a challenge in the process of determining the alignment and technical design of the toll road. The original alignment (based on basic design) of Probolinggo-Banyuwangi toll road which is now in the planning stage was passing the wonorejo fault which is an active fault based on the Seismic Hazard Maps of Indonesia 2017. Because earthquakes are natural events that have not been accurately calculated and estimated: both when and where they occur and also their magnitude, according to the mitigation strategies for fault rupture suggested by FEMA (Federal Emergency Management Agency), the fault rupture should be avoided, even more, earthquakes have the potential to cause large losses. Based on these considerations, the alignment of the Probolinggo-Banyuwangi toll road is in the process of being submitted for a shift in order to avoid the location of the wonorejo fault.

ICEEDM-790

EARTHQUAKE HAZARD MITIGATION ANALYSIS OF THE PIER 231 HARBOUR ROAD BRIDGE

N. Retno Setiati[1], Ireng Guntorojati[2] and Winarputro A. Riyono[1]

[1]Institute Road of Engineering, Research and Development Agency, The Ministry of Public Works and Public Housing, Indonesia
[2]Wiratman Chodai Indonesia
✉ retno.setiati@pusjatan.pu.go.id

ABSTRACT

Earthquake mitigation for infrastructure, especially bridges, needs to be done to avoid sudden collapse of the bridge structure. The investigation and rehabilitation of existing bridges against earthquake hazards needs to be carried out through a screening process based on The Bridge Inspection Guidelines (Pd No. 005-01 / P / BM / 2011). Based on the results of the inspection and the screening process, it can be determined whether the bridge is able to accept earthquake loads during the service life or if the bridge needs to be strengthened. This study aims to determine the strength capacity of Harbour Road bridges in receiving earthquake loads based on SNI 2833: 2016 and Peta Gempa Nasional 2017 during service life. Analysis of the pushover structure was carried out at Pierhead 231 which is located on the Wiyoto Wiyono Jakarta. The modeling of Harbour Road bridge structure in longitudinal direction consists of piers and concrete girder separated by

expansion joint and bearing, while in transverse direction is modeled as a single pier system. Structural analysis modeling is assumed to behave as a system with single degree of freedom (SDOF). Based on the results of pushover analysis, it can be seen the location and level of plastic hinge that occur when the performance point is reached. During design earthquake conditions, the performance point is obtained in the Immediate Occupancy condition and the plastic hinge occurs first at the bottom of the Pier. Structural performance at the time of the earthquake design is still under life safety conditions so the Harbor Road bridge still meets the strength requirements.

ICEEDM-798

PARAMETRIC STUDIES ON THE DUCTILITY OF SQUARE REINFORCED CONCRETE COLUMN MADE OF NORMAL-STRENGTH CONCRETE (NSC) AND HIGH-STRENGTH STEEL REBAR (HSSR) WITH VARIOUS TIES CONFIGURATION

Anis Aulia Ulfa[1], Bambang Piscesa[1], and Mario M. Attard[2]

[1]Civil Engineering Department, Institut Teknologi Sepuluh Nopember, 60111 Surabaya, Indonesia
[2]School of Civil and Environmental Engineering, The University of New South Wales, NSW 2052, Sydney, Australia
✉ piscesa@ce.its.ac.id

ABSTRACT

During an earthquake, Reinforced Concrete (RC) building structure should behave in a ductile manner to prevent from collapses. Therefore, the column element should have sufficient ductility to sustain axial load at the post-peak region. Ductility of the RC column can be sufficiently provided by confinement to the RC column core. Therefore, in this paper, ductility of the square RC columns made of NSC and HSSR are being analyzed using nonlinear finite element analysis (3D-NLFEA) with various ties configurations. In total, there are 12 specimens for each ties configuration. The ductility measures used for comparisons is the I10 index (AS 3600-2018) and is compared with the concept of ductility available in the literature (for example ACI 318-19). This study results computation of minimum lateral bar diameter of column specimen according to ACI 318-2014 has a bigger diameter than the requirements of AS 3600:2009. Furthermore, the minimum confinement diameter has decrease each increnement of rebar strength. In addition, when the rebar stress is

increased the stress peak decreases. Decreasing the requirement of lateral bar diameter at each increase of strength steel rebar also results in ductility and the value of ductility index (I10) each the specimen decreases.

ICEEDM-799

EARTHQUAKE POTENTIAL SOURCE IDENTIFICATION USING MAGNETOTELLURIC DATA OF KENDENG THRUST SURABAYA AREA

Amien Widodo, Firman Syaifuddin, Wien Lestari and Dwa Desa Warnana

Geophysical Engineering Department, Institut Teknologi Sepuluh Nopember Surabaya
Jl. Raya ITS, Keputih, Kec. Sukolilo, Kota SBY, Jawa Timur 60111
✉ firmansyaifuddinakbar@gmail.com

ABSTRACT

The existence of the kendeng fault passing Surabaya is still the subject of study by the researchers after being declared active by the National Earthquake Centre. The Surabaya was passed by two segments of the Kendeng fault, the Surabaya segment and the Waru segment, the two segments had an earthquake potential of 6.5 M. In the context of disaster mitigation and earthquake analysis more detailed information is needed relating to the geometry and position of the earthquake source with certainty, so that the identification of earthquake sources is needed in more detail. The magnetotelluric method is one of the geophysical methods that is able to properly identify anomalous objects in tens of kilometers depth. Kendeng fault as a potential earthquake source, one of its segments across Surabaya can be identified using the magnetotelluric method. Megnetolelluric measurements were carried out as many as 15 points in the Surabaya region in order to identify the geometry of the kendeng fault. From the 3D resistivity model, the inversion of magnetotelluric data can be identified well with the Kendeng fault that crosses the city of Surabaya, both the Waru segment and the Surabaya segment at a depth of less than 8 km.

ICEEDM-801

SURABAYA EARTHQUAKE HAZARD SOIL ASSESSMENT

Firman Syaifuddin, Amien Widodo and Dwa Desa Warnana

Geophysical Engineering Department, Institut Teknologi Sepuluh Nopember Surabaya
Jl. Raya ITS, Keputih, Kec. Sukolilo, Kota SBY, Jawa Timur 60111
✉ firmansyaifuddinakbar@gmail.com

ABSTRACT

The vulnerability of land in an area to earthquake ground motions is one of the factors causing damage caused by earthquake events. The city of Surabaya, which is crossed by two active fault segments, needs an assessment to reduce the risk of being affected by an earthquake that might occur. The purpose of this study is to find out the distribution of Seismic Site Classes, knowing the distribution of the value of Seismic Amplification and knowing the potential of liquefaction in the city of Surabaya. The Surabaya which is geologically dominated by alluvium deposits consists of soft soil (SE) and medium (SD) sites based on N-SPT30 and Vs30 data. The level of soil amplification against earthquakes ranging from 1 to 4. This occurs because the physical properties of the Surabaya City soil layer are dominated by alluvium deposits. Regions with more than 2 amplification values are located around the coastline on the North and East coasts of Surabaya City. Based on the potential liquefaction index value, Surabaya City is included in the region with high potential for liquefaction with a potential liquefaction index value of more than 5.

ICEEDM-802

RESEARCH PRIORITY OF THE POTENTIAL EARTHQUAKE ON THE JAVA ISLAND USING DECISION MAKING ANALYSIS

Wien Lestari, Amien Widodo, Firman Syaifuddin and Dwa Desa Warnana

Geophysical Engineering Department, Institut Teknologi Sepuluh Nopember, Surabaya, East Java
✉ wienlestari02@gmail.com**ABSTRACT**

Referring to the Indonesian earthquake source and hazard map published by the National Earthquake Center (Pusgen) in 2017, it was stated that there were 25 active faults on the island of Java and could potentially be a source of earthquakes with earthquake strength more than the 6.5 M scale. Each potential source of earthquake needs to be carried out detailed research on each fault that is declared active so as to reduce uncertainty in the seismic

hazard analysis. Due to limited funding and human resources researching, it is necessary to make research priorities based on the level of urgency. By utilizing decision making analysis techniques, priority of research is carried out by considering several aspects, such as the magnitude of the earthquake that may occur possible economic impact factors, population density and the level of importance of a region on a national and international scale. From the modeling results, it is shown that faults that have the potential to become earthquake sources that are located near large cities are a top priority for detailed research such as the Lembang, Semarang and Surabaya Faults.

ICEEDM-803

RESILIENCE MEASUREMENT OF PADANG CITY'S INFRASTRUCTURES TOWARD MULTI-HAZARD

Giani Ananda[1], Taufika Ophiyandri[1], Abdul Hakam[1], and Edi Hasymi[2]

[1]Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
[2]Padang City's Regional Board for Disaster Management, Pasar Ambacang, Padang, 25152, Indonesia
✉ gianiananda@gmail.com

ABSTRACT

The complexity of geographical conditions and regional morphology of Padang City has caused it to be at high risk of multi-hazard. Besides being located near the meeting point of the Indo-Australian Plate and the Eurasian Plate, Padang City is also located on the Sumatra Fault line or Semangko Fault. Because of this, strong infrastructures are needed in order to minimize the risks impact of multi-hazard. For this reason, this study is conducted to measure the resilience of the Padang City's infrastructures toward multi-hazard and provide recommendations that can improve the resilience of the Padang City's infrastructures toward Multi-hazard. To achieve these objectives, the study was conducted with qualitative methods which will be presented quantitatively in the form of diagrams. The measurement is carried out based on the concept of city toughness measurements made by UNISDR known as the "Scorecard". This study only focuses on essential 8 about "Increase Infrastructure Resilience" and essential 10 about "Expedite Recovery and Build Back Better". From this study, it can be concluded that the resilience of Padang City infrastructures is still relatively low. For this reason, several recommendations that are expected to increase the resilience of Padang City's

infrastructures are proposed, that are the need of in-depth assessment of infrastructure problems in Padang City, important assets of the city and protective infrastructure data collections, and supervision enhancement in routine monitoring and evaluation of protective infrastructure.

ICEEDM-806

ANALYSIS OF MACROSEISMIC, MICROTREMOR SURVEY AND SPECTRUM SEISMOGRAM IN LOMBOK EARTHQUAKE AUGUST 5, 2018

Angga Wijaya, Puji Aryanto, and Hadi Nur Rahman

State College of Meteorology, Climatology and Geophysics, Indonesia, Tangerang Selatan, Indonesia

✉ wijayaangga@gmail.com

ABSTRACT

Microtremor surveys have been done in the Lombok region due to the August 5 2018 Lombok earthquake which caused 563 people dead. Microtremor measurements were carried out in 36 points by the BMKG and STMKG teams. Data were analyzed using the HVSR method to obtain the value of the dominant period and the seismic vulnerability index of Lombok island then compared to the results of the macroseismic survey. From the results of the microtremor survey, the Lombok region has a value of the dominant period of 0.03-2.65s. In addition, it is known that the area which is strongly affected namely Tanjung, has a soft soil type with Tdom <0.2 seconds while the seismic vulnerability index in the area is quite low compared to the Mataram area. The value of the dominant period also triggers amplification because it is in the dominant spectrum range of the seismogram of the Lombok Earthquake M6.2, which is 0.9-1.5 Hz. Whereas from the analysis of microtremor data obtained Lombok island has a sediment thickness of 3-198 meters.

ICEEDM-815

IDENTIFICATION OF LIQUEFACTION DISASTER IN JUNDUL RAWANG, PADANG CITY WEST SUMATRA

Utami Dewi Arman, Rafki Imani, Afrilda Sari and Widiawati Purba

Civil Engineering Department, University of Putra Indonesia YPTK Padang, Indonesia
✉ udewi2679@gmail.com

ABSTRACT
Liquefaction is a condition of continuous soil mass deformation at residual stress due to increasing pore water pressure that results in effective stress reduced. This study was conducted to identify the potential hazards of liquefaction in the Jondul Rawang area in Padang City. This study is to observe the soil contour and characteristic. Primary data obtained by observing the soil contour, soil characteristics, and the form of buildings, etc. Whilst, secondary data obtained from the related documents as supporting data. The results concluded that Jondul Rawang area is potentially liquefaction area where the soil contours and characteristics could be classified as peat soil and lied in the swamps. Furthermore, if the rainfall intensity increase then flooding occurred. Then as consequences, there were many residential houses and other buildings around the area turning into tilted and drowned due to the degradation of soil bearing capacity. Therefore, requiring disaster management efforts against the threat of liquefaction in that area, both in terms of drainage system due to flooding and overall repairs in order for the sewerage could work well.

ICEEDM-816

PARAMETER IDENTIFICATION FOR MODELLING STEEL FIBER REINFORCED CONCRETE UNDER COMPRESSION TO PREVENTS CONCRETE COVER SPALLING UNDER SEVERE EARTHQUAKE LOADING CONDITION

Nia D. Puspitasari[1], Bambang Piscesa[1], Mario M. Attard[2], Dwi Prasetya[1], Faimun Faimun[1], Pujo Aji[1] and Priyo Suprobo[1]

[1]Civil Engineering Department, Institut Teknologi Sepuluh Nopember, 60111 Surabaya, Indonesia
[2]School of Civil and Environmental Engineering, the University of New South Wales, NSW 2052, Sydney, Australia
✉ piscesa@ce.its.ac.id

ABSTRACT
The use of steel fiber in concrete material can improves both the strength and ductility of concrete. The fibers can postpones or mitigate the concrete cover

spalling under severe loading conditions such as during an earthquake. In this paper, the behavior of Steel Fiber Reinforced Concrete (SFRC) under compression is modelled using the Attard and Setunge's stress-strain model. The parameter identification consisted of the elastic modulus (Ec), the peak strength (fcc), the residual strength (fres), and the peak strain of concrete under compression (εcc). From the investigation, it is found that the models proposed for active confined concrete can be applied for steel fiber reinforced concrete. It was also shown that the axial strain at peak stress increases as the fiber volumetric ratio and fiber aspect ratio increased. A simple formula to predict the approximate value of confining pressure to account for the steel fiber presence is proposed. Verification of the proposed model with the experimental results is presented in detail. Furthermore, an insight on the performance of the reinforced concrete column made of SFRC using the fiber-based cross-sectional analysis is sighted.

ICEEDM-818

MAPPING THE RIVER DROUGHT-INDICES IN WEST SUMATRA

Mas Mera, Afdhal Amri, Novita Sari Yelni and Feska Ostari

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ mas_mera@eng.unand.ac.id

ABSTRACT

The smallest magnitudes from a series of daily average-streamflows every month are selected to form a new series of data called a series of monthly minima from daily average-streamflows or then just simply called the monthly minimum-streamflows. The present study uses these monthly minimum-streamflows to determine a drought index in terms of duration and deficit streamflows of successive drought in every watershed in West Sumatra Province. Both terms of drought index are determined by using the theory of runs with a 5-year average-period. So far, we successfully collect series of the daily average-streamflows for 19 watersheds with a minimum length of 20 years. The resulting indices are then mapped using the geographical information system ArcGIS. The drought indices are expressed in 4 levels of drought: normal (green), mild (blue), moderate (yellow) and severe (red). The study results show that the river or watershed with the longest drought-duration is Batang Anai, i.e. 33 months (severe level), with a cumulative deficit-streamflows of 143.26 m^3/s. The river with the shortest drought-duration is

Batang Siat, i.e. 11 months (mild level), with a cumulative deficit-streamflows of 44.64 m^3/s. The average drought-duration for all corresponding rivers is 20 months (mild level) with a cumulative deficit-streamflows of 131.57 m^3/s.

ICEEDM-822

ANALYSIS OF SETTLEMENT PREDICTION DUE TO PRELOADING AND VERTICAL DRAIN APPLICATIONS ON RUNWAY CONSTRUCTION

Adriyati Meilani, Rifa'i Ahmad and Faris Fikri

Department of Civil and Environmental Engineering, Universitas Gadjah Mada, Yogyakarta, Indonesia
✉ ahmad.rifai@ugm.ac.id

ABSTRACT

Consolidation settlement is a general geotechnical problem particularly found in the area where is composed of soft soil. This is caused by the discharge of pore water pressure induced by the increase of stress in the soil mass. Construction of runway above soft soil requires analysis for stability related to the reduction of consolidation settlement and the recovery. The aim of this study is to analyze the settlement comprehensively using empirical methods of Pre-fabricated Vertical Drains (PVD) and preloading installation. Preloading is a technique by which consolidation of soil can be achieved to a substantial amount before imposition of actual construction load. According to soil investigation, the characteristic of the soil layer is clay soil, which has the potential to consolidation settlement. The result of settlement analysis of Taxiway in the research area is from 33 cm to 214 cm. It takes 10 years for primary consolidation to reach 90% degree of consolidation. However, in the research Hansbo (1979) methods of Pre-fabricated Vertical Drains (PVD) and preloading are applied, with triangular configurations in depth of 11 meters and duration for variation embankment spacing of 1 m is 79 days, 1.5 m is 202 days and 2 m is 390 days. The conclution of efficient distance of PVD installation and preloading is spacing of 1 m with 79 days for primary consolidation.

ICEEDM-823

ANALYTICAL PREDICTION OF REINFORCED CONCRETE BEAM-COLUMN JOINT STRENGTHENED WITH DEEP EMBEDMENT METHOD

Ridwan[1], Yaser Jemaa[2], Samir Dirar[3] and Zulfikar Djauhari[1]

[1]Civil Engineering Department, Universitas Riau, Pekanbaru, 28293, Indonesia
[2]Civil Engineering Department, Liverpool John Moores University, Liverpool, L3 3AF, United Kingdom
[3]Dept. of Civil Engineering, University of Birmingham, Edgbaston, Birmingham, B15 2TT, United Kingdom
✉ ridwan@eng.unri.ac.id

ABSTRACT

A Practical and effective strengthening technique, deep embedment (DE) method, has been developed to strengthen shear deficient reinforced concrete (RC) beam-column joints (BCJ). The DE technique exhibited enhancement to the behaviour of BCJ under reversed cyclic loading conditions. This paper presents an analytical model for predicting the shear capacity of RC BCJ strengthened with embedded bars. The proposed model was able to determine the joint shear stress as well as the stress and strain response before and after the yielding of both the longitudinal and transverse reinforcement bars at various stages of loading up to failure. Failure was defined as either concrete crushing or debonding of the embedded bars. Input data of a) the geometric variables of the BCJ section, b) the bond assumption between the concrete and reinforcement bars and c) the axial load acting on the column were provided to trace the state of stresses and strains in the BCJ until failure. The calculation procedure is introduced by applying an incremental strain acting on the transverse reinforcing bars. At the end of each iteration, the stress in the joint area is then compared with both the concrete compressive crushing and the failure of the embedded bars. The joint shear strength predicted using the proposed analytical model is then validated against the joint shear strength of the unstrengthened and strengthened RC BCJ. The results show a considerable level of agreement between the predicted shear strength of the joint using the proposed model and the shear strength of the RC joint tests extracted from selected database.

