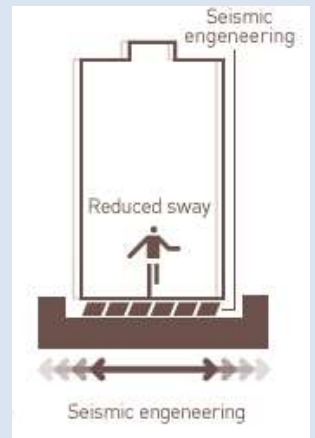
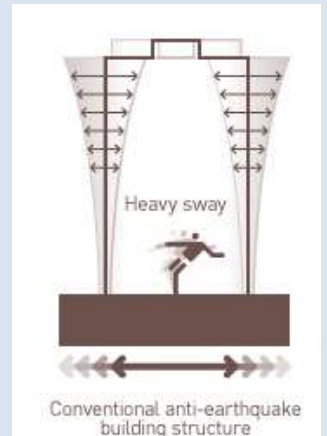


Training Programme Report
(One Week, Online)

STRUCTURAL AUDIT FOR EARTHQUAKE SAFETY



November 24-28, 2020

Organised By:

**National Institute of Disaster Management
Ministry of Home Affairs, Govt. of India
&
Department of Civil Engineering
Delhi Technological University**



One Week Online Short Term Training Programme
“STRUCTURAL AUDIT FOR EARTHQUAKE SAFETY”
November 24-28, 2020



One-Week
Online Short Term Training Programme
on
**STRUCTURAL AUDIT FOR
EARTHQUAKE SAFETY**
November 24 - 28, 2020



PATRONS



Maj. Gen. Manoj K. Bindal, VSM
Executive Director, NIDM



Prof. Yogesh Singh
Vice Chancellor, DTU



Prof. Nirendra Dev
HOD, Civil Engineering

SPEAKER



Prof. Ravi Sinha
IITB



Prof. C.V.R. Murthy
IITM



Prof. Pradeep K. Ramancharla
IIITHYD



Dr. Ajay Chaurasia
CSIR-CBRI



Sh. Alok Bhowmick
MD, BSES and President,
IAStructE



Prof. Amit Srivastava
DTU



Prof. Chandan Ghosh
IITJ



Dr. Girish Chandra Joshi
USDMA



Mr. Arun Kumar
BIS



Dr. Sandeep Donald Shah
Taylor Devices India



Sh. R. C. Sharma
Chief Delhi Fire Services
(formerly)

COORDINATORS



Dr. Shilpa Pal
Associate Professor, DTU



Prof. Raju Sarkar
Professor, DTU



Dr. Amir Ali Khan
NIDM

Organized Jointly by

National Institute of Disaster Management
Ministry of Home Affairs, Govt. of India
New Delhi-110001

Delhi Technological University
Shahbad Daulatpur, Main Bawana Road, New Delhi-110042

ONLINE REGISTRATION

Detailed online registration form available on following link
<https://forms.gle/2uQpZQeBvSQhdMrBA>

Last Date of Registration **November 20, 2020**

NO REGISTRATION FEE

One Week Online Short Term Training Programme “STRUCTURAL AUDIT FOR EARTHQUAKE SAFETY”

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One-Week
Online Short Term Training Programme 
on
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NATIONAL INSTITUTE OF DISASTER MANAGEMENT
Ministry of Home Affairs, Govt. of India
and
Department of Civil Engineering
DELHI TECHNOLOGICAL UNIVERSITY



**Department of Civil Engineering, Delhi Technological University &
National Institute of Disaster Management, Ministry of Home Affairs, GOI** 

One Week Online Short Term Training Programme
“STRUCTURAL AUDIT FOR EARTHQUAKE SAFETY”

November 24-28, 2020

INAUGURATION
01:00 PM – 01:30 PM

Programme Coordinators
Dr. Shilpa Pal (DTU)
Prof. Raju Sarkar (DTU)
Dr. Amir Ali Khan (NIDM)

SCHEDULE

| Time (hrs) Day/Date | 01:30 PM - 02:30 PM | 02:45 - 03:45 PM | 04:00 – 05:00 PM |
|---|--|--|--|
| Day 1 Tuesday (24.11.20) | Challenges of Seismic safety of built environment in Indian Scenario Prof. Ravi Sinha , IITB | Roles & Responsibilities of Structural Engineer Sh. Alok Bhowmick MD, BSECPL and President, IAStructE | Seismic Conceptual Design of Buildings Dr. Shilpa Pal , DTU |
| Day 2 Wednesday (25.11.20) | Geotechnical investigations Prof. Raju Sarkar , DTU | Rapid Visual Screening of Buildings Prof. Pradeep K. Ramancharla , IITHYD | Retrofit Analysis & Design for Masonry Buildings – A Case Study Dr. Ajay Chaurasia , CSIR-CBRI |
| Day 3 Thursday (26.11.20) | Safety Evaluation of Critical Lifeline Infrastructure Prof. C.V.R. Murthy , IITM | Vulnerability Analysis and Design of Retrofit Strategy for RC buildings Dr. Ajay Chaurasia , CSIR-CBRI | Good Construction Practices Prof. Amit Srivastava , DTU |
| Day 4 Friday (27.11.20) | Audit of Non-Structural Elements for Earthquake Safety Prof. Chandan Ghosh , IITJ | Seismic Evaluation of existing Building in Hilly areas Dr. Girish Chandra Joshi , USDMA | National Building Code-2016 provisions for Earthquake Risk Mitigation Mr. Arun Kumar , BIS |
| Day 5 Saturday (28.11.20) | Retrofitting Techniques for Seismic Safety Mr. Sandeep Donald Shah , Taylor Devices India | Fire Safety Considerations in Buildings Sh. R. C. Sharma , Chief Delhi Fire Services (formerly) | Valedictory and closing remarks |
| Dr. Shilpa Pal shilpapal@dtu.ac.in , 8800325860 | | Prof. Raju Sarkar raju.sarkar@dce.ac.in , 7678120434 | |
| Mr. Alok Bhowmick 9811175255, bsec.ab@gmail.com | | Dr. Girish C. Joshi 9412379345, ajginish@gmail.com | |
| Prof. Pradeep K. Ramancharla 9391131199; ramancharla@iitm.ac.in | | Prof. Amit Srivastava 8800667128, aksrivastava@dce.ac.in | |
| Dr. Ajay Chaurasia 9897209050; ajaycbri@gmail.com | | Prof. Ravi Sinha rsinha@civil.iitb.ac.in | |
| Sh. R. C. Sharma rcsharmadfs@gmail.com | | Prof. Chandan Ghosh 9968668503, cghosh24@gmail.com | |
| | | Dr. Amir Ali Khan amir.nidm@nic.in M-7840847473 | |
| | | Prof. C.V.R. Murthy cvm@iitm.ac.in | |
| | | Mr. Arun Kumar strukarun@gmail.com | |
| | | Dr. Sandeep Donald Shah sandeep.shah@taylordevicesindia.com | |

One Week Online Short Term Training Programme
“STRUCTURAL AUDIT FOR EARTHQUAKE SAFETY”
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INTRODUCTION

A one week online short term training programme on “**STRUCTURAL AUDIT FOR EARTHQUAKE SAFETY**” jointly organized by National Institute of Disaster Management, Ministry of Home Affairs, Govt. of India and Department of Civil Engineering, Delhi technological University from 24th Nov. 2020 to 28th Nov, 2020. The STTP aims to provide opportunities to Engineers, faculty members, research scholars and students, to enrich their teaching skill and research in the field of Earthquake Safety, Structural audit, retrofit analysis and design. The STTP was attended by 262 participants from different organization, industry, govt. organizations, faculty members, research scholars and students. The selected eminent speakers gave all the detailed insights of all their experiences in every sector where auditing of buildings is required for earthquake safety. The training programme generated a successful detailed discussion on seismic safety and construction practices, debate on retrofitting techniques, experiences gained for fire safety and also highlighted the initiatives needed to be taken by qualified structural engineer community and government.

