

AVEI NEWSLETTER



Satprem teaching about the "Free-Spanning" technique in Texas

IN THIS ISSUE

• Arches Vaults & Domes Workshop, Texas.....	page 2
• Earth USA 2015.....	page 3
• Remembering Fred Webster.....	page 4
• Earth in the Southwest - Taos Pueblo & Mesa Verde.....	page 5-6
• Satyajit Ghosh presentation on Anuradhapura.....	page 7
• Hilary's Visit to TerraKorea.....	page 7
• New Team Member.....	page 8
• News from Nepal.....	page 8
• AVEI Training Course Schedule for 2015-16.....	page 9

This season began with a trip to the American southwest, during which Satprem and Lara taught a course on vault construction in Texas, participated in the Earth USA conference in New Mexico and visited a number of key earthen construction sites.

In parallel, AVEI librarian Hilary Smith paid a visit to Korea to exchange knowledge with UNESCO partner organization TerraKorea.

Back home in Tamil Nadu – after 3 years of failed monsoons – the monsoon has returned in full force, dropping more than the average annual rainfall within 3 weeks (1,300mm)! Despite the rain, progress has still continued for the construction of foundations, masonry and pre-casting for Sharanam Phase II.

Please feel free to share this newsletter with your friends and colleagues as we spread the knowledge of earth architecture to the world!

Earthily yours,
The AVEI Team

**Arches Vaults & Domes:
Catalan & Free Spanning
Techniques, Texas**

From September 25 to 27, Satprem and Lara taught a 3 day hands-on workshop on the design and construction of earthen Arches, Vaults and Domes (AVD) in the hill country of Fredericksburg, Texas. Organized by respected earth-builder and dear

friend, Jim Hallock of Earth Block International, the workshop took place at EBI headquarters, on the site of their beautiful, recently completed earthen building featuring CSEB barrel vaults and hybrid thin-tiles vaulting.

The workshop introduced two vaulting techniques used for the construction of vaults without formwork: the "Free-Spanning"

technique developed by AVEI from traditional Nubian vaulting, and "Catalan" vaulting, a traditional Mediterranean technique originating in Catalonia, Spain. Day 1 of the workshop included lectures on constructive principles, materials and case studies of each technique, as well as on the basic structural principles and calculation methods for vaulted masonry. On Day 2 & 3, participants built various types of free-standing arches, several vaults and one dome with the "Free-Spanning" technique (using CSEB and earth mortar) and "Catalan" technique (using recycled fired brick and rapid-setting gypsum mortar). Vaults were load tested by participants, including professional architects, engineers, builders and developers. Thanks to all for a wonderful event, especially to Jim and to our sponsors: Earth Block International/ Earth Block Texas, Maritech Engineering and Earth Ventures. ■

www.earthblockinternational.com



Arch and "Free-Spanning" vault construction with CSEB and earth mortars



MARITECH ENGINEERING

EARTH VENTURES



UNESCO CHAIR EARTHEN ARCHITECTURE

EARTH USA 2015

8th International Earthbuilding Conference

Earth USA 2015

Satprem and Lara attended Earth USA 2015, the Eighth International Conference on Architecture and Construction with Earthen Materials, which was held from October 2 – 4 at the New Mexico Museum of Art in Santa Fe, New Mexico. The conference was organized by Adobe in Action, moderated by Quentin Wilson and coordinated by Kurt Gardella. A wide array of presentations were given over three days – 41 presenters from 10 states and 13 countries – covering the subjects of adobe, rammed earth, compressed earth blocks, cob, wattle & daub, as well as earthen vaulting, flooring and plasters. There was also a poster session on topics of various earthen techniques.

A few of our favorite presentations included:

- Eric Liefeld, David Rockstraw, PhD, P.E., Gregg Henry, Pat Taylor (NM, USA) *"Remediating Salt Attack in Adobe"*
- Luran Unzueta (Canada) *"Fabric Remnants of a Forgotten Past: 19th-Century Earthen Architecture of South-central Ontario"*
- Sukita Reay Crimmel and James Thomson (OR, USA) *"Earthen Floors for Modern Homes: Bringing More Earth Inside"*
- Dr. Midori Yamada, Eng. and Dr. Naoyuki Koshiishi, Eng. (Japan) *"Fracture Behavior and Resistance Mechanisms of a Japanese Traditional Clay Wall on Bamboo Lathing When Subjected to Horizontal Forces"*
- Mostafa Arefhaghi, Samane Barjasteh Delforoos, Rene Du Terroil (Iran) *"Adobe Architecture Technology in Iran, Linkage to the History of Nature No. 1 Case Study - Iranian ASBAD (Windmills) and KHARKHANE (Thorn House)"*
- Jim Hallock (TX, USA) *"Dirtus Maximus: A Sustainability Strategy"*

