



IABSE SYMPOSIUM KOLKATA 2013

*Long Span Bridges and Roofs –
Development, Design and Implementation*

REPORT

Organised by
Indian Group of IABSE

Supported by
**Ministry of Road Transport and Highways, Government of India
and
Government of West Bengal**

ULB Darmstadt

19306569



<i>Committee</i>	ii
<i>Preface</i>	iii
<i>Table of Contents</i>	iv
<i>Author List</i>	xvi

Table of Contents

KEYNOTE SESSIONS

KS 1: Long Span Bridge & Roof

<i>Fifty Years of Bridge History</i> Jacques COMBAULT	2
<i>Can Bridge Design Competitions Give Value for Money</i> Naeem HUSSAIN	12
<i>The New Football Stadium Roof in Saint-Petersburg, Russia</i> Igor KOLJUSHEV, Roman GUZEEV, Dmitry MASLOV	20
<i>Evolution of the Ohio River Bridges Project in Kentucky/Indiana</i> Peter D. BRETTELL	26

KS 2: Long Span Bridge & Roof

<i>Invention and Innovation—New Roof Concepts for Large Sports Stadia</i> Knut GOPPERT	34
<i>Challenges in Erecting the West Kowloon Terminus Roof</i> Michael TAPLEY, Rick SHELDON	41
<i>The Use of Science in Long Span Bridge Engineering</i> Robin SHAM	49
<i>Innovation in Long Span Concrete Bridges</i> Akio KASUGA	60

SPECIAL PLENARY SESSIONS

SS 1: Poverty Alleviation

<i>Infrastructure Engineering and Poverty Alleviation</i> S. S. CHAKRABORTY	72
<i>Technology as a Means of Reducing Poverty</i> Robert SILMAN	79
<i>The Role of Structural Engineers in Poverty Reduction</i> Jan A. WIUM	84
<i>Poverty Alleviation through Bridge Building</i> Jean-Claude BADOUX	93

**SS 2: Disaster & Others**

<i>The Uttarakhand Disaster of June 2013 – A Note</i> Prem KRISHNA	98
<i>Towards Implementation of Safer Built Environment by Integrating Technological and Social Approaches</i> Kimiro MEGURO, Yozo FUJINO	103
<i>Lessons Learned from the Collapse of the Nicoll Highway in Singapore April 2004</i> John ENDICOTT	112
<i>Rapid Assessment for Collapse Vulnerability of Non-Ductile Structures in Areas Of Low and Moderate Seismicity</i> Nelson LAM	118
<i>Condition of Vidyasagar Setu - Cable-Stayed Bridge in Kolkata</i> Mike SCHLAICH, Sadhan BANERJEE, Subhashish SEN	130

SS 3: Urban Transit including Metro

<i>Challenges in Implementation of Elevated Transport Projects in Mumbai</i> P. R. K. MURTHY, Vikas NAIK	136
<i>Some interesting Construction Features in Namma Metro Viaducts and Stations</i> Sudhir CHANDRA	142
<i>Kolkata Metro including the East West Metro</i> H K SHARMA, Bidhan C. ROY, Biswanath Dewanjee	154
<i>Mass Rapid Transit System Challenges for Indian Cities</i> Herve CUGNET	164
<i>Dynamic Train-Bridge Interaction in Monorail Sao Paulo Metro Line 2</i> Janjic DORIAN	172

TECHNICAL SESSIONS**TS 01: Long Span Bridge: Cable Stay**

<i>The Signature Cable-Stayed Bridge in New Delhi</i> Mike SCHLAICH, Uwe BURKHARDT	182
<i>Innovative Design of Tuanbo Bridge in an Urban Environment</i> Andrew YEOWARD, Luke Yunbiao YANG, Xuekai LIU, Bin XIE	184
<i>Orio Bridge in Innovative Hybrid: Cable Stayed - Suspended Structure</i> José ROMO	186