ICEEDM-824

EFFECT OF FLAT SLAB TO PROGRESSIVE COLLAPSE ON IRREGULAR STRUCTURES BUILDING

Roni Suhendra, Zulfikar Djauhari, Reni Suryanita and Enno Yuniarto

Civil Engineering Department, University of Riau, Pekanbaru, 28293, Indonesia
✉ zulfikar.djauhari@lecturer.unri.ac.id

ABSTRACT

Technological developments in the field of construction today increasingly developed, structures built not only irregular but also irregular. Story of the irregular-structure building significantly shaped affect the building collapse. The collapse of this building can be a collapse of natural and artificial collapse. The natural collapse was a collapse caused by the load capacity received by building or exceeds the capabilities of the structure itself. The potential of structural failure due to their natural collapse can lead to progressive collapse. This research aimed to analyse the influence of flat slab against progressive collapse at irregular building structures, and determine the type of collapse that occurred at irregular building structures. This research was conducted by analysing the structural elements of the first destroyed by the addition of the maximum load. The analysis is done by eliminating one or more of the critical column based on the General Service Administration (GSA). Examination of the power structures using finite element based software, based on the value Demand Capacity Ratio (DCR). Irregular building structures undergo a progressive collapse if the value of DCR> 1. The analysis showed a progressive collapse does not occur at irregular building structures, due to the building using structural elements in the form of a flat slab. The collapse happened only on some elements of the building structure, does not occur in the whole structure of the building.

ICEEDM-828

LIQUEFACTION POTENTIAL ANALYSIS ON RUNWAY CONSTRUCTION BASED ON SOIL ENGINEERING PROPERTIES

Arif Maulana, Rifa'i Ahmad and Faris Fikri

Department of Civil and Environmental Engineering, Universitas Gadjah Mada, Yogyakarta, Indonesia
✉ ahmad.rifai@ugm.ac.id

ABSTRACT

The term of liquefaction refers to a liquefied soil phenomenon during an earthquake causing the loss of soil bearing capacity. In general, liquefaction occurs in loose sandy soil with saturated condition triggered by an earthquake with Peak Ground Acceleration greater than 0.25 g. This research aim to analyze the liquefaction potential of runway construction which located on loose sandy soil area. The analysis of liquefaction potential is based on borelog data, grain size distribution, soil physical properties, and earthquake risk map. The liquefaction potential was obtained by calculating the liquefaction probability in one dimension analysis determined as safety factor. Settle 3D is also applied in this research. The results show that the liquefaction potentially occurs in sand soil layer at 0-6 meters depth with safety factor 0.11-1.06 from manual calculation and 0.19-1.1 from Settle 3D. This result represents high probability of liquefaction at runway construction area, so that the liquefaction prevention method is needed.

ICEEDM-830

EFFECT OF SOIL STRUCTURE DISTURBANCE ON THE SHEAR STRENGTH OF BLACK VOLCANIC ASH SOIL

Okri Asfino Putra[1], Noriyuki Yasufuku[1], Ryohei Ishikura[1], Ahmad Rifa'i[2], Adel Alowaisy[1], and Yuko Kawaguchi[3]

[1]Department of Civil and Structural Engineering, Kyushu University, 744 Motooka, Nishi-ku, Fukuoka 819-0395, Japan

[2]Department of Civil and Environmental Engineering,Faculty of Engineering, Universitas Gadjah Mada, Yogyakarta, Indonesia.

[3]West Nippon Expressway Company Limited, 1-6-20 Dojima, Kita-ku, Osaka City, Japan

✉ okriasfino27@gmail.com

ABSTRACT

The effect of soil disturbance on the shear strength of black volcanic ash soil was investigated using a constant volume direct shear apparatus. Disturbance of soil structure was considered as the pore size distribution which obtained from soil water characteristic curve (SWCC). The disturbed sample was used as a representation of soil structure disturbance due to earthquake shakes. A series of cyclic tests were conducted under unsaturated and saturated samples. The cyclic test under two patterns were adopted. First type of pattern,

cyclic one-sided shearing was applied. While, for the second type two-sided shearing was conducted. It was found that the undisturbed samples exhibit a unimodal pore structure and the disturbed samples indicate to a bimodal pore structure. Since the pore structure of the disturbed sample is unstable, the degradation index value is higher than that of the undisturbed sample and increases with the increasing number of cycles. In other words, the cyclic normalized vertical stress of disturbed samples degrades faster under cyclic loading. On the other hand, the degradation index value in the normally-consolidated samples was found to be larger than that the over consolidated samples. It might be attributed to increase of the pore water pressure during shearing. Where, in the over-consolidated sample is lower than normally-consolidated samples. Furthermore, it can be observed that the normalized shear stress of unsaturated condition, it is slightly larger. The obtained results are in good agreement with the normalized vertical stress behavior in the cyclic shearing. This can be related to the suction forces to the total strength of soils.

ICEEDM-831

NUMERICAL MODELING APPROACH FOR COASTAL AND SMALL ISLANDS VULNERABILITY ANALYSIS IN PARIAMAN CITY, WEST SUMATERA - INDONESIA

Koko Ondara, Guntur Adhi Rahmawan and Nia Naelul Hasanah Ridwan

Research Institute of Coastal Resources and Vulnerability, Ministry of Marine Affairs and Fisheries,Jln. Raya Padang – Painan Km.16, Padang, West Sumatera, Indonesia

✉ koko_ondara@alumni.itb.ac.id

ABSTRACT

Pariaman City is a low-lying area located on the west coast of West Sumatera Province and has hot temperatures. The coastal area of Kota Pariaman has a very high level of vulnerability. Many of the people who live only a few meters from the beach. This study aims to analyze oceanographic conditions such as tides, bathymetry, currents and waves that affect the level of vulnerability of shoreline changes and the distribution of sediments in coastal areas. The results of the analysis show that shoreline changes from 2005 and 2015 were predominantly abrasion of 31,38 ha when compared to accretion of 10,98 ha which occurred almost along the coastline. The simulation results show that

the estuary area around Gondoria Beach has the potential to accretion with the large number of particles piled up in the Central and North coastal areas of Pariaman City.

ICEEDM-833

SEISMIC PERFORMANCE OF BRICK MASONRY INFILLED FRAME STRUCTURES WITH BED JOINT REINFORCEMENTS

Maidiawati[1], Jafril Tanjung[2], Yulia Hayati[3], Agus[1] and Satria Rangga[1]

[1]Civil Engineering Department, Padang Institute of Technology, Padang, Indonesia
[2]Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
[3]Civil Engineering Department, Syiah Kuala University, Banda Aceh, Indonesia
✉ maidiawati@itp.ac.id

ABSTRACT

This paper presents the evaluation of the seismic performance of brick infilled RC frame structures with bed joint reinforcements based on reversed cyclic lateral load tests. Three specimens of the structural model of 1/4 scale-down single-story single-bay brick infilled RC frame was prepared, i.e., one brick infilled RC frame and two brick infilled frames with bed joint reinforcements in which they were different in the spacing of bed joint reinforcements. The specimens were tested by applying reversed cyclic lateral loading in-plane direction. During the tests, the applied loads and specimens' displacements were recorded, and the crack propagation was observed at the peak and residual drifts of each loading cycle to recognize the failure mechanisms of the specimens. As the results, although the use of the bed joint reinforcements ineffective to increase the lateral strength of the overall infilled frame structure, rebars in mortar bed joints role to sustain the lateral strength in plastic deformation, and provide the whole structure with high ductility. The infilled RC frames can survive in large deformation without failure of the infills in out of plane direction due to the rebars in bed joints confined the crick infill.

ICEEDM-839

THE ACCESSIBILITY OF TSUNAMI PRONE AREAS SOCIETY TOWARDS POTENTIAL SHELTERS: A CASE STUDY IN PADANG BARAT SUB-DISTRICT

Titi Kurniati, Adrial Sy and Purnawan

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ titi@eng.unand.ac.id

ABSTRACT

Padang city, which is located on the western coast of Sumatra, has the potential to experience a powerful earthquake and thus generate tsunami. After the earthquake, with or without a tsunami warning, the society is required to evacuate. Because of the short time, vertical evacuation is the best alternative for the safety of society. Evacuation on foot to the temporary rescue building (Temporary Evacuation Shelter, TES) is more advisable than evacuation using motorized vehicles that tends to cause congestion. Temporary evacuation maps and potential shelters in Padang have been established by BPBD (Disaster Management Agency). In the Padang Barat sub-district, there are 13 potential shelters. This study aims to determine the level of accessibility to potential shelters based on travel time and road width parameters. In determining accessibility, the study area is divided into 50x50m size grids. The travel time is determined based on the distance from the center of the grid to the nearest TES through the road network. The limitation of evacuation time is 10 minutes. The results of data analyzing showed that among the 4358 grids which were occupied by society, there were 2272 grids (52.1%) which have low accessibility (based on travel time) and 30% has a low level of accessibility based on travel time and width road parameter.

ICEEDM-841

SAND BOILING IN SATURATED SANDY SOILS DUE TO UPWARD FLOW

Rina Yuliet, Abdul Hakam, Mas Mera and Fauzan

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ yulietrina@gmail.com

ABSTRACT

Although sand boiling phenomenon is neither a form of ground failure nor causing ground deformation, this phenomenon indicates an evidence of increasing pore water pressure at level in where liquefaction has occurred. As a result, a systematic research to describe the sand boiling phenomenon is to be necessary. In this paper, the mechanisms of sand boiling are discussed based on laboratory experiments. The materials as samples consist of coarse sand (size range 4.75 to 2 mm), medium sand (size range 2 to 0.425 mm) and

fine sand (size range 0.45 to 0.075 mm) with varying relative densities. These samples are then put carefully into the observation tank and then being saturated. The water level in the tank is set just as high as the surface level of the sample sand. During the experiments, the presence of excess pore water pressures at any level due to upward flow is observed and recorded. The experiment results show the grain size variations on pore water pressure give the significant effects to the liquefaction and sand boiling phenomena. These initial experiment results will be used to further researches in association with liquefaction phenomena.

ICEEDM-842

MITIGATION THROUGH SEEPAGE REDUCTION IN DAMS

Novy Haryati and Abdul Hakam

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia

✉ Novy.haryati@gmail.com

ABSTRACT

There are many landslide and damages have occurred at dams due to the seepage. In addition, dam works often took inattention of the underneath soil parameters. This careless works resulted in failure of the dam structure as well as landslides. Based on this reason, a good research to be applied to dams is needed. Further, the potential landslides can be avoided. In this study an analysis of seepage analysis at the bottom of the dam is carried out. The landslide analysis is done by varying the parameter to build up the seepage. The case studies analyzed is taken at the seepage that occurred in Sei Wampu Dam located in North Sumatra. Soil data are obtained from the field tests which have been carried out in the previous work. The numerical simulation using the finite element method is gained to conduct the analysis. During the analyses, the variation of parameters obtained from the seepage calculation was recorded. The obtained seepage parameters that affect the stability of dams are then elaborated. The study results can be used for the mitigation efforts at the dams that have the potential for landslides.

ICEEDM-845

SLIDING FAILURE ANALYSIS OF GABION RETAINING WALL ON NATIONAL ROAD SECTION AT KM 31+800 LUBUK SELASIH – PADANG CITY BORDER

Hanafi, Abdul Hakam, Hendri Gusti Putra and Andriani

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ ing106hans@gmail.com

ABSTRACT

In August 2010, there was alandslide in the side-slope of national road section at Km 31+800 Lubuk Selasih –PadangCity Border. In order to prevent the larger damages, it was necessary to do the immediate repairment by constructed the gabion retaining wall. Since urgently action, the determination ofphysical and mechanical soil parameter on thestability analysis merely applied data in literature.Stabilityanalysis consist of overturning, sliding, and soil bearing capacity of the retaining wall. For sliding stability analysis,the friction considered onlyfrom the interaction soil and the base of retaining wall, with assumption the contact area was equal withthe total area in the all base of retaining wall. After the construction of gabion retaining wall, sliding failure then occured due to the pressure that resulted from backfill embankment behind the retaining wall.This research is conducted to perform reanalysis of the retaining wall stability with the soil and gabion parameter received from field investigation and laboratory test result.In the sliding stability reanalysis, the friction contact area that will be used between the base retaining wall and soil was the wiremesh projection areain the base of retaining wall.Based on the reanalysis result, it is obtained the main cause of sliding failure which will be usedto increase the accuracy of stability analysis for gabion retaining wall.

ICEEDM-852

THE COMPARISON BEHAVIOURS OF CABLE STAYED BRIDGE UNDER THE EARTHQUAKE LOAD APPLIED WITH SINGLE AND MULTI SUPPORT EXCITATION

Rahmadona, Masrilayanti and Ruddy Kurniawan

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ donacivil@gmail.com

ABSTRACT

This paper presents the effects of Barelang Cable Stayed in Indonesia under earthquake loads applied with Single Support Excitation (SSE) and Multi Support Excitation (MSE). The main reason why Multi Support Excitation (MSE) should be considered for Barelang Cable Stayed analysis is because the spans are very long, which are: 146 m -350 m – 146 m. The bridge is connecting Batam Island and Tonton Island by total length 642 m. Basically, long spans cause various ground types in every support that means excitation of earthquake will be different in each support. The method used in the analysis is time history analysis which is considered as the most suitable method to conduct for super long cable stayed bridge. The results of the analysis is then compared to obtain the behaviours differences between the two methods, especially for the pylon internal forces (moment and shear) and displacement of top of pylon. The result of the research concludes that there is a big discrepancy between the two analysis. The internal forces and displacements are larger by using Multi Support Excitation (MSE) bridge model and more reliability

ICEEDM-854

FACTOR AFFECTING PRECIPITATION RATE OF CALCIUM CARBONATE IN BIO-BASED REPAIR MATERIALS

Prima Yane Putri

Universitas Negeri Padang

✉ prima.yane.putri@gmail.com

ABSTRACT

The utilization of bio-based material for repairing concrete is a relatively new method, therefore is significant to observe more results in simulating real condition experiments before applied on a practical scale. In the recent past, several studies have been conducted towards the improvement of bio-based repair materials. In this study, the bio-based material involving yeast, glucose and calcium acetate mixed in tris buffer solution has the potential to develop microbial metabolic process leads to precipitation of calcium carbonate.

This research investigated the factor affecting precipitation rate of calcium carbonate in bio-based materials for repairing leakage on concrete specimens. Based on a series of experiments involving temperature, type of dry yeast and concentration of tris buffer solution, the best composition of bio-based

materials with the highest precipitation rate of calcium carbonate was selected. The selected mixture was applied to the leakage concrete specimens and repeatedly for several days until the cracks were completely sealed.

ICEEDM-857

SEISMIC RESPONSE OF CABLE-STAYED BRIDGE SUBJECT TO SINGLE-SUPPORT EXCITATION ON VARIOUS SOIL CONDITION.

Ade Prayoga Nasution, Masrilayanti, Ruddy Kurniawan

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ adeprayoganasution@gmail.com

ABSTRACT

For the cable-stayed bridge, pylon and girder are one of the most important factors in the design process. The behavior of superstructure was investigated using time history analysis that was subjected excitation uniformly on the pylon and girder. The test model was a cable-stayed bridge which was classified as the super long-span bridge. For this purpose, the response spectrum of three soil types: firm, medium, and soft soil were converted to ground acceleration and displacement in time history. The displacement were then subjected uniformly to the structure to determine the behavior of the bridge. The result show the maximum displacement on the pylon and girder due to longitudinal load were in the shortest cable connection on pylon and in the middle of the main span. As for the transverse load, the maximum displacement was in the longest cable connection on the pylon and in the middle of the main span. Displacement caused by firm soil is smaller than medium soil and soft soil. Thus, this study recommends considering the soil condition used in designing an earthquake-resistant bridge.

