CPP | CEPT UNIVERSITY CHC CENTER FOR HERITAGE CONSERVATION | CRDF

CEPT Professional Programs

Wooden Heritage Conservation

19th- 21st January 2024

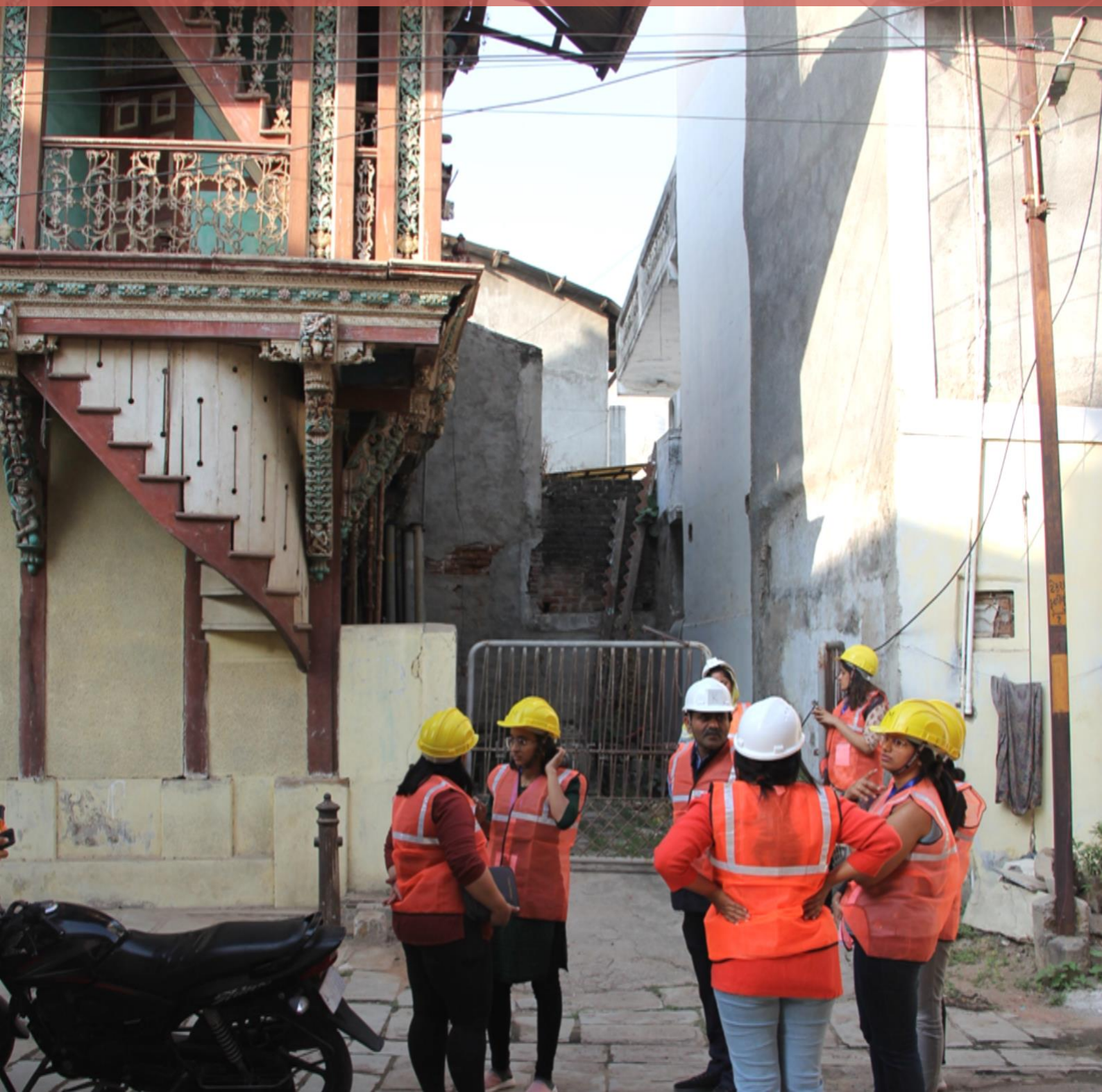
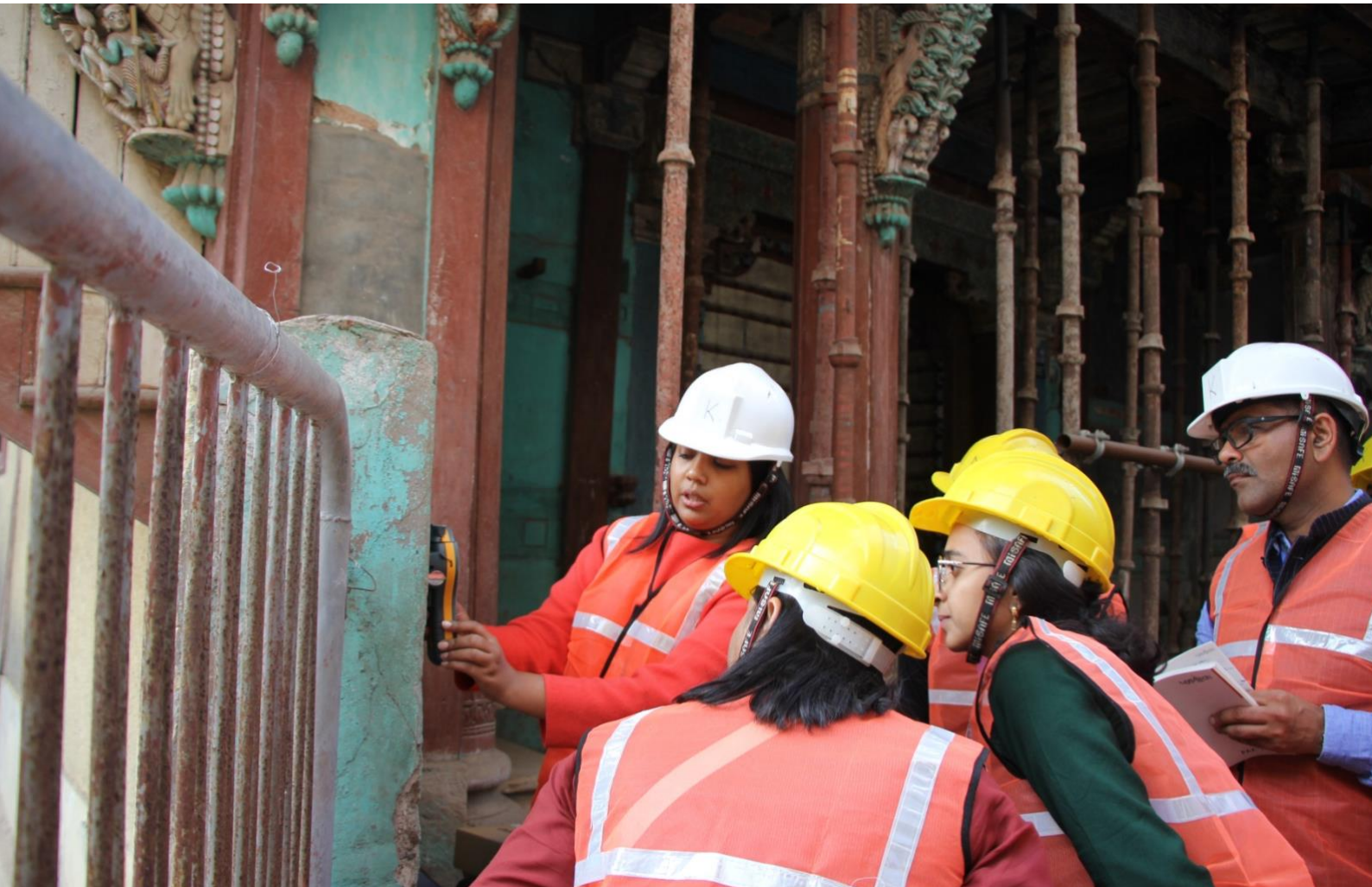


Image Credit: Ashna Patel, CHC-CRDF

This booklet has been compiled in 2024 by Komal Gandhi and Nishra Shah with the support of Nigar Shaikh, Ashna Patel and Jayashree Bardhan for Center for Heritage Conservation (CHC), CEPT Research and Development Foundation (CRDF). The compilation is a session-wise overview of the certificate program 'Wooden Heritage Conservation' conducted from 19th to 21st January 2024. The program was developed by CHC-CRDF and offered by CEPT Professional Programs (CPP).

Cover Image: CPP participants at CEPT Conservation Site School, Mukhi Delu, Dharmaj, Gujarat

All images of the program or site used in the booklet are photographed by Komal Gandhi from CHC-CRDF (unless mentioned otherwise). Image Credit: Komal Gandhi, CHC-CRDF, January 2024.



About the Program

Center for Heritage Conservation (CHC) at CEPT Research and Development Foundation (CRDF) and CEPT Professional Programs (CPP) conducted a three-day certificate program on Wooden Heritage Conservation from 19th to 21st January 2024. The workshop was conducted partly at CEPT Campus in Ahmedabad and partly at CEPT Conservation Site School at Kalidas Jethabhai House and Mukhi Delu in Dharmaj, Gujarat. This program was designed for professionals, teachers and researchers of architectural conservation, heritage management, architecture, design, civil and structural engineering, or any other field allied to built-environment studies and heritage studies.

The program focused on conservation approaches for wooden built heritage. On the first day, the participants had introductory sessions on wooden heritage conservation by the course tutors Ashna Patel, Jigna Desai, Saatvika Pancholi and Nigar Shaikh. Later they visited 'Laathi Bazaar' in Ahmedabad accompanied by Saatvika Pancholi and master craftsperson Fulchand Suthar for insights into contemporary processes of sourcing and processing of wood in conservation projects. The second day was conducted in Dharmaj where the participants had on-site engagements to understand damage assessment of wooden structures. These sessions were conducted at CEPT Conservation Site Schools under Dharmaj Heritage Collaborative at Kalidas Jethabhai House and Mukhi Delu. Mehul Shah and Nigar Shaikh conducted these sessions. On the third day, the sessions were curated on the topic of conservation strategies. Conservation practitioners presented and discussed examples from practical work and academia. These sessions were conducted by Khushi Shah, Ashna Patel, Nigar Shaikh and Benny Kuriakose.

The program was supported with material from CHC's ongoing work for the Endangered Wooden Architecture Programme (EWAP) Grant, hosted by Oxford Brookes University. On-site support was provided by Avichal Heritage Foundation, Kalidas Jethabhai House, Dharmaj and Audrey Alvares (Research Associate, CHC). The tutors were supported by Komal Gandhi (Teaching Associate, CHC). The program content was curated by Prof. Jigna Desai (Head, CHC), Jayashree Bardhan (Program Lead - Assessment and Training, CHC), Nigar Shaikh (Program Lead - Material Characterisation, CHC) and Ashna Patel (Program Lead - Conservation Site School, CHC).

Learning Objectives:

After completion of the program, the participants were expected to be able to:

1. Demonstrate a basic understanding of the need for wooden heritage conservation and available conservation approaches
2. Identify appropriate tools and techniques to be employed for assessment of wooden built heritage
3. Recognise typical on-site challenges faced in the process of wooden heritage conservation.