SCOPE AND OBJECTIVE

The present Short Term Training Programme (STTP) on “Structural Audit for Earthquake Safety” intends to sensitize, institutionalize and promote information, knowledge, and innovation for seismic stability of the built environment comprising of residential and commercial buildings and critical infrastructure like hospitals and schools etc. The STTP is being organized with an aim to strengthen human capacity to reduce risks from impending earthquakes. Through this STTP efforts would be made to share and disseminate experiences, knowledge, information, innovations and ideas on seismic safety of structures as per the National Building Code and latest instructions issued by the Honbl’e High Court of Delhi to make the existing buildings seismic compliant.

TARGET GROUP

This programme is primarily designed for people across the humanitarian to development spectrum, who may in some capacity be involved in construction activities at different levels. The programme will be useful for architects, engineers, planners, administrators, and teaching faculties involved in teaching and research related to built environment. The target group for this programme would be senior and middle level functionaries of the central/state governments, PSUs, Municipal Corporations involved in planning, design, construction and maintenance of buildings and representing various departments including CPWD, PWD, Rural Development, Municipalities, Town Planning, Faculties/ Researchers at Universities/IITs/NITs and Industries/R&D facilities dealing in upcoming innovation in sustainable constructions.

One Week Online Short Term Training Programme
“STRUCTURAL AUDIT FOR EARTHQUAKE SAFETY”
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INAUGURAL SESSION:

Assoc. Prof. (Dr.) Shilpa Pal, DTU Delhi and Course coordinator of FDP welcomed all the respected dignitaries and participants. Prof. (Dr.) Nirendra Dev, HOD of Civil Engg. Department, DTU appreciated the program organized by Civil Dept in his speech. Prof. (Dr.) Raju Sarkar, Professor DTU, Delhi and Course coordinator also encouraged for such activities. (Dr.) Amir Ali Khan (NIDM) and Course Coordinator emphasized the benefits of such kind of resourceful activity.

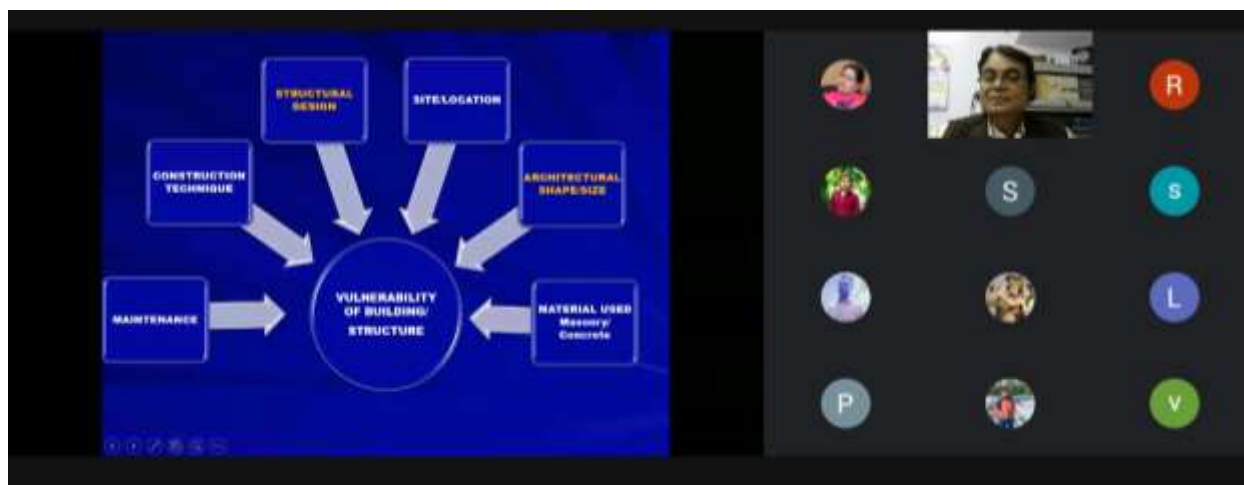


Chief Guest, Prof. (Dr.) P.R Bose, Associate director, DDF consultants Pvt. Ltd., Delhi has delivered keynote address on “structure audit importance and its need in engineering field. As part of the earthquake prevention measure, the Delhi Development Authority (DDA) has issued a directive that all the buildings are to be audited which are constructed till the year 2001. As per the order, all the buildings with a height of 15 meters or above will be required to do a structural audit. It will apply to all the government and private buildings in the national capital.

Key Takeaways

- Structural Auditing is required when the condition of the building is terrible, change in usage/Addition/Alterations etc. also puts the existing structure and its occupants at risk, sometimes after earthquake event auditing is put into action.
- A wide range of existing structures requires seismic retrofitting because of the non-compliance of the seismic codes.
- EQ risk depends upon the vulnerability and natural hazard. Hazard cannot be changed hence we can ONLY reduce the vulnerability and structural safety audit has a big role.
- Challenges such as non-availability of architectural and structural drawings require NDT tests to be performed which involves a wide range of assumptions, sometimes semi-destructive tests are also to be carried if needed.
- Non-structural aspects are also to be covered while carrying out a structural audit for seismic safety.

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TECHNICAL SESSIONS:

Day-I (24/11/20)

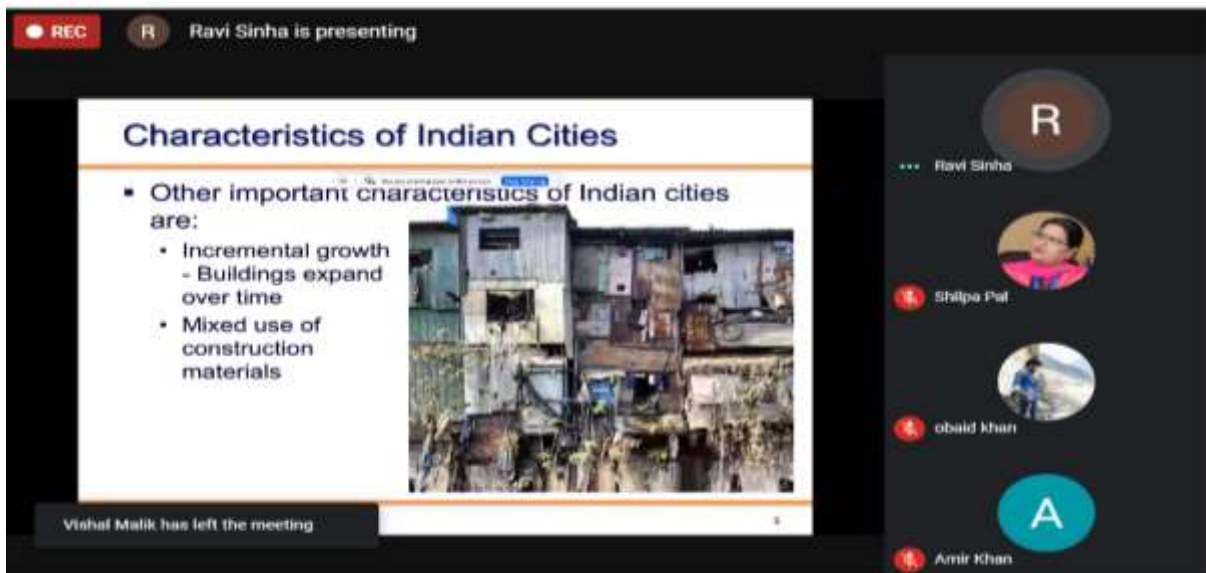
Session I:

Prof. Ravi Sinha, Professor, IIT Bombay, has delivered keynote address on “Challenges of Seismic safety of built environment in Indian Scenario”. In this session participants were learned the different building by laws and importance of structural audit aspects for understand the structural vulnerability of our building.