ICEEDM-858

COASTAL ZONE DISASTER MITIGATION THROUGH COASTAL CHANGES ANALYSIS IN PARIAMAN CITY

Azria Paldi Donal and Abdul Hakam

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ azriapaldi@gmail.com

ABSTRACT

Many disasters have happened that caused infrastructures damage and loss of lives along the coastal area of Pariaman City. On the other hand, the construction costs for development in coastal areas are relatively expensive. Then, early good research must be done prior to field implementation to reduce losses and damage in the coastal area of Pariaman City. The method used to monitor shoreline changes using satellite image GeoEye-O1 and used GIS techniques. The coastal change analyzes is studied including the coastal sediment transport. In this study, disaster mitigation and impacts reduction caused by changes in coast are the final purposes. The values of losses and damage are calculated by comparing the coastal conditions before and after the change. The losses and damage due to coastal changes was monitored during a certain time. The results of this study are aimed to make up a solution for disaster mitigation in coastal areas caused by the changes especially in Pariaman City

ICEEDM-860

MODAL PUSHOVER ANALYSIS ON REINFORCED CONCRETE ARCH BRIDGE TO ESTIMATE SEISMIC RESPONSES

Lukman Murdiansyah[1], Robby Permata[2] and Donald Essen[3]

[1]Politeknik Negeri Padang, Jurusan Teknik Sipil, 25163 Padang, Indonesia
[2]Universitas Bung Hatta, Jurusan Teknik Sipil, 25133 Padang, Indonesia
[3]Universitas Mercubuana, Jurusan Teknik Sipil, 11650 Jakarta, Indonesia
✉ lukman@pnp.ac.id

ABSTRACT

This paper presents an evaluation study of the performance of reinforced concrete arch bridge structures under earthquake load. The study is aimed to investigate the seismic performance of Wreksodiningrat Bridge, located at the province of Yogyakarta, Indonesia. This bridge is a three spans reinforced concrete arch bridge with a main span length of 75 m and two side spans with a length 35 m, respectively. This study is a part of a large project carried out by the Ministry of Public Works to study the impact of the new 2016 Indonesia Seismic Design Code for Bridges (SNI 2833:2016). The main objective of this paper is to determine the displacement demands due to earthquake load based on the new seismic code design for bridges, SNI 2833:2016. In addition, demand capacity ratios (D/C) of the main structural components such as

compression arch and main column (pier) at the fixed support are also reviewed in this paper. Analysis was carried out using a nonlinear modal pushover analysis. The arch bridge modelling is three dimensional where structural elements such as beams, columns and compression arches are modelled as frame elements. The plastic hinges are modelled as fiber hinges with unconfined and confined concrete material stress-strain relationship folllowing Mander formula . The analysis result shows that displacement demands of bridge are 2.9 cm and 20 cm in the longitudinal and transverse direction, respectively. The D/C ratios of compression arch due to demand earthquake load are 0.74 and 0.95 in the longitudinal and transverse direction of the bridge while the D/C ratios of the pier are 0.15 and 0.80 in the longitudinal and transverse direction. Based on the above results, it is concluded that the studied bridge is able to withstand the seismic load requirements in the new Indonesia Seismic Design Code.

ICEEDM-864

ALTERNATIVE FOUNDATION FOR REDUCING BUILDING LOSSES DUE TO FOUNDATION FAILURE IN SOFT SOIL

Susy Srihandayani, Abdul Hakam and Mas Mera

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ susys3unand18@gmail.com

ABSTRACT

Many losses occur, damage to buildings in areas that have soft soil layers due to foundation failure. Besides that, foundation in soft soil generally requires construction which is relatively very expensive. For this reason, good research is needed to be applied to soft soil at a relatively low cost. In this study testing of the foundation on soft soil was carried out. The foundation used in the study was varied according to its diameter and depth. The foundation is made of PVC pipes with variations in diameter and depth of the same size. Soft soil in the form of sediment-sized clay particles passed the No. filter. 200 made in the Laboratory. The foundation is planted in soft soil in a test box, then the load is given vertically at the top of the foundation. During the testing, the recording of the load given and the decrease occurred. From this test, it can be seen that there is an influence of the size of the foundation on carrying capacity and the decrease in foundation in soft soil. The results of this study are one solution to

be able to reduce building losses / damage in areas dominated by soft soil layers above.

ICEEDM-866

AVIATION MITIGATION WITH PLANNING PARKING AND AIRPORT AREAS

Ari Azhari, Abdul Hakam and Andriani

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ arikainside@gmail.com

ABSTRACT

One of the aviation safety which is also related to security is closely related to pavement at the airport, both on the runway, taxiway and in the aircraft parking area. Recently there has been an incident of damage to the pavement of the runway at the airport of Halim Perdana Kusuma in 2017 which has worrying National flight safety. In order to avoid similar incidents, the carefulness is needed to be taken in to account in pavement designs for critical areas of the airport, including in the aircraft parking area. This study describes the analysis of the pavement layer used on the aircraft parking area was analyzed. The pavement layer used is considered based on the time in the construction and the operation. The surface pavement layer is made of rigid pavement. The parameters used in the analysis are taken based on globally accepted requirements for the airport. The study was conducted by analyzing the ability of the pavement system subjected to the aircraft load including maneuvering and stopping. The results of the study are one of the efforts to improve the flight safety from the airport design approach.

ICEEDM-868

DAMAGE PREDICTION OF EXISTING BUILDINGS IN CULTURAL HERITAGE TOWN KAMPUNG CINA PADANG CITY AFTER 2009 WEST SUMATRA

Eka Juliafad

Universitas Negeri Padang
✉ ekajuliafad@ft.unp.ac.id

ABSTRACT

Old City China Town or so-called Kampung Cina is one of a famous area for cultural tourism in Padang City. This area is renowned for the availability of many unreinforced masonry buildings that attract many tourists to come. However, in the 2009 Earthquake, many unreinforced masonry buildings were heavily damaged and collapsed. This study aimed at investigating the current building typology in China Town and did a building damage assessment to predict the damage at the existing buildings in the future, when another big earthquake comes. By using street survey and google street survey, this study found that the building typology in a large area of China town has been changed due to the rehabilitation and reconstruction activities. This study found that the population of unreinforced masonry wall was decreased (35.02%), while the Reinforced Concrete (RC) buildings are significantly increasing (62.63%). The change on Kampung Cina's building typology will affect the damage due to seismic load that might be happening in the future. By using available fragility functions for RC building type and unreinforced masonry building type, the damage prediction was calculated. This study will compare the damage prediction that was calculated by using fragility function form HAZUS that were developed by using Finite Element Method numerical analysis and the fragility function that developed based n Applied Element Method numerical analysis. The comparison will give more information about the probability of damage that might be happened in the future for Padang and China Town municipality to arrange the appropriate earthquake mitigation

ICEEDM-869

SEISMIC CAPACITY EVALUATION OF THE DAMAGED REINFORCED CONCRETE BUILDING DURING PALU EARTHQUAKE 2018

Fajar Nugroho[2], Zaidir[1], Jafril Tanjung[1] and Maidiawati[2]

[1]Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
[2]Civil Engineering Department, Padang Institute of Technology, Padang, Indonesia
✉ fajarnugroho@itp.ac.id

ABSTRACT

This paper presents an evaluation of seismic capacity in the Dekanat FISIP building of Tadulako University due to the Palu earthquake 2018. The building was established in 2016 and began to be used in 2017. The building is made

of reinforced concrete frame consisting of three floors and collapsed after an earthquake. Data for analysis was taken from the DED drawings of the Dekanat FISIP building of Tadulako University in 2015. Evaluation of seismic capacity was analyzed based on the Standar for Seismic Evaluation of Existing Reinforced Concrete Buildings issued by the State of Japan. Analysis was carried out on first floor structural elements because the greatest shear force occured on the first floor. Seismic capacity is given in the form of a relationship between the lateral strength index and the ductility index. In addition, the Structural Earthquake Response Analysis (STERA-3D) software was used to determine the performance of building structures due to the earthquake. The results of the analysis using Japanese Standards obtained by building seismic capacity is relatively small in resisting earthquake loads so that the building has collapsed. While the analysis using STERA-3D obtained the building performance at the level of collapse. Based on the results of observations in the field by conducting non-destructive testing using a hammer test, the quality of the concrete material was relatively low and lack in beam column joint due to insufficient reinforcement which resulted in the building collapse.

ICEEDM-872

DYNAMIC RESPONSE OF INTEGRAL BRIDGE DUE TO EARTHQUAKE LOAD

Masrilayanti[1], Riza Aryanti[1], Muhammad Fauzi[2] and Muhammad Ogi[2]

[1]Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
[2]PT. Wijaya Karya, Indonesia
✉ masrilayanti@eng.unand.ac.id

ABSTRACT

Short and medium spans integral bridge are commonly considered good in overcoming the earthquake load since it has a larger stiffness compared to others type of bridges. This paper presents the structural response of 25 meters concrete integral bridge due to lateral and longitudinal earthquake loads. The study is conducted to see the behaviour of this kind of the bridge when earthquake applied into it. A 25 meters conventional concrete existing bridge is redesigned to become a concrete integral bridge and used as a model in the research. The method used is by arranged a time history analysis to the bridge and resume the internal force and displacement of the main and the

cross girder of the bridge. An artificial earthquake acceleration is arranged by converting response spectrum built from Indonesian Standard Code. The dynamic response of the bridge relating to its transient displacement and acceleration in certain points are also analyzed. Results show that the internal forces and displacements of the bridge are acceptable and still in safety zone.

ICEEDM-877

URBAN PLANNING JAKARTA SETTLEMENT AREA BASED ON EARTHQUAKE MITIGATION: SOCIO-CULTURAL ECOLOGY STUDY

Sigit Wijaksono[1], Sasmoko[2,3], and Yasinta Indrianti[3,4]

[1]Department of Architecture, Faculty of Engineering, Bina Nusantara University, Indonesia
[2]Primary Teacher Education Department, Faculty of Humanities, Bina Nusantara University Jakarta, Indonesia 11480
[3]Research Interest Group in Education Technology, Bina Nusantara University, Indonesia
[4]Department of Entrepreneurship, Faculty of Social Science, Podomoro University, Indonesia
✉ sasmoko@binus.edu

ABSTRACT

Jakarta has the potential to be rocked by a large and proven earthquake, based on the historical record of the city of Jakarta. There are three occurrences of a devastating earthquake that once rocked Jakarta which damaged a number of houses and tall buildings and permanently stone walls. Conceptual and implementation readiness is needed when a major earthquake occurs, especially in terms of inspections of building structure capabilities, public education, and contingency plans that are in accordance with the conditions of the people of Jakarta. This research aims to build a conceptual framework for the readiness of Jakarta society through various approaches. The conceptual framework will be the theoretical basis of earthquake disaster profiling and disaster mitigation-based spatial planning. The study was conducted on exploratory research as part of the Neuroresearch Research Method. The results of the study were in the form of theoretical constructs of the study of socio-cultural ecology to realize the spatial layout of Jakarta residential areas based on earthquake mitigation.

ICEEDM-883

SEISMIC MICROZONATION OF SOIL AMPLIFICATION AND LIQUEFACTION FOR PADANG CITY

Adrin Tohari

Research Center for Geotechnology, Indonesian Institute of Sciences, Bandung, Indonesia

✉ adrin.tohari@gmail.com

ABSTRACT

An earthquake event with a magnitude of M_W 7.6 struck on 30 September 2009 in West Sumatera, producing significant damages on buildings in Padang City associated with phenomena of amplification and liquefaction. This paper presents the results of amplification and liquefaction assessment and mapping, carried out in a coastal area of Padang City. Soil amplification mapping was carried out using microtremor HVSR method in 250 locations, while the evaluation of liquefaction potential was conducted using cone penetration test-based method in 95 locations. Based on the analysis, Padang City is classified into 5 (five) zonations of amplification and liquefaction susceptibility. The coastal areas, including Koto Tangah, Padang Utara, Padang Barat, and Padang Selatan sub-districts are located in high to very high susceptibility to soil amplification and liquefaction. The results of mapping are in a good agreement with the phenomena of building damages due to amplification and liquefaction during the 2009 earthquake.

ICEEDM-884

BEHAVIOR STUDY OF CONCRETE FILLED STEEL TUBE COLUMN TO STEEL BEAM CONNECTION UNDER CYCLIC LOADING

Budi Suswanto, Djoko Irawan, Heppy Kristijanto, Aniendhita Rizki Amalia, and Agustina Dwi Atmaji

Department of Civil Engineering, Institut Teknologi Sepuluh Nopember, 6011, Surabaya

✉ budi_suswanto@ce.its.ac.id

ABSTRACT

Concrete filled steel tube columns have many advantages in the building conctruction, however they still have some problems in the construction

because of the complexity of connections. Experimental program have conducted on the connection of concrete filles steel tube columns with steel beams by Sheet et al. This research will refer to the research that has been done by Sheet et al. by considering the variation modeling of CFT columns on connection by using ABAQUS 6.14 program. The modeling in this research used 203×133×7.8×5.8 mm beam and used two types of CFT column, for specimen A1 with rectangular dimension 220×220×6 mm and for specimen A2 with CFT circle dimension with diameter 220 mm and thickness 6 mm. From the modeling results, it can be concluded that the modeling of both specimens is close to the experimental results with difference is less than 5%. For specimen A1, the first step of yield occurs at drift ratio 0.24% and for specimen A2 occurs at drift ratio 0.21%. The specimen A1 yields later than specimen A2. Specimen A2 is more ductile than specimen A1 with drift ratio 7.4 % and 7.2 % respectively.

ICEEDM-885

SEISMIC CAPACITY EVALUATION OF THE DAMAGED REINFORCED CONCRETE LAW BUILDING TADULAKO UNIVERSITY DURING PALU EARTHQUAKE 2018

Hamdeni Medriosa[2], Zaidir[1], Jafril Tanjung[1] and Maidiawati[2]

[1]Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
[2]Civil Engineering Department, Padang Institute of Technology, Padang, Indonesia
✉ hamdenimedriosa@itp.ac.id

ABSTRACT

This study was to evaluate the seismic capacity of the Tadulako University Faculty of Law Building due to the Palu earthquake 2018. The Faculty of Law building was established in 2015 and actively used in 2016. Data for analysis was taken from the DED image of the Faculty of Law Building, Tadulako University in 2015. Has a reinforced concrete frame consists of three floors and heavily damaged after the earthquake. Seismic capacity is calculated by the relationship between the lateral strength index and the ductility index. The software used is the Structural Earthquake Response Analysis (STERA-3D) to calculate the performance of building structures due to earthquakes. The seismic capacity evaluation was analyzed based on the Standard for Seismic Evaluation of Existing Reinforced Concrete Buildings issued by the State of

Japan. The results of analysis calculations using Japanese Standards, where building seismic capacity is relatively small in resisting earthquake loads so the building has heavily damaged. Because the biggest shear force is on the first floor, an analysis is carried out on the floor. The results of observations in the field using a hammer test obtained relatively low-quality concrete material and there was a column beam connection failure due to insufficient reinforcement which resulted in the building experiencing a heavily damaged.

ICEEDM-887

PREDICTION OF A DESIGN FLOOD-DISCHARGES THAT CAUSED SEDIMENTATION IN THE RIVER MOUTH OF BATANG ANAI

Mas Mera and Hendra Yuldi

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ mas.mera2015@gmail.com

ABSTRACT

Batang Anai is a river that crosses through four administrative regions in the West Sumatra Province with a catchment area of about 498 km2. The upstream is a steep topography because it is located in west part of the Marapi mount. While the middle and lower reaches are mild since in the lowlands. The flow empties into the Indian Ocean. These conditions make this river meandering in the middle and lower reaches. The river mouth is influenced by the tide in which resists sedimentation toward the ocean. The logical consequence is the capacity of the river cross-section decreasing which eventually causes flooding. In 2013, the lower reach was dredged. In 2015, however, the river mouth was covered back by sedimentation by two-meter height in some points. Bathymetry was measured before and after dredging. This study is conducted to determine a design flood-discharge that caused sedimentation based on the 2015 bathymetry data by simulation using the SMS software, i.e. the RMA2 module for hydrodynamic model and the SED2D module for sediment model. The attention is paid to see both flow patterns and sedimentation profiles. The model scenarios consider by either including or excluding the Batang Kandis flow. Batang Kandis is a tributary of Batang Anai which empties into near its river mouth. The design flood-discharges for simulation are varied according to the return periods of 2, 5, 10, 25 and 50

years. The bathymetry data used for simulation are the 2013 one after dredging. All the simulation results are then compared to the 2015 bathymetry data. The hydrodynamic model in which the Batang Kandis flow included gives velocities close to those from the field for all return periods. The results of the sediment model using the flood flow with a 5-year return period, that's Batang Anai is 1060 m^3/s and Batang Kandis is 268.5 m^3/s, show that the sedimentation profiles are closed to the 2015 bathymetric measurement data.

ICEEDM-889

TOWARDS A COMMUNITY RESILIENCE FRAMEWORK FOR DISASTER RISK MANAGEMENT

Osmar Shalih

Badan Nasional Penanggulangan Bencana (BNPB)
✉ osmar.shalih@gmail.com

ABSTRACT

Along with the increase in large and medium scale disasters in the world including in Indonesia in the last decade, many theories and practices have developed in terms of measuring and improving disaster resilience. This study discusses the conceptual model of community-level disaster resilience and disaster risk reduction. Using a basic conceptual model for spatial protection to geological hazard, research examines the role of community resilience in reducing risk by using social dimensions. Research suggests that the importance of social capital in terms of forming community resilience is related to disaster risk reduction. Social network, social experience, social knowledge, belief systems, contribute to increasing resilience and disaster risk reduction. The results of this study are the importance of building social capital and spatial resilience of communities in reducing disaster risk. Keyword: community resilience, disaster risk reduction, spatial behavior

ICEEDM-890

COMPARISON OF STRUCTURAL PERFORMANCE OF OPEN FRAME STRUCTURES BASED ON SNI 03-1726-2002 AND SNI 03-1726-2012

Siti Aisyah Nurjannah[1], and Yoga Megantara[2]

[1]Civil Engineering Department, Universitas Sriwijaya, Jl. Raya Palembang-Prabumulih Km. 32, Indralaya, Indonesia
[2]Center of Research and Development of People Residence, Ministry of Public Work and People Residence, Jl. Panyawungan, Cileunyi, Bandung, Indonesia
✉ sitiaisyahn@ft.unsri.ac.id

ABSTRACT

The performance analysis of a building structure under inelastic conditions was available to be considered both in static and dynamic methods, each divided into a linear and non-linear categories. The performance-based analysis was included in the non-linear static category and described in the Applied Technology Council (ATC)-40, Federal Emergency Management Agency (FEMA) 273, FEMA 356, and FEMA 440. In this study, there were some structural open frame models to be assessed in determining the structural performance level. The aim of this study was to compare the performance of the open frame building structural models using pushover analysis based on SNI-1726-2002, SNI-1726-2012, and ATC-40 codes. The structural element properties were modeled based SNI-1726-2002 to represent the buildings that had been constructed before SNI-1726-2012 applied. From the analysis results, it showed that some open frame structural models analysed based on SNI-1726-2012 code showed a lower performance than the counterpart models which were analysed based on SNI-1726-2002 code, in terms of performance points and structural performance level. Other models showed the opposite behavior. This was due to differences of the characteristics of seismic zones that were represented by the respon spectrum curves in the SNI-1726-2002 and SNI-1726-2012 codes.

