STRUCTURAL ENGINEERING

QUARTERLY JOURNAL OF

INDIAN SOCIETY

OF

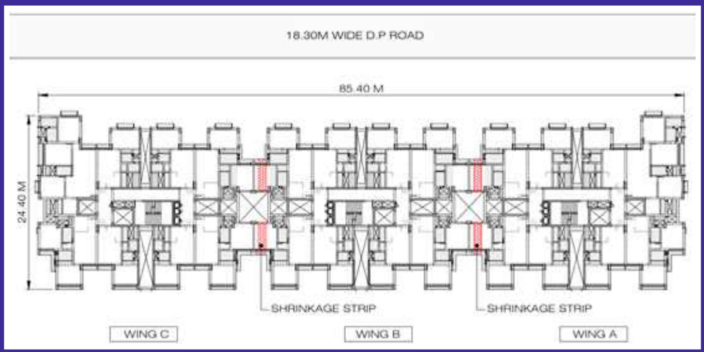
STRUCTURAL ENGINEERS

ISSE

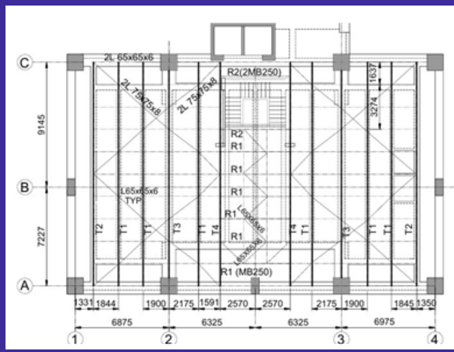
VOLUME 28- 1

JAN - FEB - MAR 2026

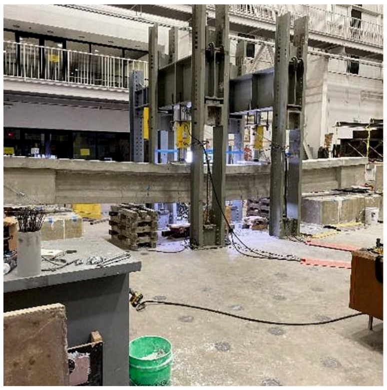
GEM 47 PROF. CHANDRAKANT S. DESAI, EXPERT IN THE FINITE ELEMENT METHOD AND CONSTITUTIVE MODELING see page 3

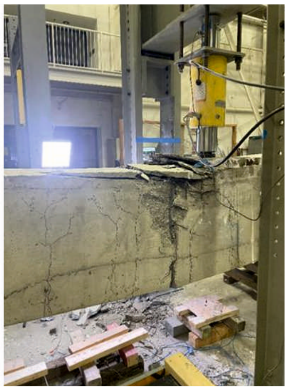


AMARYLLIS TOWERS AND PLAZA - see page 8



NAV RESHMA CO-OPERATIVE HOUSING SOCIETY LIMITED - see page 12





EPOXY-COATED OPTICAL FIBER-EMBEDDED STRANDS FOR LONG-TERM MONITORING OF POST TENSIONED TENDONS IN BRIDGE ELEMENTS- see page 12

NEWS AND EVENTS DURING JAN TO MAR 2026 see page - 22

LET US BUILD A STRONG STRUCTURE OF INDIAN SOCIETY


अल्ट्राटेक
सी मेंट
इंजीनियर की पसंद
देश का नं.1 सीमेंट
ADITYA BIRLA
CEMENT
पेश है
अल्ट्राटेक सुपर+
टैम्परप्रूफ बैग
UltraTech
ADITYA BIRLA GROUP
UltraTech
CEMENT
The Engineer's Choice
SUPER+
INDIA'S NO.1 CEMENT

INDIAN SOCIETY OF STRUCTURAL ENGINEERS

ISSE

VOLUME 28 - 1, JAN - FEB - MAR 2026

Correspondence Address : C/O, Maansi Nandgaonkar, 101, Sunflower, Sakharam Keer Road, Shivaji Park, Mahim, Mumbai - 400016

Charity Commissioner Reg. No. E 17940, Mumbai   Donations are exempted from Income under 80-G

Tel.: 91-22-24314423, +91 22 3167 1614 • E-mail : issehq@hotmail.com • Website : www.isse.org.in

FOUNDER PRESIDENT : **Late Eng. R. L. Nene**

Past Advisors :

Late G. C. Oak	Late D. S. Joshi
Late M. C. Bhide	Late M. D. Mulay
Late G. B. Choudhari	Late S. G. Patil
P. B. Dandekar	Late N. K. Bhattacharyya

ISSE WORKING COMMITTEE :

President	....	Hemant Vadalkar
Hon. Secretary	....	Rangnath Satam
Treasurer	....	Paresh Unnarkar
Past President	....	S. G. Dharmadhikari
	....	Shantilal H. Jain
Members	....	J. R. Raval
	....	K. L. Savla
	....	U. V. Dhargalkar
	....	Madhav Chikodi
	....	Vatsal Gokani
Technical Committee Member	....	Shekhar Vaishampayan
		Vivek Abhyankar
		Tanuja Bandivadekar
		Chirag Jain
		Ankit Asher
Managing Trustee	....	Maharashtra Executor and Trustee Co. Pvt. Ltd.

ISSE LOCAL CENTRES:

Pune	Aurangabad
Solapur	Baramati (Dist- Pune)
Navi Mumbai	Amravati
Palghar	Kalyan - Dombivali
Kolhapur	Indore (MP State)

ISSE Student Chapter :

M. H. Saboo Siddiki College of Engg., Mumbai
MIT WPU, Pune
Chameli Devi Group of Institutions, Indore
Vivekanand Polytechnic, Mumbai.
Walchand College of Engg. Sangli.
MIT College, Loni Kalbhor, Pune
Aditya Engineering College, Surapalem
G H Raisoni College Of Engineering & Management, Pune
Maharaja Institute of Technology, Thandavpura, Mysore
Vidyavardhini College of Engineering, Vasai (VECT)
P. R. Pote Patil College of Engineering & Management, Amravati
Sardar Patel College of Engineering, Mumbai
Sipna College of Engineering & Technical, Amravati.
The Sayajirao Maharaja University of Baroda

Contents

Editor : Vatsal Gokani

Views expressed are authors' or reporters' personal and do not necessarily reflect views of ISSE. ISSE is not responsible for any consequent actions based on contents or information given in the journal.

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 2026)

2689	Nilay Kirit Gandhi	2701	Shubhankar Raviraj Mane
2690	Ajay Mukund Marathe	2702	Chaitanya Harshawardhan Patki
2691	Abhijeet Santosh Gawde	2703	Mahendra Shahaji Mane
2692	Akbarkhan Jamsherkhan Pathan	2704	Prathamesh Sopan Wanjale
2693	Mohammed Aamir Mohammed Zuber Patni	2705	Asifraj Jafar Shaikh
2694	Hanan Ashraf Wani	2706	Hari Om Pal
2695	Aravind S. Seeram	2707	Anbarasan A. K.
2696	Mohd Moazzam	2708	Nikhil Narendra Mhatre
2697	Manan Bipin Khatri	2709	Aditya Saini
2698	Lokesh Kisan Patil	2710	Sandeep Shivram Pendhari
2699	Nilesh Namdev Nale	2711	Madhusudan Anil Wani
2700	Sukumar Vedhachalam	2712	Niha Udaranikkar

Patrons : 38
Members : 2712
Student Members : 886

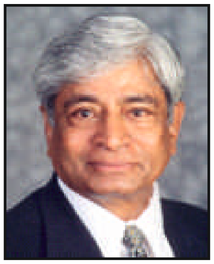
Organisation Members : 43
Junior Members : 91

Sponsor : 8
IM : 08

TOTAL STRENGTH : 3,786

GEM 47 PROF. CHANDRAKANT S. DESAI, EXPERT IN THE FINITE ELEMENT METHOD AND CONSTITUTIVE MODELING

Dr. N. Subramanian



Prof. Chandrakant S. Desai (1936-2025)

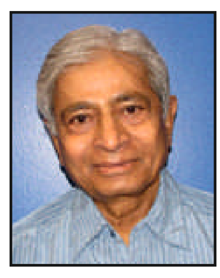
Prof. Chandrakant S. Desai, Regent's Professor, at the University of Arizona, was internationally recognized for his significant and outstanding contributions in research, teaching, applications, and professional societies in a wide range of topics in engineering. The topics where he made major contributions include material (constitutive) modeling, laboratory and field testing, and computational methods for interdisciplinary problems in engineering related to geomechanics, geotechnical engineering, structural mechanics, structural engineering, soil-structure interaction and earthquake engineering, coupled flow through porous media, and electronic packaging. He was a prolific author of 25 books, 20 book chapters and 350 papers, mainly in the areas of finite element method and constitutive modeling.

Dr. Desai's research on the development of the new and innovative disturbed state concept (DSC) for constitutive modeling of geomaterials and interfaces/joints has found significant engineering applications; it can connect mechanics, physics (thermodynamics) and philosophy. In conjunction with nonlinear finite element methods, it provides a new and alternative procedure for analysis, design and reliability for challenging and complex problems of modern technology. The DSC is considered to be a major and significant contribution that has been adopted for research, teaching and application in a number of engineering disciplines. Prof. Desai has received a number of awards and recognitions. It may be mentioned that Dr. Desai has the unique honor for receiving two prestigious awards from the Geo-Institute, and the Structural Engineering and Engineering Mechanics Institutes of ASCE in recognition of his interdisciplinary contributions. His professional resume is a testament to his lifetime of academic excellence.

EARLY EDUCATION AND TEACHING

Chandrakant S. Desai was born on November 24, 1936 in a farming village in Nadisar, Gujrat, India, as son of Sankalchand P. and Kamala M. (Kothari) Desai. He was always an academic, sent to boarding school when he was twelve. He graduated from the University of Bombay's Victoria Jubilee Technical Institute with a baccalaureate degree in civil engineering in 1959 and received his master's and doctorate degrees from Rice University in Houston and University of Texas at Austin in 1966 and 1968, respectively.

He worked as a civil engineer in government/ private agencies, in India, during 1959-1964; As Research civil engineer, USAE Waterways Experiment Station, Vicksburg, Mississippi, during 1968-1974; Professor Civil engineering, and Director of computational methods group, Virginia Polytechnic Institute and State University, Blacksburg, during 1974-1981.