Key Takeaways from the lecture

- Poor implementation of building bye-laws, a large proportion of non-engineered buildings, incremental development of coming up of buildings in cities, mixed-use of construction materials, low maintenance of older buildings, frequent use of inferior construction materials are some of the significant challenges of seismic safety.
- Improving the seismic safety of cities is critical for sustainable growth of the country. Safety audit of buildings is essential to assess the effect of vulnerability on risk accurately.
- An essential key to reducing seismic risk is by decreasing structural vulnerability. The structural audit is an essential first step to understand the structural vulnerability of our building stock.

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Session II:

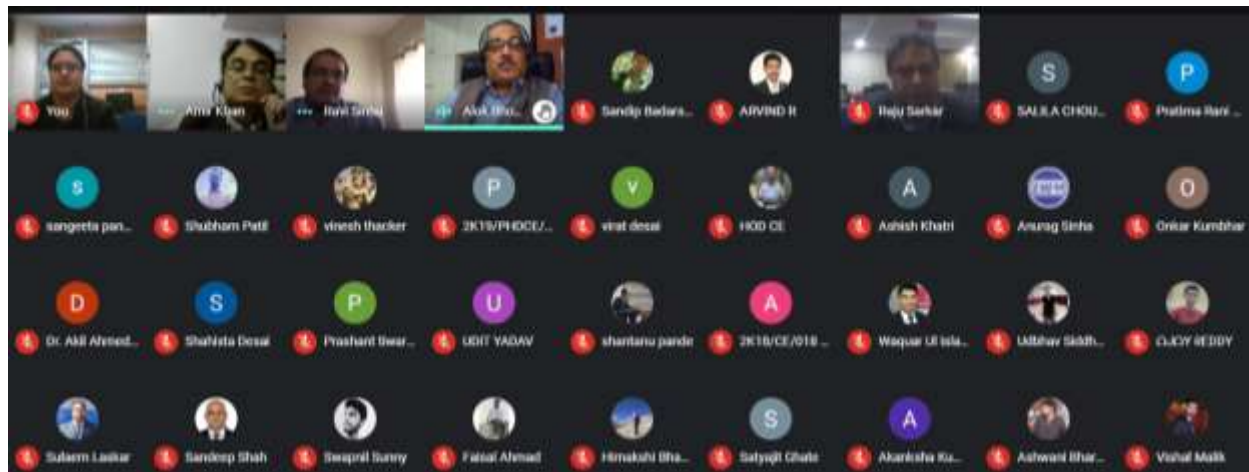
Mr. Alok Bhowmick, President of Indian Association of Structural Engineers (IAStructE) have delivered an interactive lecture on “Roles & Responsibilities of Structural Engineer”. In this session participants were learned the assessment and design consideration of retrofitting of the existing structures.

Key Takeaways from the lecture

- Structural Engineers have a responsibility to analyse, design, plan and research structural components and systems.

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- The assessment of the residual capacity of the existing structures, retrofitting of the existing structures for catering to revised loadings or revised codes or changed functionality of the structure should involve structural engineers.
- Structural engineers in today's era also need to focus on human engineering skills. One should inculcate the essence of integrity, professional competence, punctuality and trust.



Session III:

Dr. Shilpa Pal, Associate Professor Civil Engineering department, DTU Delhi, delivered an interactive lecture on “Seismic Conceptual Design of Buildings”. In this session participants were learned the different economically acceptable design consideration under severe earthquake.

Key Takeaways from the lecture

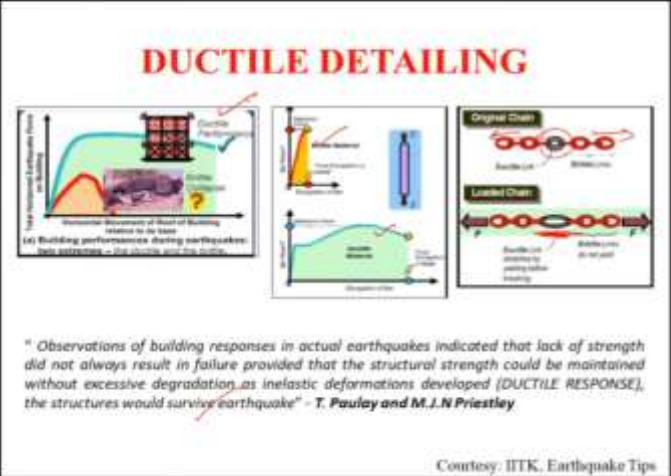
- An economically acceptable design under severe EQ can be achieved by allowing the structure to undergo limited damage without collapse.
- The desirable attributes of an EQ resistant building are robust structural configuration, at least a minimum elastic lateral stiffness, a minimum lateral strength and adequate ductility.


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- The strong column-weak beam design approach, continuous load transfer mechanism, simple and symmetric plan layout, ductile detailing for seismic considerations are some of the main and desirable attributes of an EQ resistant design.
- It is responsibility of every engineer to stop non-engineered construction, perform a proper structural audit, and bring the aware the public about the importance of EQ resistant design and related information.









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Day-II (25/11/20)

Session I:

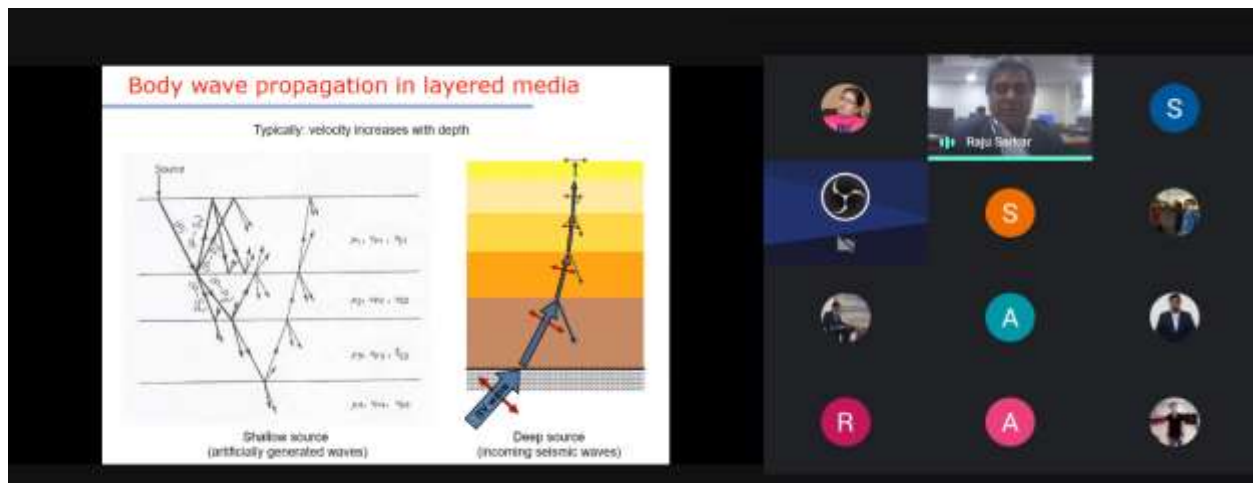
Prof. Raju Sarkar, Professor Civil Engineering department, DTU Delhi shared an informative lecture on “Geotechnical investigations”. In this session participants were learned about soil characteristic and the necessity of site investigation for new construction as well as retrofitting of older structure too.

