STRUCTURAL ENGINEERING

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STRUCTURAL ENGINEERS

ISSE

VOLUME 25 - 1

JAN - FEB - MAR 2023

GEM 35: PROF. SURENDRA P. SHAH, OUTSTANDING RESEARCHER & AMP; MENTOR ON CEMENT-BASED MATERIALS - see page 3

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LET US BUILD A STRONG STRUCTURE OF INDIAN SOCIETY

NEWS AND EVENTS DURING JAN TO MAR 2023

◀ **13 Jan 2023**

ISSE Palghar Local Centre in association with ULTRATECH Technical Lecture was held on a) MEP FOR HIGH RISE STRUCTURE BY Er. Manish Parekh (MEP Consultant) b) CONCRETE FOR HIGH RISE STRUCTURE BY Er. Mahesh Tendulkar (Concrete Technologist) at Boisar.

31 Jan 2023 ▶

ISSE Student Chapter inaugurated at Aditya Engineering College, Surapalem, Andhra Pradesh. Er. Madhav Chikodi from ISSE Mumbai was invited as Chief Guest for the function.

◀ **17 Feb. 2023**

ISSE in association with ULTRATECH CEMENT and IEI conducted a technical lecture on Methods of Demolition for Bridges and Buildings by Er. Ram Matte

17 Mar. 2023 ▶

ISSE Navi Mumbai chapter in association with ULTRATECH CEMENT and IEI Belapur Local Centre arranged lectures on how to make earthquake resistant buildings and learning from failures on the sidelines of the Turkey earthquake.

STRUCTURAL ENGINEERS

INDIAN SOCIETY OF STRUCTURAL ENGINEERS

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Editor : Hemant Vadalkar

AIMS & OBJECTIVE OF ISSE

1. To restore the desired status to the Structural Engineer in construction industry and to create awareness about the profession.
2. To define Boundaries of Responsibilities of Structural Engineer, commensurate with remuneration.
3. To get easy registration with Governments, Corporations and similar organizations all over India, for our members.
4. To reformulate Certification policies adopted by various authorities, to remove anomalies.
5. To convince all Govt. & Semi Govt. bodies for directly engaging Structural Engineer for his services.
6. To disseminate information in various fields of Structural Engineering, to all members.

FIELD OF INTEREST

- ❄ Structural; Designing & Detailing
- ❄ Computer Software
- ❄ Materials Technology, Ferrocement
- ❄ Teaching, Research % Development
- ❄ Rehabilitation of Structures
- ❄ Construction Technology & Management
- ❄ Geo-Tech & Foundation Engineering
- ❄ Environmental Engineering
- ❄ Non Destructive Testing
- ❄ Bridge Engineering & Other related branches

Fraternity News

WELCOME TO NEW MEMBERS

(JAN - FEB - MAR 2023)

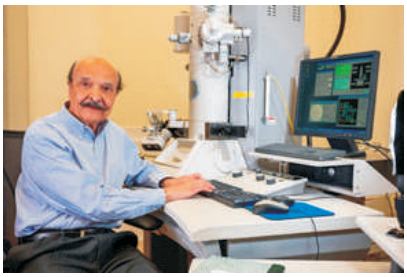
2252 Sandeep Kumar Dubey
2253 Sarjerao Mahadeorao Patil
2254 Sanjaybhai Kiritkumar Shah
2255 Ritesh Jagdish Laddha
2256 Ravindra Padmakar Bapat
2257 Raja Subhash Hatkar
2258 Tanmay Pramod Thakur
2259 Sumit Sadanand Joshi
2260 Yayati Rajendra Patil
2261 Sagar Diliprao Wankhede
2262 Prasad Ravikant Pant
2263 Vineet Ashok Kedia
2264 Sunil Kamlakar Jadhav
2265 Milind Vishwas Mohod
2266 Ankush Pramodrao Pachgade
2267 Bhaskar Das Nadia
2268 Alaukik Kiran Alkari
2269 Pankaj Subhashrao Deshmukh
2270 Rohan Harish Karande
2271 Sambhaji Prakash Keche
2272 Shubham Vasant Patel
2273 Amit Mohanlal Gilda
2274 Vipin Vijay Gupta
2275 Prasad Prakash Rahare
2276 Shadab Anjum Momin Azizurrahman
2277 Atulkumar Ganesh Mishra
2278 Amit Pundlikroa Mahajan
2279 Samir Ahmed Yakeen
2280 Vikrant Vikram Rastogi
2281 Rajkumar Sureshchandra Laddha
2282 Ashok Gurusiddappa Patil
2283 Omeshwar Ramakant Mhatre
2284 Ninad Chandrakant Chidrawar
2285 Rakesh Shravankumar Jha
2286 Keshav KashinathSangle
2287 Amol Balasaheb Tardale
2288 Naveen Kumar Nagendrappa
2289 Abhyuday Titiksh
2290 Kinchit Harshadkumar Soni
2291 Muhhammed Mustafa M P
2292 Mahendrakumar Ananda Rane
2293 Rashmi Santosh Parathnale
JM 71 Ayush K Bansal
JM 72 Vikas Singh
OM 36 Altair Engineering India Pvt Ltd.

Patrons : 38
Members : 2293
Student Members : 370
Organisation Members : 36
Junior Members : 72
Sponsor : 8
IM : 05

TOTAL STRENGTH : 2,822

GEM 35: PROF. SURENDRA P. SHAH, OUTSTANDING RESEARCHER & MENTOR ON CEMENT-BASED MATERIALS

Dr. N. Subramanian, Ph.D., FNAE



Prof. Surendra P. Shah (1936-)

Prof. Surendra P. Shah, Ph.D., Hon. MACI, Hon. MASCE currently serves as the Presidential Distinguished Professor, University of Texas at Arlington, and Walter P. Murphy Emeritus Professor of Civil and Environmental Engineering, Northwestern University, USA. Professor Shah has been actively involved in concrete technology research for several decades. His current research is concerned with using nano-technology to enhance the performance of concrete at macro scale. Professor Shah has published more than 600 papers in top technical journals, published three books, and co-edited 20 books. He has served leadership role in professional societies including ASCE, ACI, TRB, and RILEM. He has received numerous awards from ACI, ASTM, ASCE, American Ceramic Society, and RILEM.

Early Life and Education

Surendra Shah was born in India to Poonamchand and Maniben Shah in year 1936. His father worked as a businessman, and his mother was a hard-working housewife. Following his education at Modern School in Bombay, he attended Elphinstone College in Bombay before graduating with a bachelor's degree in Civil Engineering from the Birla Vishvakarma Mahavidyalaya (B.V.M.) College in Vallabh Vidyanagar, Gujarat, India. He then moved over to the United States, where he received his M.S. from the Lehigh University in Bethlehem, Pennsylvania, and his Ph.D. from the Cornell University in Ithaca, New York.

Teaching Experience

He served as a Professor of Civil Engineering and Materials Engineering, University of Illinois at Chicago; Coordinator, Graduate Program Structural Engineering, Department of Civil and Environmental Engineering, Northwestern University; Director, Center for Concrete and Geomaterials, Northwestern University; and Director, Graduate Program, Department of Materials Engineering, University of Illinois, Chicago. He was the founding director of USNSF funded center of Advanced Cement Based Materials (ACBM). This interdisciplinary center, based at Northwestern University included the academic partners Universities of Illinois, Michigan, Purdue, and NIST.

In addition to teaching at Northwestern, he has taught at the University of Illinois at Chicago and served as a visiting professor at Massachusetts Institute of Technology (MIT), University of Sidney, Denmark Technical University, Delft University of Technology, National University of Singapore, Darmstadt Technical University, and LCPC Paris. He has been an honorary professor at the Hong Kong Polytechnic University and L'Aquilla University in Italy, guest professor at Southeast University, and the distinguished professor at Indian Institute of Technology, Madras, and Jinan University China. He is an honorary academician at Dalian Maritime University and Tongji University. He is the member of the Institute of Advanced Studies at Hong Kong University of Science and Technology.

Currently, he is serving as the director of the Center of Advanced Construction Materials, Civil Engineering department at University of Texas at Arlington. The center has four core faculty members and about 20 Ph.D. students and post doctoral fellows.

Industrial Experience

Short-term and Long-Term Positions:

Prof. Shah acted as a short-term consultant to several industrial companies in U.S. and abroad.

In addition, Prof. Shah was involved with the following organizations as a long-term consultant.

- Research Consultant, Lafarge, France
- Research Consultant, U. S. G., Des Plaines, Illinois
- Research Consultant, Wiss, Janney, and Elstner, Northbrook, Illinois
- Research Consultant, Holderbank Management, Ltd., Switzerland
- Research Consultant, Corning Glass Works, Corning, New York
- Research Engineer, Portland Cement Association, Skokie, Illinois
- Design Engineer, Modjeski and Masters, Harrisburg, Pennsylvania.