Subsequently, he moved to the University of Arizona, Tucson, (USA) in 1981 as Professor of Civil Engineering and Director of Engineering Mechanics and was named Regent's Professor in 1989 – the highest distinction given by the University of Arizona. He was the head of the Department, University

Arizona, Tucson, during 1987-1991. He also taught as Erskine professor of University Canterbury, Christchurch, New Zealand, 1980, 91. He retired from UA in 2012 as Regent's Professor Emeritus

BOOKS AND PAPERS

Prof. Desai authored seven original and innovative technical books, containing literary and philosophical aspects, on behavior of materials and computer methods, that have been published by Van Nostrand Reinhold, McGraw Hill, Prentice Hall, Taylor and Francis/CRC Press. Some of them have been best sellers. In addition, he co-authored/edited 17 more books and 20 book chapters in the areas of finite element method and constitutive modeling and published 345 papers in well-reputed journals and conferences of international scope.

Prof. Desai's research on the development of the innovative disturbed state concept (DSC) for constitutive modeling of materials and interfaces/joints has been accepted widely for research and teaching in many countries. In conjunction with the nonlinear finite element method, it provides an innovative and alternative approach for analysis and design of complex nonlinear problems in engineering.

Prof. Desai's book (co-authored by J.F. Abel), Introduction to the Finite Element Method, published in 1972, was the first formal textbook on the subject in the United States and second internationally. It has been translated into several languages worldwide. He authored the first textbook, Elementary Finite Element Method, which is widely used for introducing this powerful method to undergraduate students.

In 1977, Prof. Desai edited (with John Christian as Co-Editor) the first book on Numerical Methods in Geotechnical Engineering that deals with pr oblems from geotechnical and structural engineering in a unified and easy to understand manner. This one-of-a-kind edited book has been used extensively by the academic community and practitioners.

Understanding, testing, and defining the behavior of materials that compose engineering systems are essential to finding realistic and economical solutions. His book (co-authored by H.J. Siriwardane), Constitutive Laws for Engineering Materials, published in 1984, is considered pioneering on the subject and used worldwide in teaching and research. In 2001, Prof. Desai authored a book, Mechanics of Materials and Interfaces: Disturbed State Concept, that presents a detailed theoretical treatment of the DSC and shows that it can provide a unified and simplified approach for mathematical characterization of the mechanical response of materials and interfaces.

The disturbed state concept (DSC) is a unified, constitutive modelling approach for engineering materials that allows for elastic, plastic, and creep strain, microcracking and fracturing, and stiffening or healing, all within a single, hierarchical framework. Its capabilities go well beyond other available material models and lead to significant simplifications for practical applications. Typically, the available models account for one factor at a time; however, the disturbed state concept (DSC) within the hierarchical single-surface (HISS) plasticity framework can allow for numerous factors simultaneously, and in an integrated manner.

In 2013, Prof. Desai authored (with Musharraf Zaman as co-author) Advanced Geotechnical Engineering: Soil-Structure Interaction Using Computer and Material Models in which he introduced modern computer-based methods for solving complex geotechnical engineering problems considering such factors as in-situ stress, stress paths, volume change, discontinuities and microcracking (initial and induced), strain softening, and liquefaction. The details of these methods (finite element, finite difference, analytical, and semi-analytical) were presented for one-, two-, and three-dimensional problems. Also, various constitute models for geologic media and interfaces, from simple to advanced, were discussed and numerical examples included along with exercises or partial solutions of several problems.

In 2023, Prof. Desai edited (along with Yang Xiao, Musharraf Zaman, and John Carter as Co-Editors) a book, DSC/HISS Modeling Applications for Problems in Mechanics, Geomechanics, and Structural Mechanics, that provides readers with comprehensive information including the basic concepts and applications for the DSC/HISS modeling regarding a wide range of engineering materials and contacts. Specifically, it presents a new and simplified way to learn characterizations and behaviors of materials and contacts under various conditions. Also, it offers modeling choices applicable to different materials including geologic (clays, sands, rocks), modified geologic materials (structured soils, over-consolidated soils, expansive soils, loess, frozen soils, chemically treated soils), hydrate-bearing sediments, and more.

In addition to these technical books, Prof. Desai has also written a book "Kachro" which literally translates to dirt and is the story of the protagonist with the same name. A foray into his journey, this poem in prose is an experience as mystic as it is fulfilling. Not having been written along the usual lines of fiction, this is the story of a man who is on a journey to search and understand its true meaning and also embraces all those mystical experiences along the way that lends the true leverage to his search for incandescence and enlightenment. Prof. Desai has mentioned that literature and writing were his favorite subjects-but fate led him to technology!

EDITOR OF JOURNALS

Prof. Desai was the founding editor of the International Journal for Numerical and Analytical Methods in Geomechanics from 1977 to 2000, published by John Wiley, UK. He was the founding editor-in-chief of the International Journal of Geomechanics (IJOG) from 2001 to 2010, published by the Geo Institute, American Society of Civil Engineers (ASCE). Subsequently, he served as the advisory editor of this journal. In addition, he has served on the editorial boards of 14 other journals.

ASSOCIATION WITH PROFESSIONAL SOCIETIES

Prof. Desai was the founding president of the International Association for Computer Methods and Advances in Geomechanics (IACMAG) - since 1991. He is credited with introducing the interdisciplinary definition of geomechanics that involves various areas such as geotechnical engineering, rock mechanics, static and dynamics of interacting structures and foundations, flow through porous media, geo-environmental engineering, natural hazards such as earthquakes, landslides, and subsidence, petroleum engineering, offshore and marine technology, geological modeling, geothermal energy, ice mechanics, and lunar and planetary systems. He was so proud of starting a conference series called the International Association for Computer Methods and Advances in Geomechanics in 1971. He was a Fellow American Society of Civil Engineers (Chairman of Computer and numerical methods committee of GeoTech. Division from 1976-1981).

He was a Member of the American Society for Testing and Materials, Institute of Structural Engineers (Wallace Premium prize 1963), International Society Soil Mechanics and Foundation Engineering, Earthquake Research

Institute, American Academy Mechanics, American Society Engineering Education. He also has served as chair/member of committees of various national and international societies and conferences. He was a Trustee of Deep Foundation Institute, during 1978-1980. He acted as Chairman/vice chairman of the 1st, 2d, 4th, 5th, 6th, 7th, 8th, 9th International Conference Numerical Methods Geomechanics.

CONSULTANCY WORKS

Prof. Desai was involved in consulting work for the solution of practical problems for several private, public, international agencies. For example, he served as a consultant for UNESCO in which he was involved in computer analysis and design in the Narmada Sardar Sarovar Project in India, Tunneling Projects in the Himalayas, and Development of Testing Equipment for Central Material Testing Laboratory in India.

AWARDS AND RECOGNITIONS

The body of Prof. Desai's research, publications, and professional work has been seminal and original. He has significantly changed the direction of research, teaching, and design applications for civil and other engineering disciplines. He has received many national and international awards and recognitions including the following:

- Distinguished Member Award by the American Society of Civil Engineers (ASCE);
- The Nathan M. Newmark Medal by the Structural Engineering and Engineering Mechanics Institutes, ASCE;
- The Karl Terzaghi Award by the Geo Institute, ASCE;
- The Meritorious Civilian Service Award by the U.S. Corps of Engineers;
- The Alexander von Humboldt Stiftung Prize by the Alexander von Humboldt Foundation, Germany;
- Honorary Professor, University of Nottingham, U.K.;
- Distinguished Alumni Award from his alma mater (VJTI);
- Lifetime-achievement-award, Indian Society of Earthquake Technology,
- The Diamond Jubilee Honor by the Indian Geotechnical Society, India;
- Distinguished Scholar in Residence and Professor, Indian Institute of Technology, Bombay and Gandhinagar;
- Chief Distinguished Guest Professor, Chongqing University, China;
- Diamond Jubilee Honor, Indian Geotechnical Society;
- Suklje Award/Lecture, Slovenian Geotechnical Society;
- The HIND Rattan (Jewel of India) Award by the NRI Society, India;
- The Outstanding Contributions Medal by the International Association for Computer Methods and Advances in Geomechanics;
- Fellow, American Academy of Mechanics;
- Outstanding Contributions Medal in Mechanics by the Czech Academy of Sciences; and
- Clock Award for outstanding Contributions for Thermomechanical Analysis in Electronic Packaging by the Electrical and Electronic Packaging Division, ASME;

For excellence in teaching, he has received the Five Star Teaching Award and the El Paso Gas Foundation Faculty Achievement Award at the University of Arizona, Tucson, Arizona.

FAMILY

Prof. Desai enjoyed almost 56 years of marriage life with Patricia Lynn Porter, whom he met at the University of Texas in Austin. They traveled the world together, read books together, and supported each other daily. He has two children. His son, Sanjay, who lives at a long-term care facility in Tucson., and his daughter, Maya, along with her husband, Sean, and children (Lois Mira and Vermon Jay) live in Worcester, Massachusetts. He loved when Maya and her family would visit as he would encourage them to eat Indian snacks and try laughing yoga with him.

He came to the United States in 1964, naturalized, 1973. Over the ensuing 60 years he sponsored and supported countless family members as they immigrated as well. Siblings, cousins, nieces, and nephews often came to live with him and his family as they started their lives in the US. Many have shared that, if not for him, they would never have had so many opportunities. Over the past few days these relatives described him using adjectives such trailblazer, mischievous, funny, brilliant, handsome, admirable, selfless, supportive, curious, courageous, generous, and pioneering.

Even though he lived in the U.S., he held deeply on to his ties to India and loved to read Indian literature and poetry, watch Bollywood movies, and follow Indian politics. His love for Indian food especially pakoras, ladoos, and dal-bhat was unparalleled. No matter which city he went to in his lifetime of travels, he had to try the Indian restaurant.

Passes Away

On March 28, 2025, Chandrakant S. Desai, University of Arizona Regent's Professor Emeritus died peacefully in Tucson, Arizona after several weeks of illness. With Prof. Desai's passing away, the geomechanics community worldwide lost a giant who could not be replaced. The community will miss him profoundly.