ICEEDM-896

EVALUATION OF CONCRETIZATION OF LOCAL ROAD IN PADANG CITY USING THE IMPORTANCE SATISFACTION ANALYSIS AND CUSTOMER SATISFACTION INDEX METHODS

Yosritzal, Elsa Nofriyanti, and Yossyafra

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ yosritzal@eng.unand.ac.id

ABSTRACT

A road is the most important Infrastructure in economic development, therefore, should be maintained at a certain level of service. In improving road

quality, the satisfaction of road users can also be used as a reference to determine whether the road is still in good condition or if handling is needed to improve the comfort of the road users. This study aims to map the attributes that affect the satisfaction of local road users using the Importance Satisfaction Analysis and Customer Satisfaction Index methods, identify the main priority attributes that need to be improved and assess the impact of concretization according to the community perceptions. The study found that road supporting facilities (road shoulder, drainage), the width of the road, smooth flow in and out of the road, prevention of stagnant water during the rainy season are the most priority attributes to be improved. The satisfaction index value is 67.22%, suggesting that overall, road users are satisfied with the existence of local road concretization in the city of Padang.

ICEEDM-897

DISTRESS MODELLING AND ANALYSIS OF IBS STORMPAV GREEN PAVEMENT

Elsa Eka Putri[1], Rina Yuliet[1], Seng Cheh Hoo[2], Md Abdul Mannan[2], Larry Silas[2], Wan Hashim Wan Ibrahim[2], Mohamad Raduan Kabit[2], Ron[2] and Sadia Tasnim[3]

[1]Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
[2]Civil Engineering Department, Universiti Malaysia Sarawak
[3]Faculty of Engineering and Science, Curtin Universiti Sarawak, Miri Sarawak Malaysia ✉ elsaeka@eng.unand.ac.id

ABSTRACT

Adequate roading infrastructure is a significant factor in the economic health of a nation because it allows goods and people to be transported efficiently and rapidly from one area to another. But with growth of economy and population density open space is being converted to roads or other infrastructures such as buildings or parking lots reducing green space. This paper demonstrates a new type of green pavement designed to replace flexible and rigid pavements which are water impermeable and have a short design life. This type of green pavement helps reduce runoff problems in urban areas. StormPav GP is an innovative Industrialised Building System (IBS) Green Pavement which has been shown to have structural, environmental and economic advantages. However, its susceptibility to distress has yet to be

analyzed. This study addresses this gap by analyzing the mechanistic properties and evaluating distress of StormPav GP as compared to flexible and rigid pavements. WinJULEA, KenPave and Circly 6.0 were used for this analysis which also investigated the effects of different tire pressures on deflections. StormPav GP was found to have lower deflection due to a tandem axle dual wheel load on any pavement surface and provided a more uniform settlement with higher elastic modulus and shear modulus than flexible and rigid pavement.

ICEEDM-907

DETECTING AND MAPPING OF TRADITIONAL COAL MINE LINES TO ANTICIPATE THREATS STABILITY OF THE 150 KV TRANSMISSION TOWER USING THE GEOELECTRIC METHOD

Prasetyo Adi Wibowo, Rasgianti, and Mujammil A. Rahmanta

PLN Reaserch Institute, 102 Duren tiga Street Jakarta, Indonesia
✉ prasetyo.awibowo@pln.co.id

ABSTRACT

Transmission tower of 150 kV number T.045 line Bukit Asam-Baturaja Muara Enim Regency, there are many former underground coal mines belonging to the community. The problem is self combusting that is thought to originate from coal self-ignition or the presence of trigger fire which resulted in explosions and land subsidence in several locations where the closest distance collapsed with T.045 which is ± 15m at horizontal distance. This can threaten the potential for destruction of the surrounding environment and also the stability of the transmission tower. The purpose of the study was to determine the underground structure around the tower due to ex-mining holes on the condition of the existing tower structure. Research around the tower is geological mapping and geoelectric survey. The results are: the interpretation of 5 line geoelectric under the foundation stub of the tower was not found any indication of underground cavities, based on line A the closest horizontal distance to the former coal mining hole is 12m from center line tower at ± 10m depth. In conclusion, the condition of the slopes around the tower is still stable, there is no threat to the potential disruption of the stability of tower because coal mine excavation lines do not pass below the center line tower.

ICEEDM-910

FINITE ELEMENT MODELING OF CONCRETE CONFINED WITH CIRCULAR THIN WALLED STEEL SHEET

Ashando Hario Yudhanto[1], Bambang Piscesa[1], Mario M. Attard[2], Budi Suswanto[1] and Priyo Suprobo[1]

[1]Civil Engineering Department, Institut Teknologi Sepuluh Nopember, 60111 Surabaya, Indonesia
[2]School of Civil and Environmental Engineering, the University of New South Wales, NSW 2052, Sydney, Australia
✉ piscesa@ce.its.ac.id

ABSTRACT

For a reinforced concrete column to behave in a ductile manner without much loss on strength requires sufficient confinement to the concrete core. One way to provide confinement to the concrete core is to use external confining devices such as a series of thin-walled circular steel sheet tube to confine the concrete. This type of external confining devices falls off on the categories of Steel Tube Confined Concrete (STCC). With the presence of a gap between the steel sheet, the buckling on the tube due to high axial stresses can be avoided. On the other hand, STCC also offer great advantages to strengthen a non-code conforming reinforced concrete column to achieve better resistance to withstand earthquake load. From the numerical analysis point of view, the important task to successfully model STCC specimen lies on the modeling of the interface behavior between concrete and steel tube. For that purpose, in this paper, 3D-NLFEA package is used to study the response of STCC. The analysis result is further compared with the available test results in the literature. From the analysis, the predicted response is excellent. Detailed discussion on the parameter of the interface behavior between concrete and steel tube is presented.

ICEEDM-911

KRAKATAU PROJECT: TERRESTRIAL RADIO TRANSMISSION SYSTEM FOR A REAL-TIME MONITORING INFRASTRUCTURE OF THE ANAK KRAKATAU VOLCANO

Fadil Hamdani, Ardian Ulvan, Mona A.M. Batubara, Melvi Ulvan

Department of Electrical Engineering, Universitas Lampung
✉ fadil.hamdani.telco@gmail.com

ABSTRACT

Gunung Anak Krakatau is an active volcano, by which its activity is potential to generate a tsunami. The Sunda strait tsunami on 22 December 2018, with high fatalities, prove our lack of monitoring efforts on the Anak Krakatau. The insufficient data could not provide an early warning of tsunami. This research is a subsystem of the disaster early warning system for Gunung Anak Krakatau. The purpose is to provide a transmission mechanism to convey data collected by the sensors, which were placed around the Anak Krakatau to the hub at the volcano monitoring point at Hargo Pancoran village in Rajabasa, Kalianda, South Lampung.

Gunung Anak Krakatau is surrounded by three islands i.e., Sertung, Panjang, and Rakata. Each island has a sensor system called sensor access point (SAP) that collect data from sensors placed nearby. The SAPs will send the data gathered to the main transmitter tower in the Island of Rakata through radio transmission mechanism Line of Sight (LOS). The transceiver system at Rakata island is functioned as the main gateway to the hub at Hargo Pancoran with the distance of 22 Km. Based on the results of data processing, if it is potential for tsunami, then the hub at Hargo Pancoran will be booted the broadcast early warning alarm to the shore communities through Local Community Center (LCC). This warning alarm and information system is designed by using radio transmission system LOS multihop, so that information can be delivered to the areas that are far from the hub.

The optimal design on radio transmission system requires the appropriate parameters. This work focuses on the qualification of traffic data that is sent through radio transmission channel. A careful survey and analysis on Earth surface elevation are required as the basis for the placement of the antenna. Moreover, some data such as weather factors and rainfall levels are also required to determine the fading margins of link budget of transmission channels designed. These studies are important due to its significant impact on the level of energy consumption of radio devices. The main energy source for radio devices must be a renewable energy using the photovoltaic. The result of the research is expected to provide a prototype of the radio transmission system. The modeling and simulation at the laboratory will be adjusted with the real environment condition therefore the accurate analysis results can be obtained.

ICEEDM-912

STUDY OF THE STRUCTURE AND BEHAVIOR OF CONSTRUCTION SUPPLY CHAINS IN BUILDING PROJECTS

Refdizalis Syahrul, Taufika Ophiyandri and Yervi Hesna

[1]Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ refdizalis@gmail.com

ABSTRACT

The Construction Supply Chain is a system of suppliers, producers, transportation services, distributors and sellers created to convert basic materials into a construction product. This study aims to identify and analyze the patterns and structure of supply chain construction materials and analyze the behavior of the parties in the supply chain of building construction. This research was carried out at three building project locations in Tanah Datar District, with a qualitative approach and using descriptive analysis.The results showed that there were four general patterns of construction supply chains, namely the pattern of work carried out entirely by the main contractor, the pattern of work carried out by sub-contractors including the supply of materials, labor and equipment, work carried out by sub-contractors with equipment, materials and labor is provided by specialist sub-contractors, as well as patterns of work carried out by workers with special expertise, but the main equipment and materials are still held directly by the main contractor.The construction supply chain behavior is carried out by examining the interaction relationships of construction supply chain actors including analysis of the procurement system used, the form of the agreement, the payment system and management of the supply chain network.

ICEEDM-917

EFFECT OF POLYPROPYLENE FIBERS LENGTH ON HIGH STRENGTH MORTAR SUBJECTED TO ELEVATED TEMPERATURE

Muhammad Ridwan[1], Hu Liang[2] Jun and Isamu Yoshitake[2]

[1]Department of Civil Engineering, Institute Technology of Padang, Jalan Gajah Mada Kandis Nanggalo, Padang, 2500 Indonesia
[2]Department of Civil and Environmental Engineering, Yamaguchi University, 2-16-1 Tokiwadai, Ube, Yamaguchi 755-8611, Japan
✉ mhd.rid.wan.itp@gmail.com

ABSTRACT

This study focuses on the thermo-mechanical properties of mortar in the retrofitting cover of additional reinforcement for existing concrete structures. In addition, the residual mechanical properties of high strength mortar incorporating polypropylene fibers subjected to the effect of fiber length and elevated temperature was investigated. Several experiments were conducted to determine the optimum mixture proportions of high strength mortar incorporating polypropylene fibers which had a slump-flow of 25–30 cm, compressive strength of 50 MPa or higher, and flexural strength of 4–8 MPa. Subsequently, an experiment was conducted by using high-strength mortar-blended polypropylene fibers with a length of 2 cm, and the ratio of fiber length to diameter of cylinder mortar-specimens was 0.4. The experimental parameters were the weight volume of fibers (0 %, 0.5 %, 1 %, and 2%) and the heating temperature (100, 200 and 300 °C). The effect of the mixing parameters, including polypropylene length on compressive strength, slump-flow and the flexural strength of mortar were discussed. It is evident that fiber length in the mortar cover influenced the initial and residual mechanical properties, such as elasticity, compressive strength, and Poisson's ratio, of the mortar.

ICEEDM-918

EVALUATION OF RESILIENT MODULUS AND UNCONFINED COMPRESSIVE STRENGTH OF SUBGRADE

Dian Hastari Agustina and Adnan Zainorabidin

Departemen of Civil Engineering, University Tun Hussein Onn Malaysia, 86400, Batu Pahat, Johor, Malaysia

✉ dian_rajendra@yahoo.com

ABSTRACT

Subgrade soil is the important material as the foundation for support the pavement layers and the repeated load of vehicles traffic. To characterize the stiffness and strength behaviour of subgrade due to traffic loading in structural pavement design can be determine by resilient modulus and unconfined compressive stength test. In this study, laboratory test of resilient modulus and unconfined compressive strength which to investigate the effect

of moisture content, this testing is done on dry side, OMC condition and wet side. The result show the difference of stiffness and strength characteristic.

ICEEDM-919

THE ANALYSIS OF PERFORMANCE LEVEL ON AN EXISTING MULTI-STORY BUILDING STRUCTURE USING THE TIME HISTORY BASED ON THE SUBDUCTION EARTHQUAKE SOURCE

Wisnu Erlangga, Mochamad Teguh and Lalu Makrup

Department of Civil Engineering and Disaster Risk Management, Islamic University of Indonesia, Indonesia
✉ wisnuuangga@gmail.com

ABSTRACT

The use of time history in the building evaluation process is rarely done. Usually the time history used is taken from a different location with the building being evaluated so that the evaluation results become less valid. Each place has a different time history character, that is why the analysis of buildings using time history from other places is not accurate. In this study, the time history used was sourced from subduction earthquake sources. In order for the time history to be used in accordance with the location of the study, a spectral matching process is needed to equalize the response spectra of the time history with the response spectra at the study location. Building evaluation uses SNI 03-1726-2012, FEMA 356 and ATC -40 as references with structural modeling using SAP2000. From the evaluation results, it is found that 1) displacement values that occur on each floor do not exceed the maximum limit so that this building has fulfilled the requirements, 2) limitation of permit for inter-level displacement due to earthquake loading does not exceed the permit limit so that this building is feasible for use, and 3) the performance level of the Alana Hotel is Immediate Occupancy (IO).

ICEEDM-920

BEHAVIOUR OF COLD-FORMED STEEL AND CONCRETE COMPOSITE STRUCTURES WITH COMPRESSION REINFORCEMENT

Sabril Haris, Zaidir, Rendy Thamrin and Asri Yuda Trinanda

[1]Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ sabril.haris@eng.unand.ac.id

ABSTRACT

Experimental and analytical studies on the composite of cold- formed steel and concrete structures with compression reinforcement are presented in this paper. Tensile bar on the typical reinforced concrete beams was substituted by cold-formed steel profile which placed on the lowest surface of the specimen. Cold-formed steel used was a channel section with a size of 75 mm x 35 mm and thickness of 0.75 mm. Ten composite specimens consisted of five specimens without compression reinforcement were compared to other five specimens with compression reinforcement. Each specimen had a total length of 2300 mm and a width of 150 mm. The height of specimen were 80 mm, 100 mm, 120 mm, 200 mm and 300 mm, respectively. Two point static loads which were monotonically increased were applied to the specimen until ultimate condition reached. It was obtained from the test results that the specimen height was significant to the strength, the stiffness, the ductility and mode of failure of the specimens. Shear failure mode were found on the higher specimens while lower ones exhibited flexural failure. Adding compression reinforcement were less affected to increase the ultimate capacity, but it could increase the structural ductility. A developed computer program, called RCCSA V4.3, was utilized to calculate theoretical flexural capacity of the specimens and a good agreement between theoretical flexural capacity and the test results was achieved.

ICEEDM-921

NUMERICAL STUDY OF BRACING SECTION VARIATIONS IN ECCENTRICALLY BRACED STEEL FRAME

Sabril Haris, Nidiasari and Sonya Triaz Pramadhani Putri

[1]Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ sabril.haris@eng.unand.ac.id

ABSTRACT

Eccentrically Braced Frame (EBF) is a better option for earthquake-prone country due to it having a better strength, stiffness, energy dissipation and ductility than Moment Resisting Frame (MRF) structure and more so than structures made of concrete. The structure's ductility was influenced by the cross-sectional profile, thickness and link element of the frame. This study aims to determine the relation behavior of EBF with varied link element and cross-

sectional profile of bracing with ultimate load and ductility of the structure.The analysis was done using MSC. PATRAN/NASTRAN student edition software. A total of three link model variation, each one represents the three link variations of EBF; short link, medium link and long link. As for the cross-sectional profile, variation was made on the flange and web thickness of IWF profile and web thickness of HSS profile. The most optimum performance of the structure was determined by displacement control and static monotonic loading. The result indicates that variations in cross-sectional profile of bracing effects the short linked EBF the most, while the medium and long linked EBF doesn't show a significant change in term of ultimate load. Meanwhile, ductility is not bound by the increasing of bracing thickness.

ICEEDM-922

LANDSLIDE DISASTER MITIGATION PLAN IN KARAWANG TENGAH VILLAGE, BANTUL DISTRICT, YOGYAKARTA

Sri Aminatun, Mochamad Teguh and Wisnu Erlangga

[1]Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ sriaminatun024@gmail.com

ABSTRACT

Karang Tengah Village is one of the villages that are vulnerable to landslides and located on the topography of the ridge to the hills in the eastern region of Bantul Regency. Based on the map of landslides incident from the Regional Disaster Management Agency in 2011, Karang Tengah Village has steep slopes, so it has a high potential for landslides. One way to mitigate the landslide disaster is to assess and analyze the risk of landslide disaster in detail. This study aims to identify the homes of a resident who is in landslide either high or medium risk zone. A descriptive method with qualitative approach combined with a quantitative method was used to provide a clear layout of the number of houses in each zonation. Primary and secondary data sources were used for interviews and documentation. The results indicate that the number of households in the high to medium risk zones is 63 and 59 houses, respectively. Furthermore, the village of Karang Tengah has high to medium vulnerability, and medium capacity producing medium to high risk. For this reason, good infrastructures should be essentially recommended to build in the area.

ICEEDM-925

OPTIMUM STRUCTURAL DESIGN OF SELF-SUPPORTED SHELTER FOR TSUNAMI EVACUATION IN PADANG CITY

Febrin Anas Ismail, Abdul Hakam and Deded Eka Putra

[1]Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ febrin@eng.unand.ac.id

ABSTRACT

A Self-Supported Shelter is a building that has an area about 100 m2 to 1000 m2 designated as a temporary vertical shelter for tsunami evacuation. The Self-Supported Shelter is built and managed by the community. That size of shelter is fit for mosques or mushollas (small Mosques) which is about 700 units spreading in the districts of Padang City. The Self-Supported Shelters are proposed since the number of vertical shelter is very limited at the moment. There are only four vertical shelters available in Padang City which are built by Government with capacity 2000-3000 people. Meanwhile, there is at least 600,000 people of Padang City must be evacuated in case of tsunami. There are four reasons for proposing the mosques or mushollas to be vertical shelters: First, that kind of building are available to small sub-district. Second, the land may be free to be developed. Third, they have an organization chosen by the community. Forth, it is easy to get construction funding for the religion reason. However, the community does not have guidance for developing a shelter for tsunami evacuation. This study is purposing to develop the optimum design of shelter in term of structural analysis. Here, the shelters are categorized into three types base on the area of the mosque or musholla: 10m x10m, 20m x20m and 30m x30m. Frame Structural Systems are used for the main structure of the building with or without the bracing system are involved. The optimum structural design is taken based on the strongest structure to restrain the applied loads. The soil-structure interaction analysis is also considered in to get a more reliable design. The results of the study may be used to guide the communities to build a proper shelter in their area.