HONORS AND OTHER PROFESSIONAL ACTIVITIES

The outstanding research and accomplishments made by Prof. Shah in the areas of fracture, fiber reinforced composites, non-destructive evaluation, transport properties, processing, rheology, nanotechnology and use of solid waste materials in concrete were recognized by several National and international bodies with several awards and accolades. Dr. Shah is a member of the National Academy of Engineering and a foreign member of the Chinese Academy of Engineering, the Indian Academy of Engineering, Russian Academy of Engineering, and Athens Academy. He is the only civil engineer who is a member of all these academies. He has received many awards including the RILEM Gold Medal in 1980, the ASTM Sanford E Thompson Award in 1983, Swedish Concrete Award in 1993, Engineering News Record News Maker Award in 1996, ASCE Charles Pankow Award in 1997, and the ACI Arthur R. Anderson Award in 1999. Most recently, he was awarded honorary memberships in the American Concrete Institute and RILEM, a construction association based in France. He was named one of the Most Influential People in the industry by Concrete Construction Magazine in 2006. He spent time as an honorary professor at the Indian Institute of Technology, Bombay, as well as IIT Madras, through a Fulbright grant. The other recognitions are listed below:

- Member: National Academy of Engineering Member, National Academy of Inventors
- Foreign Member: Chinese Academy of Engineering; Indian Academy of Engineering; Russian Academy of Engineering; and Academy of Athens
- Honorary Professor: University of L'Aquila; Nanjing Technical University; Tongji University; Hong Kong Polytechnic University; and Dalian Maritime University
- Distinguished Professor, Indian Institute of Technology, Madras and Jinan University
- Member in Institute of Advanced Study, Hong Kong University of Science and Technology
- Honorary Member: American Concrete Institute; and The International Union of Laboratories and Experts in Construction Materials, Systems and Structures (RILEM, from the name in French)
- Distinguished Lecture Series, University of California, Los Angeles; University of Illinois, Chicago; and Vanderbilt University, Iowa State University, Ames
- Fulbright Award, Indian Institute of Technology, Mumbai; and IIT Madras
- Elizabeth D. Rockwell Engineering Lecture, University of Houston Della Roy Lecture, American Ceramic Society, Detroit,
- Frank E. Richart Distinguished Lecture, University of Michigan
- Top Ten Most Influential Persons in the Concrete Industry, by Concrete Construction
- Robert E. Philleo Award, American Concrete Institute, Concrete Research Council
- CTU Award, University of Dundee. Scotland
- The Richard J. Carroll Memorial Lectureship, Johns Hopkins University
- Henry Crown Award, American Concrete Institute
- Arthur R. Anderson Award to ACBM Center

- Charles Pankow Award for Innovation American Society of Civil Engineers,
- Swedish Concrete Award
- Arthur R. Anderson Award, American Concrete Institute
- Sanford E. Thompson Award, American Society of Testing and Materials (ASTM) RILEM Gold Medal Award
- Alexander von Humboldt Fellowship Award for Distinguished Senior Scientist
- Conferences in his honor have been organized by American Concrete Institute, RILEM, University of Dundee.
- UNESCO Expert to India
- Member, Editorial Board, ASCE Journal of Civil Engineering Materials
- Member, Editorial Board, Journal of Ferrocement
- Member, Editorial Board, RILEM Journal of Materials and Structures,
- Editor-in-Chief, Concrete Science and Engineering.

TECHNICAL COMMITTEES

Prof. Shah served in the technical committees of several research organizations, including the following:

- Transportation Research Board, Task Force on Nanotechnology
- NAE Liaison Committee
- NAS Panel to evaluate NIST Building and Fire Research (2009-2010)
- ACI- 215 Fatigue of Concrete, ACI- 236 Material Science of Concrete, ACI- 237 Self Consolidating Concrete, ACI- 231 Properties of Concrete at Early Ages, ACI- 440 Fiber Reinforced Polymer Reinforcement, ACI- 544 Fiber Reinforced Concrete, ACI- 548 Polymers in Concrete, and ACI- 549 Thin Reinforced Cementitious Products and Ferrocement,
- Member, Transportation Research Board Task Force on Nanotechnology
- Member, Bureau, RILEM (2002)
- Chair, Advisory Committee, Engineering Mechanics Division, ASCE (1999-2001), Chairman, Executive Committee, Engineering Mechanics Division, American Society of Civil Engineers (1996-1997),
- Chairman, Properties of Concrete, Transportation Research Board (1993-96)
- Member, National Initiative on High-Performance Concrete (past)
- Member, Materials Research Council, American Concrete Institute (past)
- Member, Management Advisory Board, RILEM.
- Member, Advisory Committee on Cement and Concrete, Strategic Transportation Research Study (1985-1986)
- Chairman, RILEM Committee on Strain -Softening of Concrete
- Chairman, RILEM Committee on Fracture of Concrete (1986-1992)
- Chairman, Fiber Reinforced Concrete, American Concrete Institute (past)
- Vice Chairman, Fracture of Concrete and Rock, Society of Experimental Mechanics
- Member, High Strength Concrete, American Concrete Institute
- Member, Ferrocement, American Concrete Institute
- Member, Fracture Mechanics, American Concrete Institute
- Member, Polymer Concrete, American Concrete Institute
- Chairman, Fatigue of Concrete Structures, American Concrete Institute (past)
- President, Chicago Chapter, American Concrete Institute (1974-75)
- Chairman, Properties of Materials, Engineering Mechanics Division, American Society of Civil Engineers (1973-75, 1985-87)
- Member, Ad Hoc Committee on Ferrocement for Developing Countries, National Academy of Sciences (1971-1972)

CONFERENCES

Prof. Shah was also eager to disseminate his research through publications and presentations and acted as Chair/Co-chair in numerous conferences. Some of these conferences are listed below:

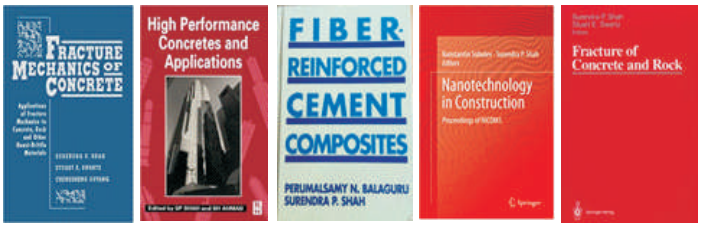
- Co-Chair, NICOM 7, Melbourne, 2022
- Co-Chair, NICOM-6, Nanotechnology in Construction, Hong Kong, 2018
- Co-Chair, SCC 2016, 6th North American Conference and 8th International RILEM Symposium, May 2016, Washington, D.C.
- Co-Chair, NICOM-5, Nanotechnology in Construction, May 2015, Chicago.
- Co-Chair, SCC 2013, Fifth North American Conference on the Design and Use of Self -Consolidating Concrete, Westin Michigan Avenue, Chicago, IL, USA, May 12–15, 2013
- Chair of Scientific Team, First International Conference in North America on Nanotechnology in Cement and Concrete, Beckman Center, Irvine, CA, May 5-7, 2010
- Co-Chair, US-India Workshop for Concrete in Extreme Events, Mumbai, December 2009
- Chair, SCC 2008, Third North American Conference on the Design and Use of Self Consolidating Concrete, Chicago, November, 2008
- Co-Chairman of Organizing Committee, Lahore, Pakistan 2007
- Member, Advisory Board, Conference on Damage in Composite Materials; Non Destructive Testing and Simulation
- Member, International Scientific Committee, FRAMCOS 6th International Conference
- Member, Scientific Committee, 10th Int. Inorganic-Bonded Fiber Composites Conference, Sao Paulo, Brazil, Nov. 2006.
- Chair, SCC 2005, Combining the Second North American Conference on the Design and Use of SelfConsolidating Concrete and the Fourth International RILEM Symposium on Self Compacting Concrete, Chicago, November, 2005
- Co-Chairman, International Conference on Advances in Concrete Composites and Structures, Chennai, India, January 2005
- Co-Chairman, International Conference, Advances in Concrete Structures and Materials, Xizou, China, May 2004
- Co-Chair, First North American Conference on the Design and Use of Self-Consolidating Concrete, Chicago, November 2002
- Co-Chairman, ACI-RILEM Symposium in Non Destructive Evaluation, Dallas, October 2001
- Chair, Symposium on High Performance Fiber Reinforced Thin Products, ACI, Chicago, March 1999
- Co-Chairman, Symposium on Materials Science of Concrete, ACI, Chicago, March 1999
- Co-Chairman, Engineering Foundation Conference, Canada July, 1998
- Co-Chairman, Materials for Infrastructure, Institute of Mechanics and Materials, UCSCD, April 1998
- Co-Chairman, Symposium on Nondestructive Characterization of Materials in Aging Systems, Materials Research Society, Boston, December 1997
- Co-Chairman, Symposium on Advanced Cement-Based Materials, McNU '97, Evanston, IL June 1997
- Co-Chairman, Symposium HH: Structure -Property Relationships in Hardened Cement Paste and Composites, Materials Research Society, 1996 Fall Meeting, Boston, December 1996
- Co-Chairman, Synthesizing Cement-Based Materials for the 21st Century, American Chemical Society, National Meeting, Chicago, 1995
- Co-Chairman, International Conference Workshop on Technology Transfer of the New Trends in Concrete, Barcelona, Spain, November 1994
- Co-Chairman, SEM Conference on Nondestructive Testing of Concrete in the Infrastructure, Dearborn, Michigan, June 1993
- Co-Chairman, ACI Symposium on Materials Science in Concrete, Boston, March 1991
- Co-Chairman, ACI Symposium on Fiber Reinforced Concrete, Dallas, November 1991
- Co-Chairman, International Conference on Micromechanics of Failure of Quasi-Brittle Materials, Albuquerque, June 6-8, 1990