References

1. https://www.evergreenmortuary-cemetery.com/obituaries/chandrakant-desai/obituary
2. https://iset.org.in/iset-lifetime-achievement-award/
3. https://www.amazon.com/stores/author/B09Y51V2S8/about?ccs_id=7470dfe8-6984-4f0a-8770-7bc77004e6a6

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 48 years of experience in Industry (including consultancy, research and teaching). He was awarded with the 2024 Edmund Friedman Professional Recognition Award of the American Society of Civil Engineers, ACCE(I)'s Gourav Award, ICI's 'Life Time Achievement Award' and many other awards for his contributions towards Structural Engineering. He is the author of 25 books and over 315 papers, 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)

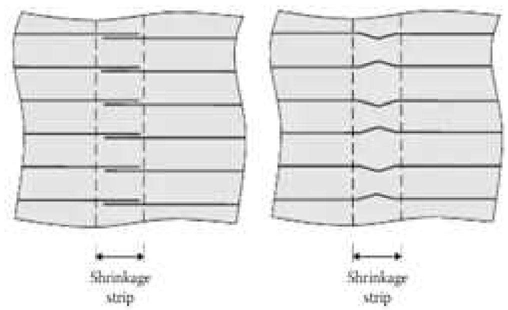
AMARYLLIS TOWERS AND PLAZA

Adaptive Foundations and Shrinkage Strip Innovations in Urban Construction Part of Nahar's Amrit Shakti Township

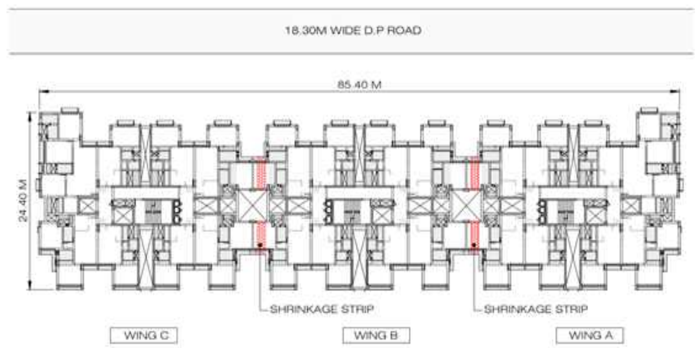
By Faisal Chogle

Located in the thriving residential–commercial corridor of Chandivali, Amaryllis Towers and Plaza is a landmark development by Nahar Group that exemplifies intelligent mixed-use urban design. Conceived by the renowned Architect Hafeez Contractor, the project integrates street-level retail with high-rise residential living across three interconnected wings and an adjoining multilevel car park block.

At the heart of this project lies a bold structural strategy to accommodate the longitudinal spans of the buildings—85 meters in the main residential block and 110 meters in the MLCP. These unusually large floor plate lengths necessitated the incorporation of shrinkage strips, engineered to mitigate volumetric changes in concrete due to drying shrinkage and temperature variations. The strips, strategically introduced with a 90-day construction lag, are detailed with lapped reinforcement zones to control differential contraction while maintaining structural continuity.



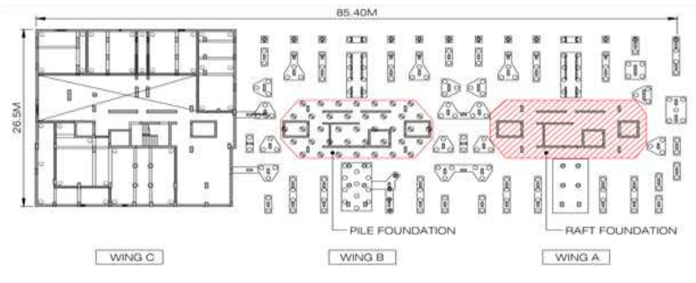
Lapped reinforcement detail at shrinkage strips to restrain uneven contraction



Typical Residential Building Plan Showing Shrinkage Strips (Note: Structural drawing superimposed on Architectural Layout)

The MLCP structure on the northern edge of the 18,950 sq. ft. plot also houses a rooftop clubhouse and amenity zone—making efficient use of vertical real estate while maintaining visual separation from the residential mass.

A major design pivot occurred during the foundation phase when geotechnical excavation revealed weak, oversized boulders that rendered the planned pile foundations unfeasible in some zones. STERLING's structural team responded with agility—opting for a hybrid foundation system comprising raft slabs in boulder-heavy zones, integrated with piles elsewhere. This midstream adaptation involved rapid reanalysis, revised construction detailing, and close coordination with site teams—ensuring safety, stability, and schedule continuity.



Foundation Layout Showing Part Pile Foundation

Further, STERLING worked closely with the MEP consultants during early design stages to establish MEP–structural coordination protocols. These included standardization of shaft alignments, sleeve zones, and service openings—minimizing clashes and construction-stage improvisation. These protocols, now formalized, are being replicated across multiple ongoing projects.

About the Author
Faisal Chogle
faisalchogle@sterlingengg.com

NAV RESHMA CO-OPERATIVE HOUSING SOCIETY LIMITED

By Vasudev V Nori

Six additional floors were constructed over an existing seven-story building. The existing building was designed by C.M. Jain (Consulting Engineer), no longer practicing, Kantilal and Co. (Architects), believed to be 25 years old. The design lateral loads were not available in the documents retrieved from the Municipal Corporation. The building was founded on open foundations The plinth levels of buildings on the three adjoining sides are considerably higher.

Six additional floors were proposed over the old building. Before proceeding further, we requested that Bhojwani's engineer check the dimensions of the columns on the ground floor. They tally with what was shown in the drawings. We checked the column loads independently, assuming the design loads mentioned by the original designer. We found that some columns were overstressed, even without considering wind loads.

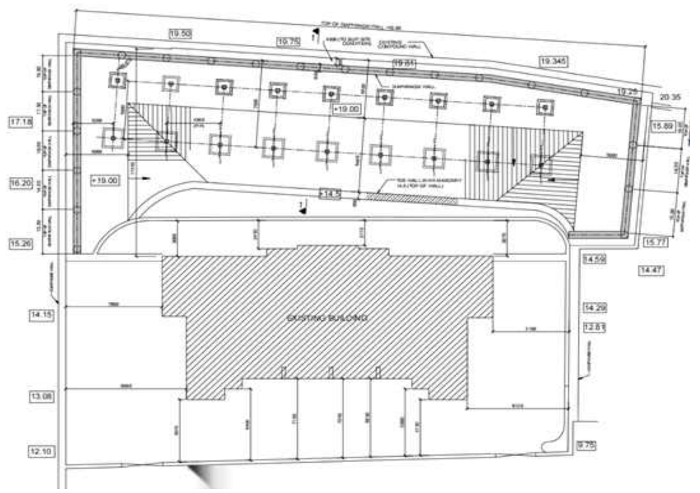
We visited the site and observed wide vertical cracks on some columns. EPICONS Consultants were appointed to conduct Non-Destructive Tests. The quality of concrete was poor according to Ultra Pulse Velocity tests, but satisfactory according to Rebound Hammer tests. The appearance of cracks in the first-floor balcony on the rear side suggests that the drawings were not followed. The balcony was propped up immediately. We inspected all other floors and identified damage at several locations. The balconies were in such poor condition that it would be better to replace them with new balconies that could be integrated with the peripheral frame of the new structure.

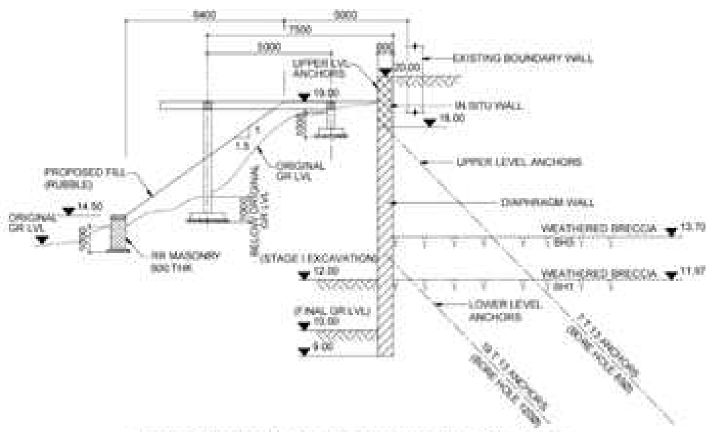
In other rooms where the ceiling is exposed, corrosion of reinforcement is seen. All the concrete surfaces must be thoroughly cleaned. We suggested that these defects be rectified by protecting the reinforcement with a suitable paint and the concrete repaired using polymer concrete. Moreover, the top surface needs to be patched up with M25 grade concrete using a suitable bonding agent. Detailed specifications for retrofitting the structure using polymer mortar and jacketing for the ground floor columns were given to the Constituted Attorney. Retrofitting was completed before the commencement of the construction activities for the new building.

The existing building occupied only the front part of the land occupied by the Nav Reshma Co-operative Society. On three sides, the plot sloped irregularly by vegetation. The ground levels of the adjoining properties were much higher. These had to be lowered to match the road levels. This would be possible by constructing a diaphragm wall. The earth retention height on the rear side was 10 m. D.V. Karandikar (Geotechnical Consultant) was appointed to investigate and recommend the engineering properties of the strata that would form the basis for designing the diaphragm wall.

Considering severe site constraints, we preferred to work with Tarways Construction and Foundation

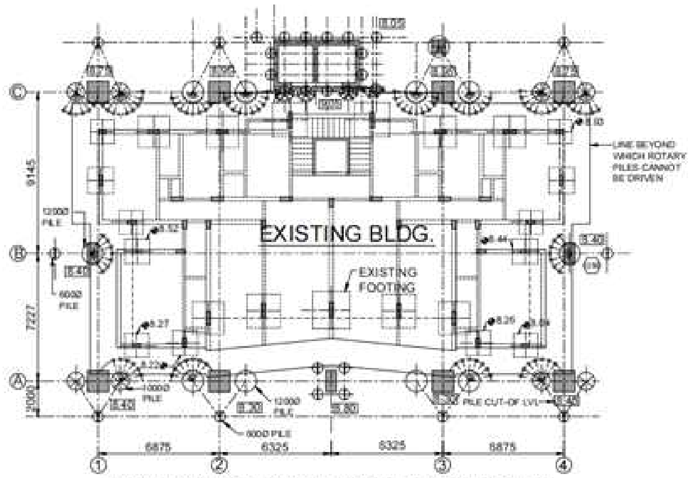
Corporation. Mr. B.H. Malia visited the site and explained that this would require a rail-mounted machine. A temporary reinforced concrete frame resting on open foundations was constructed for this purpose. A toe wall was built to stabilise the original soil profile to a stable one. The plan of the diaphragm wall showing the levels of the adjoining properties and temporary footings for the reinforced concrete frame is shown below.





DIAPHRAGM WALL WITH PRESTRESSED ANCHORS

Once the diaphragm wall was cast, the upper-level inclined anchors were installed, stressed, and grouted. The temporary reinforced structure was then dismantled, and Stage I excavation was completed. The lower-level anchors were installed, and Stage II excavation was completed. On the sides, the diaphragm wall was stepped down to match the ground levels of the adjoining properties. Lower-level anchors were not required on the sides



PLAN SHOWING NEW COLUMNS, & PROPOSED PILES.