Program Faculty

Nigar Shaikh

Conservation Engineer, Program Lead - Material Characterisation, CHC, CRDF

Jigna Desai

Architect, Sustainability, Conservation and Regeneration Expert, Center Head, CHC, CRDF

Ashna Patel

Architect, Heritage Conservation Specialist, Program Lead - CEPT Conservation Site School, CHC, CRDF

Saatvika Pancholi

Conservation Architect, Research Associate, CHC, CRDF

Guest Experts

Benny Kuriakose
Conservation Architect,
Designer, Benny Kuriakose & Associates

Fulchand Suthar
Master Craftsperson,
Senior Carpenter, F.M. Furniture

Mehul Shah
Expert in Earthquake Resistant Design of Structures,
Structural Engineer, Ami Engineers

Khushi Shah
Conservation Architect,
Visiting Faculty, CEPT University

About Dharmaj Heritage Collaborative

Center for Heritage Conservation (CHC), CEPT Research and Development Foundation (CRDF), Ahmedabad and Avichal Heritage Foundation, Dharmaj have collaborated to safeguard the heritage of Dharmaj, a small village in the Charotar region of Gujarat. Under the collaborative, two sites - Mukhi Delu and Kalidas Jethabhai House have been adopted as CEPT Conservation Site School, an initiative of CHC.

About Mukhi Delu

Mukhi Delu is located near Athamni Khadki, one of the oldest parts of the historic settlement. The building is a composite structure built in the year 1907 consisting of timber framing with intricate wood carving work and brick walls. The three-storeyed structure has not been inhabited, maintained, or repaired for a very long time due to which parts of it had become extremely fragile and were found to be at risk of collapsing.

About Kalidas Jethabhai House

Kalidas Jethabhai House, Conservation Site School at Dharmaj is located at the periphery of the dense historic core of the village and is owned by the heirs of Kalidas Jethabhai Patel. The building is a two-storeyed composite structure consisting of timber framing and mud and lime mortar brick walls. The building has two linearly organised wings (one of which is severely dilapidated), separated by a courtyard. Adjoining the building, there is a large open ground that was used to host family gatherings and festival celebrations until the time the house was occupied by the family. The house was rented out to members of the local community for several years after the family left and has remained unoccupied since more than a decade after that. Over the years, the structure has undergone considerable damage due to continuous disuse, weather impacts and the lack of funds and resources for its repair and maintenance. The rear wing showed evidence of repairs, modifications and additions done in concrete by tenants which, due to its incompatibility with the traditional material, led to further deterioration of the structure.

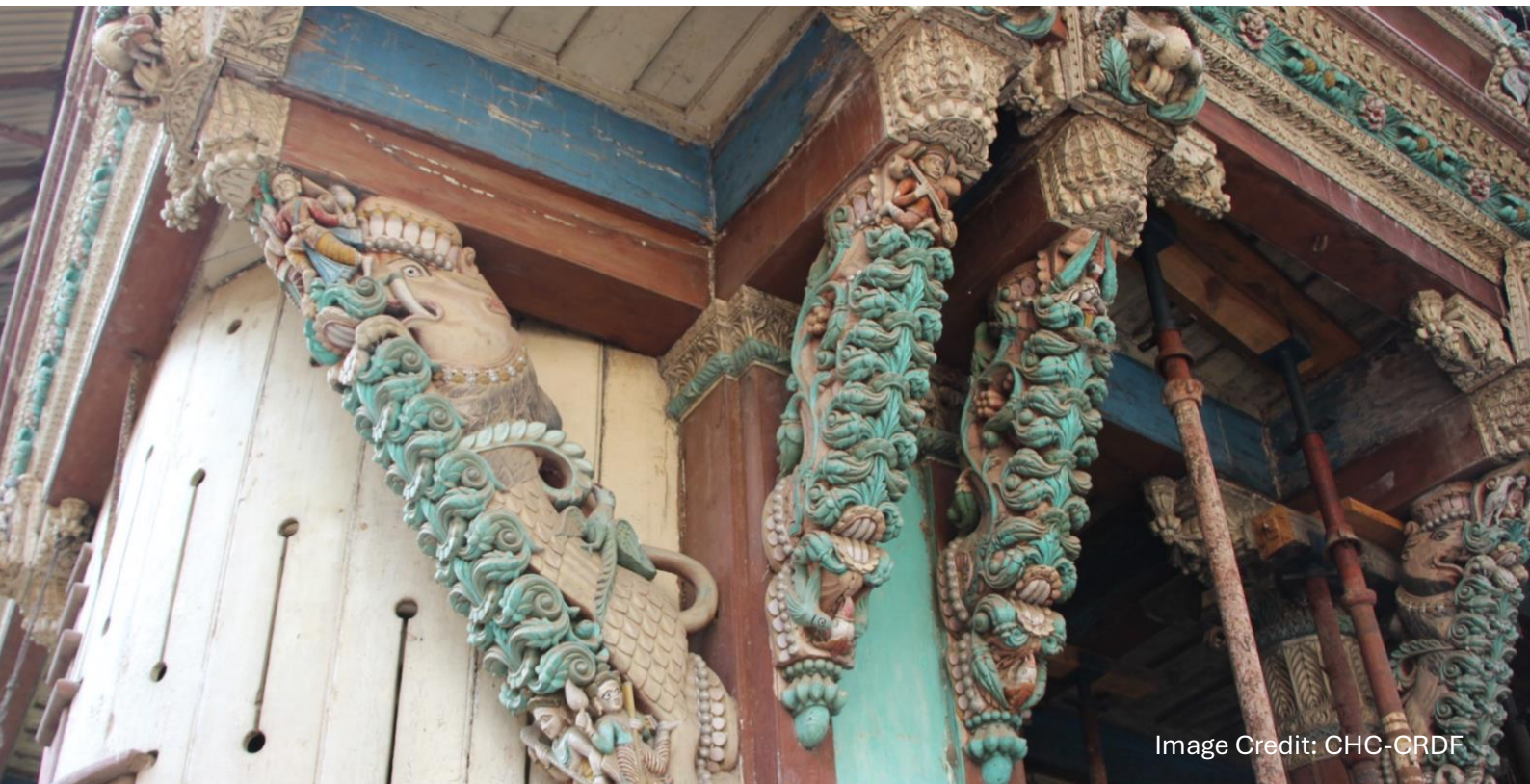
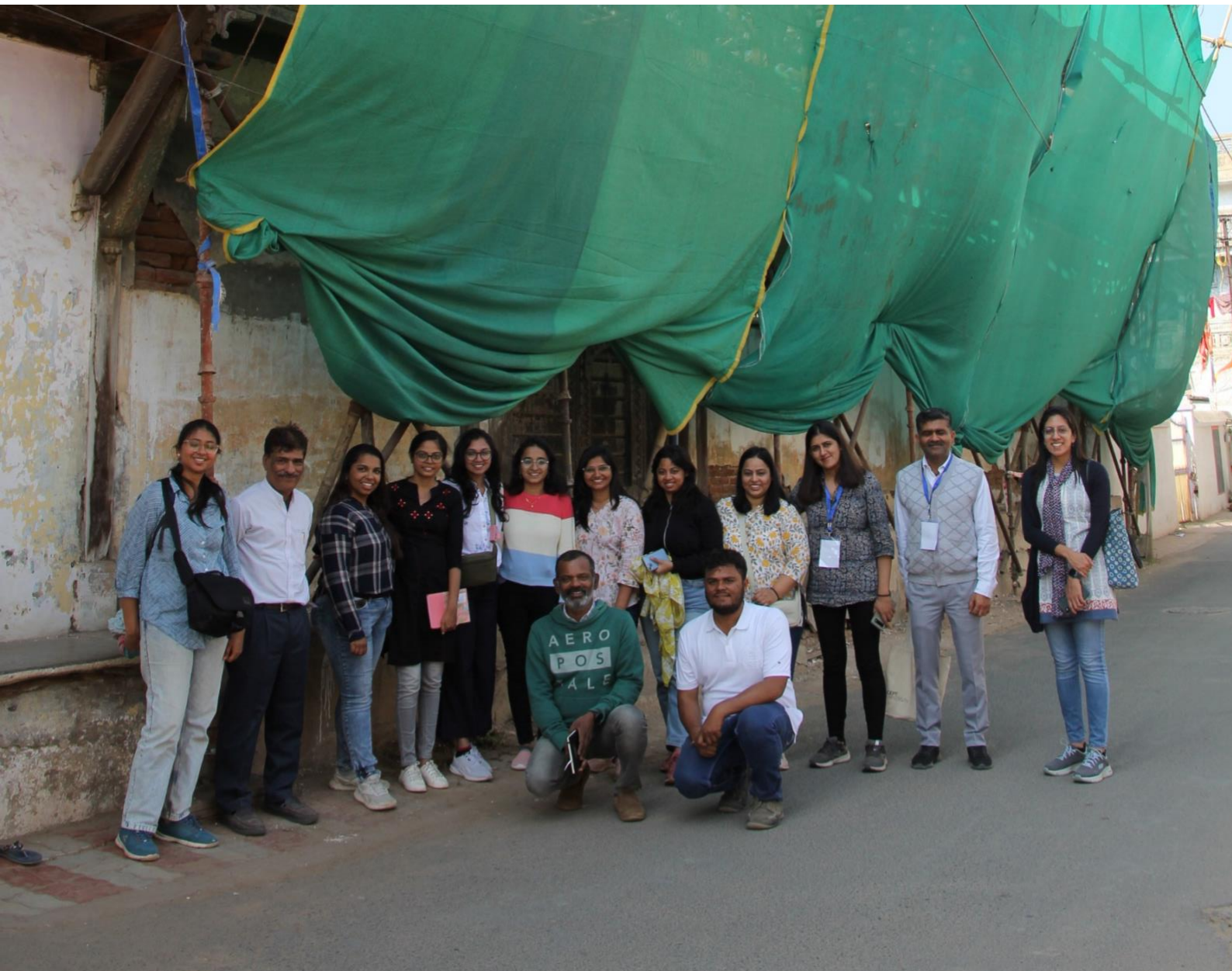
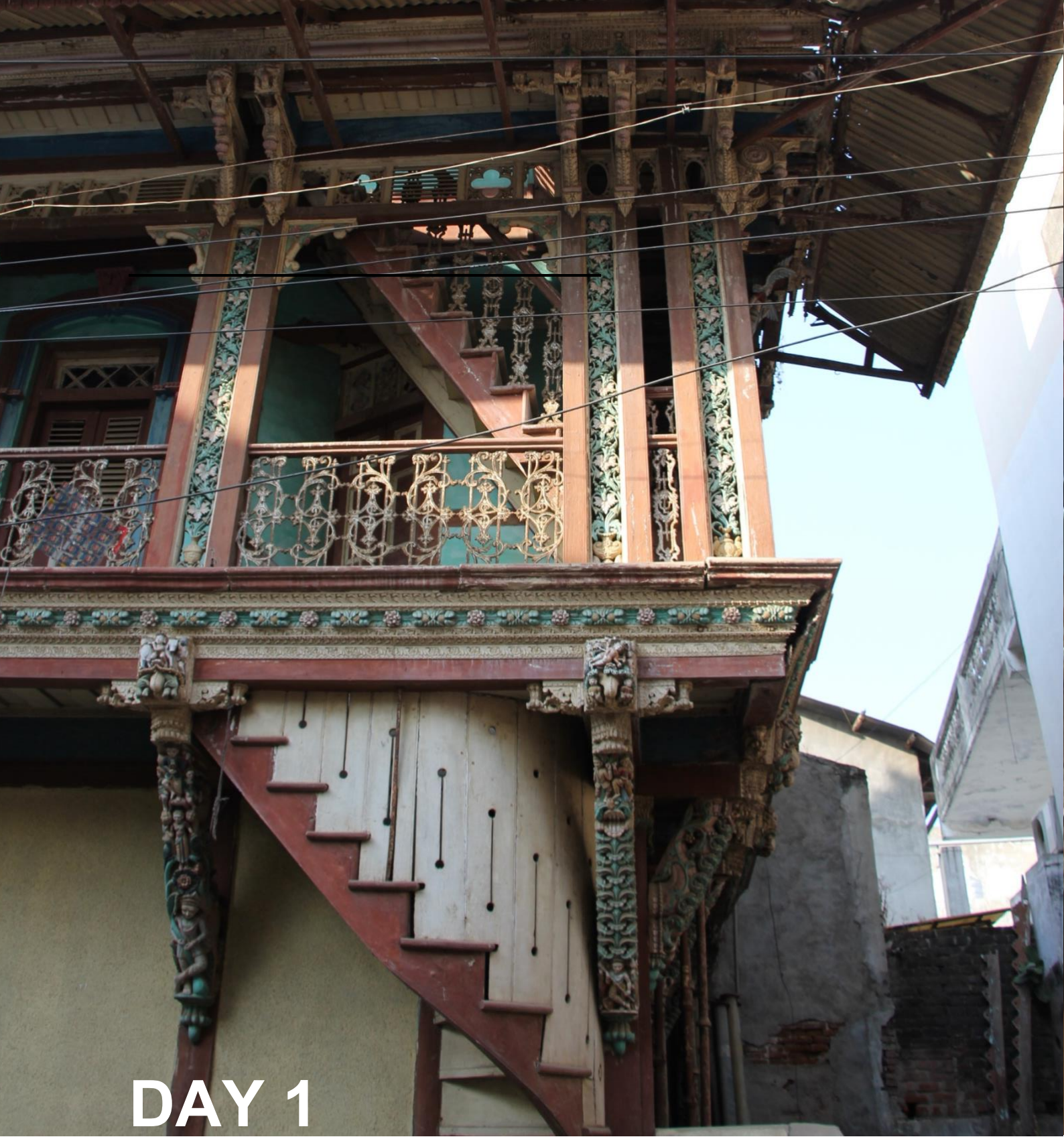