- Chairman, NATO-ARW on Toughening Mechanism of Quasi-Brittle Materials, Northwestern University, July 1990
- Co-Chairman, International Conference on Fracture of Concrete and Rock, Cardiff, September 1989
- Co-Chairman, Symposium on Bond in Cement Based Composites, Materials Research Society, Boston, December 1987
- Co-Chairman, International Conference on Fracture of Concrete and Rock, Society of Experimental Mechanics, Houston, June 1987
- Co-Chairman, Symposium on Strain Rate Effects in Cement-Based Composites, Materials Research Society, Boston, December 1985
- Member, Organizing Committee, RILEM Symposium on Fracture of Concrete, Laussane, October 1985.
- Co-Chairman, NSF-STU Seminar on Steel Fiber Reinforced Concrete, Stockholm, June 1985
- Co-Chairman, International Symposium on Ferrocement, Bangkok, January 1985
- Chairman, NATO Advanced Research Workshop on Nonlinear Fracture Mechanics, Northwestern University, Evanston, September 1984
- Member, Scientific Committee, RILEM-CEB Conference on Multiaxial Loading, Toulouse, April 1984
- Chairman, ACI-RILEM Symposium on Fatigue, Detroit, September 1982
- Member, Advisory Panel and Chairman of the Session, International Conference on Bond in Concrete, Scotland, June 1982
- Co-Chairman, RILEM Symposium on Ferrocement, Bergamo, Italy, July 1981
- Chairman, Symposium on Recent Research on Fatigue of Concrete Structures, ACI, Puerto Rico, Sept. 1980; Dallas, February 1981
- Chairman, National Science Foundation Sponsored Workshop on High Strength Concrete, 1979
- Member, Steering Committee, Gordon Conference on Building Materials, 1973
- Chairman, Conference on New Materials in Concrete Construction, University of Illinois at Chicago Circle, Chicago 1971.

TECHNICAL BOOKS

Prof. Shah co-authored 3 books and edited more than 20 books (some of them are listed below). He is past editor-in-chief of RILEM's journal Materials and Structures.

1. S.P. Shah, S.E. Swartz and C. Ouyang, Fracture Mechanics of Concrete, John Wiley & Sons, 1995.
2. S.P. Shah and S.H. Ahmad, High Performance Concrete and Applications, Edward Arnold, 1994.
3. P. Balaguru and S.P. Shah, Fiber Reinforced Cement Composites, McGraw Hill, 1992.



SELECTED PUBLICATIONS

In addition to the above books, Prof. Surendra Shah has published more 600 journal articles; a handful of highly cited and recent publications are listed below:

1. Yeoushang Jenq, Surendra P Shah, “Two parameter fracture model for concrete”, Journal of Engineering Mechanics, 111 (10), 1985, 1227 1241.
2. Maria S Konsta-Gdoutos, Zoi S Metaxa, Surendra P Shah, “Highly dispersed carbon nanotube reinforced cement based materials”, Cement and Concrete Research, 40 (7), 2010, 1052-1059.
3. Kejin Wang, Daniel C Jansen, Surendra P Shah, Alan F Karr, “Permeability study of cracked concrete”, Cement and Concrete Research, 27 (3), 1997, 381-393.
4. Maria S Konsta-Gdoutos, Zoi S Metaxa, Surendra P Shah, “Multi-scale mechanical and fracture characteristics and early-age strain capacity of high-performance carbon nanotube/cement nanocomposites”, Cement and Concrete Composites, 32 (2), 2010, 110 -115.

5. Small Changes Can Make a Great Difference, Transportation Research Record, Vol. 2141, May 2010, pp. 1-5 (with J. J. Gaitero, I. Campillo, and P. Mondal)
6. American Road Map for Research for Nanotechnology-Based Concrete Materials, Transportation Research Record, Vol. 2142, May 2010, pp. 130-137 (with B. Birgisson, P. Taylor, and J. Armaghani).
7. Miroslaw Grzybowski, Surendra P Shah, "Shrinkage cracking of fiber reinforced concrete", Materials Journal, 87(2),1990,138 -148.
8. Shiho Kawashima, Pengkun Hou, David J Corr, Surendra P Shah, "Modification of cement based materials with nanoparticles", Cement and Concrete Composites, 36, 2013, 8-15.
9. Antoine E Naaman, Surendra P Shah, "Strain Capacity of Strain-Hardening Ultra-High -Performance Concrete with Steel Fibers", ACI Materials Journal, 119 (2), 2022, 171-180.
10. Wengui Li, Wenkui Donga, Yipu Guo, Kejin Wang, Surendra P. Shah, "Advances in multifunctional cementitious composites with conductive carbon nanomaterials for smart infrastructure", Cement and Concrete Composites, 128, 2022, 104454.
11. Ange-Therese Akono, Mimi Zhan, Jiaxin Chen, Surendra P Shah, "Nanostructure of calcium silicate-hydrates in finerecycledagg -regateconcrete" , Cement and Concrete Composites,115, 2021, p.103827
12. Zhen Li, David J Corr, Baoguo Han, Surendra P Shah," Use of Tetraethyl Orthosilicate to Improve Durability of Ferrocement", ACI Materials Journal, 116(6), 2019.

INDUSTRIAL PATENTS

The outstanding work of Prof. Shah in cement-based materials resulted in him obtaining the following patents:

- SP Shah, MS Konsta-Gdoutos and ZS Metaxa, Highly dispersed carbon nanotube reinforced cement based materials, United States Patent Application US2009229494 (A1) — 2009-09-17
- Hersam; Mark C., Seo; Jung-Woo T. , Shah; Surendra P. , Konsta-Gdoutos; Maria S., Metaxa; Zoi S., Highly concentrated nano reinforcement suspensions for cementitious materials and method of reinforcing such materials, United States Patent, US8,865,107(B2)- 2014-10-14
- Shah; Surendra P., Shao; Yixin, Marikunte; Shashi, Method of making extruded fiber reinforced cement matrix composites, United States Patent, US5,891,374 (B2)- 1999-04-06
- Shah; Surendra P., Shao; Yixin, Marikunte; Shashi, Extruded fiber reinforced cement matrix composites and method of making same, United States Patent, US6,528,151 (B2)- 2003-03-04

RESEARCH AWARDS

Prof. Surendra Shah had worked on numerous research awards. Only a few are listed below.

1. Carbon Nano Tube Reinforced Cement Based Materials, CEMEX,(with David Corr and Maria Konsta)
2. Increasing Use of Fly Ash in Concrete through Nanomaterial Modification, Multiscale Characterization, and Improved Processing, Tennessee Valley Authority (with K. Wang)
3. Design and Application of High-Volume Fly Ash Self-Consolidating Concrete with the Incorporation of Nanoparticles, Infrastructure Technology Institute, Northwestern University
4. Crack Free Concrete Made with Nanofiber Reinforcement, Infrastructure Technology Institute, Northwestern University
5. Collaborative Research: Measuring, Monitoring, and Modeling the Setting Properties of Concrete, National Science Foundation (with Z. Sun)
6. Chemically Bonded Phosphates, Institute of Tribology and Coatings
7. SCC Formwork Pressure, Ready Mixed Concrete Research Foundation and American Concrete Institute Concrete Research and Education Foundation (with K. Khayat)