ICEEDM-926

CYCLIC BEHAVIOR OF THE R/C FRAMES WITH REINFORCED MASONRY INFILLS

Jafril Tanjung[1], Febrin Anas Ismail[1] and Maidiawati[2]

[1]Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
[2]Civil Engineering Department, Padang Institute of Technology, Padang, Indonesia
✉ jafriltanjung@eng.unand.ac.id

ABSTRACT

This study focuses on the experimental works to define the behavior of the reinforced concrete (R/C) frame model with the strengthening of the brick masonry infill by using the embedded reinforcement bars subjected to lateral reversed cyclic loads. A previous study by applying the lateral monotonic static loads showed that the embedded reinforcement bars increased the lateral capacity of the R/C frame and also delayed the failure of the brick masonry infill and R/C frame structure as well. However, in order to define its seismic capacity, a lateral reversed cyclic loading is required. The experimental works in this study were conducted by preparing and testing the 1/4 scaled-down R/C frame specimens represented the first story of the middle multi-story commonly constructed in the earthquake-prone area such as West Sumatera, Indonesia. The specimens including the bare R/C frame and the R/C frame with brick masonry infills where one of them strengthened by the embedded reinforced bars. All specimens were tested for applying the lateral reversed cyclic loads. The applied lateral load, the lateral displacement, the progressive cracks and the failure mode of the specimens were observed and recorded during experimental works. As it was expected, the presence of the embedded reinforced bars in the brick masonry infills increases the seismic capacity and stiffness of the R/C specimens and also delayed the failure of the specimens. The experimental results in this study imply the simple strengthening method for the brick masonry infills.

ICEEDM-928

STRUCTURAL EVALUATIAON OF 3-STORY DORMITORY BUILDING WITH CONSIDERING SOIL LIQUFACTION

Fauzan[1], Rina Yuliet[2], Nadia Milla Hanifah[3], Willy Peratundhika E[4], Mutia Putri Monika[5]

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ fauzan@eng.unand.ac.id

ABSTRACT

The phenomenon of liquefaction is the increase of water pressure in the soil which causes a reduction in the strength of the soil in supporting the load to

lose the binding power between the grains. Land liquefaction is a natural phenomenon that occurs when there are shocks or seismic movements in the soil layer due to seismic loads such as earthquakes. The analysis carried out aims to identify the effect of liquefaction on column capacity and carrying capacity of dormitory building found in terms of field conditions. The method used in this study is a structural analysis method using building existing soil data based on the results of the Cone Penetration Test (CPT). Data were collected through observation, interviews, documentation, and literature studies which were then analyzed using ETABS software version 9.7.1. This analysis provides recommendations to the government to be a consideration in making policies on buildings that are in soil liquefaction potential land.

ICEEDM-944

NUMERICAL ANALYSIS FOR PROGRESSIVE COLLAPSE OF 7-STOREY REINFORCED CONCRETE ACADEMIC BUILDING IN YOGYAKARTA INDONESIA

Taufiq Ilham Maulana and Alwan Wisnu Pamungkas

Department of Civil Engineering, Faculty of Engineering, Universitas Muhammadiyah Yogyakarta, Brawijaya Street Bantul 55183, Indonesia
✉ taufiq.im@ft.umy.ac.id

ABSTRACT

Indonesia is the fourth biggest populated country which has many reinforced concrete buildings and the number is still growing until now. These buildings are often used to support people's activities and its safety must be ensured from all possible loads, one of them is earthquake load. This load is one biggest issue for building since Indonesia has many experiences from earthquake events. Many approaches can be applied to perform evaluation for structural buildings, one of them is progressive collapse analysis. This evaluation is based on the guidelines published by General Services Administrations (GSA) in 2016. In this study, a 7-storey reinforced concrete building as academic facilities in one of Indonesia's region is assessed using progressive collapse. Numerical analysis was performed by linear finite element method supported by SAP2000 v21 program. Three cases suggested by GSA guidelines were observed by removing the base floor column on corner, middle of long side plan and short side plan. The inspected structural elements in this research are only the beam and column by comparing its demand-capacity ratios (DCR). From the

numerical modelling, the DCR for beam and column are known as well as the collapse mechanism, which is strong column weak beam.

ICEEDM-947

MATERIAL CHARACTERISTICS OF INTERLOCKING CONCRETE-BLOCK FOR MASONRY WALL OF NON-ENGINEERED EARTHQUAKE RESISTANT BUILDINGS

Mochamad Teguh[1], Furqon Widi Rivai[2], Novi Rahmyanti[1], and Erik Wahyu Pradana[3]

[1]Department of Civil Engineering and Disaster Risk Management, Islamic University of Indonesia, Yogyakarta, Indonesia.
[2]Master Program, Department of Civil and Environmental Engineering, Gadjah Mada University, Yogyakarta, Indonesia.
[3] Department of Civil Engineering, Sebelas Maret University, Surakarta, Indonesia.
✉ m.teguh@uii.ac.id

ABSTRACT

Most of the seismic damage of existing traditional buildings is due to the absence of practical beam and column structures as the main reinforcement of the building. While a masonry wall as a structural component is commonly negligible due to their relatively low strength in contributing to the frame structure. As a result, when the earthquake struck the building collapsed and the ruins of building elements hit the occupants seriously and caused many deaths. This paper presents the results of preliminary research on the material characteristics of interlocking concrete-block for the masonry wall applied to non-engineered earthquake-resistant buildings. The interlocking between concrete-blocks is expected to contribute to the strength of the masonry wall in resisting the loads either in-plane or out-of-plane directions. The novelty of this type of concrete-block lies in the uniqueness of the interlocking shape, making it effective in withstanding the earthquake load. This research focuses on the testing of interlocking concrete-block units in withstanding loads in the direction and perpendicular to the field and equipped with testing the compressive strength of the wall and diagonal shear strength. The results produce interlocking models of concrete-block contribute to better strength than ordinary clay bricks for the masonry wall.

ICEEDM-949

FRAGILITY CURVE OF LOW-TO-MID-RISE CONCRETE FRAME RETROFITTED WITH FRP

Rida Handiana Devi[1], Senot Sangadji[2], and Halwan Alfisa Saifullah[2]

[1]Master Program in Civil Engineering, Faculty of Engineering, Universitas Sebelas Maret

[2]Civil Engineering Department, Faculty of Engineering, Universitas Sebelas Maret

✉ ridahandiana@student.uns.ac.id

ABSTRACT

In order to achieve satisfactory global seismic behaviour of a concrete fame structure and to prevent undesirable local failures of its structural element, local strengthening of structural members by means of FRP wrap is one of the cost effective retrofitting strategy. This FRP wrapped column will increase the ductility of the element as well as the capacity that in turn will allow attaining more energy dissipating global performance. This on-going research aims to demonstrate the seismic performance of Low-to-Mid-Rise Concrete Frame retrofitted by FRP wrap in several configurations. The fragility curves of the structure before and after to local strengthening will be developed and analysed. Fragility curve will describe the probability of the structure that will exceed certain damage states given the ground shaking intensity during its service life. This curve allows evaluation for the retrofitting strategy is carried out rationally.

ICEEDM-951

SLOPE STABILITY ANALYSIS BY USING FINITE ELEMENT METHOD: A CASE STUDY ON BORDER AREA OF WEST SUMATERA – RIAU, INDONESIA

Soewignjo Agus Nugroho[1], Muhamad Yusa[2] and Andarsin Ongko[3]

[1]Undergraduate Program, Civil Eng. Depart. Universitas Riau, HR Subrantas KM 12 Pekanbaru, Indonesia

[2]Magister Program, Civil Eng. Depart. Universitas Riau, HR Subrantas KM 12 Pekanbaru, Indonesia

[3]Civil Engineering Department, Universitas Riau, HR Subrantas KM 12 Pekanbaru, Indonesia

✉ nugroho.sa@eng.unri.ac.id

ABSTRACT

This paper discussed a study case related to slope stability and its analysis. The observation and also research object was a hill side on border area between West Sumatera-Riau, Indonesia. This border area consists of numerous slopes with heterogeneous characteristics. This location is also susceptible for having landslides, especially on rainy season. The scheme of this research consisted of collecting samples, laboratory tests, finite element method analysis, and slope `s reinforcement planning with anchors or geosynthetic plates. The soil samples were tested on their actual condition and liquid limit condition. This purposed to predict the failures on slope. Afterwards, some reinforcement plannings need to be done. The results of this researach have shown that on existing condition, the safety factor was 1.262. If the soil reach its liquid limit, the safety factor decreased to 0.568. After the reinforcement planning was done, the safety factor went up to 1.120 and the slope stability could be maintained.

ICEEDM-953

SWEDISH WEIGHT SOUNDING: A PROSPECTIVE PORTABLE SOIL INVESTIGATION TOOLS FOR LIQUEFACTION ASSESSMENT OF RESIDENTIAL HOUSES IN INDONESIA

Yusa Muhamad[1], Bowman Elisabeth T[2] and Nugroho, S.A[1]

[1]Civil Engineering Department, University of Riau, Pekanbaru, 28294, Indonesia
[2]Civil and Structural Engineering, University of Sheffield, Sheffield S13JD, United Kingdom
✉ m.yusa@eng.unri.ac.id

ABSTRACT

National Disaster Management Agency (BNPB) statistic show that the majority of earthquake's affected building is residential houses. Whereas in practice soil investigation is rarely conducted for residential houses in Indonesia. This study is preliminary work on the prospective of Swedish Weight Sounding (SWST) for liquefaction assessment for residential houses. Material used is poorly graded sand. Number of half turns from SWST (NSW) per meter for very loose and loose clean fine sand ranges from 4 to 168 (equivalent to SPT 0-30). Liquefaction potential was assessed using indirect method by converting NSW into equivalent NSPT and direct method. In general factor of safety from direct method is more conservative (thus lower liquefaction potential index) than

indirect method. Torque range for material in this study range from 6-54 Nm equivalent to specific energy range from 7-70N/mm2.Liquefaction assessment using SWST data with torque measurement also indicate the soil is liquefiable. SWST may be able to detect sand ageing. In summary SWS has a good prospect as a highly portable and low cost investigation tools for liquefaction assessment of residential houses in Indonesia.

ICEEDM-954

REHABILITATION AND RECONSTRUCTION OF COMMUNITY HOUSING POST WEST NUSA TENGGARA EARTHQUAKE 2018 (CASE: LAUK RURUNG TIMUK AND LAUK RURUNG BARAT SUB-VILLAGES, SEMBALUN BUMBUNG, SEMBALUN, EAST LOMBOK)

Choirul Rama Saputra

Ministry of Public Works and Housing, Indonesia
✉ choirulrama@pu.go.id

ABSTRACT

Three strong earthquakes have occurred and damaged the infrastructures and human settlements at some region of West Nusa Tenggara Province, in July and August 2018. This paper describes the policy and action taken by Ministry of Public Works and Housing (MPWH), Republic of Indonesia, to assist the rehabilitation and reconstruction specifically for the housing. The processes started from early September 2018 by Civil Servant Candidate from MPWH together the society since then. The action has three phases, they are, socialization, design and construction. Those phases have been conducted and will be elaborated in this paper along with their particular obstacles. The most critical phase will be deducted. All the resources have been gathered from the law applied in Indonesia, the official instruction of implementation, the technical instructions, interviews and volunteer has point of view. This paper uses qualitative approach through observation, survey, group discussion and interview to analyse factors that significantly impact the implementation of rehabilitation and reconstruction of houses referring to the theory. Based on this study, the socialization phase is found to be the most decisive.

ICEEDM-961

EXPLORING KEY ISSUES RELATED TO TSUNAMI SHELTER IN PADANG CITY – INDONESIA

Badrul Mustafa Kemal[1], Yosritzal[1] and H Putra[2]

[1]Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
[2]Department of Information System, Universitas Andalas
✉ badrulmustafa@eng.unand.ac.id

ABSTRACT

Padang is a city on the coast of Sumatra island in the province of West Sumatra that has the potential to be threatened from a tsunami originating from the Mentawai megathrust. Various attempts have been made by the Padang City Government to anticipate casualties if a tsunami really occurs. One such effort is in the form of building shelter or TES (Temporary Evacuation Sites). Unfortunately, until now the data on the capacity of existing shelter and the number of shelter needed have not been found. In addition, the maintenance of existing shelters has the potential to become a burden on the Padang city government budget. The Mayor of Padang once complained about the need for the budget to build and maintain the shelter building so that it could function properly when needed. Therefore it is necessary to conduct a study regarding the optimal amount of shelter and how to optimize its function. Determination of the optimal number of shelter begins by identifying factors that influence the determination of the location of the shelter through questionnaires and interviews. This study also examines the alternative use of shelter and maintenance techniques so that the constructed shelter can be effective and efficient according to its function but still economical or not a burden on the government budget.

ICEEDM-963

BRIDGE CONSTRUCTION COST SAVING FROM USING LRB (LEAD RUBBER BEARING) IN THE AREA PRONE TO EARTHQUAKE, KENTENG BRIDGE CASE STUDY

Ariono Dhanis[1], Herdianto Arifin[2], and Iwan Zarkasi[3]

[1]Young Functional Official of Ministry of Public Works and Housing, Highway General Directorate, Bridge Directorate, Jl. Pattimura No 20 Lt 6, South Jakarta, Indonesia

[2]Middle Functional Official of Ministry of Public Works and Housing, Highway General Directorate, Bridge Directorate, Jl. Pattimura No 20 Lt 6, South Jakarta, Indonesia
[3]Head of Bridge Directorate of Ministry of Public Works and Housing, Highway General Directorate, Bridge Directorate, Jl. Pattimura No 20 Lt 6, South Jakarta, Indonesia
✉ ariono.dhanis@gmail.com

ABSTRACT

There are many ways to reduce the earthquake force excited in the bridge structure such as the using of Lead Rubber Bearing, Sliding Isolation Pendulum and Damper/Lock Up Device. The concern that described in this paper is Lead Rubber Bearing support to damp earthquake thrust above the pier. The declared by the manufacture guarantee is that the LRB can weaken the shock for about 30%. The analysis executed here is response spectrum analysis calculating the natural frequency of the bridge. After the analysis, we compare the contractual cost of the structure (with LRB structure) with the non-LRB structure. We did not compare in terms of reinforced concrete volume reduction because the price of the LRB each and the price of the concrete with rebar per m3 are different. From the analysis it is shows that without LRB, the price of the bridge will be increased at 19% from the original contractual price (before tax) or 16% saving. From this point, it is important to use LRB in our earthquake prone area as conclusion.

ICEEDM-979

DEVELOPMENT OF SYNTHETIC GROUND MOTION AT A SPECIFIC SITE IN YOGYAKARTA TOWN, INDONESIA UTILIZING THE PSHA METHOD

Widodo Pawirodikromo[1], Lalu Makrup[2],Mochamad Teguh[2], and Bambang Suryo[3]

[1,2]Dept. of Civil Engineering and Disaster Risk Management, Universitas Isam Indonesia (UII), Yogyakarta, Indonesia
[3]Alumni of the Earthquake Engineering Management Master Program, UII, Indonesia ✉ widodo355@gmail.com

ABSTRACT

The 2019 Indonesian Seismic Code provides an alternative method in the analysis of building structures by applying the dynamic time history analysis. The availability of earthquake recordings in Indonesia is still limited and leads to a severe problem. At least 11-pairs of earthquake recordings must be used in the analysis of synthetic ground motion utilizing the Method of Probability Seismic Hazard Analysis (PSHA). A selected site in Yogyakarta town was chosen as a pilot study considering that there were many fatalities and building damage caused by the 2006 Yogyakarta earthquake. The resulted Uniform Hazard Spectra (UHS) using the shallow crustal earthquake source is higher than the earthquake source Megathrust. The synthetic ground motions (SGM) are based on the shallow crustal earthquakes. The deaggregation results present the magnitude and dominant distance of RD = 6.5 and RD = 14.5 km. They show that the contribution of the Opak River fault to the hazard in Yogyakarta town is very dominant because the distance is very close. Based on the magnitude and dominant distance, after spectral matching and testing significant D595 duration, the 12-synthetic ground motion was successfully developed.

ICEEDM-982

2D NUMERICAL SIMULATION OF URBAN DAM BREAK AND ITS EFFECT TO BUILDING USING LAX SCHEME WITH NUMERICAL FILTER

Tias Ravena Maitsa[1], M Gilang Indra Mardika[1], Mohammad Bagus Adityawan[2], Dhemi Harlan[3], Dyah Kusumastuti[3], and Arno Adi Kuntoro[5]

[1]Graduate School of Civil Engineering, Faculty of Civil and Environmental Engineering, Institut Teknologi Bandung
[2]Water Resources Engineering and Management, Faculty of Civil and Environmental Engineering, Institut Teknologi Bandung
[3]Water Resources Engineering Research Group, Faculty of Civil and Environmental Engineering, Institut Teknologi Bandung
[4]Structural Engineering Research Group, Faculty of Civil and Environmental Engineering, Institut Teknologi Bandung
[5]Center for Water Resources Development, Institut Teknologi Bandung
✉ tiasravena@gmail.com

ABSTRACT

Dam-break is one of the disasters that can occurred due to earthquake. The earthquake vibration may damage the dam construction and therefore causing a dam-break flow. The flow can cause severe destruction to the downstream urban area. Dam-break modeling offers a way to analyze its effect of buildings. In this study, a 2D model for analyzing dam break flow is developed based on the Saint Venant equations and solved using Lax Scheme. The initial condition of the modelling is a rectangular channel with obstacles at both sides of the channel and two similar columns in the middle of the channel. These obstacles are considered as buildings in an urban area. Numerical filter is used to increase the stability of the simulation. The developed model is able to perform well in simulating a case of urban dam-break based on a previous experiment. In addition, the applied numerical filter is able to handle shock, therefore maintaining the stability of the model while reducing the simulation time without the needs to use a higher order numerical scheme.