Image Credit: CHC-CRDF

Participants

1. Swapnali Ladpatil
   Conservation Architect, Pune
2. Anagha Ajit Pawar
   Conservation Architect, Pune
3. Hannah Susan Mathew
   Conservation Architect, Kerala
4. Manepalli Vinay Babu
   Furniture-making Entrepreneur, Chennai
5. Anushka Nitin Deshpande
   Heritage Management Professional and Archives Manager, Mumbai
6. Shruti Ullas Uchil
   Assistant Professor in Interior Design, Mumbai
7. Inder Gulati
   Architect at Punjab University, Chandigarh
8. Athmeeka V V
   Conservation Architect, Chennai
9. Gargi Durgesh Phondekar
   Architect, Mumbai
10. Aanchal Mehta
    Architect, Ahmedabad





DAY 1

Introduction to Wooden Heritage Conservation

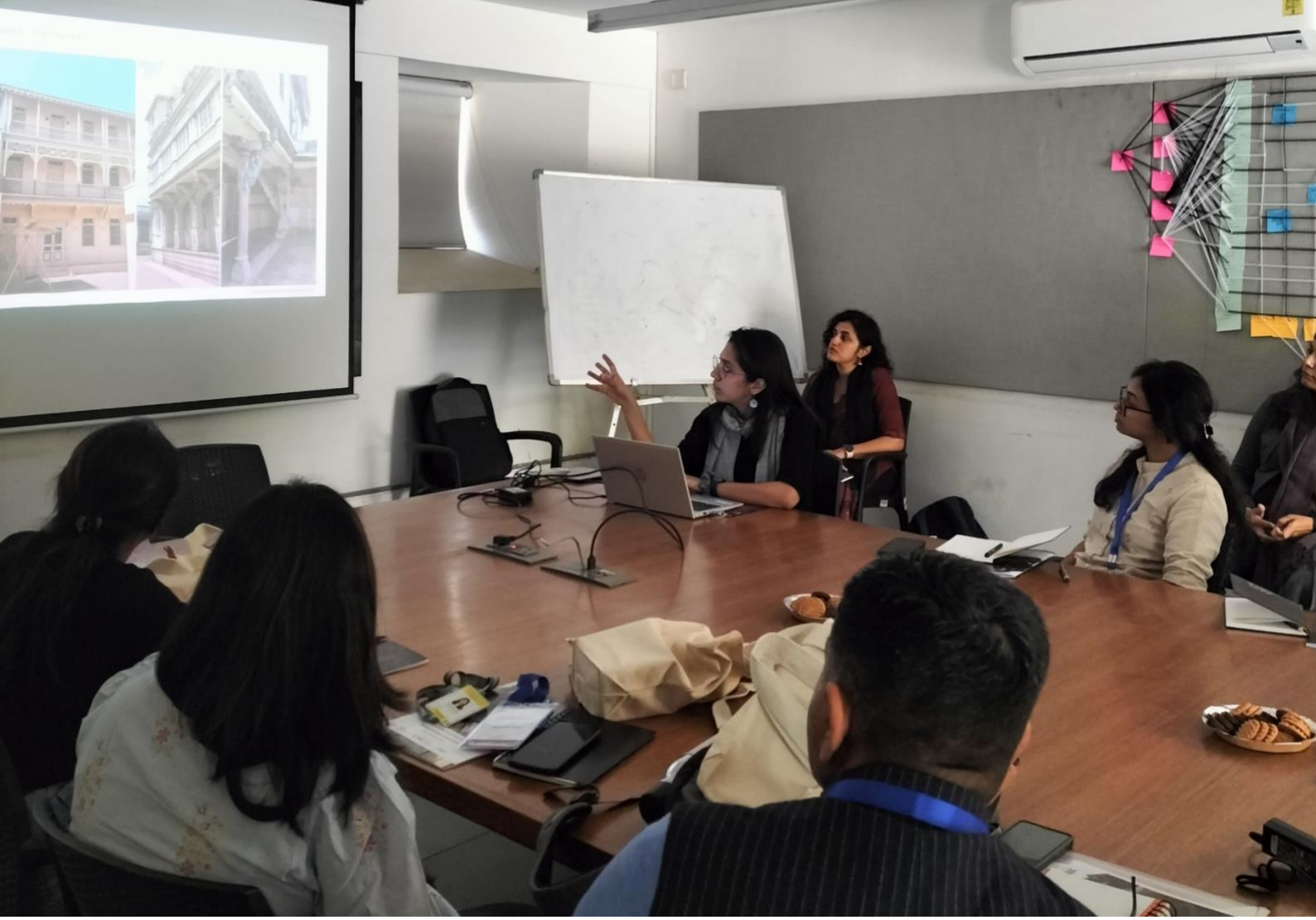


Image 1: Introductory session on the context of Dharmaj and its heritage structures by Ashna Patel.

Session 1

Course Overview and Introduction to CEPT Conservation Site Schools

Program Faculty: Ms. Ashna Patel
Architect, Heritage Conservation Specialist
Program Lead - CEPT Conservation Site School, CHC, CRDF

This session outlined the course and its objectives in the context of the CEPT Conservation Site Schools Program. The participants were introduced to CEPT Conservation Site Schools Program and the sites currently adopted by CHC-CRDF. The session highlighted the challenges faced by Site Schools in the context of wooden built heritage in Dharmaj and more specifically, in the case of Conservation Site Schools at Mukhi Delu and Kalidas Jethabhai House.

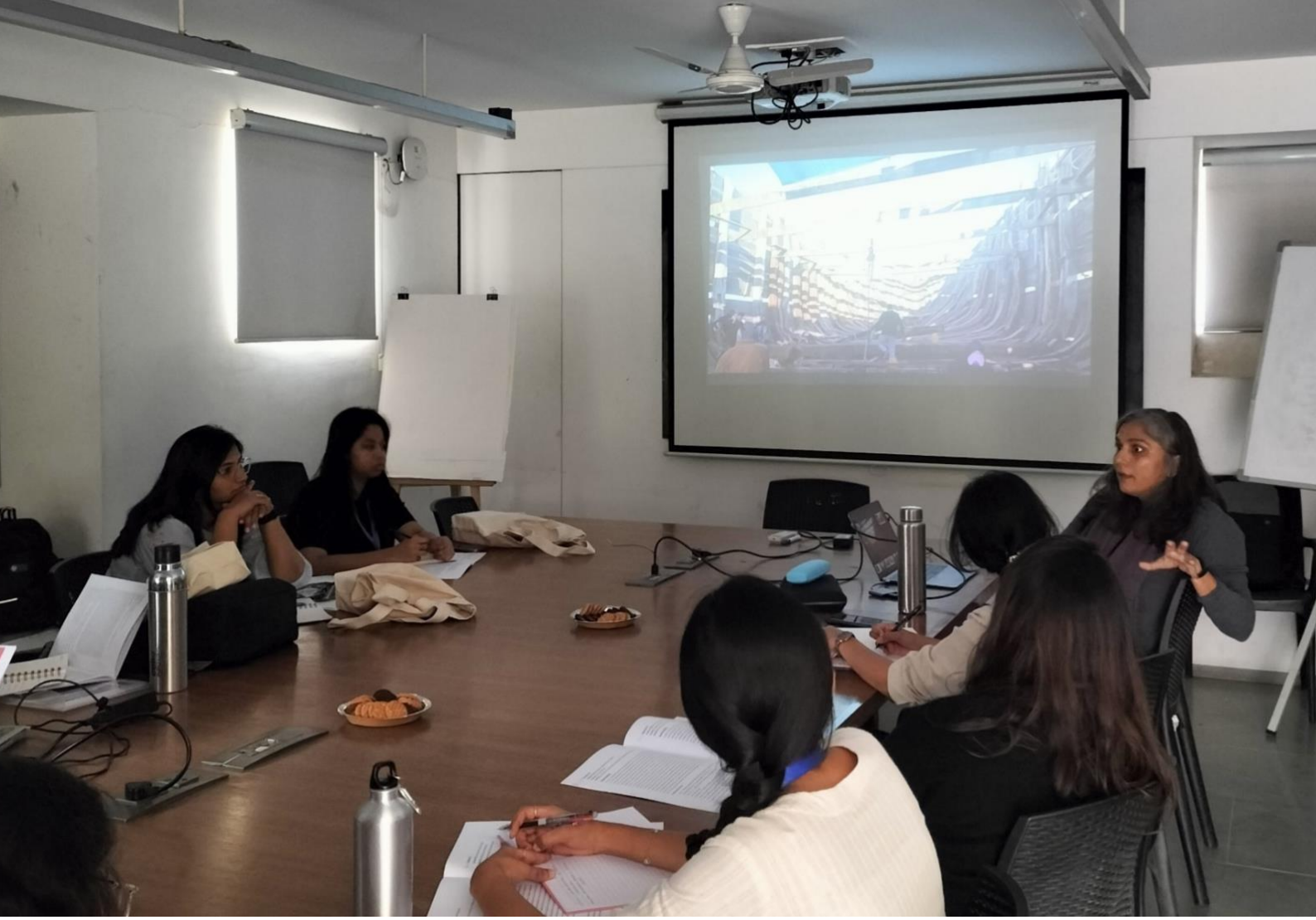


Image 2: Presentation on the history of timber construction practices of Gujarat by Prof. Jigna Desai.