Key Takeaways from the lecture

- Buildings can be damaged by the EQ itself or by the ground beneath them, settling to a different level than it was before EQ.
- During an earthquake the ground displacement could seriously damage or rip apart any structure (building, road etc.) when built across a fault.
- Determination of surface and sub-surface soil conditions, groundwater condition and features in an area of the proposed construction is a crucial step as it may influence the design and can also address the expected post-construction problems.
- Site investigation is a vital step not only for new construction but for retrofitting of older structure too. A good site investigation plan and execution can balance the total cost of a project.

The screenshot displays a Zoom meeting interface. On the left, a presentation slide for Prof. Raju Sarkar is visible. The slide includes a circular portrait of the professor, his name, and his title as Professor in the Department of Civil Engineering at Delhi Technology University. To the right of the portrait, under the heading 'SPEAKER INTRODUCTION', are sections for 'PROFESSIONAL QUALIFICATION', 'VISITING SCHOLAR', 'RESEARCH INTEREST', and 'EXPERIENCE'. The 'RESEARCH INTEREST' section lists topics such as Geotechnics for Natural Disaster Mitigation, Geotechnical Aspects of Earthquake Hazards, and Slope Stability. The 'EXPERIENCE' section states 'TEACHING (Total - 25 yrs.)'. On the right side of the Zoom window, there is a grid of video feeds for participants, each represented by a small circular icon with a letter (A, D, R, R, S) or a small video thumbnail. The background of the Zoom window is dark.

One Week Online Short Term Training Programme “STRUCTURAL AUDIT FOR EARTHQUAKE SAFETY” November 24-28, 2020

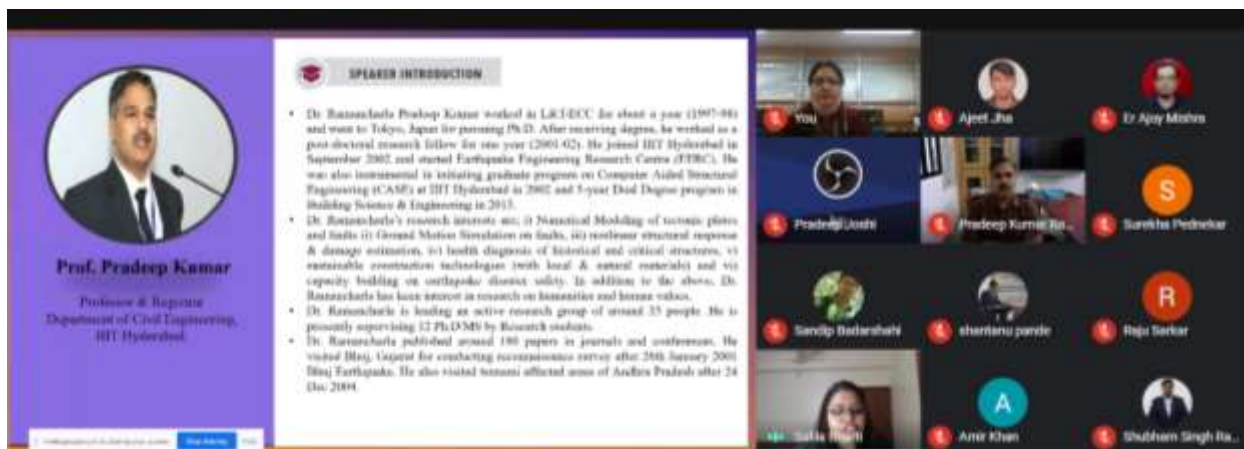


Session II:

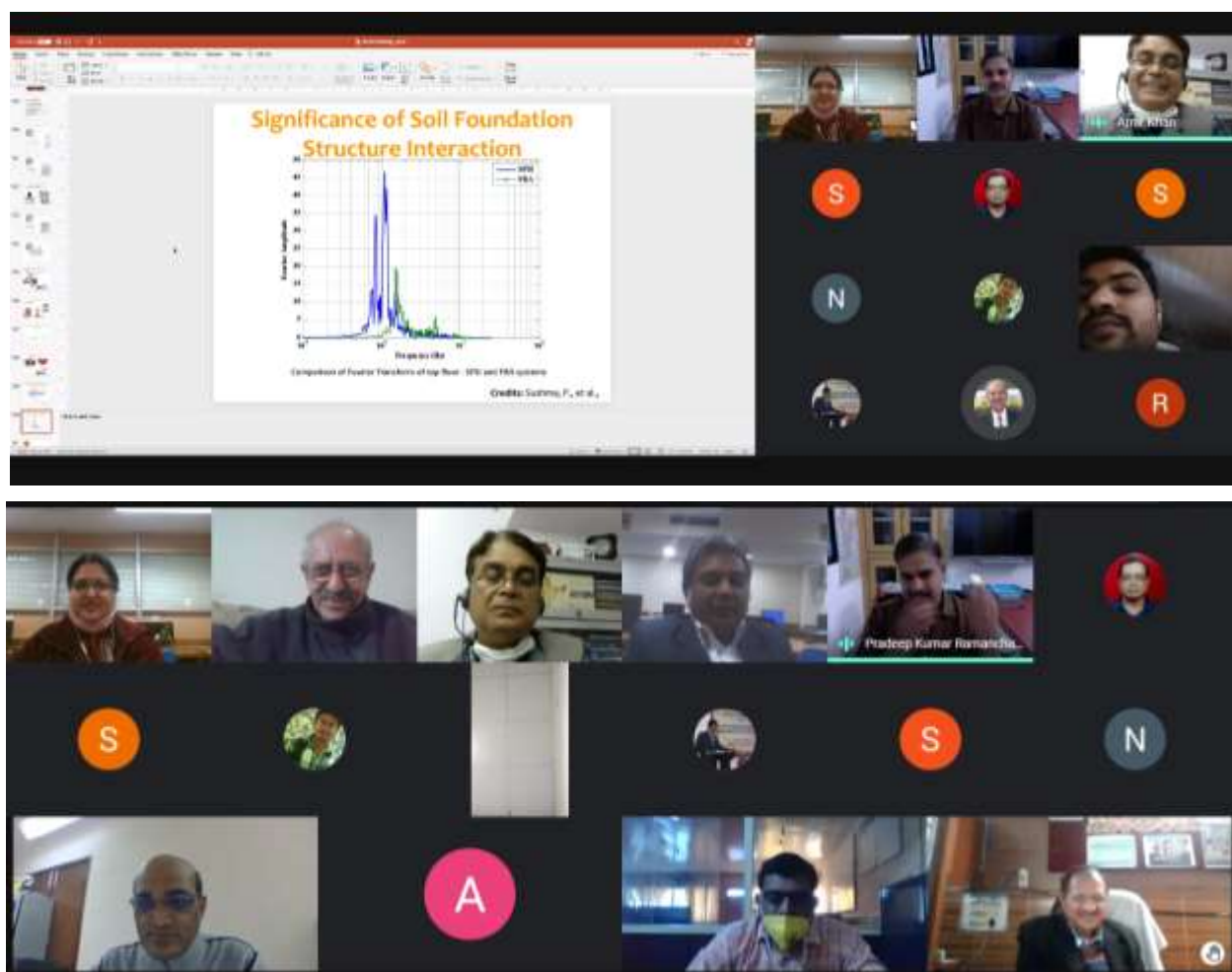
Prof. Pradeep K. Ramancharla, Civil Engineering Department, IIIT Hyderabad has delivered an informative lecture on “Rapid Visual Screening of Buildings”. In this session participants were learned the different types of Earthquake Safety Assessment and challenges involved in Earthquake Safety assessment.