8. Thixotropy and Formwork Pressure of SCC, National Science Foundation
9. Design and Application of Low Compaction Energy Concrete for Use in Slip-Form Concrete Paving, Infrastructure Technology Institute
10. Highways 2008, Federal Highway Administration
11. Self-Consolidating Concrete—Applications for Slip Form Paving, Iowa State University
12. Sensing Intrinsic Nano-Microstructural Characteristics of Hardening Concrete with High-Frequency Transverse Waves, National Science Foundation
13. Collaborative Research: Theoretical, Experimental, and Stochastic Multi-Scale Analysis of Concrete, National Science Foundation (With L. Graham-Brady)
14. Clinker-Free Concrete Made with Illinois Class F Fly Ash, Illinois Clean Coal Institute
15. Ultrasonic Technique for Monitoring the Setting and Hardening of Concrete, Infrastructure Technology Institute, Northwestern University
16. Development of Non-Clink Cement for Environmental Hazard Reduction, National Science Foundation
17. Hybrid Fiber Reinforced Composites, Center for Advanced Cement-Based Materials
18. CKD-Slag Blended Cements, Center for Advanced Cement-Based Materials
19. Extruded Fiber Reinforced Concrete Panels for Residential Construction, National Science Foundation
20. Effect of Pressure on Manufactured Cement Board, Saint-Gobain
21. Concrete Reinforced with Cellulose Fibers, Weyerhaeuser
22. Rheology of Cement Matrix for Self-Compacting Concrete, Center for Advanced Cement-Based Materials
23. Durability of Glass Fiber Reinforced Cement Based Composites, Nippon Electric Glass Fibers, America
24. Ultrafine Fly Ash, Boral Materials Technology
25. High Performance, Non Corroding Steel Reinforced Concrete, NSF-SBIR
26. Injection System Pilot Study, Hilti EntwicklungsgesellschaftmbH
27. Instrumentation and Laboratory Improvement, National Science Foundation
28. Extruded Fiber Reinforced Cement Composites, Illinois Clean Coal Institute
29. General Wall System Specification, Butler Mfg. Co. Research Center
30. ACBM-Howard Joint Research Collaboration, National Science Foundation
31. Studies of Fracture Processes with Computer Vision and Microtomography, Air Force Office of Scientific Research
32. Constitutive Modeling of Concrete, FAA Center of Excellence for Airport Pavement, University of Illinois
33. Constitutive Modeling of Concrete, FAA Center of Excellence for Airport Pavement, University of Illinois Microstructure,
34. Transport Property and Statistical Science, National Institute of Statistical Sciences
35. Stonecraft, Incorporated, General Research
36. Improved Condition Monitoring for Bridge Management, Infrastructure Technology Institute
37. Concrete Research Needs Symposium, ITT
38. Immobilization of Waste in Grout-Main, Westinghouse Hanford
39. The Faculty Enhancement Program, National Science Foundation
40. Simplified Boiling Water Reactor Project, Department of Energy
41. Strain Softening Response of High Strength Concrete, National Science Foundation
42. Rate of Loading Dependency of Reinforced Concrete, National Science Foundation - Pennsylvania State
43. Characterization of Fracture Using Acoustic Emission, AFOSR
44. Removing Barriers to the Increased Use of High Strength Concrete, State of Illinois (with E. Rossow, F. Young and R. Burg)

45. NATO-ARW on Toughening Mechanism of Quasi-Brittle Materials, State of Illinois Challenge Grant, Illinois Business Partnership Program
46. Innovative Infrastructure, Department of Education (with C. H. Dowding)
47. Sensing Intrinsic Nano-Microstructural Characteristics of Hardening Concrete with High-Frequency Transverse Waves, National Science Foundation
48. Collaborative Research: Theoretical, Experimental, and Stochastic Multi-Scale Analysis of Concrete, National Science Foundation (With L. Graham-Brady)
49. Clinker-Free Concrete Made with Illinois Class F Fly Ash, Illinois Clean Coal Institute
50. Ultrasonic Technique for Monitoring the Setting and Hardening of Concrete, Infrastructure Technology Institute, Northwestern University
51. Development of Non-Clink Cement for Environmental Hazard Reduction, National Science Foundation

FELLOWSHIP AND CHAIR IN NATIONAL ORGANIZATIONS/INSTITUTES

The ACI Foundation,with a generous donation of $50,000 from Surendra P. Shah, formed the S.P. Shah Fellowship in 2021. This new fellowship will be open for Ph.D. student applicants in mid-2021 for the ACI Foundation's 2022-2023 awards cycle. A fundraising campaign led by ACI Past President David Lange, Kejin Wang, and several other former students of Prof. Shah is aiming to raise an additional $25,000 from the concrete community to fully fund the S.P. Shah Fellowship through 2027.

Recently, Surendra & Dorothie Shah Chair was launched at IIT Madras, India with another generous donation of $161,620 from Prof. Shah & Dorothie Shah.

Some glimpses of Chair launched at IIT Madras in December 2021is shown below:

FAMILY

Prof. Surendra Shah married Dorothie Shah during the year 1962. They have two sons: Byron and Daniel and six grandchildren.

He has advised more than 200 Ph. D. students, post-doctoral fellows and visiting scholars. They are all part of his academic family.

Source:

1. http://acbm.northwestern.edu/
2. https://www.acifoundation.org/home/news/articleid/296/surendra-p-shah-makes-donation-to-establish-new-aci-foundation-fellowship.aspx#prettyPhoto
3. https://www.youtube.com/watch?v=SDboc35pIRA&ab_channel=KannanKrishnamurty

About The Author

Dr. N. Subramanian,
Ph.D., FNAE
is an award winning Author, Structural Engineering consultant and Mentor, currently based at Maryland, USA, with over 45 years of experience in Industry (including consultancy, research and teaching). He was awarded with a 'Life Time Achievement Award' by the Indian Concrete Institute and many other awards for his contributions towards Structural Engineering. He is the author of 26 books, including the famous books on 'Design of Steel Structures', 'Design of RC Structures' and 'Principles of Space Structures' and the recent 'Building Materials, Testing and Sustainability'.
(email - drnsmani@yahoo.com)

THE FIRST PROFESSOR R K KATTI MEMORIAL LECTURE

The First Professor R K Katti Memorial Lecture was held on March 25, 2023, his 95th birth anniversary. The event was organised by the Institution of Engineers (India) Maharashtra State Centre and The Indian Society of Structural Engineers. The associate organisers were the Civil Engineering Department of Indian Institute of Technology, Bombay and the Indian Geotechnical Society, Mumbai Chapter. The concept of holding a series of Prof R K Katti Memorial lectures was initiated by his former students.

The event was held in the auditorium of the Institution of Engineers (India) Maharashtra Chapter at Haji Ali, Mumbai. The event was attended by more than 125 delegates.

Prof R. K. Katti was one of the first four faculty members to commence the functioning of Indian Institute of Technology, Bombay way back in 1958. He was the first in India to initiate the M. Tech programme in Geotechnical Engineering as well as probably the first Masters Programme in IIT B.

The First Memorial Lecture was given by Jorden A. Engberg Presidential Professor Dr Dinesh Katti. The Lecture was entitled "Revisiting Mechanics of Swelling Clays Atom by Atom. This was followed by a talk by Er R K Jha on "Reminiscences on the Genesis of Twin City". Both these lectures were eye-openers.

The audience included distinguished dignitaries, including the Chief Guest, Dr Sharad Kumar Saraf, The Chairman of Board of Governors of IIT Bombay, and the Guests of Honour Mr Narendra Dalmia, CEO and Director, Strata Geosystems (India) Pvt Ltd, and Dr R K Bhandari, one of the senior most student of Prof R K Katti dating back to 1962-64 batch, Dr. Mohan Dagaonkar, Past Council Member IEI (India), Immediate past chairman IEI Maharashtra State Centre Dr. H. M. Raje, Mr. Shantilal Jain President ISSE, Mr. V. C. Kamble, Honorary Secretary IEI Maharashtra State Centre and several prominent members from field and academia. The event was also graced by Prof Deepankar Chaudhary, Head Civil Engineering Department, IIT Bombay and Mr Gaurav Parab of the IGS Mumbai Chapter.

The Vote of thanks was given by Prof Katti's former student Mr Shahrokh Bagli.

FLAT SLAB FLOORS IN TALL BUILDINGS

By Prof (Retd) M. G. Gadgil

1. Introduction

Flat slab presents a very attractive flooring system in many situations where aesthetic considerations and floor height restrictions play an important role. Modern day structures like data centres demand large column free spaces along with clean finish (without beams).for high rise buildings, avoidance of beam results into more no of floors accommodated in a given height of building. With use of pre-stressed concrete for such slabs, there is further reduction in thickness of slab which makes the option very attractive. There are some issues involved in use of flat slab floors, like punching shear failure of flat slab and excessive lateral deflection of structure due to lack of frame action (in the absence of beams from column to column). Codes of practice of different countries, including Indian code, have addressed these issues, so as to allow design of such structures with some restrictions and caution.