Session 2

Wooden Architecture of Gujarat

Program Faculty: Prof. Jigna Desai
Architect, Sustainability, Conservation and Regeneration Expert
Center Head, CHC, CRDF

The session introduced the participants to the trade relations of Gujarat region and its associations with timber construction practices, through examples of old surviving practices such as wooden ship building at the old Mandvi port in Kutch. The lecture focused on the statement, '*Wood is not native to most parts of Gujarat and yet one sees the most exquisite wooden havelis built here'*. The discussion dealt with the relationships of urban morphology and the house type along with the agencies of various members of the communities involved. This was primarily explained through examples of previous documentation of wooden residences of Gujarat. The participants were also exposed to traditional terminologies for structural and non-structural wooden elements used by the locals and craftspeople in Gujarat and the intersecting logic associated with basic science.

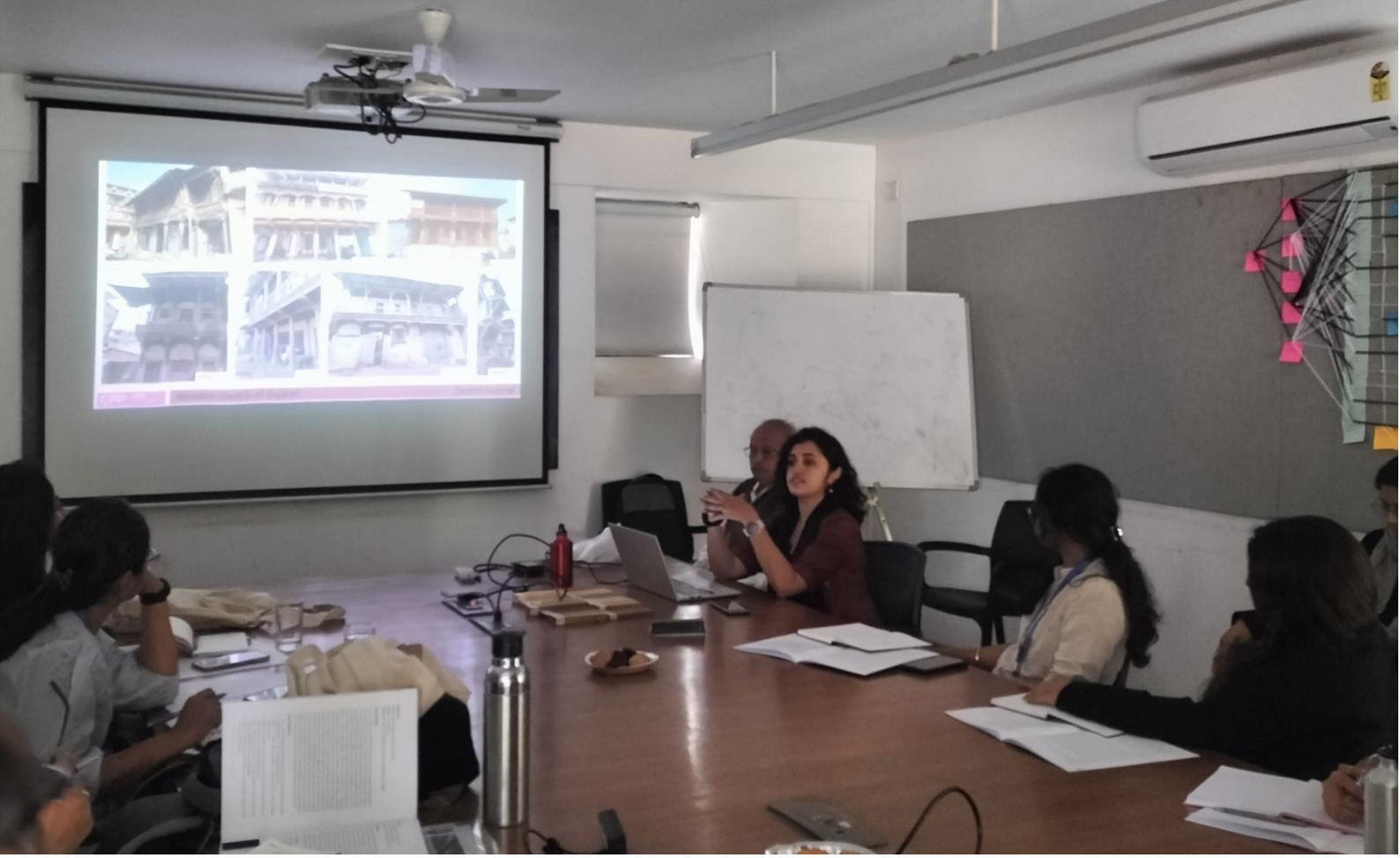


Image 3: Presentation on the reconnaissance survey of wooden havelis across the region of Gujarat by Saatvika Pancholi.

Session 3

Current context of wood as a material

Program Faculty: Ms. Saatvika Pancholi
Conservation Architect, Research Associate, CHC, CRDF

Guest Expert: Mr. Fulchand Suthar
Master Craftsperson, Senior Carpenter, F.M. Furniture

In the session, the history of wooden construction and carvings in the Indian subcontinent was explored. Various vernacular techniques of wooden house construction across India were examined, including Pol houses in Gujarat, Dajji Dewari in the Himalayan region, and wooden temples and theaters in Kerala. The tutors explained how in all these typologies, wood served as a primary structural element, with distinctive styles and ornamentation patterns based on region, community, and wood type. Model samples of around 12 wood species were given to the participants to understand the grain pattern for species identification. Participants were introduced to examples of wooden structures in Gujarat, their structural systems, earthquake resilience properties, joinery systems, symbolism, and wood types. The session also addressed the current state and challenges facing wooden heritage in Gujarat, based on the ongoing research for the Endangered Wooden Architecture Programme at CHC-CRDF. The participants also discussed their specific queries related to repair techniques in wood, furniture building, procurement and timber properties with master craftsperson Fulchand Suthar.

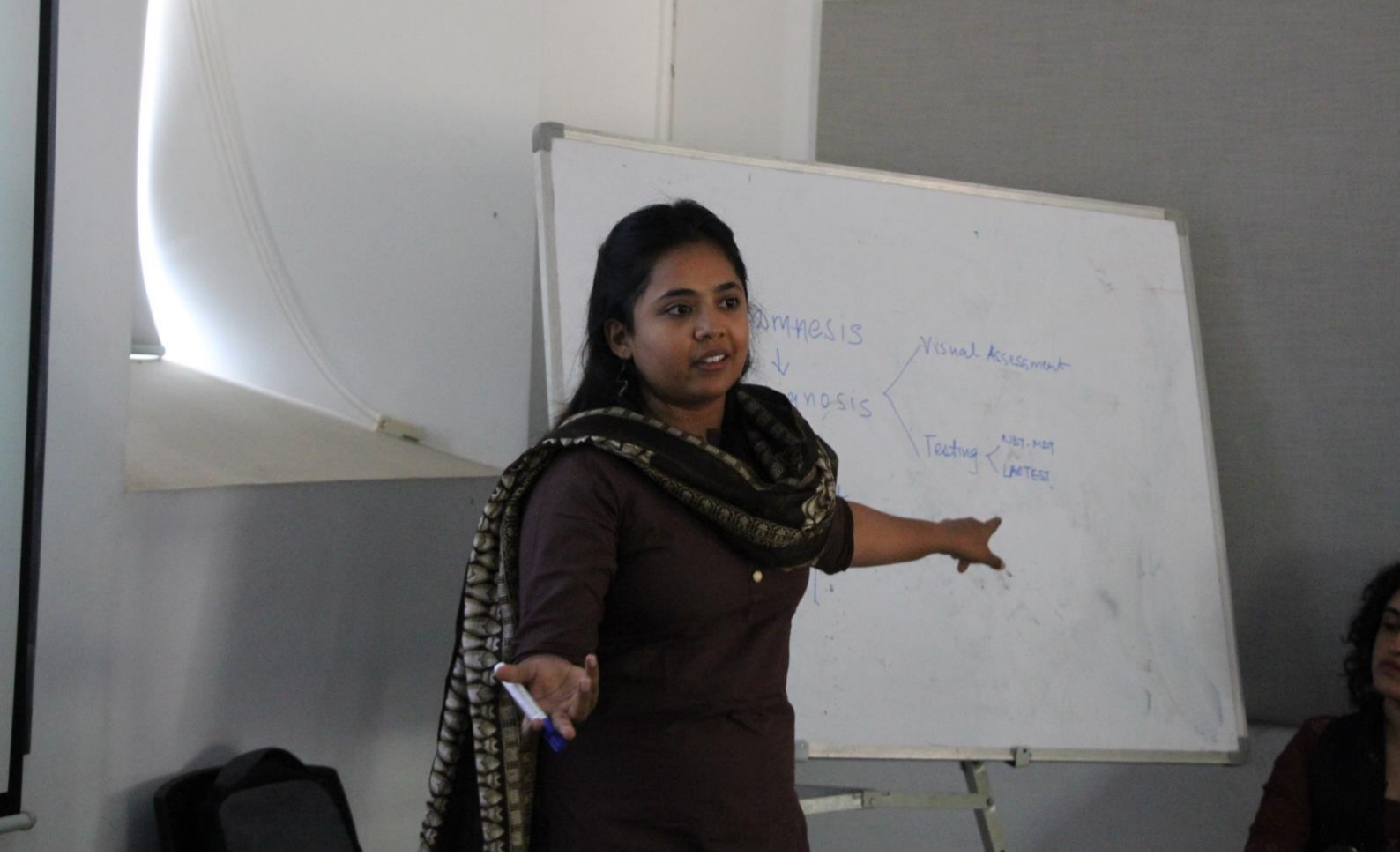
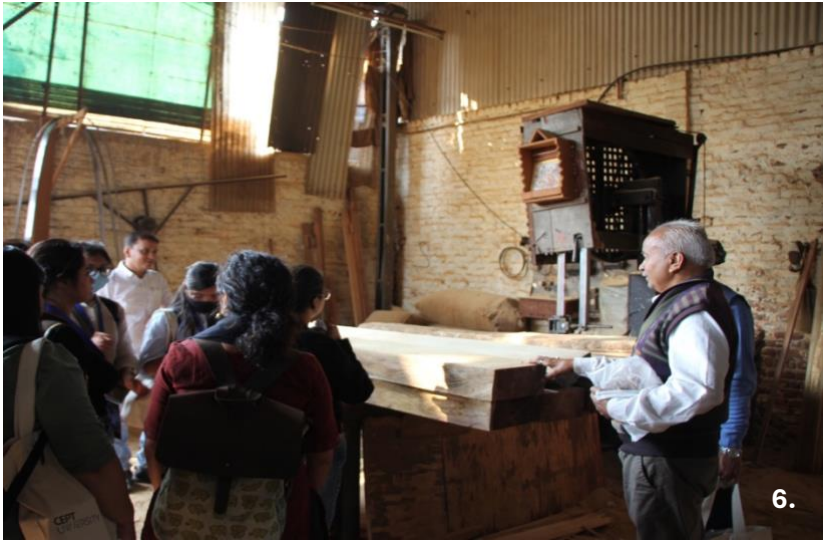


Image 4: Session on different ways of assessing deterioration in various building materials by Nigar Shaikh.