Key Takeaways from the lecture

- The vulnerability associated with collapse and damage to buildings is unreasonably high in India compared to any other country for a similar level of ground shaking.
- There is an urgent need to understand the housing risk in India to minimize future losses of life and property.
- Two of the significant challenges involved in EQ Safety assessment studies are: (a) assessment of an existing building is much more difficult task than designing a new building (because there are deviations from specifications and drawings) (b) benchmarking of simplified assessment scores.



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Session III:

Dr. Ajay Chourasia, Sr. Principle Scientist & Prof. (CSIR), has delivered a informative lecture on “Retrofit Analysis & Design for Masonry Buildings – A Case Study”. In this session participants were learned about the damage patterns observed in masonry houses and also understand the behavior of masonry buildings under seismic action.

Key Takeaways from the lecture

- It is essential to understand the behavior of masonry buildings under seismic action to minimize the damage, to keep the required stability conditions and retrofit the weaker buildings and rehabilitate if needed.
- Some of the typical damage patterns observed in masonry houses such as out-of-plane failure of walls, inclined cracking above lintels, vertical crack at corner due to wall rocking, collapsed roof and parapet, inclined and vertical cracks in walls, dilation (of volume) within the wall, sliding of one part over another, shear cracking along the diagonal direction, etc. all should be studied properly.

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- Principles of Masonry buildings under seismic action are integral box action, the integrity of corners, integrity of walls and limit of openings.
- Provisions of vertical bands and connections, steel mesh and mortar cover at corners and on both sides of walls, steel mesh anchorage to the foundation are some of the strengthening and retrofitting measures of masonry buildings.

REC P 2K19/PHDCE/02 Prateek Roshan is presenting 4:01 PM

DR. AJAY CHOURASTIA
Sr. Principle Scientist & Prof.(CSIR),
Group Leader, PD Concrete Pricing
Structural Engineering Group,
CSIR-Central Building Research Institute,
Roorkee.

SPEAKER INTRODUCTION

Dr. Ajay Chourasia is a Senior Principal Scientist and Group Leader of 3D Concrete Pricing Group at CSIR-Central Building Research Institute, Roorkee. He did Ph.D. (Structural Engineering) from Indian Institute of Technology Roorkee. The topic of his research was 'Performance Evaluation of Confined Masonry Buildings under Cyclic Lateral Loads'. His area of interest encompasses present buildings, structural health monitoring, experimental investigation of buildings and their components, earthquake resistant design, construction, confined masonry, repair & retrofitting of structure, seismic vulnerability assessment, post-earthquake damage assessment, statistical analysis, historical conservation etc. He has published more than 100 papers in International and National Journals/Conferences, more than 75 reports and a book on Earthquake Resistant Design & Construction, Guidelines for Confined Masonry, Structural Design & Detailing of Confined Masonry EWS Houses, and Good Construction Practices. He has filed 4 Indian patents. So far he has guided 5 Ph.D.s, 30 MTech's and 60 B.Tech. students. He developed 'Dynamic Tool for design of RC-Masonry and Beams for Residential Buildings' and documentary on 'Confined Masonry', which are most widely referred documents in construction sector.

REC P 2K19/PHDCE/02 Prateek Roshan is presenting 5:12 PM

nidm
National Institute of Disaster Management
Ministry of Home Affairs, Govt. of India

Delhi Technological University
Pragati Delhi College of Engineering

Certificate of Appreciation
One Week Online Short Term Training Programme on
STRUCTURAL AUDIT FOR EARTHQUAKE SAFETY

This is to certify that **Dr. Ajay Chourasia**, CSIR-CBR has delivered a lecture on **Seismic Analysis & Design for Masonry Buildings - A Case Study** in One-Week Online Short Term Training Programme on "STRUCTURAL AUDIT FOR EARTHQUAKE SAFETY" Jointly Organized by National Institute of Disaster Management, Ministry of Home Affairs, Govt. of India, Delhi and Department of Civil Engineering, Delhi Technological University, Delhi during November 24-28, 2020.

Prof. Kishore Das
Professor & Head,
Dept. of Earthquake
Engineering,
Delhi Technological University

Dr. Shripad
Associate Professor,
Dept. of Civil Engineering,
Delhi Technological University

Prof. Raju Sarkar
Professor,
Dept. of Earthquake
Engineering,
Delhi Technological University

Dr. Anil K. Sharma
Associate Professor (Research),
School of Civil Engineering,
Ministry of Home Affairs, Govt. of India

Prof. Dr. Manoj Kumar Shrivastava
Associate Professor,
School of Civil Engineering,
Ministry of Home Affairs, Govt. of India

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Day-III (26/11/20)

Session I:

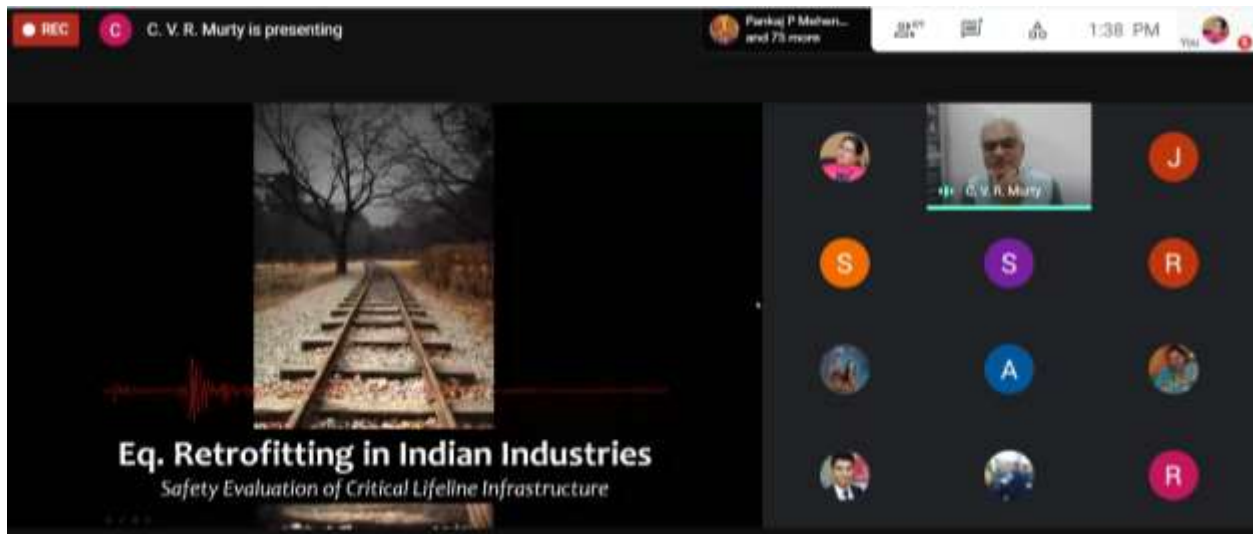
Prof. C.V.R. Murthy, Professor Department of Civil Engineering, Indian Institute of Technology, Madras has illuminated on “Safety Evaluation of Critical Lifeline Infrastructure”. In this session participants were gained with the knowledge of safety evaluation of critical lifeline infrastructure.