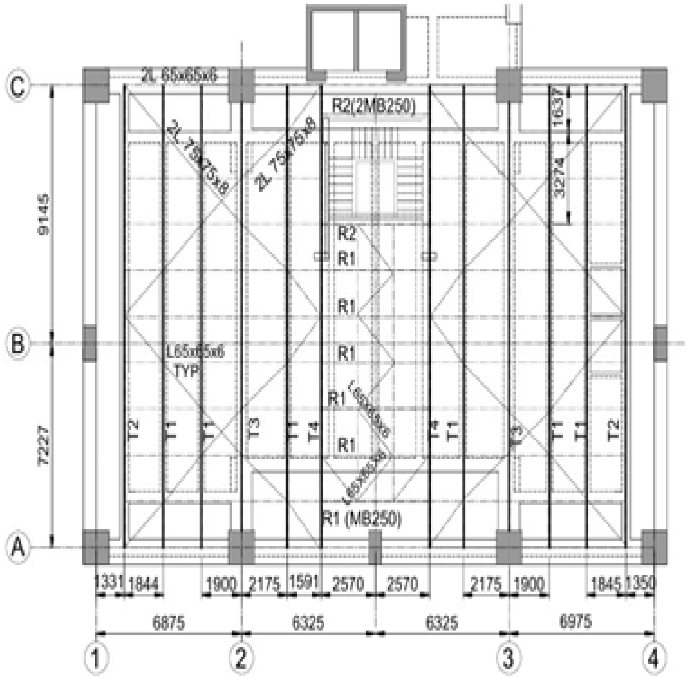
600Ø 28 NOS ; 1000Ø 8 NOS ; 1200Ø 11 NOS

The new structure must be supported on columns along the periphery. The old building's footings were resting on open foundations on soft rock, exerting a pressure of 309 kPa. The columns supporting the new structure could be supported on groups of piles (600 mm~ 1200mm). A group of micro piles was installed to prevent disturbance to the old building during pile boring operations.

The new building is a 12-story reinforced concrete frame supported by cast-in-situ piles. The frame is designed to resist the gravity loads of the new structure and the lateral loads acting on the old and new structures. The old structure is connected to the surrounding reinforced concrete frame at each floor. Flower beds were provided on each floor to provide greenery for the residents of the existing building.

The floors for the upper stories could be supported on the perimeter columns. Consequently, only lightweight partitions were used, and the floor-to-floor height was fixed at 3.58 m.

After removing the false ceiling, we inspected the condition of the existing terrace slab from below. In the toilet portion, as per the original drawings, the spacing of the reinforcement in the terrace slab in the toilet slab is 100 mm. However, the spacing of reinforcement seen is much larger. The entire terrace slab was covered with Siporex blocks after rendering the top surface. Gypsum board partitions were used for this floor.



Since the terrace floor of the existing building was not strong enough to support the deadload of the second living floor, the formwork was supported by steel trusses. Detailed fabrication drawings of the steel trusses were prepared.

This was certainly one of the most complicated projects, though the additional built-up area was only 3600 m2. The credit goes to D. N. Karandikar (Geotechnical Consultant) and B. H. Malia (Tarways Construction and Foundation Corporation) for taking up the challenge of constructing the diaphragm wall and installing post-tensioned anchors. S. A. Shenolikar (Samir Bhojwani) was available at the site, coordinating the execution. N. M. Ajuga's frequent site visits were invaluable. V. V. Nori developed and carried out the detailed design of the project. About 45 drawings were prepared for the project.

About the author :

Dr. V V Nori – Chairman
M/s Shirish Patel and Associates Consultants Pvt Ltd, Mumbai.
Author designed many outstanding and award winning structures and has more than six decades of experience in structural engineering.
Email : nori@spacpl.com

Publications For Sale

Sr. No.	Name	Rs.
Publications		
1	Professional Services by Structural Design Consultant – Manual for Practice	250/-
Proceedings		
1	National Conference on Corrosion Controlled Structure in New Millennium	500/-
2	Workshop on Effective Use of Structural Software, 6th March, 2004	250/-
3	One Day Seminar on "Shear Walls In Highrise Building",30th Octobar, 2004	250/-
4	Seminar on "Innovative Repair Materials / Chemicals", 1st October, 2005	300/-
5	Seminar on "Foundations For Highrise Buildings", 23rd September, 2006	250/-
6	One Day Work Shop on "Pile Foundations", 20th February, 2010	250/-
7	One Day One Day Seminar on "Pre - Engineered Structures", 29th January, 2011	250/-
8	One Day workshop on "Insight into Wind Loading using IS875, Part 3 : 2015", 27th April 2019	300/-
9	One day workshop on "Structural Health Evalution Vis - A - Vis Prescriptive "Mandatory Format Of Structural Audit" On 18th Jan ,2020	300/-
10	"Performance Based Seismic Design of Buildings" by Er. Vatsal Gokani released on 5th August, 2022	600/-
11	Any ISSE Journal Copy	100/-
Note : Additional courier charges for Mumbai Rs. 50 for outstation Rs. 100).		

DIFFERENTIAL COLUMN SHORTENING AND GRAVITY-INDUCED LEAN IN TALL BUILDINGS

By Vatsal Gokani

1. Introduction

As buildings become taller and more architecturally complex, structural engineers encounter new challenges in ensuring stability, precision, and long-term serviceability. One such challenge is differential column shortening — the unequal vertical deformation of load-bearing elements due to variations in load, material properties, and time-dependent effects such as creep and shrinkage.

While uniform vertical shortening is generally inconsequential, differential shortening can cause significant serviceability problems, including misalignment, cracking, and mechanical malfunction.

A related phenomenon, particularly relevant in the Indian context, is gravity-induced lean — a lateral deformation of the building arising from asymmetrical load distribution, eccentric core placement, and non-uniform stiffness. Over time, creep and shrinkage can amplify this lateral tilt or sway.

Consequences of Differential Shortening and Lean include:

- Uneven floor slabs causing non-uniform load redistribution.
- Cracking and stress concentration in facades and partition walls.
- Malfunctioning elevators and misaligned shafts.
- Misalignment of mechanical services (plumbing, HVAC, etc.).
- Excessive lateral tilt or overall deflection of the structure.

2. Causes of Differential Column Shortening

2.1 Material Properties

High-rise buildings often combine reinforced concrete, steel, and composite systems. Concrete exhibits both elastic and time-dependent deformations (creep and shrinkage), steel primarily undergoes elastic shortening with negligible creep, and composite columns behave intermediately. The differential behaviour of these materials leads to non-uniform shortening, particularly after construction completion when long-term effects become dominant.

2.2 Load Distribution and Stiffness Variation

Column shortening is directly proportional to the applied load and inversely proportional to stiffness. Core walls and mega-columns are typically stiffer and exhibit smaller deformations, while perimeter and corner columns may shorten considerably. Variations in load path and stiffness across the plan can therefore create measurable differential shortening.

2.3 Time-Dependent Effects in Concrete

Creep — progressive strain under sustained load — and shrinkage — volume reduction due to moisture loss — are the principal long-term contributors. Their magnitude depends on mix design, humidity, temperature, and load duration. These effects intensify after construction and fit-out, influencing both serviceability and vertical alignment.

3. Causes of Gravity-Induced Lean

3.1 Uneven Load Distribution and Massing

Asymmetrical layouts or core locations often produce unbalanced gravity loads. When one side of the building carries higher mass or taller segments, it may lean towards that direction under sustained loads.

3.2 Lateral Stiffness Variations

Differences in stiffness between the core, shear walls, and perimeter columns alter global deformation behaviour. An eccentric core amplifies these effects, with central walls shortening more than stiffer peripheral elements, causing a measurable lateral lean.

3.3 Time-Dependent Concrete Effects

The same creep and shrinkage mechanisms responsible for vertical shortening also induce lateral deformation, contributing cumulatively to the building's lean.

4. Mitigation Strategies

To minimize differential column shortening and gravity-induced lean, engineers employ several practical techniques:

1. Pre-adjustment of Column Heights.
2. Cambering the Building.
3. Optimized Material Selection.
4. Composite Systems.
5. Time-Dependent Analysis.
6. Construction Sequencing.
7. Post-Tensioning.

5. Predicting Differential Column Shortening and Subsequent Corrections

Differential column shortening and gravity-induced lean cannot be captured accurately using conventional elastic "switch-on" analyses, where the entire structure is modelled as fully constructed and loaded in one step. While this approach suffices for most structural design applications, it fails to represent the actual construction sequence and the time-dependent behaviour of materials. In reality, tall buildings are built floor-by-floor over many months, and concrete members experience progressive deformations due to creep and shrinkage under sustained loads. These effects, combined with the erection sequence, govern the long-term deformation and alignment of the structure.

To account for these factors, a non-linear staged-construction analysis is essential. This analysis simulates the step-by-step construction of the building, incorporating time-dependent creep and shrinkage models and load redistribution effects. Each new floor or stage is "activated" in the analysis at the corresponding construction time and elevation, thereby reflecting how loads are gradually applied and redistributed as construction progresses. This approach captures not only elastic deformations but also the accumulation of time-dependent strains and stiffness variations.

A case study of a 300 m tall reinforced concrete building, designed in the author's office and incorporating an eccentric core, is presented to examine the vertical and horizontal deformations predicted by a nonlinear staged-construction analysis at various time intervals over the service life of the structure. The study also outlines the correction strategies adopted to mitigate differential column shortening and gravity-induced global lean.
In the author's design office, this analysis is carried out using advanced finite element software capable of modelling nonlinear, time-dependent material behaviour. Each "new stage" or floor is introduced into the analytical model at its original surveyed elevation, closely replicating the actual construction sequence on site. The software implements the mathematical models defined in ACI 209.2R-08 to

estimate creep and shrinkage strains, stiffness degradation, and the progressive evolution of deformations over user-defined time intervals that align with the project's construction schedule.

The figures 1 and 2 below illustrate the differential shortening of a representative column relative to the core, as obtained from the staged-construction analysis, together with the residual differential shortening after the applied corrections.