EARTH USA 2015

8th International Earthbuilding Conference



Lara gave a lecture on the "Auroville Earth Institute – School of Earthen Architecture". Satprem presented "26 Years of Applied Research in Stabilized Earth Technologies at the Auroville Earth Institute". Proceedings have been printed by Adobe In Action.

Pre and post-conference earth building workshops were held in late September and early October by Adobe Alliance, Santa Fe Community College Adobe Construction Program, Adobe in Action, Adobe is not software, and the course taught by the Earth Institute in Texas. After the conference, tours were given to local earth building sites of interest in and around Santa Fe.

Our deep personal thanks go to Sean Kaltenbach of New Mexico Earthworks for making our participation possible! ■

Earth USA 2015
earthusa.org/

Adobe in Action
www.adobeinaction.org



ADOBE IN ACTION
ONE BRICK AT A TIME



Earth USA 2015 at New Mexico Museum of Art, Santa Fe, New Mexico

New Mexico CSEB Codes

Led by TEG, efforts are underway to revise NM CSEB codes, to improve them for broader applicability in the US. New Mexico is the only state with building codes for earthen construction, including adobe, rammed earth and CSEB. Below Satprem with Jim Hallock and his teacher Joe Tibbets, two authors of the present code.

The Earthbuilders' Guild
www.theearthbuildersguild.com



Remembering Fred Webster

Fred Webster, leading structural engineer and seismic expert in earthen construction, passed away last month following long illness. With over 30 years' experience in civil/structural engineering, Fred's tremendous contribution to the field was his work in seismic retrofitting of earthen architecture. He was the founding principal engineer of Fred Webster Associates based out of Menlo Park, California, a consultancy firm which had the reputation of being among the very few capable of assessing the seismic safety of historic earthen structures to meet modern code requirements. He designed, tested and developed seismic upgrade techniques to rehabilitate countless historic unreinforced masonry buildings, particularly adobe. He also designed and consulted



on many new earthen buildings, did extensive pre- and post-seismic disaster assessment work, developed building code standards for earthen construction and published widely. An advisor the earth-building community in the US and abroad, Fred's dedication to the community was tremendous and his loss will be deeply felt.

More about Fred's work:
isceah.icomos.org/

Saving the Swan House

During one post-conference workshop, two women volunteers (including AVEI's past student Beatrice Denham) rebuilt an adobe Nubian vault in 4 weeks as part of restoration efforts at Swan House in Presidio, Texas. This work was led by engineer Fernando Pina of Mexico and Simone Swan, founder of Adobe Alliance and apprentice of Hassan Fathy.

Adobe Alliance:
www.adobealliance.org/



Alex Williams and Beatrice Denham rebuilding the adobe nubian vault



Anthony Duran, project manager of the Taos Pueblo Preservation Program, generously gave us a tour of ongoing restoration efforts at Taos Pueblo, sharing his expertise and deep commitment to the constructive culture of the Pueblo peoples.

Taos Pueblo is considered to be the oldest continuously inhabited community and the largest surviving multi-story pueblo structure in the United States. It is recognized as a UNESCO World Heritage Site, a National Historic Landmark and listed on the National Register of Historic Places. The Pueblo homes are aggregated in a set of large, incrementally built buildings of up to five stories, with common walls of sun-dried adobe block up to several feet thick. The floors and roofs are built with large timbers (or vigas) on which are laid pine or aspen branches and a layer of packed earth. External walls are continuously by re-plastered with layers of raw earth plaster.