2. Basic concepts of slab behaviour

a. Definition Thin Plate/Slab

Thin Slab/plate is a two dimensional continuum with loads applied primarily in the direction perpendicular to the plane of the slab/plate so that it responds with two rotations and one out of plane displacement and develops two Out of plane-moments, a twisting moment and Two out of plane shears

b. Classification of slabs

i. One way slab resting on two opposite edges

ii. Two way slab resting on four edges

iii. Two way slab resting on edge beams

iv. Two way slab resting on columns without drops (flat plate)

v. Two way slab resting on columns with drops

vi. Waffle slab – Grid slab

vii. Grade slab on ground

c. Basic assumptions made in the analysis of slab/plate

i. Love's theory : For thin slabs : Plane sections before bending remain plane after bending and normal to the middle surface, before bending, remains normal to the middle surface after bending

ii. Mindlin Theory : Normal to middle plane before bending does not remain normal to middle plane after bending but the shear strain is constant

In the present study, we shall be considering only thin plate/slab with effect of shear deformation neglected

It is further interesting to note that behavior of slab is affected by sizes of edge beams. If the edge beams are very flexible the slab moments increase and vice versa. Following table shows effect of size of beam on maximum moments in a single panel square slab 150 mm thk 4m x 4m, total load 6.75 kN/sq m

Sr No	Size of Beam	+ ve Moment kN-m/m	_ve Moment kN-m/m
1	230 x 1000	4.01	2.33
2	230 x 900	4.2	2.09
3	230 x 800	4.45	1.79
4	230 x 700	4.8	1.39
5	230 x 600	5.31	0.83
6	230 x 500	6.04	0.136
7	230 x 400	7.13	0.13
8	230 x 300	8.68	0.248
9	230 x 200	10.5	1.27
10	230 x 100	14.1	0.074
11	50 x 50	14.8	0.78
12	10 x 10	14.8	0.638

3. Flat slab / flat plate --- column supported slab : These slabs are classified into

i. Flat plate (slab with no drop panels)
ii. Flat slab with drop panel
iii. Flat slab with band beam/edge beam

For analysis of such slab classical methods like a) Direct design method and b) equivalent frame method had been very popular before the advent of popular softwares like ETABS, SAFE, STAAD etc. These methods had restricted applicability and hence structural designers were reluctant to use them in high rise buildings. With the use of modern day's reliable softwares all limitations on analysis and design of slab are almost removed and now-a-days, it has become a routine process to analyze and design such type of slabs and the buildings having these slabs.

4. Design of flat slab involves following points

- Design for flexure
- Design for shear
- Design for deflection -- serviceability

Design of flexure for flat slab involves no special process, it is the same method as for edge supported slab.

Design for shear for flat slab presents very challenging problem as failure of slab due to slab shear (Punching shear) is very important as it can lead to catastrophic effect. Punching shear due to gravity loads was always taken care of traditionally by calculating value of shear at d/2 from the face of column (d—depth of slab). However in high rise building, there is increase in shear due to moments induced by lateral loads like seismic and wind loads. Sway of building also add to this effect Indian code IS 1893-2015 give following restrictions in the design of buildings with flat slab floor slabs

V) **Flat Slab - Structural Wall Systems**

(see Note 4)

RC buildig with the three features given below :

a) Ductile RC structural walls (whitch are designed to resist 100 percent of the design lateral force),

b) Perimeter RC SMRFs (whitch are designed to independently resist 25 percent of the design lateral force), and preferably

c) An outrigger and belt truss system connecting the core ductile RC structural walls and the perimeter RC SMRFs (see Note 1).

Notes :

1. RC and steel structures in Seismic Zones III, IV and V shall be designed to be ductile. Hence, this system is not allowed in these sismic zones.

2. Eccentric braces shall be used only with SBFs.

3. Buildings with structural walls also include buildings having structural walls and moment frames, but where,

a) frames are not designed to carry design lateral loads, or

b) frames are designed to carry design lateral loads, but do not fulfill the requirements of 'Dual Systems'

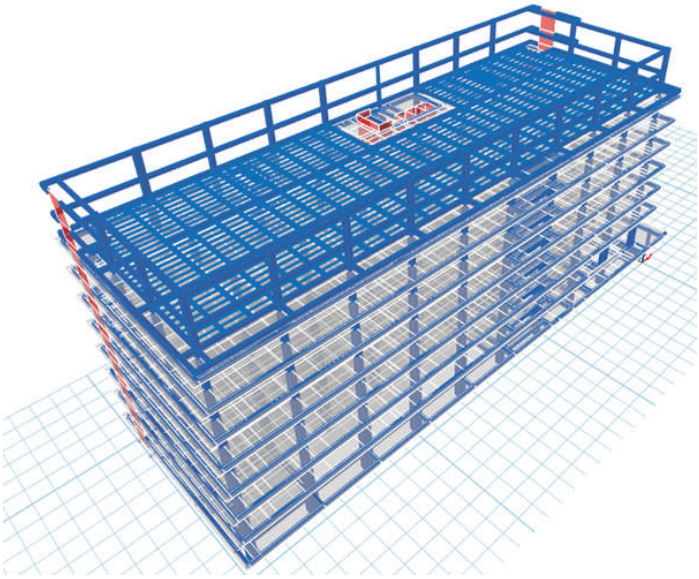
4. In these buildings, (a) punching shear failure shall be avoided and (b) lateral drift at the roof under design lateral force shall not exceed 0.1 percent.

   These provisions require designer to provide a proper lateral load resisting system like shear wall etc and to limit lateral deflection to ht/1000, which is a very severe restriction.

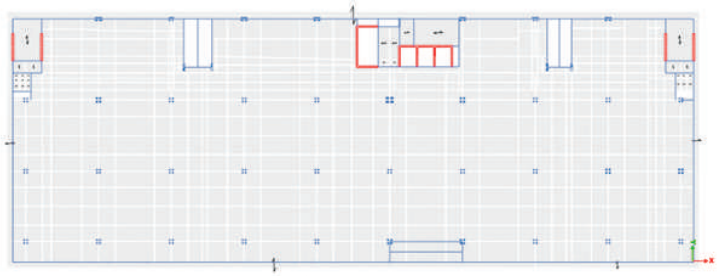
5. Numerical example :

   A G +8 building with flat slab floors (without drop panels) carrying a total load of 6.5 kN/sq m (4 LL+ 2.5 SDL) in addition to live load is checked for punching shear and lateral deflection of the building

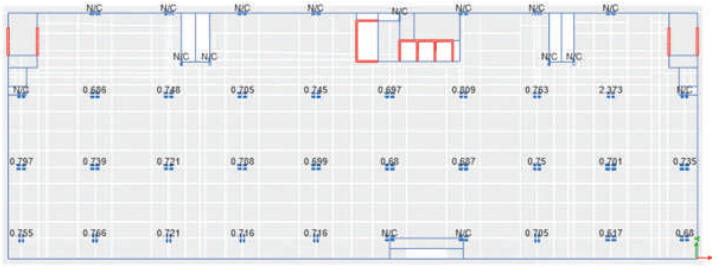
   This building of ht 37 m shows a lateral deflection of 35 mm and D/C ratios for punching shear less than 1.0 at all column locations



3D view of building



Typical floor plan



D/C ratio at second floor level

6. Slenderness of column in buildings with flat slab: There is sometime a problem of slenderness of columns in buildings having flat flabs. This is because there is not much of frame action for the column. However whether the structure as a whole is a sway frame or non-sway frame can be decided by considering provisions in Annexure E of IS 456-2002. This can be determined by considering sway of column, and axial and shear force in column and then the figures 26 and 27 can be referred to decide slenderness of column.

7. Conclusion : flat slab floor buildings present challenging problem to structural designer where the punching shear need to be controlled by providing adequate thickness of slab and the lateral sway need to be checked by providing proper lateral load resisting system like shear walls. The structure as required by end user can then be provided with adequate safety and serviceability.

About the Author:

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CASE STUDY : RESTORATION OF DETERIORATED OHWT

By Er. R. D. Kalgutkar, Prajakta Bhise

Introduction :

Overhead water tank (OHWT) is one of the important structural component of any building structure. During structural audits, we observed following typical deterioration of the base slab of OHWT : Corrosion of steel reinforcement in the bottom slab & spalling of concrete cover.

In many cases, the bottom slab is not plastered from the bottom & the concrete cover is less. This leads to reaction of carbon dioxide within concrete, reduction in pH value & subsequent corrosion of steel in it by electrochemical reaction.

When the waterproofing layer is not watertight & water from the well/borewell containing high percentage of chlorides is stored, movement of chlorides to steel reinforcement increases corrosion rate. This corrosion rate is low when the concrete is either dry or wet. But for intermittent dry & wet conditions like in filing & emptying OHWT, this rate is maximum.