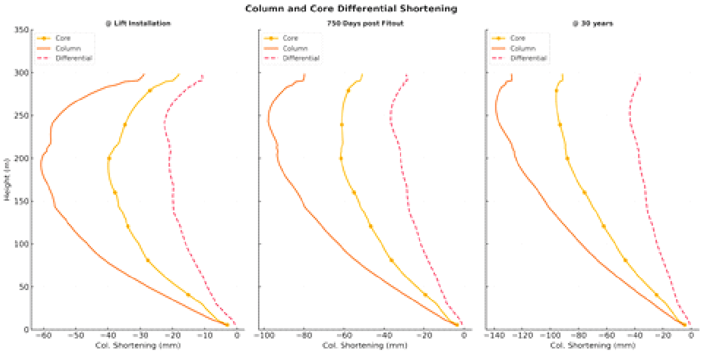


Figure 1: Column and Core Differential Shortening Prior to Corrections

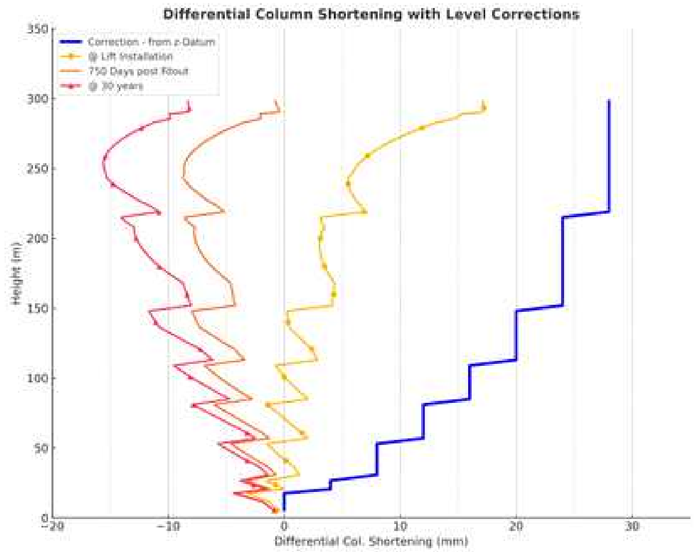


Figure 2: Differential Column Shortening with Level Corrections

Even though the exact construction timeline is often uncertain during early design, upper-bound and lower-bound estimates of long-term deformations can be determined from typical rates of construction and environmental conditions. These predictions form the basis of a correction and monitoring strategy, developed collaboratively with the construction team to ensure that both short-term and long-term deformations remain within serviceability limits.

During construction, super-elevation corrections are provided to compensate for these predicted deformations. In this project, the corrections were based on 70% of the predicted Stage 2 differential shortening, limited to a maximum of L/500 or 25 mm, whichever was smaller. This reduced correction factor was deliberately adopted to account for uncertainties inherent in long-term deformation prediction. In practice, actual structures tend to be slightly stiffer than analytical models, and creep-shrinkage predictions may vary by ±30 %. Hence, a partial correction ensures that the building settles within acceptable tolerances without over compensating. Following these construction-stage corrections, continuous monitoring is carried out during structural completion and early service life.

6. Predicting Gravity-Induced Lean and Subsequent Corrections

The asymmetry in tall buildings often generates a horizontal gravity-induced lean that can be predicted using non-linear "staged-construction" analysis models at various construction stages. Although this lean may be imperceptible to the naked eye, it can have significant implications for vertical systems such as elevator shafts, façade alignment, and mechanical installations.

In the 300 m reinforced concrete tower examined, the non-linear staged-construction analysis revealed progressive horizontal lean at successive stages of construction and service life. As each floor was cast and long-term creep and shrinkage effects developed, the structure gradually tilted towards the stiffer, less-loaded side. While the total magnitude of lean remained small, its impact on precise vertical systems — especially elevator alignment — was substantial.

To mitigate this effect, a horizontal camber was introduced during construction. This camber was applied from the floor below, creating a pre-adjusted geometry so that as the structure underwent time-dependent deformations, it would gradually return to a plumb condition. It is important to note that this camber does not represent the immediate deflection at the end of construction, but the cumulative correction from the as-built position of each floor. As a result, the structure achieves near-perfect verticality at the chosen time.

Figures 3 and 4 below illustrate the gravity-induced global lean of the structure before and after the application of corrective measures.

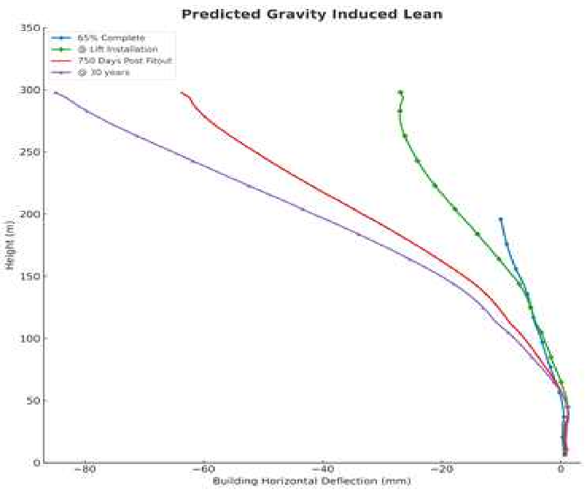


Figure 3: Gravity Induced Lean Prior to Corrections

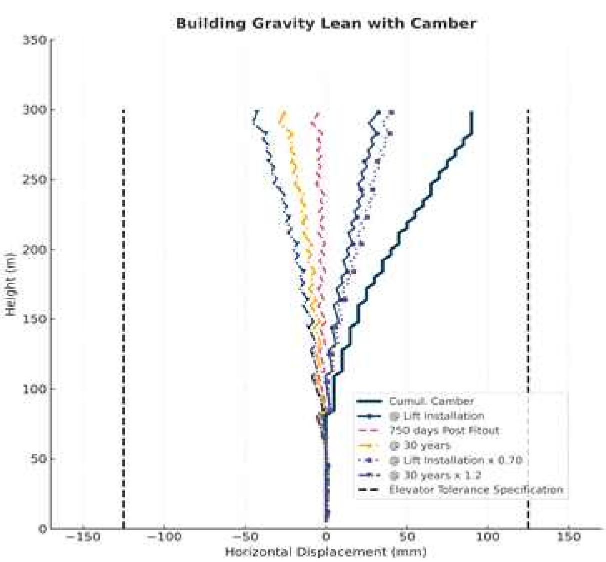


Figure 4: Gravity Induced Lean Post Corrections

The determination of horizontal camber in the design software is an iterative process. Since second-order (P–Δ) effects influence horizontal deflections, the model must be repeatedly updated until convergence is achieved between the applied camber and the predicted long-term lean.

For the elevator system, upper and lower bound deformations were established after lean correction to define a practical tolerance envelope. The lower bound was defined as 0.7 times the horizontal deformation at the time of elevator installation, while the upper bound comprised one times the elastic deformation plus 1.25 times the long-term creep and shrinkage deformation predicted over 30 years. These limits were provided to the elevator manufacturer to ensure installation compatibility.

7. Conclusions

Accurate prediction and compensation of differential column shortening and gravity-induced lean through staged-construction, time-dependent analysis is essential for tall building performance. Even when predicted deformations are within limits, construction-stage corrections ensure alignment, functionality, and serviceability.

References

1. Matar, S., et al. (2017). A Structural Engineer's Approach to Differential Vertical Shortening. International Journal of High Rise Buildings, 6(1).
2. ACI Committee 209. (2008). ACI 209.2R-08: Guide for Modelling and Calculating Shrinkage and Creep in Hardened Concrete.
3. Fintel, M., et al. (1987). Column Shortening in Tall Structures - Prediction & Compensation. Portland Cement Association.

Author :

Vatsal Gokani
Partner, Gokani Consultants and Engineers LLP B.E. (Civil), VJTI Mumbai M.S. (Structural Engineering, with Honours), The University of Texas at Austin
Email: v.gokani@gokaniconsultants.com

EPOXY-COATED OPTICAL FIBER-EMBEDDED STRANDS FOR LONG-TERM MONITORING OF POST TENSIONED TENDONS IN BRIDGE ELEMENTS

By Manan Khatri

Abstract

Monitoring prestressing forces in post-tensioned concrete bridges is essential for assessing long term structural performance, yet direct measurement of tendon strain remains challenging. This study evaluates the reliability of epoxy-coated optical fiber–embedded prestressing strands for distributed strain monitoring by comparing their performance against established measurement techniques. The sensor-embedded strands incorporate helically wrapped optical fibers within a conventional seven-wire prestressing strand and are protected using an epoxy coating. Strain measurements obtained using a Brillouin Optical Time Domain Reflectometry (BOTDR)–based measurement system were compared with results from strain gauges and digital image correlation (DIC). The experimental program included material testing, full-length prestressing test, and full-scale failure tests on post-tensioned concrete girders. Results demonstrate that, after appropriate calibration and correction, the optical fiber–embedded strands provide strain measurements comparable to conventional techniques, indicating their potential for reliable long-term monitoring of post-tensioned bridge elements.

1. Introduction

Post-tensioned concrete bridges rely on prestressing tendons to carry a significant portion of applied loads and to control cracking and deflections. The long-term performance of these structures depends on the sustained force within the tendons, which can be affected by creep, shrinkage, relaxation, friction losses, and deterioration caused by corrosion.

Despite the importance of tendon force retention, direct monitoring of prestressing strain in bridge structures is uncommon. Conventional sensing methods, including strain gauges and load cells, provide measurements only at discrete locations and are often difficult to protect and maintain over the service life of a structure. Digital Image Correlation (DIC) has been used successfully in laboratory environments but is not typically applicable for long-term field monitoring.

Distributed optical fiber sensing offers a potential alternative by enabling continuous strain measurement along the entire length of a prestressing tendon. However, before such systems can be adopted in practice, their reliability must be demonstrated through direct comparison with established measurement techniques. The objective of this study is to evaluate epoxy-coated optical fiber–embedded prestressing strands and assess whether strain measurements obtained using distributed optical sensing are reliable and comparable to strain gauge and DIC measurements under various loading conditions.

2. Epoxy-Coated Optical Fiber–Embedded Prestressing Strands

The sensing system investigated in this study consists of a 0.6-inch-diameter seven-wire prestressing strand incorporating two optical fibers. The optical fibers are helically wrapped and positioned between the individual steel wires, following the same geometric configuration used to form a conventional prestressing strand. As a result, the optical fibers are not straight but are looped along the strand length in a helical pattern.

After fabrication, the strand is coated with an epoxy layer, which provides corrosion protection and mechanical durability while maintaining compatibility with standard prestressing practices. The epoxy coating also influences the mechanical response of the strand, making experimental characterization and calibration necessary.

To enable connection to the BOTDR module, a portion of the epoxy-coated strand is locally modified to extract the optical fibers without damaging them. The exposed fibers are then connected to the BOTDR module. While this process is necessary for data acquisition, it does not affect the global mechanical behavior of the strand.

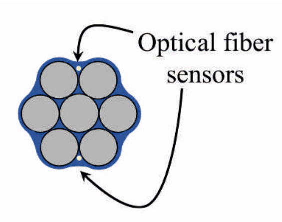


Figure 1. Cross section of the epoxy-coated optical fiber–embedded prestressing strand.