Session 4
Material deterioration

Program Faculty: Ms. Nigar Shaikh
Conservation Engineer, Program Lead - Material Characterisation, CHC, CRDF

This session commenced with the introduction to various stages of conservation and steps involved for structural conservation. Nigar Shaikh explained the role of assessment and how visual assessment plays a vital role in structural conservation. Participants learned to identify visual signs of decay. This included decay from moisture, fungi such as wet or dry rot, or insects such as termites and understanding how excessive moisture fuels these biological threats and increased possibility of deterioration under cyclic wetting and drying mechanisms. A clear bifurcation of dry and wet rot attack was discussed. The session also explored fire damage, emphasizing the charring process and its detrimental impact on strength and integrity. Additionally, participants studied deflection, buckling, and cracks in wooden roof, floor, and bracing elements as crucial indicators of distress. Beyond external threats, this session stressed the importance of choosing wood free from inherent defects such as knots, improperly seasoned wood, or wood prone to splitting and warping, since these weaknesses can compromise structural integrity.



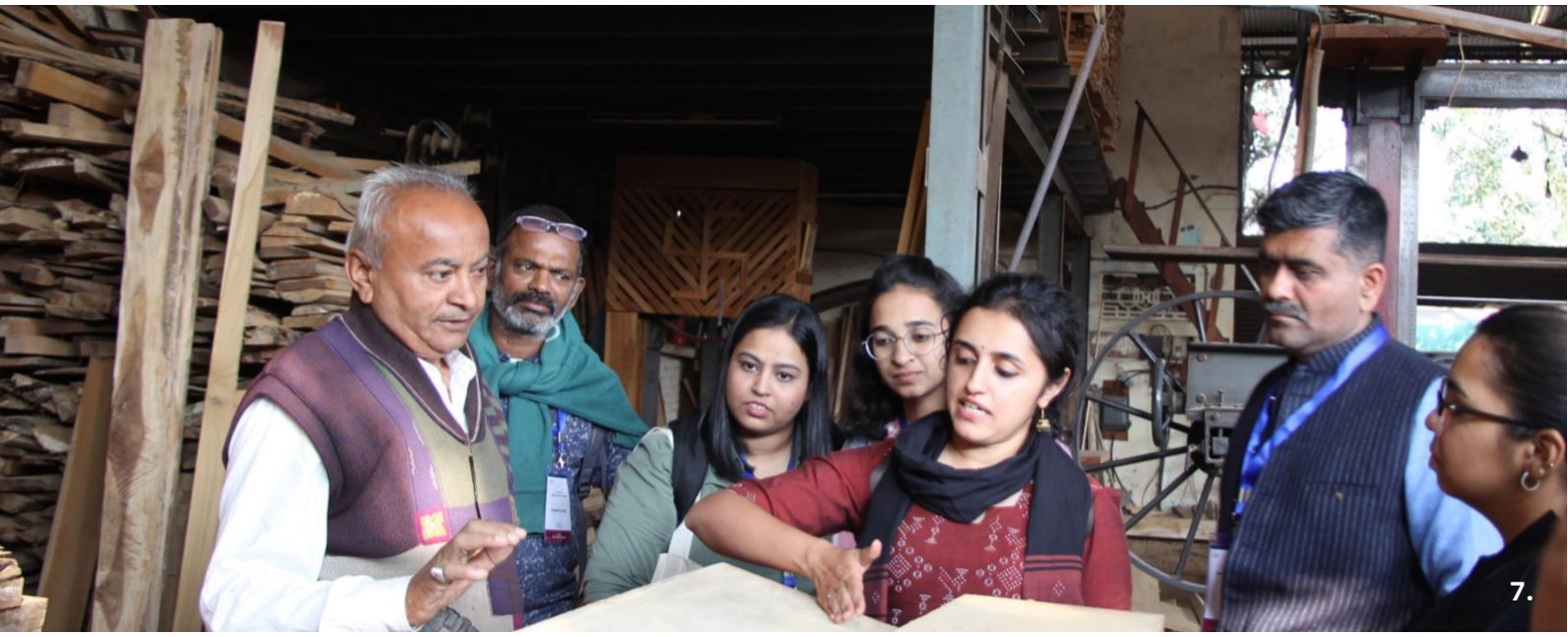


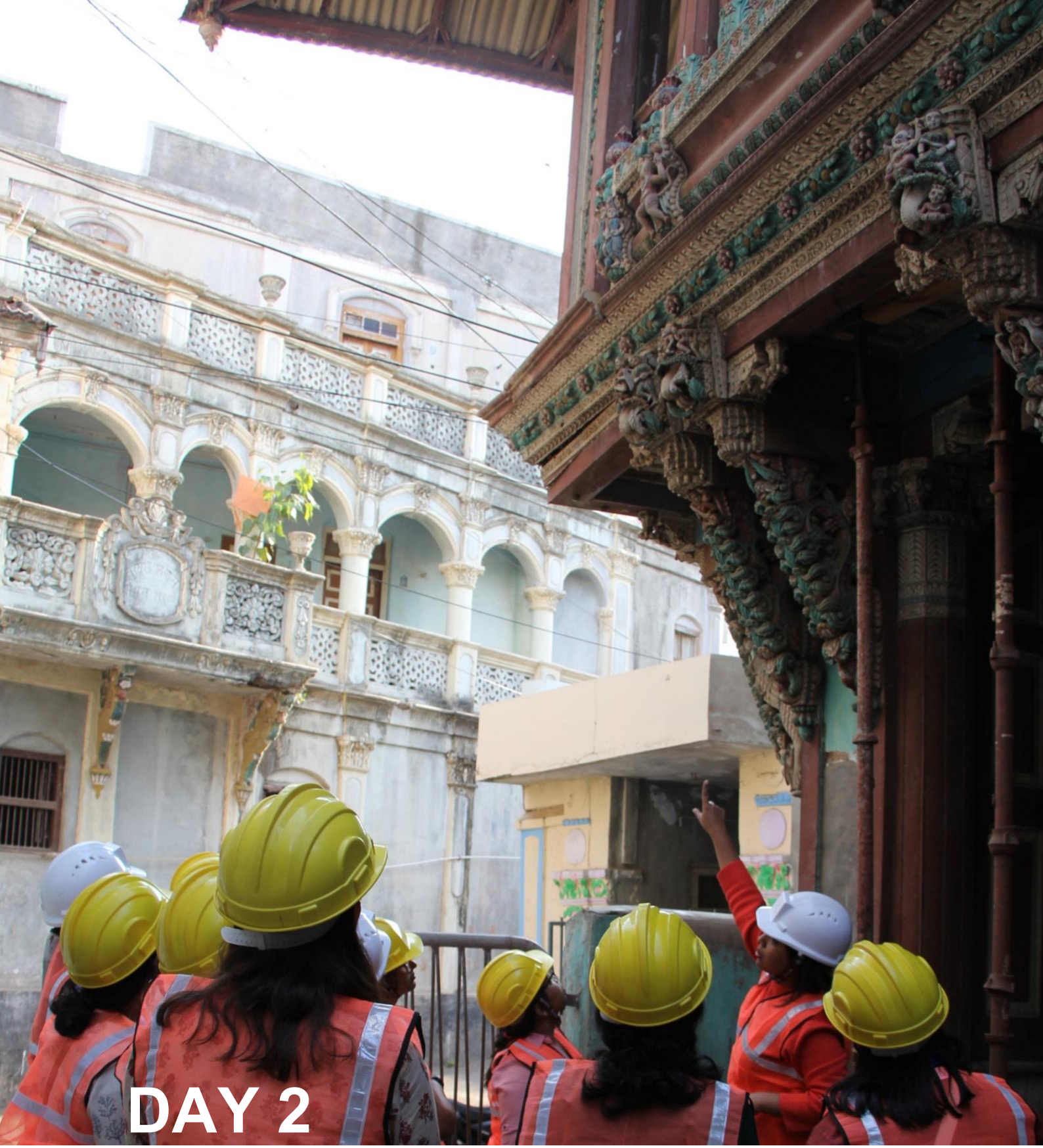
Image 5,6: Field visit to Lathi Bazar in Ahmedabad to understand the procurement of new timber.
Image 7: Visit to Idgah chowkdi timber warehouse to understand the segregation and reuse of old timber elements from demolished wooden structures.

Session 5
Visit to the Lathi Bazaar

Program Faculty: Ms. Saatvika Pancholi
Conservation Architect, Research Associate, CHC, CRDF

Guest Expert: Mr. Fulchand Suthar
Master Craftsperson, Senior Carpenter, F.M. Furniture

The session was a visit to Lathi Bazaar, which is a timber market in the old city of Ahmedabad. The participants got insights of timber procurement and current rates from the owner of one of the new wood dealers in the Bazaar. The participants got the opportunity to witness cutting and processing of timber for sale. The on-site practical session on identification of types of timber and defects was conducted by master carpenter Fulchand Suthar. The session also involved a visit to the old wood market, where structural members from dismantled wooden havelis were procured and processed for resale.



DAY 2

Damage Assessment of Wooden Structures

Mukhi Delu and Kalidas Jethabhai House, Dharmaj

Session 1

Methodologies for assessment of wooden structures

Guest Expert: Mr. Mehul Shah
Expert in Earthquake Resistant Design of Structures
Structural Engineer, Ami Engineers

The ongoing process of wooden heritage conservation at Kalidas Jethabhai House was utilised for demonstrations in this session. Participants explored the dual methods of visual inspection and non-invasive testing through theoretical and practical sessions. They learned about qualitative techniques such as tap tests, deterioration mapping, and geometric surveys to gain a comprehensive understanding of a structure's condition. Additionally, the expert presented case studies of assessment and challenges faced during execution. Examples of on-site demonstrations and discussions are illustrated below:

Image 8: Site Visit to CEPT Conservation Site School Kalidas Jethabhai House Dharmaj with Mehul Shah.

The exposed wooden elements of the front wing of the house served as a case study to gauge condition of the wood through visual assessment and geometric survey.

Image 9: Assessment of the out of plumb wooden column at the front wing of the house with Mehul Shah

Aspects of geometric survey were discussed on site through examples of wooden elements in the front wing of the house. Alignment of structural elements such as column plumb, and beam deflection were discussed

Image 10: CPP Participants at the first floor of the front wing of Kalidas Jethabhai House with Mehul Shah.

In the ongoing conservation, the weak masonry of the first floor of the front wing has been carefully dismantled to expose the wooden elements, assess their condition and form a suitable repair strategy. Aspects related to the structural system and visual assessment of the exposed wooden elements and joinery such as tracing termite/ rot attacks, weak joinery and identifying replaced elements were discussed.