ICEEDM-989

POTENTIAL LIQUEFACTION OF SAND WITH VARIATION IN GRAIN DISTIBUTIONS

Fuji Asema, Abdul Hakam and Andriani

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ fujiasema11@gmail.com

ABSTRACT

It is well known that earthquake induced liquefaction can cause remarkable damage to buildings. Recent disaster of liquefaction that happened in Palu has damage to buildings and infrastructure has paid attention to many researchers. It is necessary to conduct a study of more detailed about liquefaction in order to have good understanding and build up the mitigation efforts in the future. In this study, the potential of liquefaction analysis on sand was carried out with variations in grain distributions. The research was conducted with experimental works in laboratory. The variation of grain distribution in sand was made up by mixing the size of sand grains that pass trough certain sieves. The sand are put into camber in saturated condition the placed on a vibrating table. Then the vibrations are varied for number of acceleration. During the test, the acceleration histories of the vibration are

recorded meanwhile the liquefaction phenomena in sand are monitored. The final result of the test are plot in relationship of the variations in grain distribution with the potential of liquefaction of sands. The result of this study are become an important input for liquefaction mitigate in sandy sediment areas.

ICEEDM-991

POTENTIAL ANALYSIS OF LIQUEFACTION IN SAND SOILS WITH EARLY PRESSURE DIFFERENCES

Siti Nur Indah Sari, Abdul Hakam and Andriani

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ sariindah589@gmail.com

ABSTRACT

Earthquake disasters are the most frequent disasters in the world. One of the impacts triggered by the earthquakes is liquefaction. Indonesia is one of the earthquake prone areas that triggered liquefaction with its bad impacts. The recent liquefaction has caused losses and damage both in terms of material and lives wich happened in Palu, Central Sulawesi. This is one of reasons to study more detailed in liquefaction research for risk reduction in the future. In this study, an analysis of the liquefaction potential on sandy soil was carried out with the variation in initial pressure. The variation of initial load is given by using an additional load on the top surface. The sand is made up in a saturated condition in the testing box and placed on a shaking table. During the test, the vibration amplitude is recorded. The changes in the soil samples are observed gave rise to potential liquefaction. From this tests the effects of the initial pressure to the potential of liquefaction in the sand soil are elaborated. The results of this study give initial solution for the idea of mitigation in areas with potential liquefaction.

ICEEDM-993

THE EFFECT OF GROUND MOTION PREDICTION EQUATION MODELS TO THE DAMAGE PROBABILITY VALUE OF A CONCRETE MOMENT FRAME BUILDING DUE TO AN EARTHQUAKE SCENARIO

Yunalia Muntafi[1], Nobuoto NOJIMA[1], and Ikramullah[2]

[1]Department of Engineering Science, Graduate School of Engineering, Gifu University, Japan
[2]Department of Civil Engineering, Faculty of Civil Engineering and Planning, Universitas Islam Indonesia, Indonesia
✉ yunalia@uii.ac.id

ABSTRACT

One of the most important things to consider in seismic risk analysis is the damage probability assessment using the parameters of the ground motion prediction equation (GMPE). Several GMPE models have been proposed and developed worldwide, however it has its own parameters and gives various results. This study aimed to investigate the effect of selected GMPE models to the estimation of building damage probability. The research began by modelling the 3D-concrete moment frame building followed by performing pushover analysis to determine building response then calculating the building damage probability based on HAZUS method to generate fragility curve and damage probability matrix. The result shows that the GMPE of Ambraseys et al. (1996) gave the highest value of the peak building response which was about three times higher than the GMPE of Boore et al.(1997) and four times higher than Idriss's (2002), and also produced the highest building vulnerability value. The probability of moderate, extensive, and complete damage level were also dominated by GMPE of Ambraseys et al. (1996) which indicated that the use of this GMPE will produce the most severe damage probability value due to Yogyakarta earthquake scenario, while the GMPE of Idriss (2002) will produce the lowest one.

ICEEDM-1002

NUMERICAL MODEL FOR INVESTIGATING SEISMIC PERFORMANCE OF PRESTRESSED HOLLOW CONCRETE (PHC) PILES WITH FIBER SECTION ELEMENT

Angga Fajar Setiawan[1], and Muhamad Fauzi Darmawan[2]

[1]Department of Civil and Enviromental Engineering, Universitas Gadjah Mada, Indonesia
[2]Department of Civil and Enviromental Engineering, Universitas Gadjah Mada, Indonesia
✉ angga.fajar.s@ugm.ac.id

ABSTRACT
In the medium to high seismic zone, prestressed hollow concrete (PHC) pile for structural foundation should be designed with elastic behaviour due to low ductility and dissipated energy. However, some Indonesian practical engineer has chosen PHC pile for pile-supported slab viaduct (PSSV) with medium seismic moment-resisting frame concept in a high-risk earthquake zone. Therefore, some non-linear numerical simulations of PSSV structure in medium to high seismic zone need to be conducted to investigate its seismic performance. In the initial stage, a numerical model for investigating the seismic performance of PCH pile under flexural test with fiber section element was conducted. By implementing an appropriate plastic hinge length of forced beam-column with hinge element, the flexural behaviour of PHC piles was simulated under both monotonic and cyclic loading. As the results, the numerical model could show good agreement compared with some predecessors experimental of PHC pile in the term of skeleton curves, sectional strain distributions, and hysteresis loops.

ICEEDM-1006

PREDICTION OF TSUNAMI INUNDATION IMPACT IN PADANG CITY

Purnawan

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ purnawan@gmail.com

ABSTRACT
Sumatera Barat has predicted by experts will be hit by earthquake due to subduction of Indo-Australian and Eurasian tectonic plates, this earthquake would result tsunami that will hit Padang city. The tsunami will cause inundation in the several areas of city near the coast. The area of tsunami inundation in Padang city has predicted by expert, this prediction result is displayed on a tsunami inundation map. This paper discusses the impact of tsunami inundation on housing and public facilities in those areas, this result could be used to prepare evacuation planning. The method of study, is by identification of impact tsunami inundation on housing and public facilities. This is carried out with superimpose of tsunami inundation map to Padang city map, submerged housing and public facilities are identified manually. The data then were verified in the field. From result of identification, the depth of inundation in subdistrict are classified, then the public facilities that affected

by tsunami inundation are classified in each of subdistrict. Total 27.228 unit house and public facilities that affected by tsunami inundation, 86.3% is housing and 13.4% public facilities. The most affected subdistrict by tsunami inundation is Bungo Pasang, it is 2.899 house and public facilities submerged.

ICEEDM-1007

EFFECT OF GRAIN SHAPE TO POTENTIONAL LIQUEFACTION

Arif Rahman, Abdul Hakam and Andriani

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ rahman.arif2306@gmail.com

ABSTRACT

Earthqueke is one of the most frequent disasater in Indonesia, Earthqueke have caused losses both in terms of life and material. An earthquake also can trigger to soil liquefaction. Attention to liquefaction in Indonesia has raised after the Palu Earthquake in 2018. Liquefaction may happen in sandy soil in certain condition. Here, a series laboratory tests to study potentially liquefied in sandy soils is conducted. The liquefaction potential of sand are analyzed with the effect of the shape of the soil particles. The sandy sample is made up by special selected in three different shapes that are sharp, angular and round. Sands are placed in camber and saturated. They then are shaken with vibrations for certain acceleration. The duration and acceleration are recorded during the tests. In the same time the changes that occur in soil samples are monitored to see the liquefaction occurrence. Finally, it can be seen the effect of the shape of the soil grain on the liquefaction potential. The results of this study can be used to further investigation in order to mitigate the liquefaction.

ICEEDM-1011

DECISION SUPPORT SYSTEM FOR FLOOD MANAGEMENT IN BATANG ARAU RIVER BASIN

Nurhamidah, Ahmad Junaidi, Arraufi Hasyim Nz

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ idanh129@gmail.com

ABSTRACT

Flood is one of the most vulnerable disasters in Indonesia. Batang Arau river basin is located in the West Sumatra province, which is one of the areas that

often experience the flood. Since 1894, a number of measures have been taken to control flooding in the Batang Arau river basin. However, until now, the incidence of flooding is still not appropriately resolved. The aim of this study is to identify the areas that had the worst impact due to flood events in the Batang Arau river basin over the past 10 years and then identify the leading causes of the flood event. After that, the Decision Support System (DSS) was carried out using the Analytical Hierarchy Process (AHP) method to determine the suitable measures both structural and no structural for flood control in the Batang Arau. In order to achieve these objectives, data was taken in the form of; the historical flood event over past 10 years, the factors causing flood events based on field observations and review studies, and Measures to control flood events according to experts. So that the results of this study will be able to describe short-term and long-term for flood management, which are adaptable for future flood management strategy.

ICEEDM-1012

ANALYSIS OF SCHOOL DAMAGE DUE TO LOMBOK EARTHQUAKE AUGUST 5, 2018

Mohammad Sofian Asmirza
Civil Engineering, Engineering Faculty of North Sumatra University, Medan
✉ sofyan0076@yahoo.co.uk

ABSTRACT

Lombok earthquake in August 5 2018 has caused fatality and damage buildings including houses and schools. It was reported that the Lombok earthquake had caused damage to at least 606 schools in West Nusa Tenggara. Following the earthquake, the field survey was carried out in a few days to collecting data of damaged schools in Lombok. The global positions of surveyed schools were recorded during the survey to identify the geological and seismicity condition surrounding area. The data were analyzed to understand the cause of the damaged. The damage pattern of he schools are also analyzed and then compared to the other related studies. The damage on the schools in Lombok Island generally has a result of insufficient quality of the building materials. Further, understanding the earthquake resistant building for earthquake prone areas is the most basic knowledge to be informed to the Local Government who has authority to manage the schools. This study suggests for establish Local formal rule of related to minimal

requirement for earthquake resistant school building following the microzonation.

ICEEDM-1014

SEISMIC DESIGN OF A SUPER-TALL BUILDING: INDONESIAN EXPERIENCE

Davy Sukamta[1] and Nick Alexander[2]

[1]Founder and Principal, Davy Sukamta & Partners – Structural Engineers, Jakarta
[2]Partner, Davy Sukamta & Partners – Structural Engineers, Jakarta
✉ davy@davysukamta.com

ABSTRACT

This paper summarizes the structural concept and design of the twin 303-meter high "Indonesia- 1" supertall building currently under construction in Jakarta. The first tower is a 63-story office building and the second is 59-story, on top of seven-level basement structure. The lateral resisting system of the towers is RC core-wall and outrigger, and composite floor system - with concrete slab, metal deck and steel beams - is used for the gravity resisting system. Since the lateral system is outside the scope of the prescriptive system in Indonesian Seismic Design Code, Modal Pushover Analysis (MPA) combined with Non-linear Response History Analysis (NLRHA) had demonstrated acceptability to the Jakarta building department and its peer review panel. Some challenges in conducting Performance-based Seismic Design (PBSD) are highlighted. To speed up construction, which is a critical factor in supertall building construction, erection columns are installed in the RC columns and CSPCM (Core Structure Preceding Construction Method) is applied. Consistently, the design must account for the associated construction sequence.

ICEEDM-1015

THE EFFECT OF LAYER VARIATIONS AND STABILIZATION USING MIXTURE OF LIME ON SOIL SLOPE STABILITY OF ROAD EMBANKMENT

Rina Yuliet, Abdul Hakam, Elsa Eka Putri and Syahril Rahmat

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ yulietrina@gmail.com

ABSTRACT

Common problems that are often encountered on artificial slopes or embankments are the small stability of the soil and the low bearing capacity of the soil. To get an optimal solution from active landslides, a reliable analysis of a slope is needed with soil improvement and reinforcement. In this research using of a mixture of lime to stabilize an active landslide. So it can be seen how the effects of bearing capacity before and after stabilization using quicklime, can be known the effect of variations in the number of layers of gradual landfilling, can be known the optimum safety factor value, and can be known the failure behaviour or extreme deformation and stress that occur in the soil embankment. The soil data used in this study using laboratory testing data. The samples taken for analysis of landslide are 3 types, that is subgrade, original embankment soil and embankment soil using quicklime mixture. The embankment soil is mixed with 15% quicklime as a 40 cm thick reinforcement on the slope surface. These initial results of the study can be used further to minimize the landslide impacts on road embankment.

ICEEDM-1016

DEVELOPMENT PLANNING RELATED TO DISASTER BASED ON COMMUNITY PARTICIPATION

Benny Hidayat, Anggraini Rasadi, Taufika Ophiyandri

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ bennyhidayat@eng.unand.ac.id

ABSTRACT

Disasters are a global problem in many countries. Particularly in Indonesia, where has many prone areas to disasters. The perspective of disaster management has entered a new paradigm, from previously only focusing on emergency response activities to mitigation and preparedness approaches. Mitigation and preparedness are carried out when disasters do not occur. In disaster risk mitigation, it is necessary to involve active community participation, especially in planning for disaster-related development. So far, the communities are mostly only passive object in the development program that only accepts any initiatives of disaster-based development made by the government. The communities need to be placed as active subjects participating in the disaster-related development in their community. Many disaster-based infrastructure developments so far still use the top-down

mechanism, namely disaster planning, and management entirely based on the initiation of the government or organization. In Disaster Management Law No. 24/2007, it is stated that the community has the right to be actively involved in disaster management efforts in their communities. This paper aims to identify what forms of community participation in disaster-based development, especially at the planning stage of infrastructure development activities.

ICEEDM-1018

AN ALTERNATIVE MODEL OF RETAINING WALLS ON SANDY AREA TO PREVENT LANDSLIDES

Deni Irda Mazni, Abdul Hakam, Jafril Tanjung, Febrin Anas Ismail and Yossyafra

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ deniirdamazni@gmail.com

ABSTRACT

Landslide is one of the potential disasters that can take life and material. A way to reduce disaster risk in slopes is to improve the slope stability. A challenge in improving slope stability is how to make soil retaining walls that are simple, quickly built, and workable in the process. This research focuses on laboratory tests of gravity, segmental and pre-cast retaining walls in sands. The tested models are slopes with different segmental, pre-cast, gravity walls made of un-reinforced concrete for static loads. The slope failure patterns were observed with their load variations. This research shows that segmental precast retaining walls with certain models and sizes can be selected to support certain given loads to prevent slope failure.

ICEEDM-1019

PT - DR - D50 CORRELATIONS OF SANDS FOR LIQUEFACTION POTENTIAL ANALYSIS

Abdul Hakam, Sri Warzugni, I. F. Muharani and Mardhatillah

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ ahakam2008@yahoo.com

ABSTRACT

Liquefaction assessment is the main stage in determining the potential liquefaction in a certain site. In order to assess the potential liquefaction, the

values of physical and mechanical properties of the soil are very important. Two main parameters that are essentially needed to determine the liquefaction potential in a sand deposit; those are relative density and men particle size. In Indonesia, CPT is a testing method that is very practically famous and often conducted in the field. Assessment of Liquefaction Potential will be cheap and valuable by using the results of the CPT test. For this reason, this paper describes the results of conducted research to obtain the values of the relative density and mean particle size based on the outcomes of the CPT test: those are cone resistance (qc) and friction ration (Rf). The relationship between qc-Rf and Dr-D50 is accelerated by conducting a series of tests on soil samples with variations in the value of relative density and average particle size. The test results are plotted in a graph as well as in the terms of mathematical formulations to figure out for the relationship between CPT values and Dr-D50 in detail for sands. This research is very useful to assess the liquefaction potential in a particular area with very satisfying results.

ICEEDM-1020

GEOTEXTILE MODEL ON SOFT SOIL

Lusi Dwi Putri, Abdul Hakam, Rendy Thamrin and Yossyafra

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ lusidwiputri@unilak.ac.id

ABSTRACT

Subgrade on soft soil can cause construction failure triggered by the reduction bearing capacity and non-uniform settlement. The use of geotextiles is one of a good alternative to mitigate such problems. In this study, the laboratory test was conducted on soft soil that is strengthened with geotextiles. The used geotextiles in the study were varied according to the size of the geotextile distance and the number of geotextile layers used. The geotextile is placed above the soft soil layer with variations in the distance and number of geotextile layers. The models are arranged in a transparent testing box. The failure patterns that occur in the models are observed. The results of the test are in terms of the displacement related to the patterns of the geotextiles in the variation of distance and number of layers. The results of this study are one alternative solution to be able to increase the bearing capacity of subgrade

and overcome the non-uniform displacement in soft soil using geotextiles in certain specifications.

ICEEDM-1024

LIQUEFACTION DISASTER MITIGATION ON RAILWAY CORRIDORS IN WEST SUMATRA

Bayu Martanto Adji, Abdul Hakam, Bambang Istijono and M. Anshari

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ bayu@eng.unand.ac.id

ABSTRACT

Earthquake induced liquefaction which turning the soil to liquid from solid can cause huge lateral movement to the ground surface. It has been detected that the potential liquefaction due to earthquakes in west Sumatra is very high. The most problems due to liquefaction is loss of the stability and major settlements due to liquefaction. For special infrastructure such as rail way, liquefaction has a significant influence on the embankments. Then, it needs to be investigated whether the railway corridors are bulit in areas with a high potential of liquefaction. The analysis method used in this research is by comparing railway corridors against the Map of West Sumatra liquefaction potential. This study presents the most railway corridors in West Sumatra were built in areas with have the liquefaction potential. For the corridors which may be potentially destroyed by liquefaction, a special treatment must be applied to them.