3. Optical Sensing Measurement System

3.1 BOTDR Sensing Principle

Technology and Distributed strain measurements in the optical fiber–embedded prestressing strands were obtained using Brillouin Optical Time Domain Reflectometry (BOTDR), a distributed fiber optic sensing technique based on Brillouin scattering. When a light pulse propagates through an optical fiber, interaction between the optical wave and acoustic phonons generates a frequency-shifted backscattered signal known as the Brillouin frequency shift (BFS), which is sensitive to changes in strain and temperature.

In BOTDR, the location of strain along the fiber is determined from the return time of the backscattered light, while the magnitude of strain is obtained from the corresponding Brillouin frequency shift, enabling distributed strain measurement along the entire length of a single optical fiber.

3.2 BOTDR Module and Data Acquisition

VIAVI's BOTDR module was used to launch optical pulses into the embedded fibers and to output distributed strain values as a function of distance along the strand. While the inherent spatial resolution of BOTDR is approximately 1 m, the system used in this study provided strain output at a minimum spatial step of 80 mm, enabling dense sampling of strain variation along the tendon length.

The optical fibers are embedded within the epoxy coating of the prestressing strand and follow a helical configuration consistent with the seven wire prestressing strand geometry. As a result, the strain measured by the optical fiber differs from the axial strain of the prestressing strand. Accordingly, an experimentally determined correction factor was applied to convert BOTDR-reported fiber strain to axial strand strain for comparison with strain gauge and digital image correlation (DIC) measurements.

4. Experimental Program

The experimental program was designed to evaluate the behavior of the epoxy-coated optical fiber–embedded strands and to compare optical strain measurements with strain gauge and DIC results.

4.1 Tensile Characterization Tests

Initial tensile tests were conducted using a universal testing machine to test the elastic capacity and failure capacity of the sensor embedded strands. An extensometer was installed at the center of the strand, and DIC was used to obtain full-field surface strain measurements. Optical strain data obtained from the BOTDR system were compared with extensometer and DIC measurements to evaluate strain compatibility and determine the effective modulus of elasticity.

Due to the epoxy coating and the helical configuration of the embedded optical fibers, differences were observed between optical and mechanical strain measurements. These tests were used to establish an appropriate correction factor for interpreting optical strain data.

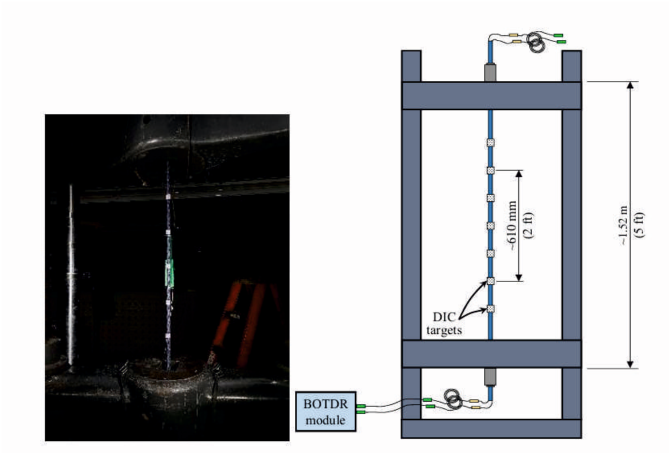


Figure 2. Tensile test setup and comparison of strain measurements from BOTDR, extensometer, and DIC.

Figure 3c. Prestressing bed setup and distributed strand setup for reading strain from BOTDR.

4.2 Full-Length Prestressing Tests

Full-length prestressing tests were performed to simulate field-relevant stressing conditions. The optical fiber–embedded strands were stressed in a prestressing bed using standard procedures. Strain gauges and DIC were used to provide reference measurements during jacking and force transfer. Distributed strain profiles obtained from the BOTDR system were compared with strain gauge and DIC results along the strand length. The correction factor developed during tensile testing was applied to the optical strain data to assess agreement between measurement techniques.

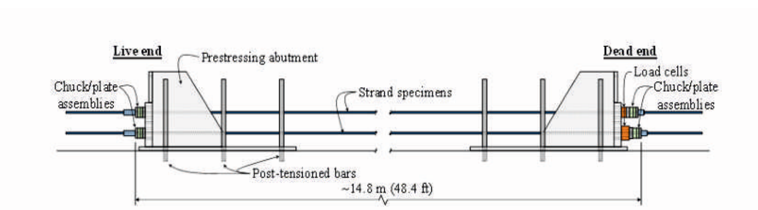


Figure3a. Prestress bed setup

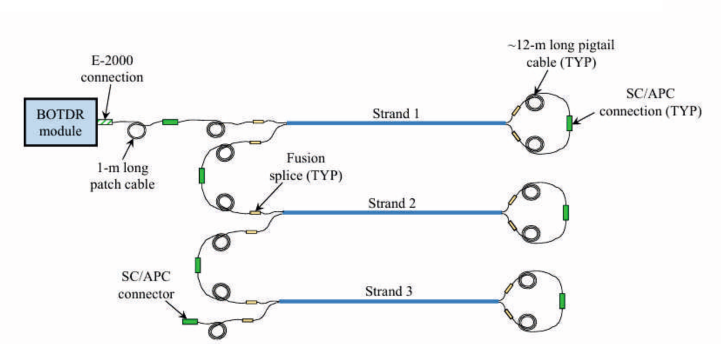


Figure 3b. Strand setup

4.3 Full Scale Girder Loading Tests

In the final phase of testing, two post-tensioned concrete girders instrumented with optical fiber embedded strands were subjected to external loading. Strain measurements were recorded continuously as load was applied to evaluate tendon behavior under service and till failure. The distributed optical strain data were examined to assess how the strand responded to cracking and load redistribution within the concrete element. Comparisons with strain gauge and DIC measurements were used to evaluate the reliability of the optical sensing system under structural loading conditions.

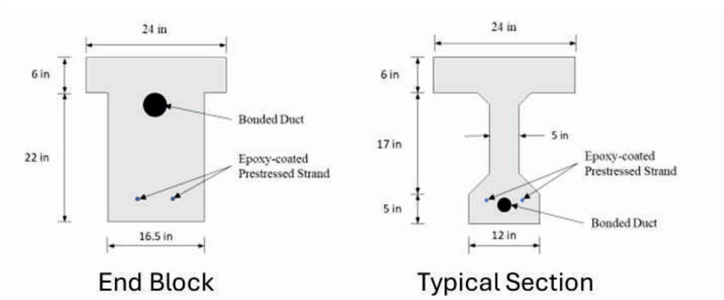


Figure 4a. I-Beam Cross section

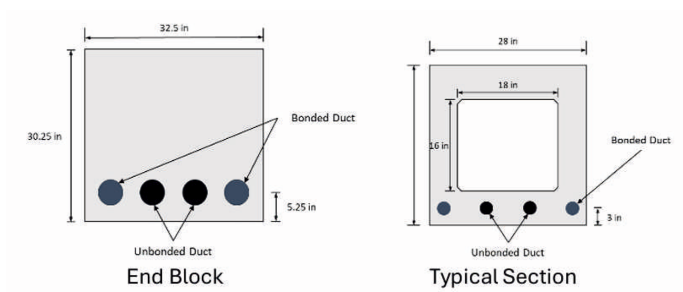


Figure 4b. Box Beam Cross section

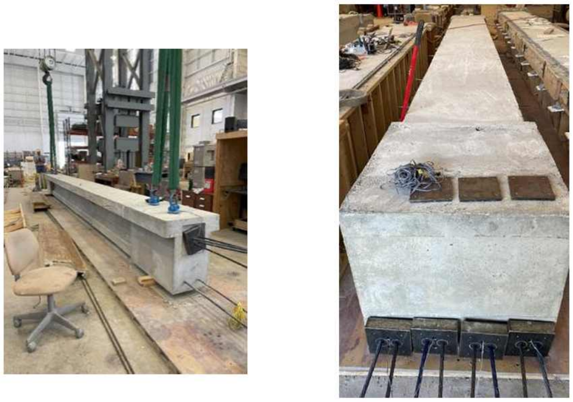


Figure 4c. I-Beam and Box Beam

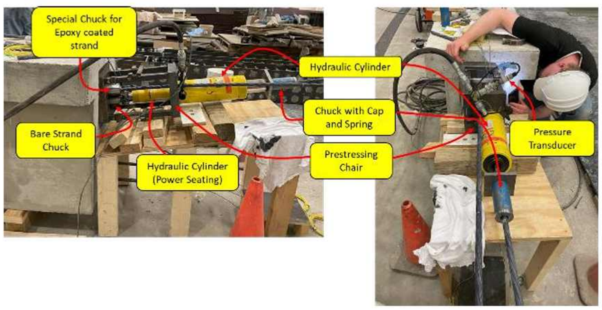


Figure 4d. I-Beam Post-Tensioning

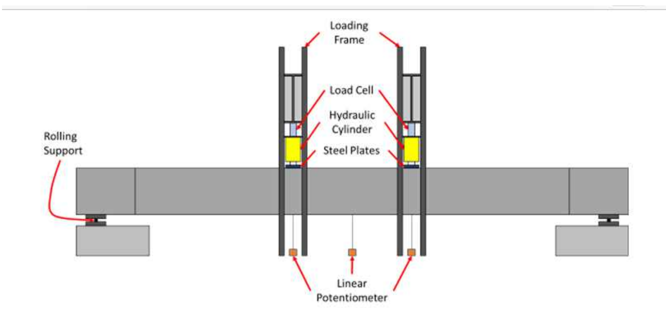


Figure 4e. Beam testing setup

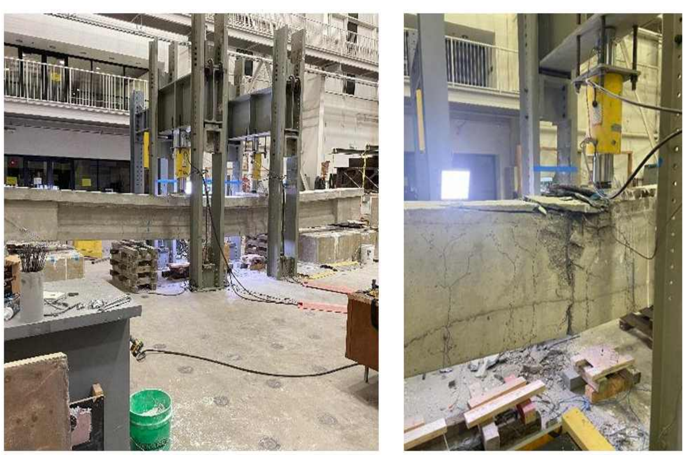


Figure 4f. Beam Testing
Structural loading setup and representative testing sequence

5. Results and Discussion

The experimental program validated the performance of epoxy-coated optical fiber sensor embedded prestressing strands by directly comparing BOTDR-based distributed strain measurements with extensometer, strain gauge, and digital image correlation (DIC) measurements across tensile testing, full-length prestressing, and girder-level structural loading.