<i>Engineering Solutions for Golden Horn Bay Bridge with V-shaped Pylons</i> Igor KOLJUSHEV, Roman GUZEEV, Dmitry MASLOV	188
<i>Rajiv Gandhi Sealink - Mumbai, India: Design and Construction of the Bandra and Worli Twin Cable-stayed Bridges</i> Max MEYER, D.K. SHARMA, Dinesh D. PARADKAR	190
<i>Design of Steel Cable-stayed Bridge with Low Height Towers</i> Tomoo TOMODA, Hidenori TAKAHASHI, Hiroshi NAKAGAWA, Yozo FUJINO, Hiroshi KATSUCHI	192
TS 02: Long Span Bridge: Suspension Bridge	
<i>Design Trend of Tower Shapes toward Long-Span Suspension Bridges</i> Namhee K. HONG, Hyun-Moo KOH, Sung-Gul HONG	196
<i>Long Span Suspension Bridge Spanning up to 2800m with Longer Design Life</i> Myeong-jae LEE, Gukjin HWANG, Jungmook, LIM, Soon-duck, KWON	198
<i>Preliminary Design of Four Optional Long Bridge Solutions for the Western Scheldt Crossing, Netherlands</i> Ryszard A. DANIEL	200
<i>Equivalent Model for Tower Design of Four-span Suspension Bridges</i> Dong-Ho CHOI, Ho-Sung NA, Sun Gil GWON	202
<i>Investigations on a Degraded Suspension Bridge: Damage Characterization and Repair Actions</i> Didier GERMAIN, Adrien HOUEL, Christian CREMONA	204
<i>Analysis and Experiments on the Secondary Stresses of the Parallel Wire Cable in Suspension Bridge</i> Minjae LEE, Jonghoon MOON, Jahgeol YOON, Ho-Kyung KIM	206
<i>Forward Analysis and Erection Control of Gwangyang Bridge</i> Dorian JANJIC	208
TS 03: Long Span Roof: Sports Complex	
<i>The Roof of the Swiss Tech Convention Centre in Lausanne - Structural Design and Execution</i> Claudio PIRAZZI, Michel THOMANN, Gabriele GUSCETTI	212
<i>Jawaharlal Nehru Stadium</i> Knut GÖPPERT, Bidhan C. ROY, Subhasish CHATTERJEE	214
<i>Dr. Shyama Prasad Mukherjee Swimming Pool Complex (SPM)</i> Knut STOCKHUSEN, Bidhan C. ROY, Dipankar, PAUL	216
<i>Innovative Erection Methods for Long Span Roofs: Two Outstanding Examples</i> Le Treut BRICE, Damien DELBOS, Boris COUSIN	218



<i>Large Span Roof for Sports Structures – a Case Study</i> Anirban SENGUPTA, Asish CHATTERJEE	220
<i>Design Features of IG Stadium</i> Subhasish CHATTERJEE, Soumya RAY	222
TS 04: Long Span Bridge: Forensic/Rehabilitation	
<i>Investigation of Fastening Failure in Tram Track Structure on a Bridge Over the Vistula River</i> Janusz HOŁOWATY	226
<i>Failure Mode Prognosis of Highway Grillage Girder Bridge Considering Shear Resistance of Diaphragms</i> Zhi SUN, Yi ZHANG, Yue AN	228
<i>Stability Analysis of Slender Passageway of AUW's Campus Center</i> Sabbir SIDDIQUE	229
<i>The Rehabilitation of Long Span Truss Bridge</i> Tomasz W. SIWOWSKI	231
<i>Overview of Research Project on Double Composite Steel Bridge</i> Steven L. STROH, Rajan SEN, Marcus ANSLEY, Niranjana PAI	233
<i>Investigation of Composite Truss Arch Bridge's Deterioration in China</i> Hai-jun WU, Ping LU, Shengning WANG, Kunling ZHANG, Wenlong WANG	235
<i>Distress Prevention during Construction Stages of a Very Sharp Horizontally Curved Bridge</i> Sayana IMSOM-SOMBOON, Monkiat CHANINTONLEELA, Sukit YINDEESUK, Panit VANACHAYANGKUL	237
TS 05: Long Span Bridge: Structural Health & Serviceability	
<i>Structural Health Monitoring of Signature Bridge in Delhi - the Bridge-Structural-Health-Monitoring-System for the Wazirabad Bridge Project</i> Peter FURTNER, Danillo DELLA CA', Chinmoy GOSH	240
<i>Structural Health Monitoring System (SHMS) for the New Forth Crossing</i> Oliver RICHES, K.Y. WONG, Ngai YEUNG	242
<i>The Role of SHM Systems in Planning Bridge Renovation Works</i> Thomas SPULER, Gianni MOOR, Niculin MENG	244
<i>SHM of the New Bridge over the River Sado in Portugal during Construction</i> Luís OLIVEIRA SANTOS, Min XU, João Pedro SANTOS	246
<i>Structural Health Monitoring of a Railway Truss Bridge from Limited Static & Dynamic Responses</i> Debasish BANDYOPADHYAY, Priyabrata GUHA, Jafar ALI	248
<i>Damage Location Identification of Railway Bridge under Moving Train</i> Deshan SHAN, Junying ZHANG, Qiao LI, Tiande LV	250