ICEEDM-1026

THE USE OF GEOTEXTILES ON SAND SOILS AS SOIL REINFORCEMENT AGAINST SOIL DEGRADATION

Fitridawati Soehardi, Abdul Hakam, Rendy Thamrin and Mas Mera

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ fitridawati@unilak.ac.id

ABSTRACT

Soil that is under the foundation must be able to maintain the construction above it against shear failure and non-uniform soil degradation. for some construction conditions that are built are on the sand. For this reason, it is necessary to research on strengthening sand in an effective, safe, inexpensive and efficient manner. In this study, testing was conducted regarding the use of

geotextiles in sand soil. The geotextile used in the study varied according to the size of the geotextile distance and the geotextile layer used. geotextiles used were net-shaped with a size of 2cm each distance and placed with several variations of soil layers, in laboratory studies using sand. Geotextiles are placed above the soil sand layer and geotextiles are placed above the soil sand layer with variations of soil layers arranged in the test box, then the load is applied vertically to the top of the foundation. During the test, the load is recorded and the decrease that occurs and the influence of geotextile movement. From this test, it can be seen that the placement of geotextiles influences the soil of the Sand to the carrying capacity and the decline in the foundation in the Sand soil. The results of this study are one solution to be able to overcome the non-uniform decrease in sand soil by using geotextiles.

ICEEDM-1028

PERFORMANCE OF ASISMETRIC STRUCTURES REVIEWED WITH BASE PLASTIC DESIGN PERFORMANCE (CASE STUDY OF APPLICATION ON BUILDINGS IN PEKAN BARU)

Jati Sunaryati, Nidia Sari and Alfadian

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ jati@ft.unand.ac.id

ABSTRACT

Peformance Based Plastic Design (PBPD) is a structural analysis that can be used to review structure performance. This method is increasingly popular to be used in earthquake prone areas. This method is based on an energy method that can be applied to steel or concrete structures. Meanwhile, Indonesia already has SNI 1726: 2102 to be used as a guide in designing the thrust load to review the level of structural performance. Both of these things need to be used as a reference in areas that were initially considered safe from earthquakes but based on the development of earthquake microzonation maps it is very possible to become potential areas that also become earthquake regions. For this reason, the case of structures which were built in the Pekanbaru area was taken. From the analysis of structural behavior, the structure that applies PBPD has a greater displacement than the structure that applies the thrust load of SNI 1726: 2012. The percentage of displacement that

occurred was 8-37%. Based on performance analysis, the structure according to PBPD shows a better level of performance compared to the application of SNI 1726: 2012 thrust load.

ICEEDM-1030

RISK ANALYSIS OF SEISMIC BRIDGE DAMAGE : CASE STUDY AFTER LOMBOK AND PALU EARTHQUAKE

Risma Putra and Winarputro Adi Riyono

Institute of Road Engineering, Agency of Research and Development,
Ministry of Public Works Republic of Indonesia
✉ risma.putra@pusjatan.pu.go.id

ABSTRACT

An experimental study of shear behaviour of reinforced concrete beams with solid circular cross sections is presented. The test variables were ratio of longitudinal reinforcement and type of stirrups. The test was carried out on nine simple beams. Three were without stirrup, three were with circular closed of stirrups type, and three were with circular spiral of stirrups type. All tested beams were subjected to two point monotonic loads. Shear capacity for all of types is in correlation of load – deflection. Comparison between two types of stirrups test results obtained are not significantly different.

ICEEDM-1033

EFFECT OF STIRRUPS TYPE ON SHEAR CAPACITY OF REINFORCED CONCRETE MEMBERS WITH CIRCULAR CROSS SECTION

Sri Hartati Dewi, Rendy Thamrin, Zaidir and Taufik

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ zaidir2000@yahoo.com

ABSTRACT

An experimental study of shear behaviour of reinforced concrete members with solid circular cross sections is presented. The test variables were ratio of longitudinal reinforcement and type of stirrups. The test was carried out on nine beams. Three beams were designed without stirrups, three with closed hoop, and the other with spiral stirrups. All tested beams were subjected to two point monotonic loads. The test results showed that all beams without

stirrups were failed due to shear. While beams with stirrups, both hoop and spiral, failed in flexural failure. In addition the ccomparison of flexural capacity between beams with hoop and spiral stirrups were not so different each other. But the beams with spiral stirrups showed a little higher ductility. Analytical prediction carried showed that the numerical model predicts the test result in a good accuracy.

ICEEDM-1034

REPAIR AND RETROFITTING OF BUILDINGS POST EARTHQUAKE

Zaidir, Fauzan and Febrin Anas Ismail

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ zaidir2000@yahoo.com

ABSTRACT

This paper discusses the damage types, repair methods and retrofitting of buildings post an earthquake. Data were taken by conducting surveys and assessment of buildings directly, both engineered and non-engineered buildings affected by the West Sumatra earthquake in 2009. Some causes of damage, among them is the detailing of reinforcement that do not follow the existing standard, soft-story effect, foundation failure, low material quality and does not meet the requirements, design and implementation of the construction do not follow the rules and technical provisions of the building earthquake resistant. Improvement and buildings retrofitting can be done after the buildings damage types or its components/parts and the quality of the building materials used were known. The structural analysis was done in order to know the cause of the building elements damaged and if the results of analysis with the latest regulations earthquake load, the building structures is able to withstand the earthquake loads and a repair is not required, but if not, the retrofitting is required.

ICEEDM-1035

DEVELOPMENT OF FLOW ESTIMATION METHOD FOR OVERBANK FLOW OF NATURAL COMPOUND CHANNEL

Muhammad Shubhi Nurul Hadie[1], Bambang Istijono[1], Taufika Ophiyandri[1], and Revalin Herdianto[2]

Department of Civil Engineering, Andalas University, Indonesia

Padang State Polytechnics
✉ nurulhadie@gmail.com

ABSTRACT

By nature rivers have compound sections consisting of a main channel, which always carry low flows and one or more side floodplains that provide extra conveyance capacity when flood occur. Compound channel flow is complicated by the existence of a region of turbulent shear at the interface between main channel and floodplain flow, which takes the form of a momentum transfer mechanism, which retards channel velocity and discharge, while increasing the corresponding parameters on the floodplain. The prediction of the effective flow resistent and conveyance capacity, is clearly important for flood alleviation scheme, as well as for studies on bank protection and sediment transport in such channel. Many studies for overbank flow estimation have been carried in recent years, however most of the studies are based on idealized laboratory compound channels and rare of them studied on natural flooding river as well as consider sediment transport process, so much so that sediment transport and its mechanism under flood condition are remain unknown clearly. This proposed study is purposed to development of a method for flow estimation under flood condition in natural compound rivers with considers natural element of river like vegetation as well as sediment transport mechanism. This research will be conduct using both field data study and mathematical modelling to develop a reliable method for hydraulic analysis under overbank conditions.

ICEEDM-1036

DETERMINATION OF WATERSHED PERFORMANCE IN MANAGEMENT RIVER FLOW PROGNOSES AND FLOOD INDEX IN BATANG HARAU RIVER PADANG CITY

Nofrizal, Bambang Istijono, Mas Mera and Junaidi

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ nofrizal6063@gmail.com

ABSTRACT

Damage to watershed land areas raises problems in watershed management in the form of changes in forest function, the impact of the Padang cement factory mining area, which fundamentally results in a decrease in the number of forests, a reduction in water sources, a decline in fertile soil layers, the

emergence of landslides, and silting of rivers, especially upstream areas which mostly have steep slopes, one of which is Harau Watershed Sub located in Lb.Kilangan Subdistrict, Padang City. The research objective is to monitor and evaluate the performance of the Harau Sub-watershed using two criteria, namely land use and water management, and the surface flow index in flood discharge pranogues. Land use criteria are determined by indicators of vegetation cover, land use suitability, and erosion indices, while water management criteria are determined by river water level indicators, and flood index. Determination of the performance of the sub-watershed each criteria and indicators then get the value of the weighting and scoring ie, and the sub-watershed Harau included in the medium category. The category is illustrating that the Harau watershed has a sub optimal level of performance, because it still has the potential for loss of land, flooding during the rainy season and drought in the dry season. In this condition the sub-watershed needs additional treatment to anticipate the decline or increase in quality because there are indicators that indicate the decline in the performance of the watershed.

ICEEDM-1037

DROUGHT DISASTER IMPACT ON WATER SUPPLY SYSTEM RESILIENCE

R. Hari Yuliandra, Bambang Istijono, Putri Sri Komala and Benny Hidayat

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ hari.yuliandra@gmail.com

ABSTRACT

Water Supply Sistem is one of critical infrastructure. The successful water supply system management depends on an in-depth understanding of the resilience of the system to pressures. Drought and population growth are among the most common pressures that can decrease the service potential of a water supply system. In previous studies, water supply resilience research under drought disasters still separates the hydrological processes models and water management systems. The objective of this paper is to develop dynamic system simulations combining hydrological processes models and water management systems in assessing water supply resilience research under drought disasters and population growth. The resilience of a water supply

system is analyzed using a robust modeling approach to identify the critical trigger points at which the system would fail.

ICEEDM-1038

RISKS OF WATER RESOURCES CONSTRUCTION PROJECTS IN WEST SUMATRA

Taufika Ophiyandri, Bambang Istijono, Benny Hidayat and Dwi Putri Nengsi

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ ophiyandri@eng.unand.ac.id

ABSTRACT

The construction industry carries more risk than other industries. Due to their uniqueness, every type of project will carry specific risks including water resources project. This paper aims to identify the risks of water resources construction project in West Sumatra and to explore the perception of owners and contractor on risks allocation. Data was collected using a questionnaire survey and distributed 23 owners and 30 contractors in West Sumatra and was analyzed using parametric and non-parametric statistical approach. It was found that 35 risks might affect the water resources projects. The most frequent and the highest risk event is heavy rain conditions and followed by land acquisition problem. It was also found that there is a same perception of respondents in determining the risks that must be shared by the owners and contractors, yet many risks cannot be decided whose responsibility if they happened due to the different perceptions between owners and contractor on their allocation.

ICEEDM-1039

SEISMIC ISOLATION SYSTEM OF TWO HINGED ARCH SUSPENDED-DECK BRIDGE: A CASE STUDY ON KALIKUTO BRIDGE – INDONESIA

Tri Suryadi[1], Arvila Delitriana[2], Zdenek Fukar[3], and Rusri Tjendana[4]

[1]PT. Freyssinet Total Technology, Jakarta, Indonesia
[2]PT. Perentjana Djaja, Jakarta, Indonesia
[3]PT. Waagner Biro Indonesia, Jakarta, Indonesia
[4]PT. Waagner Biro Indonesia, Jakarta, Indonesia
✉ tri.suryadi@freyssinet.co.id

ABSTRACT

Seismic isolation systems are widely used in buildings, bridges, and industrial structures all over the world. The system is known for the efficiency to reduce earthquake demand and thus to provide better seismic performance of the structures. In particular to an arch suspended-deck bridge, seismic isolation system can be a solution for the seismic resisting system due to the incapability of the cable hangers to transfer horizontal forces from the excitation mass on the hanging deck to the main compression arches. Kalikuto arch bridge that is built in 2018 has implemented both Lead Rubber Bearings and Seismic Rubber Expansion Joints as the part of its seismic resisting system. These two seismic isolation devices were designed and engineered accurately to fulfil the seismic design requirements of the Kalikuto bridge. Finally, several performance tests were conducted to evaluate the design compliance of the manufactured devices.

ICEEDM-1040

A QUANTITATIVE ANALYSIS OF THE LEVEL OF CONGESTION THAT OCCURRED ON THE TSUNAMI EVACUATION ROUTE DURING THE TSUNAMI DISASTER

Yosritzal, Arif Setyaji and Badrul Mustafa

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ yosritzal@eng.unand.ac.id

ABSTRACT

This paper presents a quantitative analysis of the level of congestion that occurred on the tsunami evacuation route during the tsunami disaster. This evacuation route is obtained from the distance calculation using Arcgis software. The distance used is the shortest distance between each center point of the grid to the TES location point. The speed of walking during evacuation is classified by age, adult, children and parents. Besides the departure time of evacuation in the top 2 time of departure, evacuation immediately after getting the information is valid, and 8 minutes after getting the information. Movements made by refugees from each origin point to the TES are affected by, distance, evacuation route, speed of movement (walking speed), and evacuation time are expected to cause pedestrian congestion on certain road sections. The results of this study would be a map that provides information related to the number of refugees who are at points on the evacuation route.

besides that information related to LOS is also displayed in the form of colors. Red for LOS F, orange for LOS E, yellow for LOS D, green for LOS C, purple for LOS B and blue for LOS A.

ICEEDM-1041

ACCESSIBILITY ANALYSIS OF TSUNAMI EVACUATION ROUTE TO SELF-SUPPORTED SHELTER IN SUB-DISTRICT PASIE NAN TIGO PADANG CITY

Febrin Anas Ismail, Abdul Hakam, Taufika Ophiyandri and Tria Yuli Anggraini

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ febrin@yahoo.com

ABSTRACT

The city of Padang, the capital of West Sumatra, has 1 million populations and located at west cost of Sumatra. The city situated at two earthquake sources that are subduction zone in Indian Ocean and Sumatra fault in land of Sumatra. Since the year 2006, Padang city is often experiencing an earthquake from both sources. In Mentawai island, about 200 km from Padang City westward, there is still what so called seismic gap that very potential to generate big earthquake followed by tsunami. To anticipate this, the mitigation measurements are needed to prepare the people in west cost of Sumatra especially in Padang city. One of the activities is to prepare the shelter that can cover around 600,000 people prone to tsunami near the beach. In fact, the infrastructures for shelter are very limited. Thera are only 4 shelters have been built that have capacity about 2000-3000 people. To anticipate this condition, it needs to build what so called self-supported shelter. Self-supported shelter is an idea or concept of utilizing mosque or musholla to be a shelter by participating community surrounding in its construction and management. The shelter will have function as the ritual of religion and the tsunami evacuation place. Mosque or musholla is selected to be shelter since it does not need to buy land, available in near residence area, and easy to get fund in its construction. This paper aims to analyze the accessibility of tsunami evacuation route to self-supported shelter in term of time estimation, road facilities, and barrier during evacuation. The case study is chosen the sub-district of Pasie Nan Tigo that has about 12,000 populations. The result is

useful as a model in designing accessibility to self-supported shelters in others area.

ICEEDM-1046

STRENGTHENING OF STEEL MEMBER USING UNBONDED CFRP LAMINATES

Fengky Satria Yoresta, Ryotaro Maruta , Genki Mieda , and Yukihiro Matsumoto

Department of Architecture and Civil Engineering, Toyohashi University of Technology, Toyohashi, Japan

✉ syfengky@gmail.com

ABSTRACT

Excellent mechanical and physical properties of carbon fiber reinforced polymer (CFRP) make it the best options for repair, retrofit, and rehabilitation of civil engineering structures. A great success on applying of this material in reinforced concrete (RC) structures has attracted much attention from many researchers to develop it in combination with steel. The number of studies on the use of CFRP composites for strengthening steel structures has still been limited and need to be more explored. To date, the research in this field has mainly focused on CFRP strengthening with adhesively-bonded technique. This paper reports an experimental study to investigate the performance of slender axial compression steel members partially strengthened with unbonded CFRP composites. The requirements of stiffener to prevent buckling occurred in stiffening region are derived from structural equilibrium conditions. Vacuum-assisted Resin Transfer Molding (VaRTM) method is adopted to form CFRP laminates in the strengthened specimens. Totally eight small scale specimens are tested, and it is clear from the test that improvement in load carrying capacity can be achieved by using CFRP.

ICEEDM-1047

EFFECT OF SEISMIC BASE ISOLATORS ON STRUCTURAL RESPONSE OF A 12-STORY BUILDING IN PADANG CITY, INDONESIA

Fauzan, Afdalulul Ihsan, Zev Al Jauhari, Mutia Putri Monika

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ fauzan@eng.unand.ac.id

ABSTRACT

The amount of potential investment in Padang City since 2017 attracted many investors to invest in this city. One of the investments is a 12-story hotel that will be constructed in By Pass Street of Padang city, Indonesia. Due to the hotel is located in a high seismic zone area, seismic base isolation has been proposed to be used in the hotel building. The main aim of using seismic base isolation device is to reduce the inertia forces introduced in the structure due to earthquake by shifting the fundamental period of the structure out of dangerous resonance range and concentration of the deformation demand at the isolation system. An analytical study on the Reinforced Concrete (RC) hotel building with and without rubber bearing (RB) base isolation is carried out using the response spectrum method. The effect of seismic base isolation on the hotel building is discussed in this paper.

ICEEDM-1048

ASSESSMENT OF ROAD TRAFFIC PERFORMANCE OF THE TSUNAMI EVACUATION ROAD IN THE URBAN AREA BASED ON TRAFFIC VOLUME SIMULATION APPROACH

Yossyafra, Nurhuda Fitri, Rahmat Punama Sidhi, Yosritzal, Deni Irda Mazni, Winda Roselia, Ilhamdi Fajri, Sandy Kurnia and Masril Syukur

Department of Civil Engineering, Andalas University, Indonesia
✉ yossyafra@eng.unand.ac.id

ABSTRACT

There are many cities on the west coast of the Sumatra island, which are at high risk of the Tsunami disaster. Regional Regulations on Regional Spatial Planning for each City/ Regency have compiled disaster mitigation by constructing several evacuation roads. This study wants to illustrate: what is the volume of traffic generation and road performance, if there is a Tsunami disaster. The simulation is developed by predicting traffic volume, based on parameters; population density, vehicle ownership, land use and activities in the area around the road. The assessment was carried out on two tsunami evacuation roads in the city of Padang, West Sumatra Province. The results show the highest traffic volume occurred in the period 06.30 a.m until 3:00 p.m., during school activities. One of the roads will not be able to

accommodate the volume of traffic during a disaster, due to large traffic congestion. This study shows that: (1) the period of activity and land use are two main parameters, which must be considered in designing tsunami evacuation roads, (2) periodic road performance assessments for tsunami evacuation roads are needed, so that the road remains in a good performance to accommodate any large traffic during a disaster.