During tensile characterization, the sensor embedded strands were stressed to levels representative of prestressing steel behavior, reaching stresses up to 281 ksi. The embedded optical fibers remained intact throughout loading and continued to provide stable and reliable strain measurements up to failure. BOTDR-reported strain responses showed good agreement with extensometer and DIC measurements, demonstrating that the glass optical fiber embedded within the epoxy-coated strand can safely sustain high stress levels without loss of measurement capability.

Full-length prestressing tests demonstrated that BOTDR-based distributed strain profiles accurately tracked stressing operations and force transfer along the strand length, producing stable measurements comparable to strain gauges and DIC. Girder-level testing further confirmed that distributed optical strain data could be obtained during post-tensioning and throughout external loading. The optical fiber sensors continued to provide meaningful strain measurements after concrete cracking and through advanced stages of structural response, highlighting their robustness relative to conventional point-based sensors.

A practical limitation observed during testing isthat the process of extracting the optical fiber from the strand and connecting it to the BOTDR module is critical and requires careful handling. The glass fiber is sensitive to bending and localized damage, and improper handling during extraction or connection can result in fiber breakage.

Once properly connected, however, the sensing system remained stable and reliable throughout testing.

6. Conclusions

This study evaluated epoxy-coated optical fiber sensor–embedded prestressing strands for distributed strain monitoring of post-tensioned bridge elements by benchmarking BOTDR-based measurements against extensometer, strain gauge, and DIC data.

Tensile testing demonstrated that the embedded optical fibers can safely withstand stresses up to 281 ksi while continuing to provide accurate strain measurements. Prestressing and girder-level tests confirmed that BOTDR-based measurements reliably capture distributed tendon response during stressing, post-tensioning, and structural loading, including after cracking and through advanced loading stages.

While the sensing system showed reliability as a measurement system, the extraction and connection of the optical fiber to the BOTDR module was identified as a critical step requiring careful handling due to the fiber's sensitivity to bending. Overall, the results demonstrate that epoxy-coated optical fiber sensor–embedded prestressing strands are a reliable solution with strong potential for long-term structural health monitoring of post-tensioned bridge systems.

References

Williams, C. S., Okumus, P., Khatri, M. B., & Jung, M. J. (2024). Optical Fiber Sensor-Embedded Strands for Long-Term Monitoring of Post-Tensioned Tendons in Bridge Elements (BOWN-2024-01). Purdue University 10.21949/1530681. / FHWA. DOI:

Soto, M. A. (2019). Distributed Brillouin Sensing: Time-Domain Techniques. In Handbook of Optical Fibers (pp. 1663–1753).

VIAVI. (2019). Fiber Sensing Module User Manual (DTSS Module), 70DTSS002/UM/01-23/AE Rev 003.

VIAVI. (2022). T-BERD/MTS-8000 DTSS Data Sheet: Distributed Fiber Optic Solution for Measuring Temperature and Strain Using Single Ended Brillouin OTDR.

Corning Incorporated. Measurement Techniques (2015). and BOTDR Brillouin Backscatter Characteristics of Corning Single Mode Optical Fibers (WP4259).

Klar, A., Goldfeld, Y., & Charas, Z. (2010). Measures for Identifying Cracks within Reinforced Concrete Beams Using BOTDR. Proceedings of SPIE 7647, 76472I.

Williams, C., Khatri, M., Okumus, P., & Holt, R. (2023). Post-tensioning Force Measurement Using Optical Fiber Sensor-Embedded Strand for Prestressed Concrete Structures. In Proceedings of the fib Symposium 2023, LNCE 350, 622–633.

Acknowledgement

The author sincerely thanks Dr. Christopher Williams for his guidance and mentorship throughout this research and for the opportunity to contribute to a project focused on long-term monitoring of post-tensioned bridge systems. The author also acknowledges the Federal Highway Administration (FHWA) for sponsoring the study and Sumiden Wire Products Corporation for providing the epoxy-coated optical fiber sensor embedded strands and technical support. Appreciation is extended to the research team and laboratory staff for their assistance with specimen fabrication, instrumentation, and testing. Finally, the author gratefully acknowledges the continued encouragement and support of his family throughout this work.

About the Author

Manan Khatri is a structural engineer working as a Bridge Designer at WSP USA, with experience in the analysis and design of transportation structures. His professional interests include structural monitoring, prestressed concrete systems, and bridge performance evaluation.
Email : khatrimanan20@gmail.com

NEWS AND EVENTS DURING JAN – MAR 2026

by Er. Vatsal Gokani

23–24 January 2026 : A two-day National Seminar on Earthquake Safety in India was organized at the Malaviya National Institute of Technology (MNIT), Jaipur, bringing together experts from academia, research institutions, government organizations, and professional engineering bodies. The seminar served as an important platform to review the progress made in earthquake engineering and seismic safety in India over the past two decades.

The discussions focused on the initiatives undertaken by academic institutions, state governments, and central government agencies following the 2001 Bhuj Earthquake, which marked a turning point in the development of earthquake engineering practice in India. Speakers highlighted how the disaster led to significant improvements in seismic hazard assessment, building regulations, disaster management systems, and professional training programs.

A major portion of the seminar was devoted to discussions on the recently published IS 1893 (Part 1) and IS 1893 (Part 5) provisions for seismic design of structures. Experts explained the updated seismic hazard assessment framework, improvements in response spectra, and the growing emphasis on performance-based seismic design. These discussions helped participants understand the practical implications of the revised provisions for structural analysis and design.

Approximately 160 participants, including structural engineers, faculty members, researchers, and students from across the country attended the seminar. The event provided valuable opportunities for knowledge exchange and reinforced the importance of continued collaboration between academia and professional organizations to enhance earthquake safety in India.

---

24 January 2026 :

The 8th ISSE Technical Webinar for Students was conducted on 24 January 2026, featuring a lecture by Er. Surya Prakash Ponnada on the topic "Planning and Design of High-Rise Buildings."

The lecture addressed the growing need for tall buildings in modern urban environments and highlighted the structural engineering challenges associated with high-rise construction. The speaker explained various structural systems commonly adopted in tall buildings, such as shear wall systems, core systems, and outrigger systems, which help resist lateral loads due to wind and earthquakes.

Er. Ponnada emphasized the importance of proper architectural–structural coordination during the planning stage to ensure efficient load transfer and structural stability.

He discussed how irregularities in building geometry, poor structural configuration, and inadequate lateral load-resisting systems can adversely affect the seismic performance of tall structures.

The webinar also covered topics such as foundation design for high-rise buildings, construction technologies, and advanced analysis methods used for evaluating structural response. Students from various engineering colleges actively participated in the session and benefited from the practical insights shared by the speaker.

---

24 January 2026 :

The ISSE Baramati Local Centre organized a special session titled "Stress-Free Life" as part of its General Body Meeting. The session was conducted in collaboration with Tej Gyan Foundation, Pune, with the objective of creating awareness about the importance of mental well-being among engineering professionals.

The resource persons Mr. Rajkumar Thorat, Mr. Vinod Nale, and Dr. Shradha Ughade explained the root causes of stress commonly experienced in professional environments. Engineers often face demanding project schedules, complex technical challenges, and significant responsibilities, which can lead to mental stress and reduced productivity.

The speakers discussed practical techniques for managing stress, including meditation, mindfulness practices, positive thinking, and maintaining a healthy work–life balance. Participants were encouraged to adopt simple lifestyle changes that promote emotional stability and long-term well-being.

The session was interactive and engaging, with participants sharing their experiences and discussing ways to manage professional pressures effectively. The initiative was widely appreciated by the members and highlighted the importance of addressing mental health alongside technical competence.

---

30 January 2026:

A technical webinar was organized by EPICONS on 30 January 2026, featuring a lecture by Prof. Yogendra Singh (IIT Roorkee) on the topic "Impact of the New IS 1893-2025 Code."

Prof. Singh provided a detailed explanation of the major revisions introduced in the updated seismic design code. He explained that the revised provisions are based on improved seismic hazard assessment and updated understanding of structural response to earthquake ground motions.

One of the significant updates highlighted in the lecture was the adoption of probabilistic seismic hazard assessment (PSHA), which provides a more scientifically based evaluation of earthquake risk across different regions of India. The revised code also introduces changes in the design response spectrum, extending it to longer periods to better represent the response of tall and flexible structures.

Prof. Singh explained the dynamic behaviour of structures during earthquakes, discussing concepts such as natural period, resonance, damping, and inertia force distribution along building height. These factors play a critical role in determining how buildings respond to seismic ground motion.

The lecture also addressed practical aspects of structural design, including updated site classification systems, revised importance factors, and improved load combination provisions. Special attention was given to structural systems such as flat slab buildings, which may require additional lateral load-resisting elements to achieve adequate seismic performance.

The webinar helped practicing engineers understand the practical implications of the revised code provisions and highlighted the importance of proper modeling and structural detailing to ensure earthquake-resistant design.

---

31 January 2026 : The Indian Society of Structural Engineers (ISSE) celebrated its 28th Foundation Day on 31 January 2026 at the Institution of Engineers (India), Maharashtra State Centre, Mahalaxmi, Mumbai. The event was organized in association with the Institution of Engineers (India) and attracted an impressive gathering of approximately 125 participants, including structural engineers, consultants, academicians, and students.

The program began with a welcome address by ISSE President Er. Hemant Vadalkar, who highlighted the role of the Society in promoting excellence in structural engineering through technical programs, workshops, and student chapter activities. The inauguration ceremony was followed by the felicitation of distinguished guests and contributors to the Society's activities.

A special highlight of the event was the recognition of individuals who contribute actively to ISSE's knowledge-sharing initiatives, including authors, technical lecture speakers, student webinar speakers, and resource persons.

During the program, the ISSE Indore Local Centre and ISSE Baramati Local Centre were honoured with the Best Performance Local Centre Award for their outstanding contributions and activities during the year 2025.

The technical program of the day focused on Metro Rail Infrastructure, a rapidly expanding sector in India's urban transportation systems.

Er. Ankush Bonde (AECOM) presented an overview of underground metro systems, highlighting the complexities involved in planning and constructing tunnels in densely built urban environments.

Dr. Lakshmana Rao Mantri delivered a lecture on geotechnical risk management in metro tunneling, presenting several case studies and explaining how engineering challenges encountered during tunneling operations were successfully addressed.

Mr. Ralphe Craven from K-NEST Construction Technologies discussed modern construction technologies and innovations in high-rise structures.