Case study:

We encountered a similar condition of OHWT during structural audit. (Fig. 1)

Waterproofing of the base slab from inside was poor & the concrete was pervious. Flexural cracks in concrete due to cyclic loads added to propagation of cracks. This has led to seepage of water to the reinforcement. High rate of transportation of chlorides & oxygen up to steel bars under dynamic moisture condition, having low resistivity exhibited higher rate of

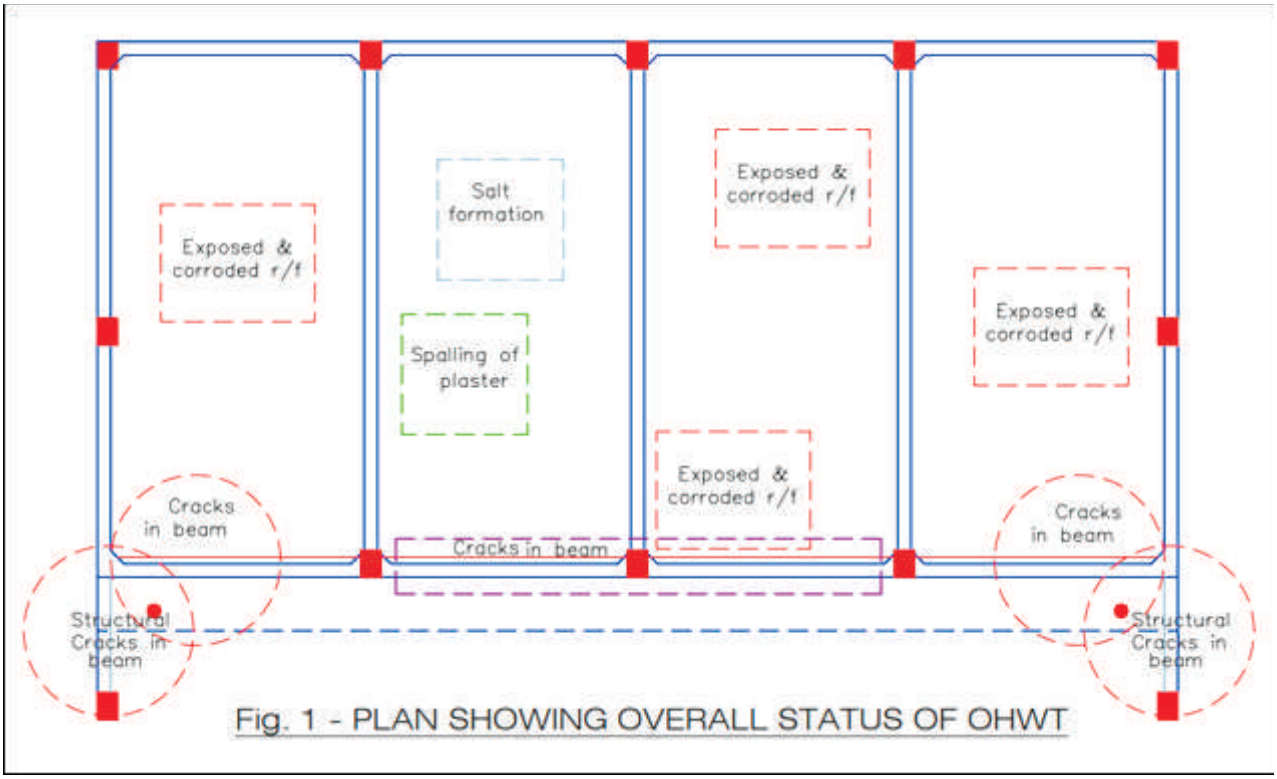

Fig. 1 - PLAN SHOWING OVERALL STATUS OF OHWT

corrosion. Also, carbonation assisted to reduce pH of concrete & aggravated corrosion. Photographs 1 & 2 show that the OHWT was not safe to store water.

It is quite acceptable that apartment/flat owners show less interest in demolishing & reconstructing the OHWT when the structure is nearing redevelopment. The option they choose is to repair it at minimal cost rather than constructing a new one.

Only repairing was not enough for this particular OHWT hence we decided to structurally strengthen it. The process of strengthening is discussed in this article.

Methodology of strengthening work was,

1. Data collection (visual & NDT)
2. Deciding strengthening methodology & execution steps.
3. Checking strengthening work

1. Data collection :

a. Visual observations :

OHWT had deterioration issues like spalling of concrete, exposed & corroded reinforcement, flexural cracks in slab, salt formation (1, 3 & 4) and delamination of plaster from base slab (2) as seen in photographs below.

Photo No. 1

Photo No. 2

Photo No. 3

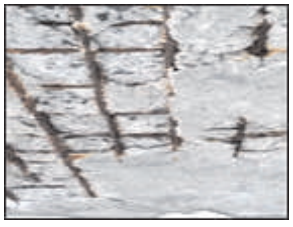

Photo No. 4

Vertical walls were intact, no structural cracks & corrosion was observed.

Peripheral RCC beams were cracked & reinforcement steel was seen corroded. Strengthening of RCC periphery beams is out of scope of this article.

b. NDT :

After conducting NDT, the results of base slab showed concrete strength of grade less than M25, possibility of corrosion upto 10% & 35 mm depth of carbonation. For RCC vertical walls, concrete strength was of grade > M35.

2. Deciding methodology of strengthening, execution steps :

Collected data showed that RCC vertical walls exhibited good structural strength.

Therefore, strengthening of base slab was necessary to bring OHWT back into use.

We worked on following three methods to check feasibility.

1. Cast additional slab over existing base slab.

Additional dead weight of the new slab will act on the old deteriorated slab.

Neutral axis will be shifted upwards & reinforcement in the new slab will not contribute to flexural strength.

Hence not feasible.

2. Demolish & reconstruct the base slab.

Since corrosion & structural cracks are observed in the supporting peripheral RCC beams, it was not possible to rebar new reinforcement & cumulative pull out strength of rebars to resist self weight & water load on the base slab was doubtful.

Hence not feasible.

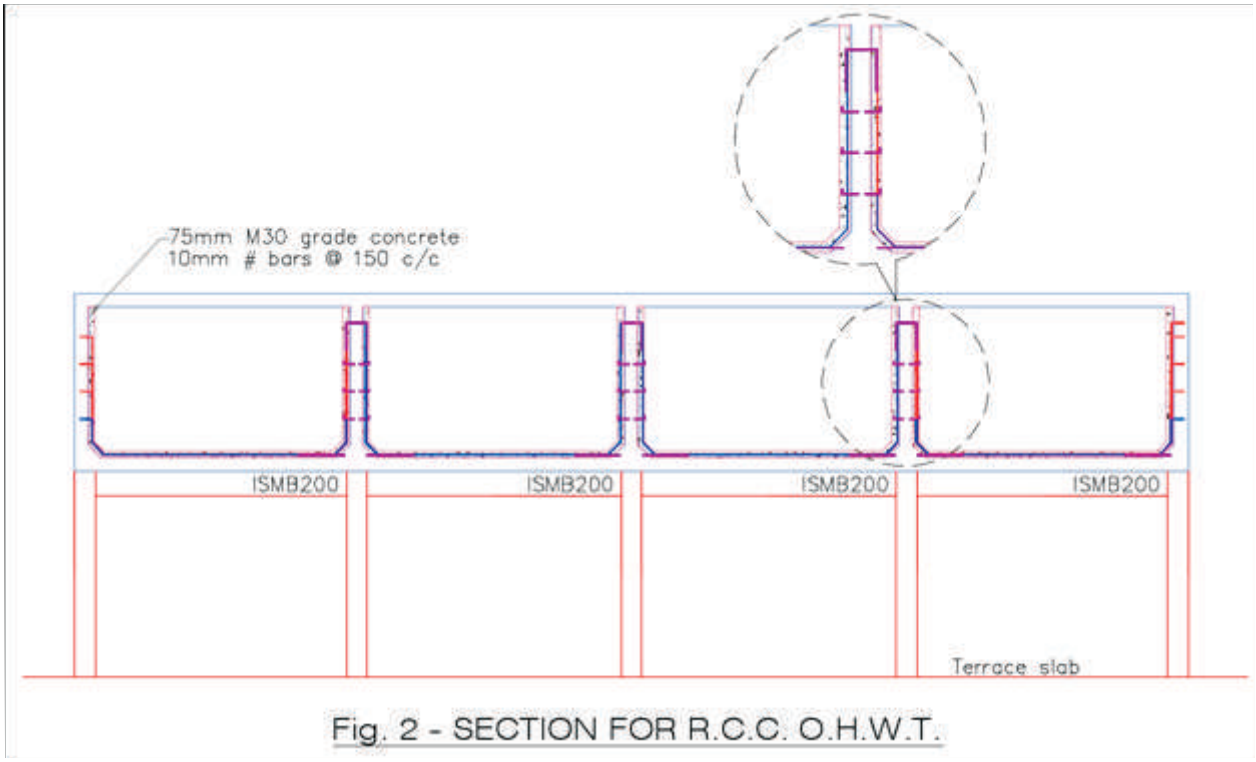

Fig. 2 - SECTION FOR R.C.C. O.H.W.T.