<i>Bridge Structural Damage Location Identification under Seismic Action</i> Deshan SHAN, Zhenxin HUANG, Zhen HUANG, Jingchao YANG	252
---	-----

TS 06: Long Span Bridge: Research/New Techniques/Materials

<i>Longitudinal Vibration Control of Long-Span Railway Cable-Stayed Bridge</i> Deshan SHAN, Qiao LI, Zhen HUANG	256
--	-----

<i>Exploration of Super-Large Span Steel Truss- Fabricated Concrete Composite Continuous Rigid Frame Bridges</i> Zhixiang ZHOU, Yanmei GAO, Chengjun LI, Guowen YAO	258
--	-----

<i>Development of Concept for a Floating Bridge for Crossing the Sognefjord in Norway</i> Svein Erik JAKOBSEN, Per Norum LARSEN, Erik SUNDET	260
---	-----

<i>An Automatic Walking-type Launching System and its Application</i> Yongtao ZHANG, Renzhong ZHOU	262
---	-----

<i>An Immersed Tunnel, Better than a Long Span Bridge?</i> Rob VERGOOSSEN, Hans DE WIT Netherlands, Eelco VAN PUTTEN	264
---	-----

<i>Unmanned Aerial Vehicles (UAV) for the Assessment of Existing Structures</i> Norman HALLERMANN, Guido MORGENTHAL	266
--	-----

<i>Towards a new agenda for Integrated Design</i> Christian ERNST	268
--	-----

TS 07 Long Span Bridge: Cable Stay

<i>Stay Cable Forces under Dead Load for Cable-Stayed and Extradosed Bridges</i> ElAraby EL SHENAWY, Mike SCHLAICH	272
---	-----

<i>Estimation of Inelastic Buckling Collapse Loads for Steel Cable-Stayed Bridges</i> Dong-Ho CHOI, Sun Gil GWON, Hoon YOO	274
---	-----

<i>Field Measurement and Load Testing of the Rama IX Cable-Stayed Bridge</i> Kridayuth CHOMPOOMING, Sayan SIRIMONTREE, Wacharapong PRASARNKLIEO.....	276
---	-----

<i>Use of 3D Product Modeling in Cable Stayed Bridge Design and Construction</i> Atte MIKKONEN, Pekka PULKKINEN	278
--	-----

<i>Dynamic FE Model Updating of a Cable-Stayed Bridge</i> Junyong PARK, Ho-Kyung KIM, Wonsuk PARK	280
--	-----

<i>Fibre-Reinforced Polymer (FRP) deck for a cable stayed bridge</i> Kees VAN IJSELMUIJDEN, Liesbeth TROMP, Peter HAGENAARS, Martijn DE BOER	282
---	-----

<i>Vessel Collision Design Method for Long-Span Bridges</i> Won Suk PARK, Jung-Hyun LIM, Hyun-Moo KOH	284
--	-----