ICEEDM-1050

SITE SPECIFIC RESPONSE ANALYSIS (SSRA) AND PAIRS OF GROUND-MOTION TIME-HISTORY GENERATION OF A SITE IN JAKARTA

Det Komerdevi, I Wayan Sengara

WSP Engineering Consultant, Bandung

✉ wayansengara@yahoo.com

ABSTRACT

The purpose of earthquake – resistence design of building is to produce a facility that can withstand a certain level of a ground shaking without excessive damage. Careful consideration in the design of structures and facilities to the seismic are implemented by design of ground motion. Jakarta as the capital city of Indonesia has potential of seismic hazard. Thus, to design of the facilities particularly high rises buildings in Jakarta requires reliable seismic design criteria for the safety and cost-effectiveness of the construction. Site-specific response analysis with reference to SNI-1726-2012 and generation of pairs of ground motions with reference to FEMA-1050-2015 of a site of 70-story high-rise building in Jakarta has been conducted. Through PSHA methods, two hazard level of earthquake have been calculated for that is representing 50% probability of exceedence (PE) in 30 years (43 years earthquake return period) and 2% PE in 50 years (2,475 years earthquake return period) ground motions at reference base-rock (SB). In addition, risk-targeted ground motions RTGM defined as 1% probability of the building collapse in 50 years are also considered adopting β-value = 0.65. Seven pairs of ground motions time-history have been generated with spectral scaling from 0.2 sec – 10.0 sec within source of megathrsut, beniof and shallow crustal have been applied to consider the short and long period of earthquake hazard that could have potential to hit the proposed building with structure period of 7.0 second.

ICEEDM-1052

INFLUENTIAL PARAMETERS IN TIME HISTORY SEISMIC ANALYSIS

Iman Satyarno

Civil and Environmental Engineering, Gadjah Mada University, Yogyakarta
✉ imansatyarno@ugm.ac.id

ABSTRACT

One method to determine the seismic response of buildings is the time history analysis. This method is especially required such as in Performance Based Seismic Design (PBSD) and in Performance Based Seismic Evaluation (PBSE). Nonlinear response of buildings under the Risk-targeted Maximum Considered Earthquake (MCER) is to be evaluated in PBSD and PBSE. However, it is important to note that there are quite many number of parameters need to be determined correctly in the analysis to achieve reliable results. Some of them are ground motion acceleration history, structural element model, structural damping, geometric nonlinearity, and material nonlinearity. Using prototype SDOF structures, this paper demonstrates how these parameters influence their seismic responses. It can be identified that some parameters are sensitively influence the responses of a structure but the others are less sensitive. Although in this study only SDOF structures is discussed, the findings may be taken as important considerations before doing any nonlinear time history analysis in the case of MDOF structures.

ICEEDM-1053

RAISING STUDENT'S AWARENESS OF TSUNAMI HAZARD IN RUMAH TAHFIZH BAKTI ILAAHI (RTBI) BENGKULU

Ade Sri Wahyuni, Mukhlis Islam, Elhusna

University of Bengkulu
✉ ade.sri.w@unib.ac.id

ABSTRACT

Educating people about disaster risk reduction is part of the responsibility of the local University. Enhancing people's preparedness before disaster strike and how to cope with it, is compulsory and the education need to be done continuously since the natural disaster cannot be predicted.

Seismic hazard is quite high in Bengkulu .The RTBI was chosen because of the locations which prone to tsunami hazard and most of the students come from

different part of Bengkulu, so the knowledge about tsunami hazard nearby their area is very limited. This paper explains about the process of raising awareness of Tsunami hazard for students in RTBI. Twenty six students were involved in this study. The questionnaire were prepared to study their knowledge about tsunami hazard .The knowledge that they can absorb during the study could be measured by comparing their answer in the questionnaire before and after the study. The result shows, After the study, the students were more aware about the vulnerability of the area and know what to do when the disaster happen.

ICEEDM-1054

CONSTRUCTION ENGINEER PERCEPTION OF COLD JOINS, APLICATION AND THE IMPACT OF THE INADEQUATION IN MEETING THE TECHNICAL REQUIREMENTS TO BUILDING CAPACITY IN EARTHQUAKE PRONE AREA (CASE STUDY IN CONSTRUCTION PROJECT IN BENGKULU CITY)

Mukhlis Islam, Ade Sri Wahyuni, Elhusna Elhusna

University of Bengkulu
✉ islam.mukhlis@gmail.com

ABSTRACT

Cold joinsare connection in concrete where the hardened concrete will be connected with new fresh concrete. The implementation of cold join depends on the construction method, the availability of materials and the scheduling of the work hence it is often unavoidable in concrete construction work, especially on work with massive or large volumes. The dependence of the implementation of the cold join on the construction method, the availability of materials and project scheduling make the construction joinsare undeterminable duringdesign phase, both the location and detail of the cold joint to be carried out on site, hence the determination of the location, design and detail of the cold join will be carried out during the construction phase by the contractor with the approval of the supervisory / construction management consultant. This condition requires the contractor's and supervisory consultant's engineer to have the knowledge and skills to determine the location, design and detail of the cold join. Failure to meet the requirements of the construction join will be fatal for structures especially those located in the earthquake prone zones due to the significantly reduced

shear capacity. This study aims to find out how far the knowledge of the engineers working for the contractor (site engineer, site manager) and supervisory consultant (inspector, expert) in the city of Bengkulu area regarding the requirements of the cold join, conducting a case study of the implementation of the cold join and determining the consequences from the error in implementation of the cold join. The results showed that most of the engineers at the contractor and supervisory consultant in the city of Bengkulu did not yet know the requirements of the cold joint, there had been many errors in the implementation of the construction joint in the city of Bengkulu and errors in the construction joint would result in the actual shear capacity of the beam would be significantly reduced compared to the capacity which is obtained from the design.

ICEEDM-1058

TOWARDS SUSTAINABLE FLOOD MITIGATION USING NATURAL WATER RETENTION MEASURES IN SUB CATCHMENTS. CASE STUDY: PADANG, WEST SUMATRA

Ahmad Junaidi, Nurhamidah, Darwizal Daoed, Februarman, Sunaryo

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ ahmad_junaidi@eng.unand.ac.id

ABSTRACT

Flooding and drainage systems are having a strong correlation in every urban management. When the drainage systems are not able to drain the water on the surface and the rivers are overflowing, then both cause flooding in urban areas. In Padang, flooding due to river overflow occur almost every year in the city center. Padang has at least 5 big catchment and many small catchments. However, Anai kandis catchment is the one of the most affected area by floods in every year. The study aims to create the sustainable urban drainage system by designing the natural water retention measures in sub catchments. The case was taken in a sub catchment which is located near the most affected areas. The methodology was using the spatial analysis D8 model matrix for the flow direction and accumulation, and using ArcSWAT for water delineation of sub catchments. The results of the analysis of the flow direction and D8 matrix in the region show flood inundation in the most populated areas. Retention ponds are the natural solution to the problem of flooding in urban areas; retention ponds function to temporarily accommodate the volume of floods

that will inundate settlements. By processing rainfall data over the past 10 years using the rational method, a maximum discharge of a 10-year return period of 292.78 m3 / s is obtained. With a concentration-time of 98.95 minutes reaching peak discharge, the planned flood volume can be calculated for retention pond planning. The proposed retention pond dimension to be used is an area of 40000 m2 with a depth of 2m from the available land area of 9.81 hectares. Retention ponds can reach a maximum volume within 273.24 minutes, with the effectiveness of minimum 75% of peak discharge.

ICEEDM-1059

IMPACT OF GROINS ON SHORELINE CHANGE BETWEEN THE BATANG AIR DINGIN AND BATANG ANAI ESTUARY IN THE PROVINCE OF WEST SUMATRA

Junaidi, Boy Setiawan, Abdul Hakam, Darwizal Daoed, Februarman

Civil Engineering Department, Andalas University, Padang, 25163, Indonesia
✉ junaidi@eng.unand.ac.id

ABSTRACT

The city of Padang has a coastline of ± 18 Km or almost 5% of the total length of the coastline of West Sumatra. The problems associated with Padang Beach are the continuous occurrence of coastline retreat due to the beach erosion. In 2012, The Sumatra V River Basin and the West Sumatra Province Water Resources Management Office had built groins to prevent the abration of the coastline between Batang Air Dingin and Batang Anai estuary. The authors are interested in researching and analyzing shoreline changes in the coastal area between the Batang Air Dingin estuary and the Batang Anai estuary after the construction of the groins in 2012. The main objective of this study is to determine the position of accretion and abration along the coastline at the research site and to simulate the direction of the wave so that it can be seen the direction of the particle (sediment) due to the presence of a coastal safety building (groins). The GENESIS software was used to simulate the shoreline changes. The data used were the coastline map (2017) from Google Earth, bathymetry data (2014) obtained from Gebco, wind data from NOAA which are converted into waves by means of hindcasting waves, and sediment data (D50) from the field survey. From this study, it was found that in the location where the groins had been built, accretion occurred along the coastal location of the research site. The coastline accretion reaches 25 m and the accretion

rate reaches 4.2 meters/year. In areas where groins have not been built, abrasion occurs due to the effect of reduced sediment supply because it has been captured by the groins on the left side. The annual abrasion rate is 1.2 m/year, which is located in the Pasie Jambak coastline. Based on GENESIS simulation for the next 10 years from 2017, sediment movement moves from the left to the right when the observer faces the sea. Groins are effective in advancing the shoreline, but have a negative impact on areas that have not been built by groins such as coastline retreat due to reduced of sediment supply.

ICEEDM-1060

NONLINEAR DYNAMIC ANALYSIS ADOPTING EFFECTIVE STRESS APPROACH OF AN EMBANKMENT INVOLVING LIQUEFACTION POTENTIAL

I Wayan Sengara and Ahmad Sulaiman

Faculty of Civil and Environment Engineering, Institut Teknologi Bandung, Indonesia

✉ 1995.ahmadsulaiman@gmail.com

ABSTRACT

Stability of an embankment under earthquake loads is challenging in the process of analysis and design. Some embankment design consist of saturated granular material that is potential to liquefaction. Earthquake loads to the embankment under this conditions is one of major cause of embankment failure. Seismic performance involving stress-deformations and excess-pore-water pressure was evaluated in this paper. The evaluation adopts effective stress approach with non-linear elasto-plastic constitutive model. Numerical simulations through parametric studies were performed to estimate minimum density and embankment height efficiently to tolerate lateral displacements due to liquefaction. A number of parametric analyses were performed to investigate the relationships among relative densities of sand, ground accelerations, embankment height to excess-pore-pressure and lateral displacement of the embankment. The liquefaction analysis is conducted numerically using a finite difference method FLAC Dynamic 2D software adopting Finn-Byrne constitutive model.

ICEEDM-1061

XFEM BASED FRACTURE ANALYSIS OF SINGLE NOTCH REACTIVE POWDER CONCRETE SPECIMEN SUBJECTED TO THREE POINT BENDING TEST

Patria Kusumaningrum, Bambang Budiono, Muhammad Fajar, Elitha

Faculty of Civil and Environmental Engineering, Institut Teknologi Bandung, Indonesia
✉ patria@si.itb.ac.id

ABSTRACT

An extended finite element method (XFEM) for fracture problem within the finite element software ABAQUS is adopted in order to investigate the mechanical properties and fracture behaviour of RPC material. The RPC materials observed are plain RPC of 0% and steel fiber RPC (SFRPC) of 2% volume fraction. Single edge notch three-point bending (TPB) tests of RPC materials are performed. The mechanical properties of RPC with respect to single edge notch TPB test, i.e. tensile stress, CMOD, and fracture energy obtained from experiment are then compared to those obtained from numerical analysis. A good agreement is observed between the experimental and numerical results.

ICEEDM-1062

RESILIENCE, CIVIL WAR AND SCHIZOPHRENIA IN WEST SUMATRA, INDONESIA

Yenny Narny, Yudi Andhoni and Herwandi

Andalas University, Padang, Indonesia
✉ *yenny.narny@yahoo.com.au*

ABSTRACT

This paper examines the life history of a woman who we call "Ibu Dini" (which is a pseudonym). Ibu Dini is a Minangkabau woman, which is the majority ethnic group of the province of West Sumatra, Indonesia. This paper explore two aspects of her life history which Ibu Dini defined in terms of her resilience: her life-long struggle with schizophrenia, and the long-lasting trauma caused by civil war.

ICEEDM-1063

PHENOMENA OF EXISTING MULTISTORIES BUILDING AS A DAMPER AGAINT TSUNAMI WAVE AT PANTAI PURUS AREA OF PADANG CITY

Darwizal Daud, Sunaryo, Akhmad Junaidi, Sefrino Hendra
Civil Engineering Department, Andalas University, Padang, Indonesia
✉ *darwizaldaoed@ft.unand.ac.id*

ABSTRACT
The Padang City was be shaken by earthquake of scale 7.8 SR at September 30, 2009. The earthquake was triggered tsunami potentially. The observation was conducted to identify the influence of the existing multistories buildings as a damper at Pantai Purus Area Padang City against tsunami wave by using three models. First model is the existing condition based on the aerial photo. The second model using the first model and placing multistories buildings along front of the buildings. The third model using the second model and the width of the front buildings to be two times. According to the observation, the multistory buildings function as damper against tsunami wave effective, especially by the height of the buildings.

ICEEDM-1064

PANDEGLANG REGENCY SPATIAL EVALUATION BASED ON TSUNAMI HAZARD POTENTIAL

Roihan Nauval Majid, Triarko Nurlambang
Department of Geography, Universitas Indonesia, Indonesia
✉ *triarko@gmail.com*

ABSTRACT
The coastal area of Pandeglang Regency is one area that has the potential to be affected by the tsunami. The existence of the Krakatau Anak Volcano and plate subduction paths in the Sunda Strait cause Pandeglang Regency to become one of the regions that has a tsunami potential. One of the steps to anticipate the tsunami disaster is to do spatial planning that has considered the potential tsunami hazard. The purpose of this research is to evaluate the spatial area of Pandeglang Regency based on the identification of potential

tsunami hazards. The identification of potential tsunami hazards is done by modeling the potential distribution of tsunami wave heights in coastal areas using GIS modeling. The results of the identification of potential tsunami hazards on the coast of Pandeglang Regency showed that an area of 194.15 hectares of residential land and the location of existing activities had the potential to be affected by the tsunami. The total area of the coastal area of Pandeglang Regency which was potentially affected by the tsunami hazard reached 1483.26 hectares. The results of a review of the Pandeglang Regency's spatial plan showed that 488.22 hectares of land were found in the planned residential spatial patterns that were potentially affected by the tsunami. Therefore, the regional spatial plan of Pandeglang Regency in the study area needs to be evaluated by changing the function of residential land that has the potential to be affected by the tsunami hazard to the border of the beach or other open land.

ICEEDM-1067

THE FLOOD DISASTER MIGITATION MODEL IN BENGKULU CITY USING HEC-RAS AND GIS

Gusta Gunawan
Department of Civil Engineering, Bengkulu University
✉ *gusta.gunawan@unib.ac.id*

ABSTRACT

Flooding is the number one natural disaster that most often strikes the city of Bengkulu. However, there is no flood forecasting model that is able to forecast the flooding accurately . So, every flood event always causes economic, social and ecological losses that always increase from time to time. This research aims to develop a model of flood forecasting to reduce the risk of economic, social and ecological loss. Flood peak is predicted with of HSS SCS synthetic hydrographs. The deepening of the water level and the extent of the flood inundation is done with HEC-RAS software. The calculation of economic, social and ecological losses of floods is carried by shadow price. Flood evacuation routes are determined by the Geographic Information System software. The ability of the channel to accommodate flood discharge is calculated and simulated with the help of SWMS software. The developed model was tested on the Air Bengkulu river and the model validation test was carried out in the

Rawa Makmur village, Bengkulu City. The results showed that the peak flood discharge was 1400 m3 /s. High flood inundation ranges from 1-3 m with a pool area covering 30% of the area of Rawa Makmur village. Direct economic losses of around 1.5 billion and indirect more than 4 billion, social losses of around 1 billion and ecological losses arising from flooding of 2 billion. The occurrence of flooding is caused by the inability of the existing channels both rivers and city drainage to collect rainwater and drain it into the sea. The best evacuation route for flood events is alternative route 1. The conclusion of this study is that the model developed has been able to answer various flood problems in Bengkulu City, but validation of the model needs to be done continuously in order to obtain a reliable flood forecasting model.

ICEEDM-1069

LESSONS LEARNED FROM THE 28 SEPTEMBER PALU-DONGGALA EARTHQUAKE

Ketut Sulendra, Anwar Dolu, Ida Sinaga, Tutang Mukhtar
Civil Engineering, Tadulako University, Central Sulawesi, Indonesia
✉ *ketutsulendra5@gmail.com*

ABSTRACT

Friday 28 September 2018, at 18:02 pm local time, a strong earthquake of moment magnitude 7.5 occurred at 77 km north side from Palu City in central Sulawesi Island, Indonesia. The earthquake epicentre location at 0.180 S; 119.850 64 E. Many infrastructures and building damage after the main shock. More than one hundred existing building to assessment to knowed mechanism and and caused of the damage. The quick assessment of building particular public building. The assessment report has been founded varieties of damages, lightweight, moderate, heavy damages until totally collaps of building. Many mechanism failures of structure building such as : sand wich, soft story, short column mechanism, poorly detailing of reinforcement. The mechanism and caused of the damage are describe and thoroughly discussed.

AUTHOR INDEX

The 4th ICEEDM 2019 is organized by Universitas Andalas (Unand), Institut Teknologi Bandung (ITB), and AARGI (Asosiasi Ahli Rekayasa Gempa Indonesia, Indonesian Earthquake Engineering Association)

Sponsored by :

PRIME PLAZA
Hotels & Resorts

MULTIKON

FREYSSINET

MAGDATAMA

NINDYA

STRUKTUR

TOTAL BANGUN PERSADA

PENTA ARCHITECTURE
A DIVISION OF PENTA AREKAYASA

AGUNG PODOMORO LAND

GREEN BAY PLUIT

Alam Sutera

JAYA KONSTRUKSI