3. Provide inside-suspended encasing supported by RCC vertical walls. (Fig. 2 above)

Since the RCC vertical walls exhibit M35+ grade of concrete, transferring dead load & water load to it was practical, considering its higher bond strength.

Alongwith RCC vertical walls & base slab, we constructed an extra 75 mm monolithic encasing from inside in M30 grade of concrete with reinforcement of #10mm at 150mm C/C to carry the hydrostatic pressure & in turn to transfer to vertical RCC walls through #10mm dia rebars spaced at 300mm horizontally at top & 600mm in the vertical walls in both vertical & horizontal direction.

Analysis & design calculations for 75mm M30 concrete encasing.

Required Ast for encasing slab considering dead load & water load

= 940 mm2/m,

A st available in old base slab = 334 mm 2 /m (considering corroded bar diameter of 8mm). However, additional steel provided is 1410 mm 2 /m.

Total load on base slab :

= Water load + Additional RCC encasing dead load = 360.495 kN

Photo No. 5

Photo No. 6

Photo No. 7

Photo No. 8

Factored tensile stress on each 10mm reinforcement bar spaced at 300mm C/C = 57.40 N/mm2 < 275 N/mm2 (For Fe500). Hence safe.

Execution steps : Rebar fixing, reinforcement cage & concreting are shown in photographs (No. 5, 6, 7 & 8) below.

Post construction observations :

1. Rebound Concrete Hammer test results on concrete encasing showed compressive strength of concrete > M30.
2. No leakages are observed after filling water in the OHWT.
3. No flexural cracks in the base slab are observed after filling the OHWT to full.

Conclusion:

1. Strengthening / Retrofitting work done is cost effective. When compared to the demolishing and reconstructing a new OHWT, cost saving was up to 64%.
2. RCC encasing can be made watertight by adding waterproofing chemicals in concrete mass itself, thereby reducing recurring waterproofing cost.
3. Further corrosion activity in the old base slab will be stopped by restricting dynamic moisture movement to the corroded reinforcement.

About The Author

Er. R. D. KALGUTKAR. Completed Master's Degree from IIT Madras. Presently practicing in the field of Structural Design and Structural Auditing through own consulting firm, Shantal Consulting Engineers.
Membership of various professional organisations & registrations with concerned government bodies. Expertise in structural audit, retrofitting and repair-remedial solutions to structures.

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LEARNING FROM EARTHQUAKE FAILURES

By Hemant Vadalkar

1.0 Introduction :

Once again, recent devastating Turkey – Syria earthquake of 6 Feb 2023 was a reminder call about safety of our built environment.

Earthquakes are occurring around the world at random intervals, shattering many man-made structures and killing people. We need to retrospect our preparedness to face such calamities. Unfortunately, we are not able to predict the location and magnitude of next major earthquake. Drifting of tectonic plates against each other is the continuous process, gradually building up pressure along the fault zones. Minor earthquakes and shaking occurs regularly which can not be noticed by humans. Only major events are felt and they cause major damage in the region. One interesting observation is that "Earthquake shatters man-made structurers but there is very less damage to natural ecosystem and habitats like forests, mountains, rivers, plants & animals."

2.0 Turkey Earthquake

6 Feb 2023 Turkey - Syria Earthquake

- Local date: 6-Feb-23
- Local time: 04:17 am TRT (UTC+3)
- Duration: 75 seconds
- Magnitude: 7.8 Mww aftershock after 9 hours of M 7.5
- Depth: 17.9 km (11 mi)
- Epicenter: 37.174°N 37.032°E
- Type: Strike-slip
- More than 50000 lives lost and counting
- Thousands of buildings collapsed
- Large scale devastation

Major findings and observations from various technical reports regarding large scale building damage in Turkey are as follows. These are applicable to our country also.

- Lack of code compliance
- Poor framing, design and detailing
- Irregularity in geometry, mass and stiffness

Figure 16. Pancake collapsed buildings in Hatay. Credit: IMO, 2023

- Lack of shear walls
- Weak columns with inadequate main steel and transverse reinforcement
- Poor soil conditions
- Poor construction practices
- Old structures constructed prior to 2000 when seismic code was revised

3.0 History of major Indian Earthquakes -

We experienced, earthquakes resulted in large scale damages and several casualties in our country. Codes are being revised after every major event. Upgradation of our seismic codes is a result of Gujarat earthquake.

Other major earthquakes in the past -

- Uttarkashi 1991
- Latur 1993
- Jabalpur 1997
- Bhuj- Gujarat 2001

- Kashmir 2005
- Nepal 2015
- Afghanistan 2015

We also have similar reasons (like Turkey) for large scale damage to building stock.

Interestingly, there is relatively less damage to the infrastructure in Turkey like roads , bridges, Pipe lines, Tunnels, Industrial structures etc. This may be due to better control over code compliance and construction practices in these sectors.

4.0 Updating knowledge and regulations

Different countries are struggling to upgrade their knowledge and design codes based on the past history and records. One observation is, for earthquake of similar magnitude, maximum damage to property and life, is reported in under-developed & developing countries than the developed countries. Japan is an earthquake prone country shaken by minor and major earthquakes frequently but damage to structures and human casualty is very less. One of the reasons may be updating of codes is done frequently and its rigorous implementation. We in India also have sufficient knowledge about the subject. We have some of the best codes for earthquake resistant design as compared to international standards. But whenever earthquake strikes in our country, there is a large scale devastation of building structures. Similar situation was observed in Turkey earthquake. Why are we suffering with major damages in spite of having sufficient knowledge?

After a big Seismic event, lot of discussion takes place in media, seminars, lectures, brain storming sessions are conducted but as days pass by the dust settles down, we forget everything till the next big event happens and the cycle repeats …..

Who is responsible for all this? Is a big question. It is conveniently blamed on systems failure.

We keep repeating same mistakes and the history repeats too.

Are we really learning from the past failures?

Our approach is very casual right from planning, design, construction and maintenance of structures. We are failing miserably in implementing good design and construction practices and due to our "Chalta Hai" attitude.

Every one of us as planner, designer, constructors and supervisors do need to ask a question to ourselves – am I doing my work honestly?

It starts with compromising in adopting efficient structural system due to pressures from architects and clients. Architects are adjusting plans on odd shape plots to utilize maximum possible FSI. Once the plans are approved, it is thrown to structural engineer for preparing lighter structural design. Many a times, structural engineers have very less say in basic planning and for making robust framing system. They cannot argue with architects or clients for fear of losing the job. They try to fit in the possible framing by removing columns and beams which the architect is objecting along with slim columns for maximum usable floor area. Since, architects do not have any responsibility towards structural stability, they can dictate terms to engineers or sometimes change the structural designer who listens to their demands. Of course, there are a few exceptions.

I think, time has come, we need to educate our architect / client about the importance of code provisions. National body like BIS or NDMA should come out with guidelines and undertaking from Architects / Clients that they will adhere to the prescribed standards. Some kind of random scrutiny of planning and structural design by expert panel may help in improving the situation. As a Good example - Dubai Municipal corporation undertakes the scrutiny of building proposal based on planning norms and structural adequacy check. We consider FSI and local bye laws only while approving the proposal. There is no room for checking structural planning and design. Specific documents are asked to be submitted in the case of high-rise buildings by High Rise committee. The high-rise committee is present in some metro cities while we see huge constructions all over. This is our short coming. There are certain strange rules like deficiency in open spaces can be condoned by levying penalty or premium. So, building plans are passed without

adequate open space around the building. In such situations, it becomes difficult to reach out with help in case of emergencies like fire.

5.0 Can we have safe, durable and green structures ?

There is a consistent demand for safe and durable structures. We need to have sustainable construction practices for our built environment. National Building code 2016 has Part 11 on " Sustainability". We need to follow Green Building norms while planning our structures.

Some tips for better structural performance -

- **Follow code guidelines during planning, execution and maintenance**
- **Simple and symmetric configuration**
- **Avoid irregularity in geometry, mass and stiffness**
- **Provide proper ductile detailing for all RCC elements with emphasis on confining steel**
- **Robust structural system**
- **Use of shear walls**
- **Avoid soft storey and floating columns**
- **Insist on good engineering practices to be followed during construction**
- **Capacity building - Continuous training and upgrading skills for the persons involved in construction sector**
- **Need to have better regulatory mechanism over unorganized building construction sector**

Documenting all the processes of planning, design and execution stage will be helpful. Insisting on "Design basis report" signed by all stake holders and maintaining all the records like design reports, drawings, site pour cards, material testing, etc during the execution stage will be a step in right direction.

Can we create some checks and balances on the planning, design and execution stage for fixing accountability and implementing good engineering practices? Rating for the structures can be provided by a third-party auditor based on some fixed parameters. Random scrutiny and proof checking of 2% structures can be carried out for checking adherence to codes and standards. We need to improve on the present system. All professional bodies and Government together can have some regulatory mechanism for this huge unregulated construction sector for further improvements in the system.