**TS 08: Long Span Bridge: Cable Stay Extradose**

<i>Second Vivekananda Bridge, Kolkata, India</i> Bidhan C. ROY, Daniel M TASSIN	288
<i>State-of-the-art Extradossed Cable Technology</i> Erik MELLIER	290
<i>Third Karnaphuli Bridge in Bangladesh – Design & Construction</i> N. BANDYOPADHYAY, Sanjib MITRA	292
<i>Extradosed Bridges for Major River Crossings on Vadodara Mumbai Expressway</i> N.K. SINHA, Gautam CHATTOPADHYAY, Malay DASGUPTA	294
<i>Innovative Design and Construction of Pier Head for Nivedita Setu</i> Arindam BASU, Dipankar PAUL	296
<i>Simplified Method to Analyse Casting Sequences of Composite Bridge Slabs</i> Luigino DEZI, Fabrizio GARA, & Graziano LEONI	298
<i>Investigation of Design Loads and Load Combinations for Limit State Design of Long Span Cable-Supported Bridge</i> Inyeol PAIK, Hae Sung LEE, Seung-Han LEE	300

TS 09: Long Span Roof: Industrial & Convention Centre

<i>High Strength Steel in Friends Arena, Savings in Weight and Cost</i> Lars CEDERFELDT	304
<i>Glass Covering of Long Span Roofs</i> Barbara SIEBERT	306
<i>Design of the Singapore Sports Hub Roof with High Strength Niobium Steel</i> Mike KING, William WHITBY, Graeme HANSHAW	308
<i>Design of a Folded Roof for the V&A Museum in London</i> Lee FRANCK	310
<i>The Mineral Storeyard Confinement Structures: A Case Study</i> Gian Michele GANCIA	312
<i>Suspension Roof Systems in the Age of Building Information Modelling</i> Cristobal CORREA	314
<i>Long-span Roof Truss Elements Space Frames</i> Ekasit LIMSUWAN, Pimol CHAROENYING, Uthai LERKSIRIRAT	316



TS 10: Young Engineers Program

David NETHERCOT, *theme*: The new idea of IABSE

Carlos MENDEZ, *theme*: YEP-Board and the working commissions and working groups, some insights about the E-Learning Board and WG 7

Franck LEE, *theme*: Studying and Working abroad and FoD (FoD stands for the successful young engineers conference in Great Britain) <http://www.iabsekempfod.com/>

Member of the German Group, e.g. Guido MORGENTHAL or Peter SEITZ, *theme*: Insights about the WC 3 and SEI EditB, invitation YEC2014 (Young Engineers Colloquium in Germany)

Geometrical Influence on Transverse Thermal Stresses in Concrete Bridge Sections
Oskar LARSSON 320

TS 11: Long Span Bridge: Pedestrian; Arch; PSC Girder/Steel bridge

New Generation Foot Bridge for Delhi: Design and Construction
Gurpreet Singh SOHAL, Mahesh TANDON 324

Design of the Chenab Bridge in India
Pekka PULKKINEN, Kilian KARIUS, Risto KIVILUOMA 326

The Construction of Long Span Footbridge over Vistula River in Cracow
Tomasz W. SIWOWSKI, Artur WYSOCKI 328

Long Span Steel Arch Bridges
R. B. S. GULIANI 330

Seaford Rail Viaduct – Launching a Kilometre
Harry TURNER, Andreas KERKOVIVUS 332

Design and Construction of Pedestrian Bridge at Kharghar, Navi Mumbai, India
Umesh K RAJESHIRKE, Nilesh L. BHADANE 334

Challenges Faced in Design of Most Unbalanced Cantilever Continuous P.S.C. Bridge over River Munawar at Beripattan, in J&K, India
Alok BHOWMICK, Praveen GUPTA, Sanjay JAIN 336

TS12: Long Span Bridge: Aerodynamics/Research Items/New Techniques

Quantification of the Effects of Turbulence in Wind on the Vortex-induced Vibrations
Tajammal ABBAS, Guido MORGENTHAL 340

Minimum Wind Design Considerations for Long Span Bridges – Case Studies
K. SURESH KUMAR, Stoyanoff STOYAN, Dallaire PIERRE 342

Reliability-based Design Of Long-Span Bridges - Wind Load Combination
Chul-Hwan YOO, Ho-Kyung KIM 344