Session 2

Demonstration of NDT and MDT for assessment of different wooden elements, Mukhi Delu

Program Faculty: Ms. Nigar Shaikh
Conservation Engineer, Program Lead - Material Characterisation, CHC, CRDF

This session discussed non-invasive methods for assessment of historic structures and their categories. Participants learnt how some methods offer a cost-effective and safe way to evaluate structural elements, ultimately guiding appropriate repair strategies. Following theoretical explanations and case studies, participants gained practical experience using various non-destructive testing (NDT) and minor destructive testing (MDT) techniques at the CEPT Conservation Site School - Mukhi Delu. Participants took a walk through the structure understanding the existing conditions and the challenges such as loss of strength of wood due to termite attack, deflection in structural members, structural cracks etc. that the site faces. Non-invasive techniques such as tap test, ultrasonic pulse velocity, rebound hammer, rebar locator, moisture meter, and borescope study were demonstrated, providing participants with a clear understanding of their application and limitations in real-world scenarios. Additionally, the session presented laboratory-tested wood specimens to evaluate strength performance of the wood when placed in different directions and discussed the procedures and significance of such lab-based testing methods. This hands-on approach equipped participants with valuable skills for effectively evaluating the condition of historical wooden structures, ensuring informed preservation. Some examples of on-site demonstration of techniques are illustrated below:

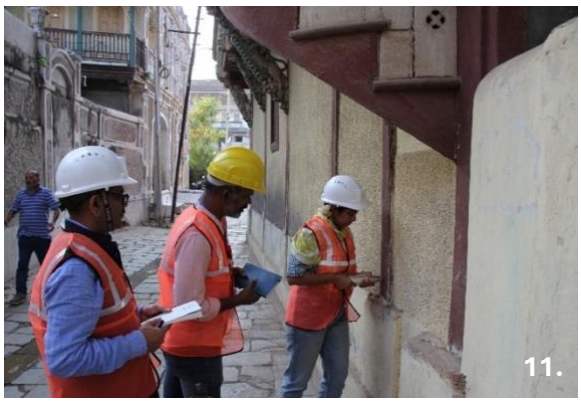


Image 11: Hands on experience of Rebound Hammer at an exterior wooden column at Mukhi Delu, Dharmaj.

The technique of rebound hammer at critical locations such as wall-column interface, external surfaces etc. along with the use of moisture meter can provide key information about decayed wooden elements of Mukhi Delu.

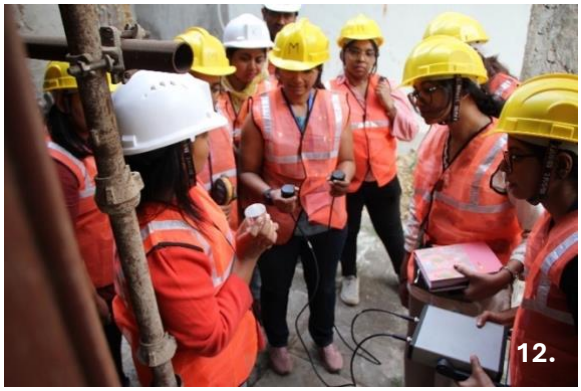
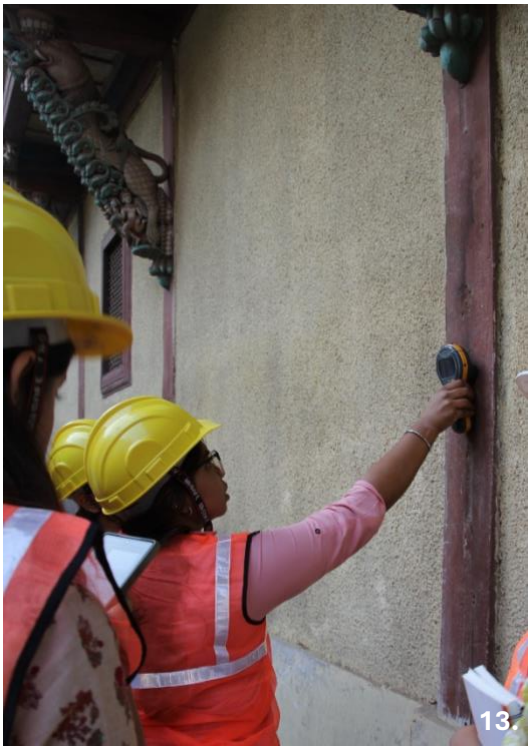
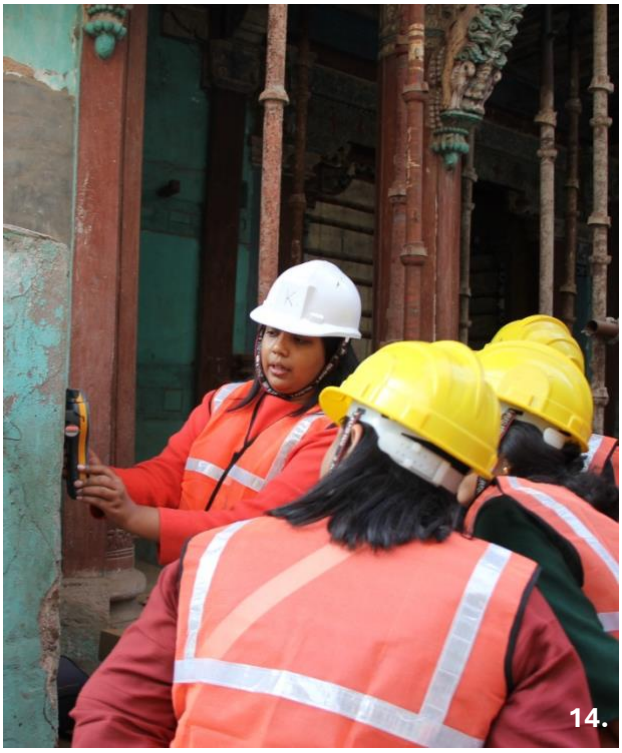


Image 12: Nigar Shaikh introducing the technique of Ultrasonic Pulse Velocity to CPP Participants.

Ultrasonic Pulse velocity can help in detecting the internal voids, presence of knots, and cracks in wooden elements. This test can prove to be instrumental in assessing the structural soundness of wooden elements at Mukhi Delu.





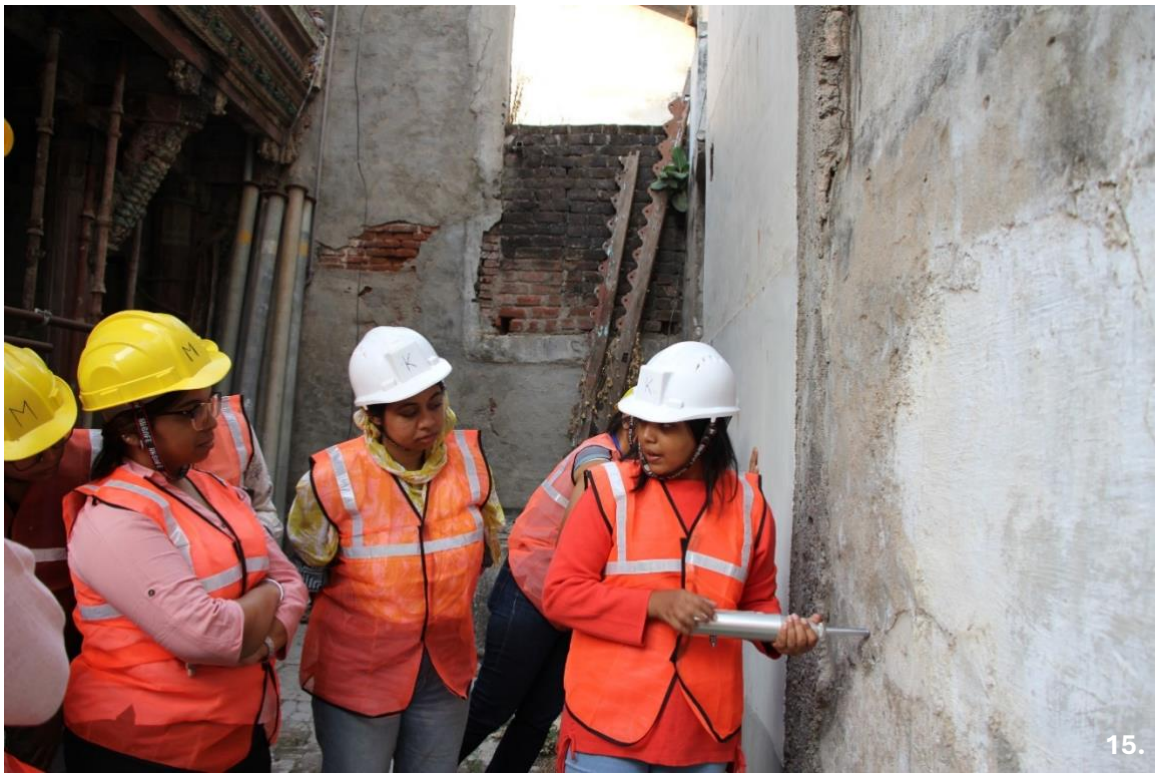
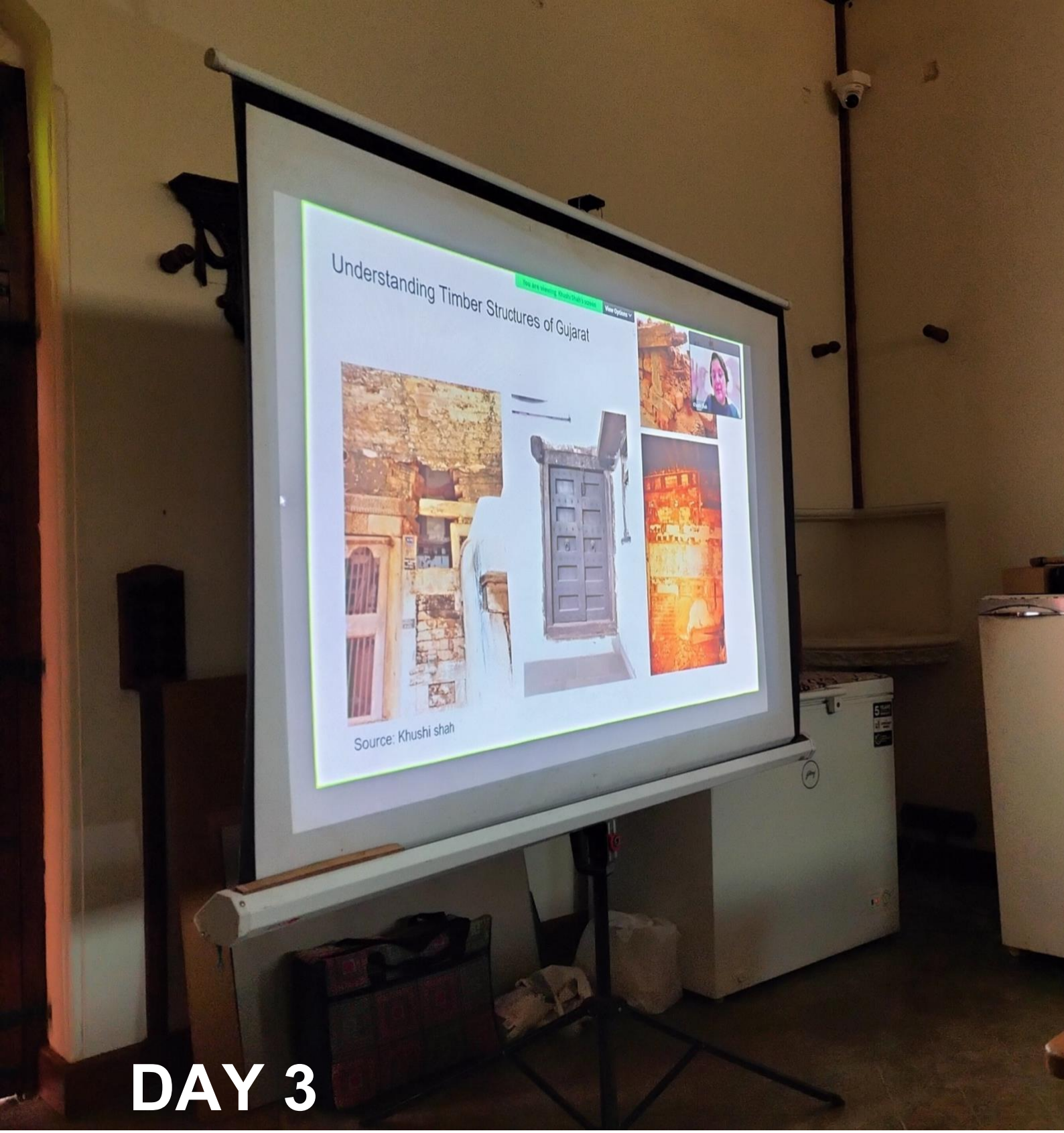