Key Takeaways from the lecture

- Industrial structures are very irregular. They have irregular mass and stiffness distribution across the length, height and width of the structure.
- The level of engineering that is used involves a large number of simplifications and it should be taken very seriously.
- No serious concern is given to connections of steel structures.
- The earthquake vulnerability of lifeline structures can be reduced to a considerable extent by adopting adequate retrofitting measures.



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Session II:

Dr. Ajay Chourasia, Sr. Principle Scientist & Prof.(CSIR), has illuminated on “Vulnerability Analysis and Design of Retrofit Strategy for RC buildings”. In this session participants were gained with the knowledge of Basic concept of retrofit, methods of retrofitting, remedial engineering etc.

Key Takeaways from the lecture

- The steps in retrofit strategy involve: setting of goals, performance levels and seismic hazard→ visual inspection and study of available documents→preparation of as-built drawings and in-situ testing→ modelling and analysis→ retrofit design.
- Evaluation of existing structures should include all past modifications, actual size of elements, actual material properties, location, size and cause of cracks, spalling, location and extent of corrosion, quantity and location of rebar.
- Basic concept of retrofit should increase the ultimate strength of the overall structure and improve the deformation capacity, i.e., ductility, jacketing with steel section or the combination of these two.
- Any structure or a system which fails to qualify against the current structural demand and building by laws should undergo retrofitting.

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The screenshot shows a Zoom meeting interface. The main window displays a presentation slide titled "Retrofitting Options". The slide content includes:

- Retrofitting Options**
- If a structure or a system fails to qualify against the current structural demand – Retrofitting is required**
- Methods of Retrofitting**
- Increase the capacity/strength of the system (Seismic Resistance Based Design)**
CFRP Wrapping, Concrete Jacketing, Steel Jacketing
- Reduce the demand/forces on the system (Seismic Response Control Design)**
Elasto-Plastic Dampers, Base Isolators, Lead Extrusion Dampers, Tuned Liquid Dampers

The slide also features several diagrams and images illustrating these retrofitting methods. On the right side of the Zoom window, a list of participants is visible, including JYOTIAGARWAL, ajay chourasia, shantanu pande, Er Ajay Mishra, Sushil Jeonwal, and Suresha Pednekar. A chat box at the bottom right shows a message from Faisal Ahmad asking for the attendance link.

The screenshot shows a Zoom meeting interface. The main window displays a presentation slide titled "REMEDIAL ENGINEERING". The slide content includes:

- REPAIRS**: visual or cosmetic modifications.
- REHABILITATION**: rebuilding of cracked walls, stitching of cracks, grouting, placement of reinforcement etc. - such that the original performance of the building are restored.
- RETROFITTING**: structural modifications such as jacketing, addition of shear walls, bracing etc... - higher performance of the building is achieved than that of original structure.

At the bottom of the Zoom window, a row of participant video thumbnails is visible, including JYOTIAGARWAL, ajay chourasia, shantanu pa..., Er Ajay Mishra, Sushil Jeonw..., Suresha Ped..., and Pratik Deshm...

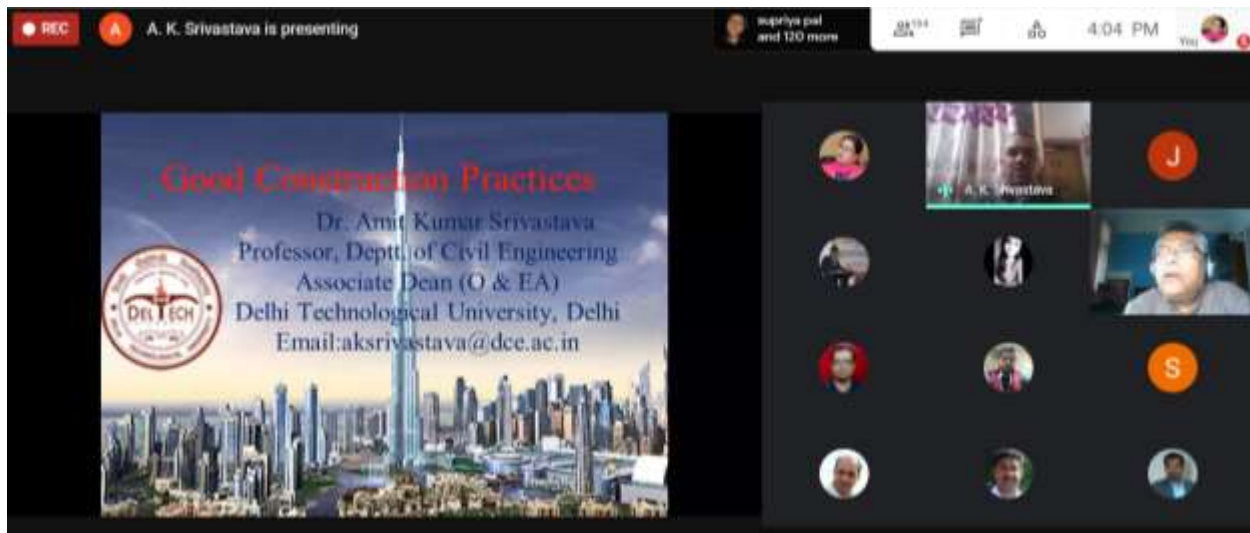
Session III:

Prof. Amit Kumar Srivastava, Professor Civil Engineering Department, DTU Delhi has delivered a informative lecture on “Good Construction Practices”. In this session participants were learned about different necessary steps of good construction practices.

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Key Takeaways from the lecture

- For RC construction acceptable construction practices involve proper care and consideration for shuttering and formwork, placement of reinforcement, concreting and post-casting operations.
- The necessary steps of good construction practice include: define and share the acceptance criteria, create an inspection plan, use checklists to conduct inspections, correct deficiencies and verify acceptance criteria, prevent future imperfections.
- Locate construction joints in walls and columns on the underside of floor slabs, beams and at the top of footings.
- Pouring point selection and avoiding entrapped air while concrete pumping is vital.



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Day- IV (27/11/20)

Session I:

Prof. Chandan Ghosh, Professor Civil Engineering Department Indian Institute of Technology, Jammu, J&K, India illuminated on the topic of “Audit of Non-Structural Elements for Earthquake Safety”. In this session participants were gained with the knowledge of risk assessment using Seismic hazard and risk models and application of these models for accurate assessment of risks.

Key Takeaways from the lecture

- Seismic hazard and risk models are needed for accurate assessment of risks to promote risk reduction and mitigating actions.
- Improvement of building codes and construction practices, sustainable land use, emergency response and protection of critical lifeline structures as well as risk transfer through insurance are some of the important actions needed to be strengthened.
- The assessment and subsequent mitigation of EQ risks are among the ultimate goals of both seismology and EQ engineering.