Dr. V. V. Nori, a senior consultant in structural engineering, shared insights into the design and construction of elevated metro viaducts, highlighting innovative structural solutions adopted in India.

Er. Vivek Abhyankar delivered a technical lecture on the design and construction of diaphragm walls, which are widely used for deep excavations and underground metro stations.

Ar. Swetal Kanwalu (DGM, Mumbai Metro Rail Corporation) explained the procedures required for obtaining No-Objection Certificates (NOCs) for construction projects located near underground metro lines and discussed the importance of coordination between infrastructure agencies and urban authorities.

The final session was delivered by Er. Vidyadhar Vengurlekar (NJS Engineers India) and Er. Paresh Unnarkar, who discussed the engineering challenges involved in resolving conflicts between existing sewer networks and newly constructed underground metro corridors.

The event was supported by K-NEST Construction Technologies, whose sponsorship contributed to the successful organization of the program.

The proceedings concluded with a Vote of Thanks by ISSE Hon. Secretary Er. Ranganath Satam, who expressed gratitude to the speakers, organizers, sponsors, and participants for making the 28th Foundation Day celebration a memorable success.

---

13 FEB 2026 : The lecture titled CVU Sustainable Tall Building Design: Navigating India's Regulatory Framework focused on explaining how India's building codes and standards shape the design of sustainable tall structures. It provided insights into the National Building Code (NBC 2016), IS 16700:2023, and environmental regulations, while also highlighting pathways for compliance and opportunities for integrating green certifications.

13 and 14 Feb 2026 : The Indian Concrete Institute (ICI), along with the Indian Institute of Technology Bombay (IITB), arranged a workshop on the Draft IS 456.

14 February 2026 : A One-Day Workshop on "Understanding IS 1893 (Part-1 and Part-5): 2025 for Seismic Design of Buildings" was organized collaboratively by the School of Engineering and Technology, Shivaji University Kolhapur, Walchand College of Engineering Sangli, and the ISSE Kolhapur Centre.

The workshop aimed to enhance awareness among practicing engineers and students about the latest revisions in India's seismic design code and their implications for structural engineering practice.

The inaugural session was attended by distinguished dignitaries including Dr. Surendra Rathod, Dr. A. B. Kolekar, Er. Prashant Hadkar, and Er. Tushar Burud, who emphasized the importance of updating professional knowledge in earthquake-resistant design.

The first technical session was delivered by Prof. Yogendra Singh, who explained the philosophy behind seismic design codes and discussed the major revisions introduced in IS 1893:2025. He highlighted how ground motion induces vibrations in structures and explained the importance of parameters such as natural period, resonance, damping, and inertia forces in determining structural response.

Prof. Singh also discussed several new provisions in the revised code, including PSHA-based hazard assessment, updated response spectra extending to longer periods, revised site classification systems, and inclusion of vertical seismic acceleration effects.

The second session was delivered by Dr. Vijay Khose, Vice President at Thornton Tomasetti, who discussed practical aspects of seismic design and presented case studies demonstrating the impact of the revised code on structural analysis.

The workshop also covered advanced topics such as ductile detailing, strong column–weak beam design philosophy, shear wall behavior, and performance-based seismic design. Participants gained valuable insights into how the revised code provisions influence real engineering projects.

The workshop concluded with an interactive panel discussion and a vote of thanks.

26 February 2026 : The ISSE Student Chapter at Sardar Patel College of Engineering (SPCE) organized a technical lecture session for students and faculty members focusing on substructures and earthquake engineering.

The event began with a welcome address by Prof. Ankit M. Asher, who emphasized the importance of bridging the gap between academic learning and professional practice.

The first lecture was delivered by Er. Gaurav Parab, who discussed substructures and shoring systems used in deep excavation projects. He explained the role of geotechnical engineering in ensuring safe construction of tall buildings and underground structures.

Er. Parab described various shoring techniques such as sheet piles, diaphragm walls, touching piles, and secant piles, which are commonly used to stabilize excavation sites in congested urban environments. He also explained advanced geotechnical investigation methods including core drilling, Rock Quality Designation (RQD), and seismic crosshole testing, which are essential for evaluating soil and rock properties.

The second lecture was delivered by Dr. Pulkit D. Velani, who discussed the fundamentals of earthquake engineering and seismic design codes. He explained the framework of Indian earthquake-resistant design standards including IS 1893, IS 13920, and IS 13935, and introduced students to the basics of engineering seismology.

Dr. Velani also discussed the major revisions introduced in IS 1893:2025, including updated seismic zone factors, revised response spectra, and provisions for irregular structures. He emphasized that engineering codes are developed based on lessons learned from past earthquakes and represent the minimum level of safety required for structural design.

The program concluded with a felicitation ceremony, where the speakers were honored by the SPCE faculty members, followed by a vote of thanks acknowledging the contributions of the speakers and organizers.

28 February 2026 : The 9th ISSE Student Webinar was conducted on 28 February 2026, featuring a lecture by Er. Vishal Bansal (NHAI, Delhi) on Tunnel Construction Methods and the New Austrian Tunneling Method (NATM).

The lecture introduced students to modern tunneling techniques used in transportation and infrastructure projects such as metro rail systems, highways, and hydropower tunnels. The speaker explained the fundamental principles of NATM, which relies on the inherent strength of surrounding rock mass to stabilize the tunnel through controlled deformation.

The webinar covered topics such as ground investigation, excavation methods, support systems, monitoring techniques, and safety considerations in tunneling operations.

7 Mar 2026 : Epicon workshop on Assessment, Testing and Rehabilitation of bridges and Jetties Part1 was conducted at IEI Belapur centre.

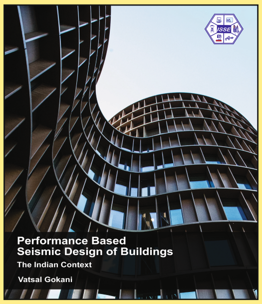
28 March 2026 : The 10th ISSE Student Webinar featured a lecture by Dr. Suhasini Madhekar, Founder of SEE and former Professor at COEP.

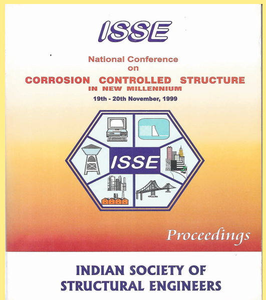
The lecture focused on the seismic behaviour of bridges and the design strategies used to improve their earthquake resilience. Dr. Madhekar explained how bridges respond differently from buildings during earthquakes due to their long spans, flexibility, and varying support conditions.

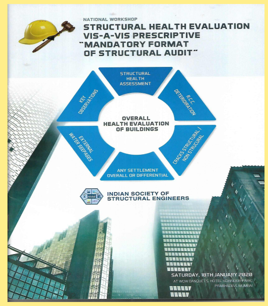
The session discussed dynamic analysis of bridges, ductile detailing of bridge components, and design approaches used to minimize earthquake damage.

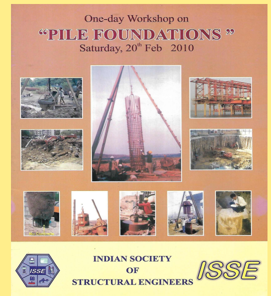
Edited and published by Vatsal Gokani for ISSE, C/o, Maansi Nandgaonkar, 101, Sunflower, Sakharam Keer Road, Shivaji Park, Mahim, Mumbai - 400016. Tel 022-2431 4423. e-mail issehq@hotmail.com Web : www.isse.org.in for private circulation and printed by G. B. Gawde, 142 Anand Estate, S. G. Marg, Chinchpokli, Mumbai 400 011.

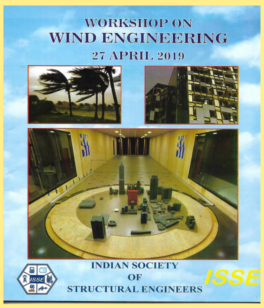
OUR PUBLICATIONS

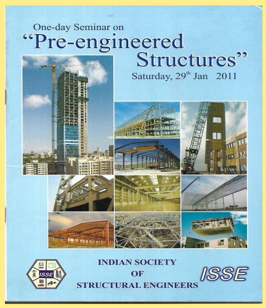


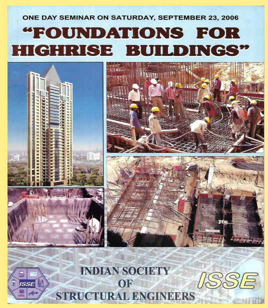


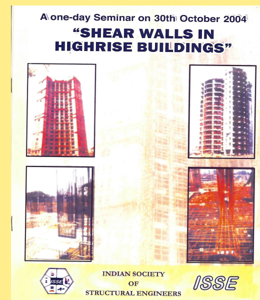


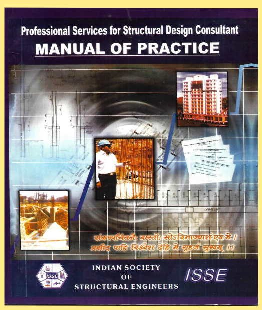


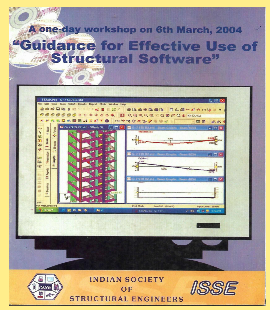












AND MANY MORE

For more information contact on
E-Mail :- issehq@hotmail.com
Web Site :- www.isse.org.in

Membership Certificate

Hemant Vadalkar felicitating Dr. K Suresh Kumar

Delegates attending the workshop

LET US BUILD A STRONG STRUCTURE OF INDIAN SOCIETY

TATA STEEL
#WeAlsoMakeTomorrow

TATA

BUILD SMART, BUILD EASY
INDIA'S FIRST BRANDED WELDED WIRE FABRIC

Sm@rtFAB

WHAT MAKES Sm@rtFAB FUTURE-READY FOR YOUR CONSTRUCTION?

- Saves Time
- Reduces Cost
- Optimises Design
- Helps Work Smarter
- Provides Quality

APPLICATIONS

Commercial Buildings


Industrial Warehouse Flooring


Canal Lining


Roads & Airport Tarmac


Home Pipes


Gabions/Retaining Walls


Tunnel Lining


For enquires, mail your details at

East: **lpeast@tatasteel.com** | West: **lpwest@tatasteel.com** | North: **lpnorth@tatasteel.com** | South: **lpsouth@tatasteel.com**

Contact: **Mr. Akshat Kumar ✆ 7903530188, Mr. Parag Ishwardas Raut ✆ 9619114344**

readybuild.tatasteel.com