Image 13: CPP participant taking a reading from the moisture meter at Mukhi Delu.
Image 14: Nigar Shaikh introducing moisture meter to CPP participant
Image 15: Nigar Shaikh explaining rebound hammer to CPP participants

Use of moisture meter at different locations of Mukhi Delu helped the participants to understand variations in the readings according to the conditions of the wooden elements such as external building elements, elements showing capillary rise and elements in damp spaces. A quick demonstration of rebound hammer on a brick wall with cement plaster was carried out for comparing results of rebound number for hard surfaces.



DAY 3

Conservation Strategies

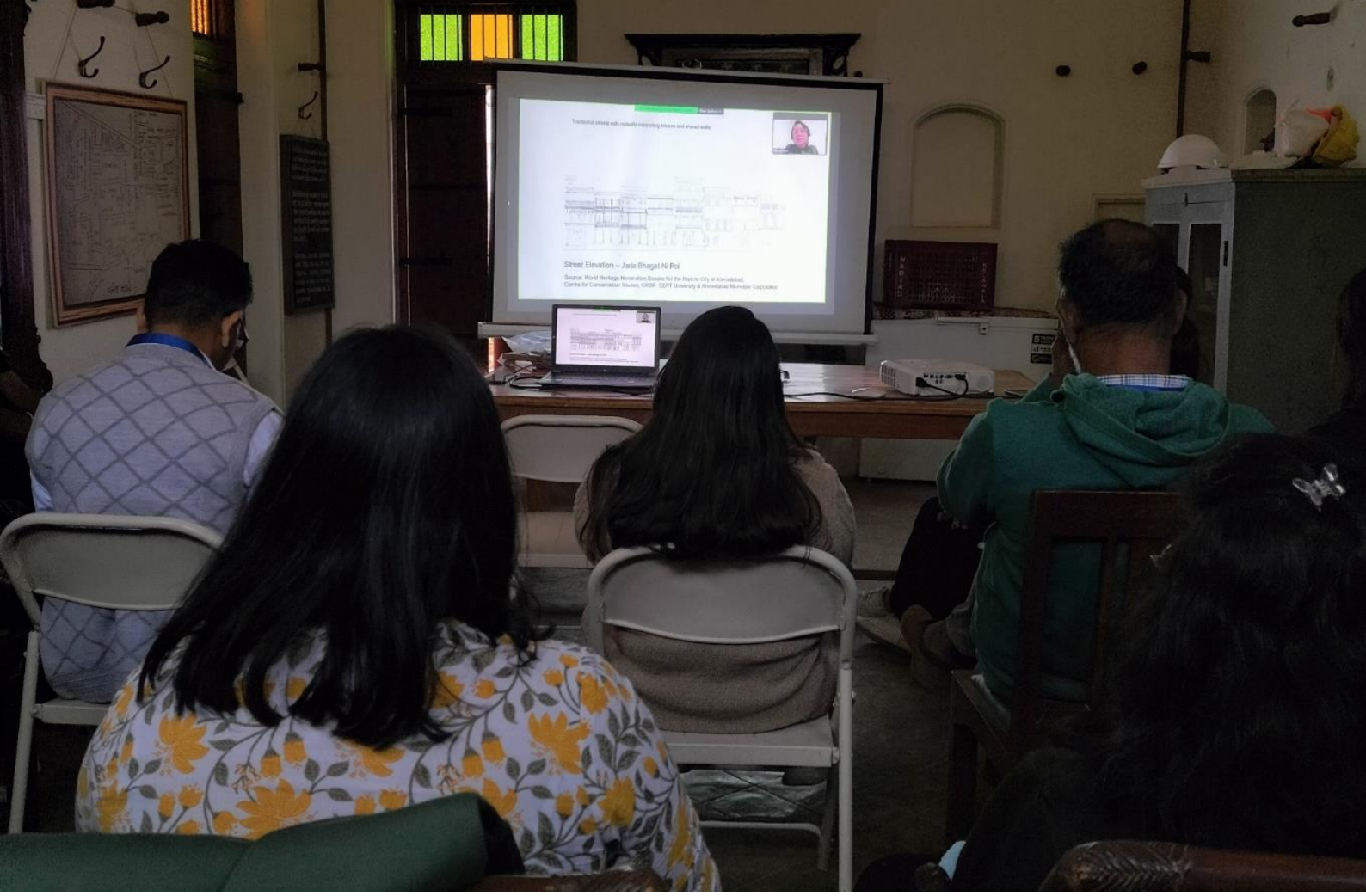


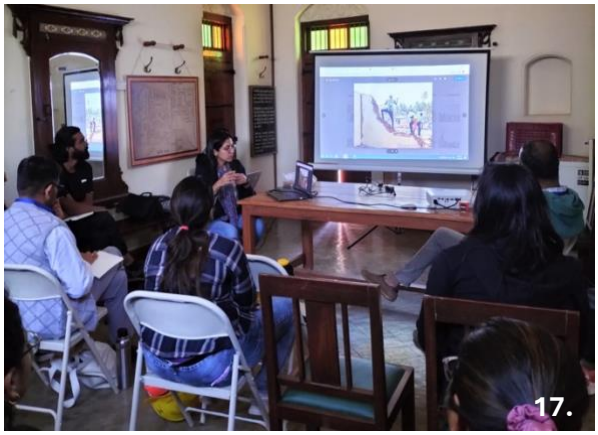
Image 16: An online lecture at Rhodesia House by Khushi Shah where she made a presentation on learnings from her conservation work of wooden havelis in Ahmedabad.

Session 1

Overview of Architectural Conservation Studio at CEPT- Dharmaj and Ahmedabad and Learnings from Wooden Heritage Conservation in Ahmedabad

Guest Expert: Ms. Khushi Shah
Conservation Architect, Visiting Faculty, CEPT University

This session delved into the rich history of wooden heritage conservation in Ahmedabad, highlighting its role as a learning ground for students and scholars for decades. The speaker shared her personal experience of working on restoring historical timber structures in the city, which provided her with invaluable knowledge about their materials, construction techniques, and vulnerabilities. Drawing upon both, her professional and academic work, Khushi Shah explained nuances of architectural conservation processes, emphasizing the need for thorough documentation of traditional buildings, including their materials, construction methods, and cultural significance. This understanding forms the basis for assessing the physical condition of historic buildings and making informed decisions about repair and restoration strategies. Through this engaging session, participants gained insights into the unique characteristics of wooden heritage structures, the challenges they face, and potential approaches for their preservation.



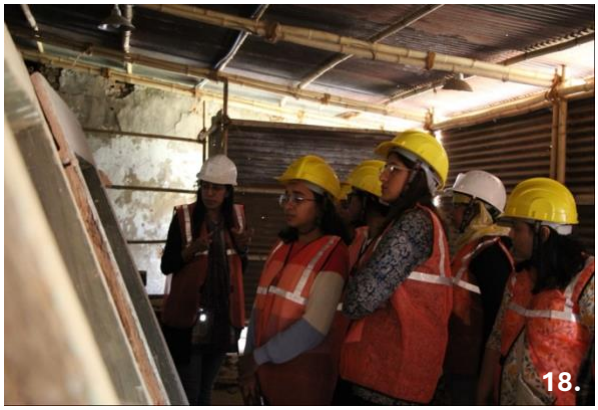


Image 17: Ashna Patel explaining the process of careful dismantling at Kalidas Jethabhai House (KJH) Site School, and the challenges faced during the process.
Image 18: CPP participants at the material inventory at KJH to understand material cataloguing.
Image 19: Ashna Patel giving an overview on the conservation work undertaken at KJH.

Session 2
Strategies for safeguarding and conserving traditional wooden structures, Kalidas Jethabhai House

Program Faculty: Ms. Ashna Patel
Architect, Heritage Conservation Specialist
Program Lead - CEPT Conservation Site School, CHC, CRDF

This session emphasised the importance of privately owned ancestral homes, which constitute a significant portion of the wooden heritage in Dharmaj. These structures, while showcasing traditional construction techniques of the region, embody layers of meaning, memories, and associations not only of generations of the family and tenants that have occupied them over the years but also of those residing around them. Through the case of Kalidas Jethabhai House, the session highlighted the relevance of conserving privately owned wooden structures that have remained unoccupied and dilapidated for several years due to family migration.

Ashna Patel explained the historic timeline of the structure and the sequence of work undertaken at the site from safeguarding to careful dismantling, along with the ongoing conservation process and vision for future sustainable use of the structure. The discussion

focused on the various challenges faced at the site while adopting a conservation approach driven by site-based pedagogical activities and capacity building.

Following the lecture-based input, participants were taken to the site to observe the safeguarding and dismantling measures that were undertaken as immediate protection measures along with ongoing conservation works in the front wing of the house. They visited the material inventory that showcased wooden architectural elements recovered from the dismantling process and the system of storing, monitoring and maintaining them for efficient reuse in the conservation of the structure. The session focused on the potential of sustainable adaptive reuse by integrating new architectural interventions within historic buildings in continuing the life of wooden built heritage, particularly in cultural contexts such as Dharmaj.