6.0 Conclusion :

We need to retrospect, be honest to ourselves because we are responsible for the safety of our citizens.

If all the stake holders perform their duties with full responsibility and honesty as planners, designers, constructors, supervisors, maintenance agencies etc, the scenario will definitely improve.

It is high time we change our mindset.

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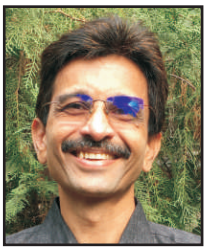
About The Author



Hemant Vadalkar is a consulting structural engineering from Mumbai having three decades of experience in the design of concrete and steel structures. He is Hon. Secretary of ISSE. He can be reached at vadalkar@gmail.com

NEWS AND EVENTS DURING JAN2023 TO MAR 2023

by Hemant Vadalkar

13 Jan 2023 : Indian Society of Structural Engineers Palghar Centre in association of Ultratech Cement arranged a lecture on Requirements for Highrise Structures on13 Jan 2023 at Atithi Inn, Boisar. Technical lecture on MEP requirements for high rise building structures and challenges faced were discussed by Er. Manish Parikh. He touched up on various aspects of planning of MEP services with sunk slab and beams, transfer girder, plumbing routing, electrical conduit routing, ducts requirements, service slab and access for maintenance, pipe sleeves / core cutting in structural members, controlling water pressure for tall structures etc.

Mr. Bimal Acharya from Ultratech Cement elaborated various concrete products from RMC plants and building solution products including tile fixing adhesives, waterproofing solutions, light weight concrete, pervious concrete, Ultrathin white topping, stamped concrete and decorative concrete.

Er. Mahesh Tendulkar talk about concrete requirements for high rise buildings. He touched up on care taken for concrete preparation, quality of ingredient , water cement ratio, admixture, mixing, transporting, placing, vibrating and curing of concrete. Blended cements, high performance concrete, pumping of concrete , controlling heat of hydration, self compacting concrete, site challenges in producing good concrete was discussed.

Chairman Sanjay Narang welcomed all the attendee and guests. Ranganath Satam informed about ISSE activities. Secretary Paresh Unnarkar proposed vote of thanks. More than 100 professionals

20 Jan 2023 : Epicons friends of concrete arranged a workshop on “Structural Audit and Remedies For Service Life Extension” at VJTI. Experts in the field talked on various topics.

1) Jayant Kulkarni – Sr. Structural Consultant, Epicons - Structural Audit, Visual Inspection, Need of NDT
2) Sharvil Alex – Infrastructure Risk Management - Balance service life assessment & need to change specifications
3) Arvind Parulekar – NDT Expert, Epicons - Role of NDT, Case Studies & Durability Testing
4) P. P. Pandey – Concrete Technologist, Epicons - Repairs Methodologies
5) Saiprasad Gaonkar – Advance NDT Expert, IRCLASS - Advance NDT for reliable diagnostics
6) Pushpam Kumar – National Manager, Sika India - Structural Strengthening of RCC Structures - Modern Approach

31 JAN 2023 :

ISSE Student chapter inaugurated at Aditya Engineering College, Surapalem, Andhra Pradesh. Technical literature of ISSE was presented to newly formed chapter. Student membership certificates were distributed to all the students.

Total 42 students registered as student member at this new chapter. The programme was well attended by various faculties from civil engineering department and around 150 students from civil engineering college.

Er. Madhav Chikodi from ISSE Mumbai was invited as a chief guest for the function. Guest of honour was Dr. Reddy, Dean, Aditya Engineering College. Programme started at 2.30 PM with Vande Mataram sung by all. Lamp lighting was done by the dignitaries. Dr. Rama Mohana Reddy, HOD civil engineering welcome all and briefed about the institute & it's programmes. Dr. S. Govindrajan guided students on various civil engineering aspects. Guest of honour Dr. Reddy briefed about extra curricular activities carried out by the institute for students. He also requested students to take benefit of ISSE members who are professionals & into various fields of structural & civil engineering. Chief guest Er. Madhav Chikodi guided students regarding ISSE, its professional working. He also appealed to students to attend various programmes conducted by ISSE, online & offline.

17 Feb 2023 :

ISSE in association with Ultratech Cement and IEI conducted a technical lecture on Methods of demolition for Bridges and buildings . IEI Secretary Er. Kamble welcomed the guests. Er. Ram Matte shared his experience in demolition of various type of structures like buildings, industrial structures and bridges. He explained various methods of demolition using chisel – hammer, diamond ropes for cutting RCC elements and controlled blasting techniques. Ultratech presented various building products available for construction industry.

17 Mar 2023 : ISSE Navi Mumbai chapter in association with Ultratech Cement and IEI Belapur local centre arranged a lectures on how to make earthquake resistant buildings and learning from failures on the side lines of Turkey earthquake. ISSE Navi Mumbai Chairman Er. Mohan Dagaonkar welcomed the guests and delegates. ISSE President Shantilal Jain presented case studies of earthquake failures and urged all practicing engineers to follow code guideline to make our structures earthquake resistant. He also emphasised that details provided by the structural engineer must be followed at site. ISSE Secretary Hemant Vadalkar touched upon the large scale devastation of buildings during Turkey Earthquake. From various available technical reports it can be observed that many buildings had collapsed due to poor construction practices , non-compliance to code provision, absence of shear walls which are similar in our country as well. But there was not much damage to infrastructure projects like Roads, Pipe lines, bridges, tunnels and industrial structures . This may be due to better control over design, construction and code compliance in this segment. Ultratech representative explained various solutions available for new construction and repair work.. Dr. Mahua Chakrabarti coordinated the function lucidly. Function was attended by more than 100 engineers

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Hemant Vadalkar felicitating Dr. K Suresh Kumar

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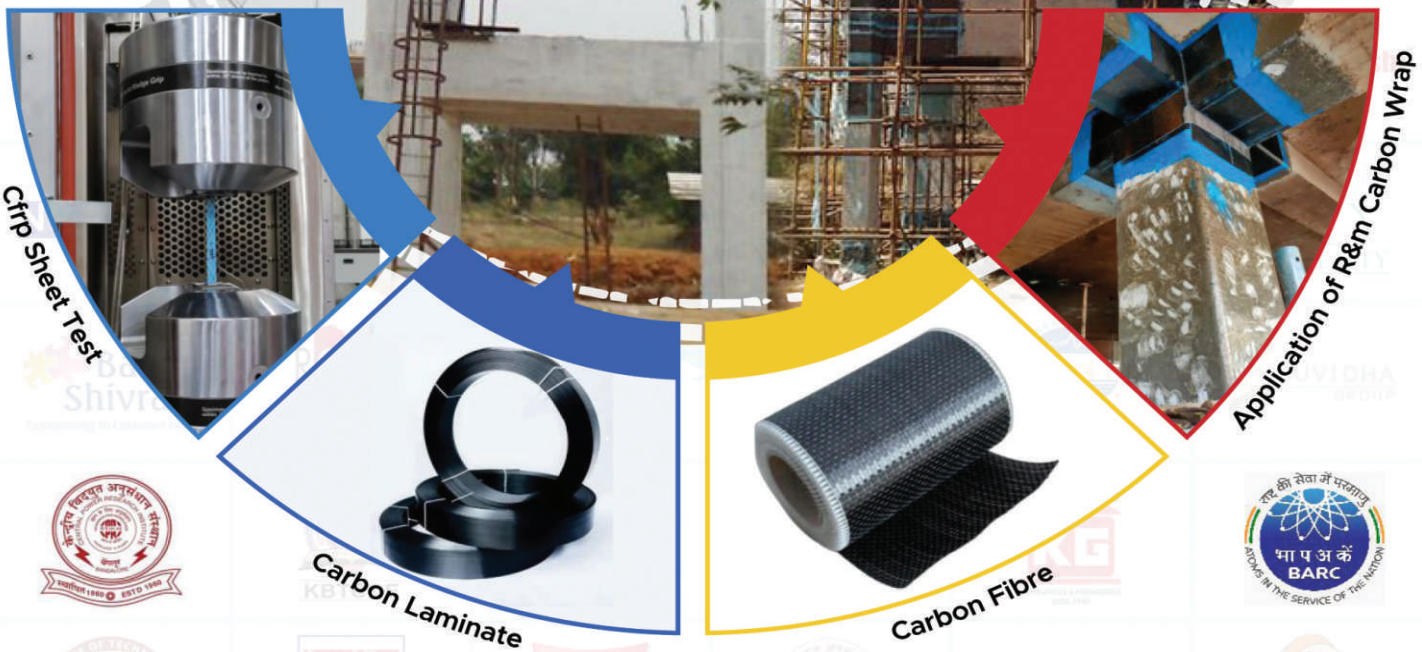

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