The screenshot shows a Zoom meeting interface. At the top, a status bar indicates '2K19/PHDCE/02 Prateek Roshan is presenting' and '1:34 PM'. The main content area is split into two parts. On the left, there is a slide titled 'SPEAKER INTRODUCTION' featuring a portrait of Prof. Chandan Ghosh and a list of his qualifications and achievements. On the right, there is a grid of video thumbnails showing participants in the meeting. The slide content includes:

Prof. Chandan Ghosh
Professor
Civil Engineering Department
Indian Institute of Technology, Jammu
J&K, India

SPEAKER INTRODUCTION

- Dr. Ghosh, a professional civil engineer with double doctorate degrees, one from IIT Kanpur and the other from Bankei University, Japan, has been working in various field such as Seismic microzonation & Risk mapping, Reinforced earth, Application of geosynthetics for hill area development, slope instability & erosion control by geosynthetics & bio-engineering by Vetiver Grass, disaster resistant housing technologies, retrofitting and seismoprotection risk mitigation & management, etc. He has published more than 100 research papers in reputed journals and proceedings.
- Besides developing some of the IEC materials such as “Naked and hidden gaps” for earthquake, flood, road safety, cyclone, DM plan for family, Prof. Ghosh has been deeply involved in conducting workshops/seminars on retrofitting, seismoprotection induced damages and landslides mitigation taking place site-specific technical/experimental studies, developing/teaching of working modules, online training programs and curriculum for the self study certificate program of the institute.
- As a recognition to his overall contribution, Dr. Ghosh received Prof. Laxman prize for the best doctoral thesis in 1993, CERC, Vidyaakarma Awards-2013, IGSI-Shri H.C. Varma Golden Jubilee Award-2013 for developing a set of instrument for the measurement of ground PWP during large stress consolidation.
- Prof. Ghosh has phenomenal field exposure and professional credence in the disaster documentation such as Lohit flood surge-2010, Sikkim Earthquake-2011, Lohita Park building collapse-2011, Avam-Bhotia bus accident-2012, Uttarakhand flash flood-2013, Seismic Vulnerability assessment by Rapid Visual Screening (RVS) across the country.

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“STRUCTURAL AUDIT FOR EARTHQUAKE SAFETY”
November 24-28, 2020



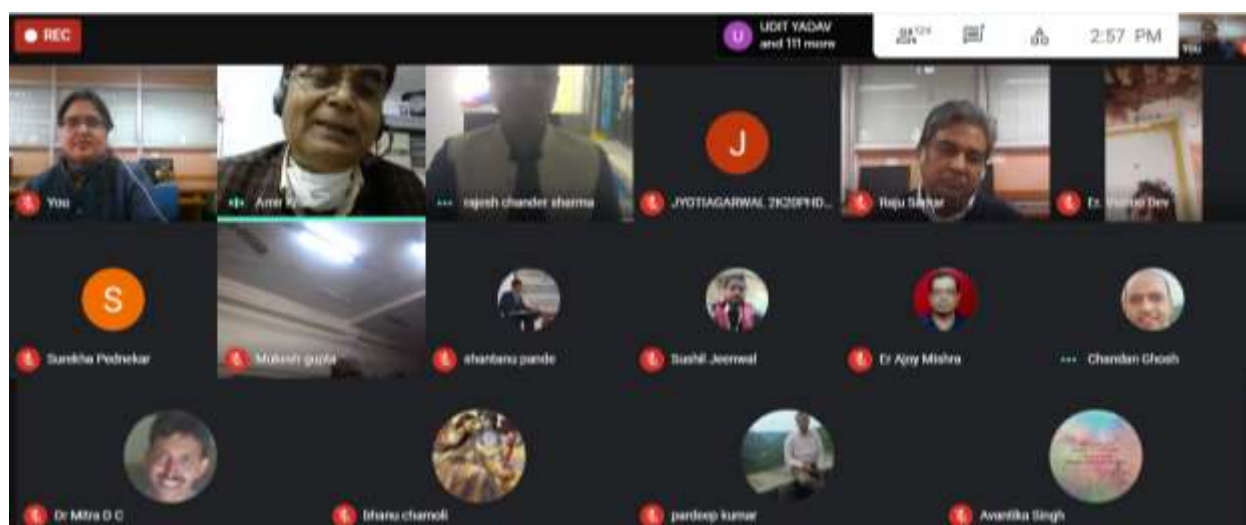
Session II:

Sh. R.C. Sharma, Former Director, Delhi Fire Services & DIG (Fire) CISF, MHA, Govt. of India gave an informative lecture on “Fire Safety Considerations in Buildings”. In this session participants were learned about the Right fire prevention measures, Built-In fire alarm/fire suppression facilities and smoke-free means of escape etc.

Key Takeaways from the lecture

- Right fire prevention measures, awareness and training to the occupants can reduce the chances of fire and help timely action to control the spread of fire.
- Built-In fire alarm/fire suppression facilities and smoke-free means of escape can considerably help in saving the life of occupants in the event of a fire.
- The structural audit has always been a desirable requirement for the buildings, which have been constructed before enforcement of mandatory seismic guidelines and bye-laws prescribed by the government.
- The buildings having unapproved addition of upper floors as well as unauthorized buildings certainly need a structural audit.

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Session III:

Mr. Arun Kumar, Scientist ‘D’, Civil Engineering, Bureau of Indian Standards, New Delhi, has illuminated on “National Building Code-2016 provisions for Earthquake Risk Mitigation”. In this session participants were gained the knowledge of new provisions added in national building code -2016 like Design spectra up to 6 sec fundamental time period, the inclusion of temporary structures, flat slab structures, intermediate importance category based on occupant density, all buildings to be designed for minimum lateral force, the inclusion of effects of masonry infill wall in structural analysis, procedure for evaluating liquefaction potential, etc. are some of the newly added provisions in IS 1893 (Part 1):2016

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Key Takeaways from the lecture

- National Building Code-2016 provisions is expected to be extensively used by local bodies for framing and revamping existing building bye-laws, govt. and other private construction agencies, building professionals like architects, engineers, town planners, building material suppliers and technology providers, research institutions, etc.
- Design spectra up to 6 sec fundamental time period, the inclusion of temporary structures, flat slab structures, intermediate importance category based on occupant density, all buildings to be designed for minimum lateral force, the inclusion of effects of masonry infill wall in structural analysis, procedure for evaluating liquefaction potential, etc. are some of the newly added provisions in IS 1893 (Part 1):2016.



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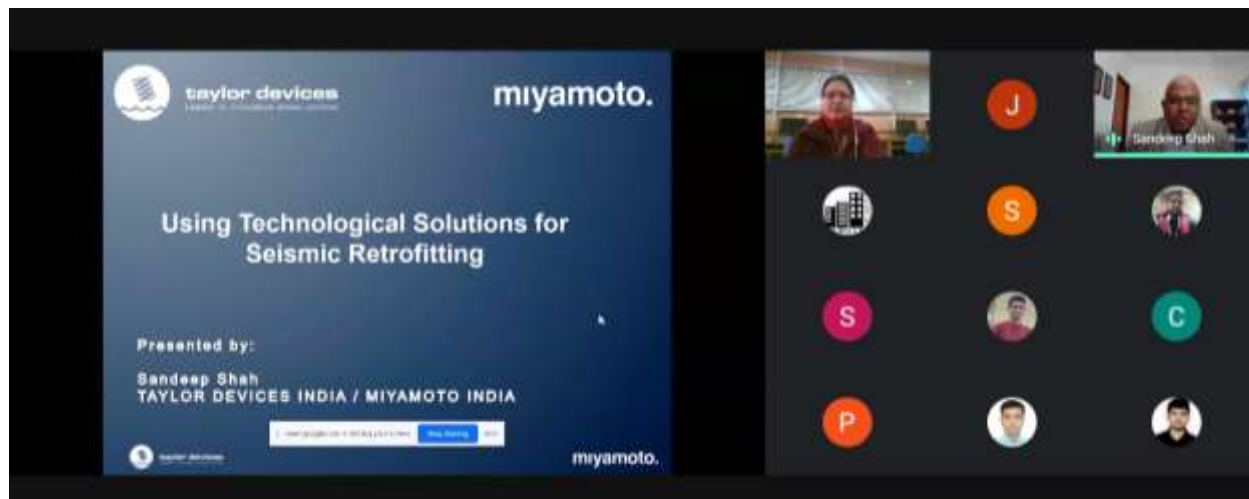
Day-V (27/11/20)

Session I:

Mr. Sandeep Donald Shah, MD - Miyamoto International India & Taylor Devices India, Guragon had delivered his lecture on “Retrofitting Techniques for Seismic Safety”. In this session participants were learned a retrofitting techniques and suitable retrofit measures for the deficient buildings.