<i>Fatigue of Threaded Rods in Stay-cable Anchorages due to Vortex Shedding</i> Bert SNIJDER, Johan MALJAARS	346
<i>Testing of Modular Expansion Joints – America’s leading role</i> Thomas SPULER, Gianni MOOR, Niculin MENG	348
<i>Equilibrium Equation for Spatial Frame Structure Constructed in Stages and Its Applications</i> Shunquan QIN, Jingxi QIN, Duo ZHANG	350
<i>Numerical Analysis of Highly Nonlinear Effects in Bridge Dynamics</i> Guido MORGENTHAL, Norman HALLERMANN	352
TS13: Long Span Bridge: Cable Stay	
<i>Design Features of Bardhaman Cable Stayed Road Over Bridge</i> Mike SCHLAICH, Subhashish SEN, Soumya RAY, Uwe BURKHARDT	356
<i>Cable Stay Technology and Its Application to Lakadiya Bridge at Bhavnagar, Gujrat</i> Aswani TYAGI, Somnath BISWAS, Kannappan SUBRAMANIAN	358
<i>Stability Analysis of the Effect of Soil Settlement on a Cable-Stayed Bridge in the Mekong River Delta</i> Hoang VU, Kiyomiya OSAMU, Tongxiang A N	360
<i>Sustainability through Innovation in Design and Construction – Case Study: Second Penang Bridge, Malaysia</i> Ismail bin MOHAMED TAIB, Sajal NANDY	362
<i>The Iconic Bandra Worli Sealink in the City of Mumbai, India – Construction of the Bandra Cable-Stayed Bridges</i> Suhaz KHEDKAR, Dinesh PARADKAR	364
<i>Construction Planning for India’s First “Signature Bridge</i> Mohan V. JATKAR, Swapnil A. NAVALKAR	366
TS14: Long Span Roof: Design, Construction & Others	
<i>Great Roof Marquee in the New Railway Station for High Speed Trains of Málaga</i> Carlos JURADO	370
<i>Design Features of Weightlifting Stadium</i> Bidhan C. ROY, Arindam BASU, Soumya RAY	372
<i>Construction of Inner Containment Dome Reactor Building - A Case Study</i> Mohan V. JATKAR, Shailesh PATIL	374
<i>Achieving Constructability in Structural Design for Building Structures</i> Jan A WIUM	376



<i>Role of Wind Tunnels in Assessing Wind Effects on Long Span Roofs – Case Studies</i> K SURESH KUMAR, B VENU KUMAR, C CINI.....	378
<i>Powerful Plastic Materials Allow New Structural Glass Roofs</i> Bernhard WELLER, Jan EBERT, Stefan REICH	380
<i>Partial Prestressing of Long Span Steel Truss Girder</i> Ekasit LIMSUWAN, Suchart CHAYOCHAICHANA, Uthai LERKSIRIRAT	382
TS15: Long Span Bridge: Cable Supported and Suspension Bridges	
<i>Three Generations of Bridging Over the Cooper River</i> Tuhin K. BASU	386
<i>New Phra Nang Klao Bridge - The Longest Prestressed Concrete Box Girder Span Bridge in Thailand</i> Sayan IMSOM-SOMBOON, Monkiat CHANINTONLEELA, Panit ANACHAYANGKUL, Sukit YINDEESUK	388
<i>Ultimate Strength Evaluation for Wide Type Box Girders in Cable Supported Bridges</i> Jong Seo KIM, Hae Sung LEE, Kyungsik KIM	390
<i>How the Quality of Cable to be Secured on Cable-Supported Bridge</i> Hajime HOSOKAWA	392
<i>New Approach on the Safety Factor of Cable in Long-span Bridge</i> Chan Min PARK, Jong Gyun PAIK, Sang Hoon SHIN, Ho Kyung KIM	394
<i>Integral Construction for Elevated Road over Barapullah Nalla from Sarai Kale Khan to Jawahar Lal Nehru Stadium</i> Mahesh TANDON, Sarvagya SRIVASTAVA, Ashish SRIVASTAVA	396
<i>Cost-effectiveness of Balanced Cantilever Girder Bridges Versus Cable Supported Bridges</i> Juan SOBRINO	397
TS16: Long Span Bridge: Research / New techniques/materials	
<i>Equivalent Wind Loading of Long-span Arch Bridges</i> Yongxin YANG, Yaojun GE	400
<i>Time-domain Aeroelastic Analysis of Bridge Using a Truncated Fourier Series of the Aerodynamic Transfer Function</i> Jinwook PARK, Kilje JUNG, Ho-Kyung KIM, Hae Sung LEE	402
<i>Modal Parameters Identification of Bridge Structure Based on Time-Frequency Domain</i> Deshan SHAN, Qiao LI, Zhaoxu WU, Zhen HUANG	404
<i>Indian Railway Bridges – Adoption of New Bearing Technology to Support the Progression towards Long Span Bridges</i> Santanu MAJUMDAR, Chinmoy GOSH, Gianni MOOR	406