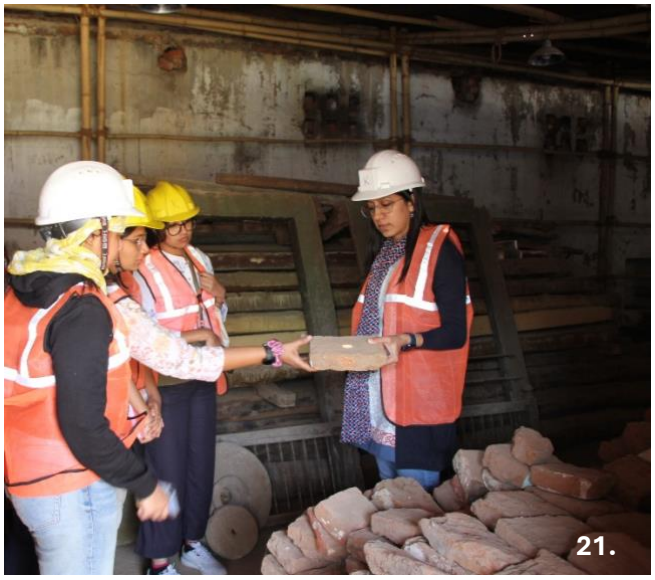
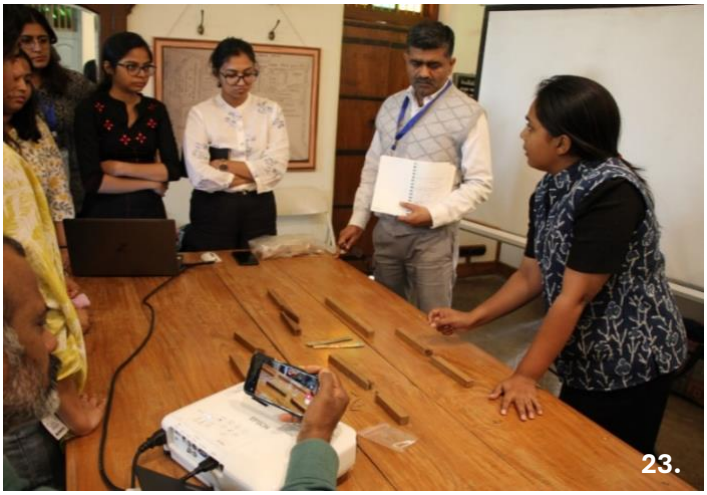
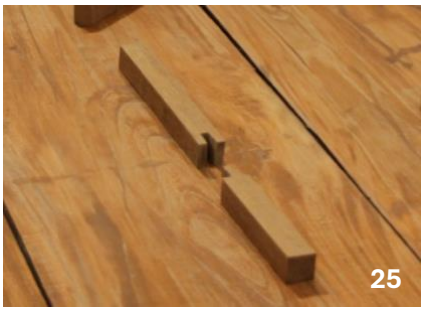


Image 20: Ashna Patel explaining wall dismantling processes at Kalidas Jethabhai House (KJH) Site School.
Image 21: Discussion at the material inventory at KJH.
Image 22: Ashna Patel showing the wooden joineries and their assembly at KJH.





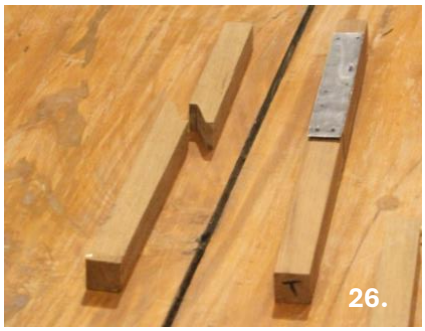


Image 23: Nigar Shaikh explaining the various methods to repair damages in timber structures through models.
Image 24,25,26,27: Examples of various joineries used to repair a timber beam.

Session 3
Practice Examples

Program Faculty: Ms. Nigar Shaikh
Conservation Engineer, Program Lead - Material Characterisation, CHC, CRDF

Various approaches to wood conservation, considering factors such as site/ element accessibility, wood type, joinery type, historical significance, damage/decay level, material compatibility, availability, and cost were discussed in this session. The session acknowledged the diminishing availability of wood as a natural resource, reducing its use in construction and presenting challenges for repairing wooden heritage structures. Participants were introduced to various intervention techniques, including prosthesis using carpentry techniques, introduction of metal plates, metal rings, bolting for joinery, epoxy resins, fiber-reinforced polymers, replacement, and the incorporation of new members. The participants could implement the repair strategies using metal intervention through the hands-on experience of scaled prototypes. The scaled prototypes exercise also helped the participants to visualise the practical challenges that may be encountered during on-site implementation.

Image 28: Online lecture by Benny Kuriakose on the various conservation projects and case studies.

Session 4

Experience of Wooden Heritage Conservation

Guest Expert: Dr. Benny Kuriakose
Conservation Architect
Designer, Benny Kuriakose & Associates

Dr. Kuriakose's lecture began by highlighting the historical significance of timber as a versatile and renewable building material. He addressed a critical issue in Indian conservation: the avoidable replacement of historic timber elements. The lecture focused on real-world case studies encompassing a diverse range of projects. These case studies examined the problems encountered and the solutions implemented, ultimately revealing key strategies for successful timber conservation. To equip participants with the knowledge and skills for practical timber conservation, the lecture covered topics such as timber properties, treatment methods, termite and fungal threats, strengthening techniques, removing finishes, fire resistance considerations, and use of modern materials in conservation efforts. By showcasing successful projects with best practices, challenges, and innovative solutions, the lecture provided valuable insights for timber conservation. The session concluded with a discussion on treatment of timber, conservation approaches and how there is an immense body of knowledge to learn from and the need to dissipate these learnings to the right audience for successful wooden heritage conservation.

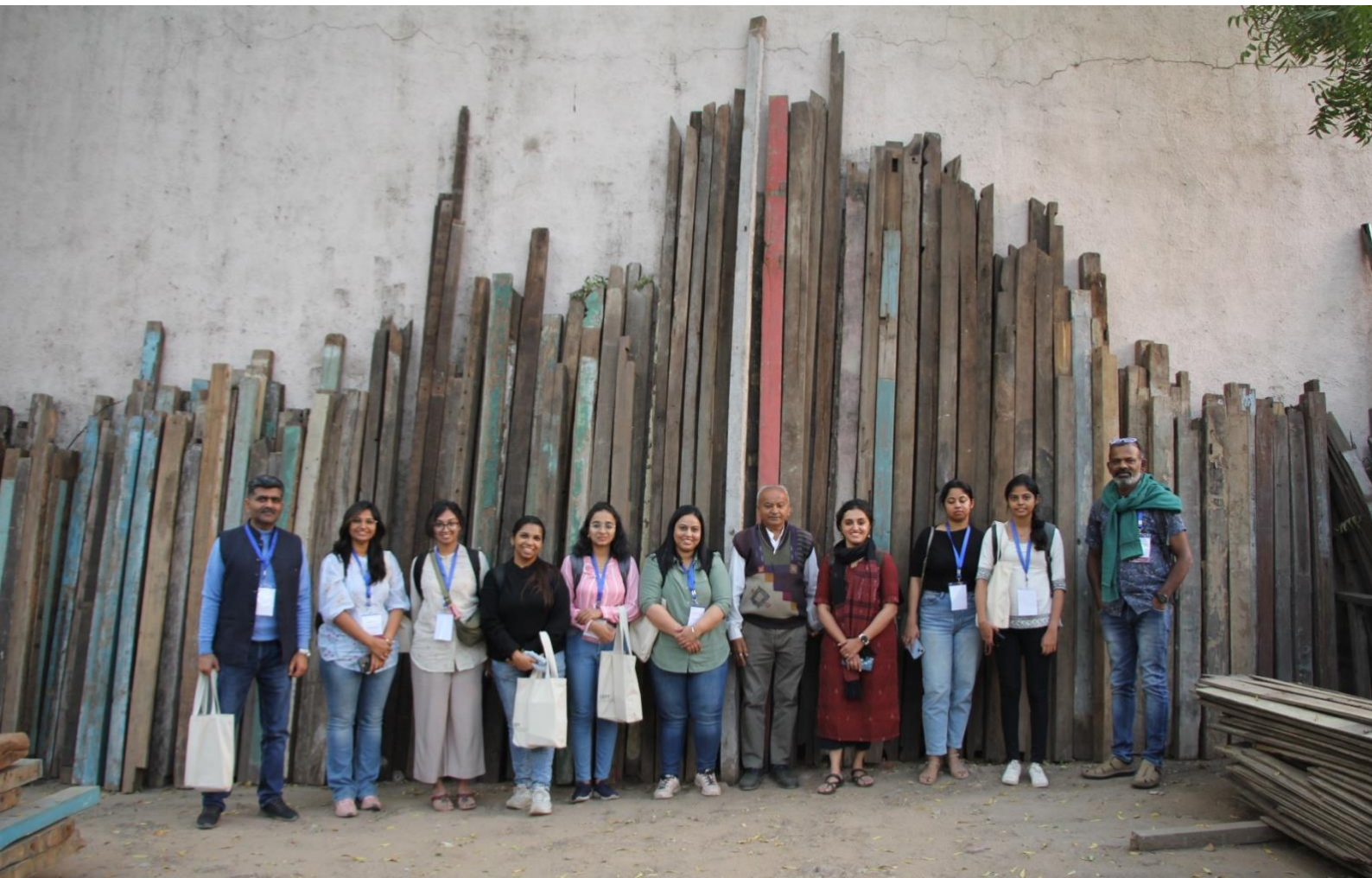
Notes:

Programs to support experiential understanding of techniques of wooden conservation for continuous learning of professionals at real conservation sites are currently marginal in India. This program aims to fill this gap.

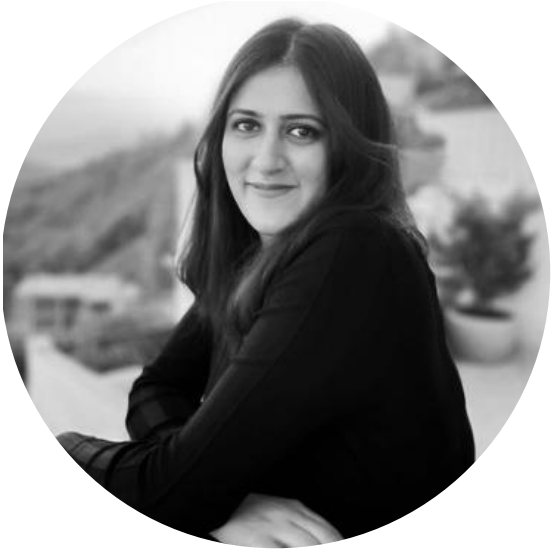
Note from Course Co-ordinator, Nigar Shaikh

- India has a variety of wooden heritage structures that are in dire need of conservation.
- As timber is an anisotropic material and comes from various tree species, it is important to learn about different types of timber, their behaviour and their properties to have the right approach to wooden heritage conservation.
- Non-invasive methods of assessment including a detailed visual assessment can help in devising an effective strategy for the conservation of wooden structures.
- The selection of repair techniques for conservation of wooden structures need to be based on ethics appropriate to the heritage context.

The workshop enabled the participants to gain an overarching understanding of wood as a building material, the different properties of wood, the types of wooden structures in India and the current scenario of wood in the construction market. The participants also learnt about various degradation factors for wooden structures, methods of assessment and techniques through which one can conserve wooden structures. This workshop provided a learning space for professionals to fill the gap in the dialogue between the theory and practice of conservation of wooden structures.



Testimonials of Program Participants:



Aanchal Mehta

Architect, Ahmedabad

"The program's well-structured curriculum offers a thorough exploration of wooden heritage conservation, blending theory and practical skills effectively. Expert instructors provide insightful perspectives on challenges, while hands-on sessions enable real-world application. I highly recommend this program to heritage conservation enthusiasts."

Inder Gulati

Architect, Punjab University,

Chandigarh

"Wooden Heritage Conservation program was a great experience! The meticulously curated sessions were rich with knowledge, providing invaluable insights into wooden heritage conservation. My gratitude extends to the dedicated team for their expertise and thoughtful approach."

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