Key Takeaways from the lecture

- Existing non-code compliant buildings are commonly the ones which perform very poorly during earthquakes causing massive loss of life and property.
- Retrofitting measures are always performance-based. Retrofitting with new shear walls and jacketing the columns are a few conventional techniques.
- Seismic isolation concept shifts the period, adds damping, decouple building from the ground. Thereby it reduces the forces coming upon the structure and imparts better chances of survival during earthquakes.
- High-rise structures can be effectively retrofitted using fluid viscous dampers to improve its seismic performance.
- Modern equipment like dampers can be very well used as an effective energy dissipation device in various structures in the form of mega brace, shear wall dampers, diagonal brace, inverted brace, toggle brace, etc.



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Session II:

Dr. Girish Chandra Joshi, Senior Consultant Uttarakhand State Disaster Management Authority, Government of Uttarakhand gave his informative lecture on “Seismic Evaluation of existing Building in Hilly areas”. In this session participants were learned about the different types of Vulnerability and its assessment for the structural and non-structural system.

Key Takeaways from the lecture

- Observations of major losses in past moderate magnitude earthquakes signals to very high risk of our built environment.
- Buildings in hilly areas are in a very fragile state where survival of these in a future earthquake is a serious concern.
- Different communities have different exposure to vulnerability. Vulnerability is multi-dimensional, dynamic, scale-dependent and site-specific. Different types of vulnerability are physical, economic, social and environmental. Vulnerability assessment for the non-structural system is as vital as for structural components of a structure. Rapid Visual Screening (RVS), simplified vulnerability assessment (SVA) and detailed vulnerability assessment (SVA) comprise the typical set of procedure to follow to calculate seismic vulnerability.

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Dr. Girish Chandra Joshi
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Uttarakhand State Disaster Management
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SPEAKER INTRODUCTION

Education:

- Doctor of Philosophy, Earthquake Engineering (2003-2009) Indian Institute of Technology, Roorkee, India
- Post Graduate Diploma, crisis emergency/disaster management(2007-2008) Indian Gandhi National Open University
- Master of Technology, Earthquake Engineering (2001-2003) Indian Institute of Technology, Roorkee, India
- Bachelor of Technology, Civil Engineering (1997-2001) College Of Technology, G.B.P.U.A.M.T. Pantnagar, Uttarakhand, India.
- Bachelor of Science(1992-1996) Kumaon University, Almora Campus.

PROFESSIONAL EXPERIENCE

Management and coordination

- Project Management in State, National & Multilateral funding agencies.
- Coordinates project implementation of all activities related to sensitization workshops for various stakeholders in the State of Uttarakhand like administrators, Civil Engineers, Architects, Masons etc. about earthquake vulnerability and possible preventive actions in substantive and financial terms.

Development and dissemination

- Of educational and training materials (BEC) related to earthquakes. Development of training modules. Delivering lectures in earthquake engineering for various target groups.

Seismic Hazard and Risk Assessment

- Working on Probabilistic Seismic Hazard and Risk Assessment using various methodologies.

Participants visible in the grid include: You, Sobha Khan, Sandeep Shah, JYOTIAGARWAL, Newgen Engin..., Suraksha Padi..., Dr. Girish Chandra Joshi, Sushil Jeena..., JJOY REDDY, sangeeta pan..., Awanika Singh, Shashita Gosal, Anjam Khan, MOHIT TYAGI, C NAGA OHEE..., Sushil Kumar..., shubham tripa..., Ishant singhal, Beena Zale, BENNET A DPE, Sandip Badar..., Marindar Singh, S K, Surjit kumar, Siddhartha Se..., Dr. RAVINDRA..., ARNAB DEB, Richa Srivasta..., Dr. M. Jayasim..., NITESH BHARD..., Bhoomika Patel, Sudip Paul, Yashwanth Reddy, Waqar Ul Islam (Attendance link is old one I think).

Valedictory and closing Session:

The program was ended with vote of thanks by Dr. Amir Ali Khan, NIDM, Coordinator of the FDP. He Summed up the 5 days programme and thanked all the participants who took great effort in attending all the sessions and making the programme a grand success.

EXPERTS Thank you very much for delivering such informative and thought-provoking lectures. It was a blend of splendid presentation and expertise which exposed our participants to the desirable practices & norms. We all got benefited from your experiences and views on the subject. We are looking forward to your cooperation in future as well.

PARTICIPANTS Thank you so much for participating in the one-week long training programme. We hope that you found the training programme informative & worthwhile. Our primary goal was to increase your understanding of the requirement, structural, execution & manageable perspective of structural audit for earthquake safety. We look forward to having a productive working & learning relation ahead.

Thank you

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All the sessions were much informative. The discussed areas were of great benefit for the participants as the topics fulfilled the current working domain. Participants were enlightened with the most widely used advance technologies in this field.

BROCHURE OF THE PROGRAM

ABOUT NIDM

National Institute of Disaster Management (NIDM), Ministry of Home Affairs, Government of India is a premium Institute and a Statutory Body (under Disaster Management Act 2005) for training, research, documentation, awareness and human resources and capacity development in the field of disaster mitigation and management. The Institute lays emphasis on multi-stakeholder interdisciplinary cross-sectoral approach for an efficient proactive continuum disaster risk management based on participatory integrated multi-risk management concept. It aims towards a disaster free / resilient India.

ABOUT DTU

With a history stretching back over 69 years, providing an academic milieu amid adequate space for ingenious research as an integral part of curriculum design, Delhi Technological University is strongly identified with engineering education in India. The University has been a forerunner, and led the way in reform movement maintaining a compatibility with values and professional morality. DTU takes pride in being one of the major contributors in planning and construction of India's infrastructure. In DTU we endorse and cultivate the purity of mind as the strongest currency, with an impressive resolve to renovate and upgrade our knowledge infrastructure. DTU aspires to be ranked amongst the leading universities globally. Consequently, DTU's mission is to edify individuals to be competitive not only in India, but all over the world.

PATRONS

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ONLINE REGISTRATION

Detailed online registration form available on following link
<https://forms.gle/2uQpZQe8vSQhdMrBA>

Last Date of Registration

November 20, 2020

NO REGISTRATION FEE

One-Week
Online Short Term Training Programme
on
**STRUCTURAL AUDIT FOR
EARTHQUAKE SAFETY**
November 24 - 28, 2020



nidm
Resilient India - Disaster free India

Organized jointly by
National Institute of Disaster Management
Ministry of Home Affairs, Govt. of India
New Delhi – 110 001

&
Delhi Technological University
Shahbad Daulatpur, Main Bawana Road,
New Delhi – 110 042

PARTICIPANTS: The STTP was attended by **262 participants** from different organization, industry, govt. organisation, faculty members, research scholars and students.

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List of Participant

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