<i>Study of the Strengthened Hybrid Structure Renovated from Railway Steel Bridge</i> Nozomu TANIGUCHI, Masanori HANSAKA, Fujikazu OHKUBO, Shinya SATAKE, Yusuke SUGINO	408
---	-----

TS 17: Long Span Bridge: Research / New techniques/materials

<i>Experimental Study on the Behavior of PBL Shear Connector for Steel-Concrete Composite Structures</i> Qiao LI, Song XIA, Canhui ZHAO, Yuzhi ZHANG	412
---	-----

<i>The Exceptional Bearings of the Tran Thi Ly Bridge, Da Nang, Vietnam</i> Thomas SPULER, Gianni MOOR, Pascal SAVIOZ	414
--	-----

<i>Traffic Actions for the Design of Roadway Bridges. A Comparison of International Codes</i> Hany B. MATAR, Mourad BAKHOUM, Ishac I. ISHAC	416
--	-----

<i>Scheme Comparison of Super-Large Span Bridge under the Condition of Limited Building Height</i> Gao, Yanmei, Zhou, Zhixiang	418
---	-----

<i>Design Live Load Model for Long Span Bridge</i> Eui-Seung HWANG; Do-Young KIM; Jin-Yong MOK;	420
--	-----

TS18: Long Span Bridge: Suspension Bridge

<i>Izmit Bay Suspension Bridge - Overview of the Project</i> Takeshi KAWAKAMI, Masahiro YANAGIHARA, Yasutsugu YAMASAKI, Junichi SHAURA, Tomoo KASUGA, Tunc CETINKAYA	424
--	-----

<i>Izmit Bay Suspension Bridge - Substructure Design</i> Assad Din JAMAL, Thomas LÖHNING, Robert ULLNER	426
--	-----

<i>Izmit Bay Suspension Bridge – Construction</i> Yasutsugu YAMASAKI, Takashi KANEKURA, Naoki IKOMA, Tomoaki SASAKI, Mitsuhiro KUDO	428
---	-----

<i>Izmit Bay Suspension Bridge. Global Analyses incorporating local sub models</i> Søren Christen CHRISTENSEN	430
--	-----

<i>Model Experimental Research for Super-Span Self-Anchored Suspension Bridge</i> Shaorui WANG, Zhixiang ZHOU	432
--	-----

POSTER SESSION

<i>A Long Span Structure in Romania</i> Zoltan KISS, Karoly BALINT, Nicu TOADER, Zsolt NAGY	436
--	-----

<i>Improving the Thermal Behavior of Steel Tendons by Shape Memory Alloys</i> Donatello CARDONE, Giuseppe GESUALDI, Domenico NIGRO	438
---	-----

<i>Slab Cracking Influence in the Fatigue Assessment of Continuous Composite Decks</i> Luigino DEZI, Massimo FORMICA, Fabrizio GARA, Graziano LEONI	440
--	-----



<i>Innovative Slip form Method for the Construction of Tapered Concrete Pylon of Long Span Cable Bridge</i> Won Jong CHIN, Young Jin KIM, Hee Seok KIM, Hye Jin YOON, Byung Suk KIM, Jong Sung SIM	442
<i>Advantages and Faults of Monitoring of Long Span Bridges in Poland</i> Henryk ZOBEL, Wojciech KARWOWSKI	444
<i>Assessment of the Condition and Performance of Long Span Bridges Using Automated Monitoring Systems – Optimising Inspection and Maintenance Efforts</i> Thomas SPULER, Gianni MOOR, Santanu MAJUMDAR	446
<i>Best practices in the use of Steel Box Girders for medium and long span Bridges in UK and Europe</i> Saprava BHATTACHARYA	448
<i>Kuala Lumpur Monorail Line Fleet Extension</i> Peter SEITZ, Azhan Effendy ARIFFIN	450
<i>Development of a new nondestructive inspection method for suspender ropes of suspension bridges</i> Masahiko TAKEUCHI, Kazuyoshi SAKAI, Akira MORIYAMA, Yuki KISHI	452
<i>Emerging Bridge Construction Industry of Bangladesh: Promise and Prosperity</i> S. M. KHORSHED ALAM, Abu Saleh Md. NURUZZAMAN	454
<i>Long Span Road Bridges of Bangladesh: Design Concept Problem Faced and Lesson Learnt</i> Abu Saleh Md. NURUZZAMAN	456
<i>Challenges in Bridge Construction over a Canal of Crocodiles at an Extremely Remote Location Thirty Years Ago</i> Ashit KUNDU, Saprava BHATTACHARYA	458
<i>A Two-Stage System Identification of Truss Bridge from Limited Measured Static Responses</i> D BANDYOPADHYAY, A MAJUMDAR, S SENGUPTA, S ROY	460
<i>Impact on the Seismic Performance of Steel Pipe Sheet Pile Foundation by the Joint Mechanical Properties</i> Tongxiang AN, Osamu, KIYOMIYA, Nguyen Thanh TRUNG	462
<i>Optimisation of Multi-type Sensor Placement for SHM based on application demands</i> Rohan SOMAN, Toulou ONOUFRIOU, Renos VOTSIS, Christis CHRYSOSTOMOU, Marios KYRIAKIDES	464
<i>Design and Construction of Multi-Span Extradosed Bridges</i> Matthias SCHUELLER	466
<i>Glass in Structures; Promising Developments</i> Rob NISSE	467



<i>Planning and Design of Long Span Bridges</i> Ravinder Bir SINGH	469
<i>The Design of a River-crossing Pedestrian Bridge in Kunming City, China: a New Structure Form for Cable-supported Bridge</i> Miao SU, Gonglian DAI, Ke LIU	471
<i>Diagnostic Load Test of Continuous Prestressed Box Girder Bridge</i> Sayan SIRIMONTREE, Kridayuth CHOMPOOMING, Wacharapong PRASARNKLIEO	473
<i>An Experimental Study of Residual Strain in Partially Prestressed Concrete Beams under Fatigue Loading</i> Yupu SONG, Jigang HAN	475
<i>Study on Seismic Responses of Frame High Pier</i> Dongsheng ZHU, Zhongfu XIANG, Shan CHANG,	477
<i>Enhancing Visual-based Bridge Condition Assessment for Concrete Crack Evaluation Using Image Processing Techniques</i> Huiju WI, Vu NGUYEN, Jaeho LEE, Hong GUAN, Yew-Chaye LOO, Michael BLUMENSTEIN...479	
<i>Design of Tall Railway Bridges in North-East India</i> Sumantra SENGUPTA	481
<i>Flutter Stability Studies of Long Span Bridge with Central Slotted Box Girder by CFD Numerical Simulation</i> Hao ZHAN, Tao FANG	483
<i>Development of Bridge Maintenance Management System in GIS Environment</i> Rajeev GOEL, Lakshmy PARMESHWARAN, S K SHARMA, Rajeev GARG, J K GOYAL, G K SAHU	485
<i>Prevention of Corrosion by Generating Potential in Reinforcement Steel Using Piezoelectric Material</i> Mahesh CHANDRA, Aggraj SHARMA, Shivam SAXENA	487
<i>Design Features of K.D Yadav Wrestling Stadium</i> Subhasish CHATTERJEE, Soumya RAY	489
<i>Bridge Construction Management</i> R. K. DHIMAN	491
<i>Rehabilitation and Upgradation of Major Dhyan Chand National Stadium</i> Hassan AHMAD, Debasish MISHRA, Tanmoy GUHA	493
IABSE REPORTS	495