The tribal builders and preservationists of the Pueblo have a great challenge of preserving this unique heritage site. Despite its cultural significance, restoration is underfunded, and the cycle of restoration from one side to the next is a daunting 10 year commitment. Yet even more important to preserve is the ancient building traditions of the Pueblo



people. Construction techniques have been passed down orally from generation to generation in the native language 'Tiwa', and only tribal members may participate in the restoration. Anthony's grandfather is a tribal elder who continues to guide him in the ancient building ways – part of a Pueblo tradition which has continued for nearly ten centuries. ■

taospueblo.com/
www.earth-auroville.com/taos_pueblo_en.php
whc.unesco.org/en/list/492



Anthony Duran , tribal preservation expert



Mesa Verde, CO

Mesa Verde, last on our earthen building tour in the Four Corners region, is a UNESCO World Heritage Site of prehistoric cliff dwelling constructions, an immense park on the Colorado plateau with almost 5,000 known archaeological sites of the Ancestral Pueblo peoples. Sites in and around the canyon walls range from early pit-house settlements to multi-story masonry structures. 600 cliff dwelling villages - homes and ceremonial 'kivas' arranged in a dense urban form to fit the cliff morphology - were built largely with sandstone and earth mortars c.1190-1270. The masonry work can be quite rough, yet the building/engineering of ceremonial spaces is immaculate: single-wythe masonry with near perfect plumb, level and stone cutting. Some alcoves are very difficult to access, with only hand-and-toehold trails chipped into canyon walls to control entry and exit.

We had the great fortune to meet the team of National Park Services archaeologists and engineer responsible for the research and preservation of the alcove sites, including monitoring, condition assessment, documentation and stabilization of threatened areas. The acute preservation challenges faced on location result from sliding, erosion, poor initial construction or early archaeological removal of timber ties, which affects the structural stability of walls and can cause collapses.



The best sites were built on flat cave bedrock, but masonry built on loose scree often requires stabilization to prevent sliding. Exposure to rains and water runoff causes extensive damage to mortars and capillary or salt erosion at the base of walls. The alcoves are a conservator's dream laboratory, with earthen mortars and decorative plasters sensitively tested and carefully observed over long periods. Thank you Kay, Gay, James and Tim for sharing your incredible work! ■

www.nps.gov/meve/index.htm
whc.unesco.org/en/list/27



Views of Cliff Palace, Mesa Verde

Satyajit Ghosh Presentation on Anuradhapura

On the 22nd of October, Satyajit Ghosh gave a lecture entitled "Buddhist Building Traditions for sustainable living in the ancient city of Anuradhapura, Sri Lanka" for Auroville's community of architects and enthusiasts. Professor Ghosh is a senior professor at the School of Mechanical & Building Sciences at VIT University (India) as well as an Associate Member of the School of Earth & Environment at the University of Leeds (UK). His research spans topics ranging from the study of rainfall patterns to energy-efficient buildings.

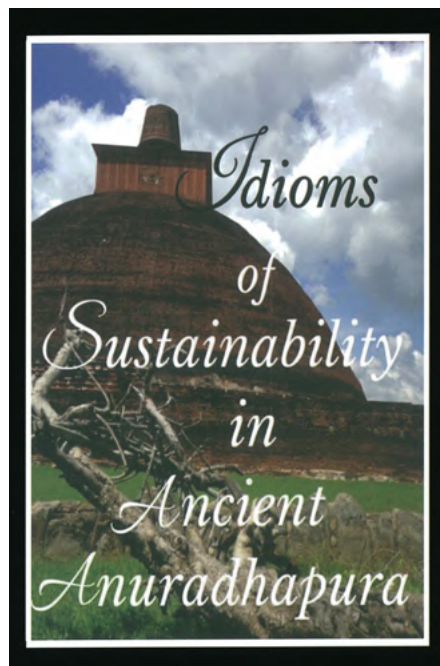
In this lecture, Prof. Ghosh looked at the design and construction techniques used for the city of Anuradhapura, which is today a UNESCO World Heritage Site. Of particular note for its climatologically-responsive design was a dormitory building, called the Great Brazen Monastery. Reportedly standing at 8 storeys tall, this ancient "skyscraper" of stone and wood could provide surprising thermal comfort for the monks despite the humid climate of the region. By running simulations using a program called ENVI-met 3.1.0, Prof. Ghosh was able to show how the location, size and orientation of the building created pleasant microclimates within the building.

Prof. Ghosh went on to also look at the construction of the domed

stupas. A study of the chronological order in which these domes were built shows that the masons intuitively modified the form of the domes to create more stable forms. As a result, the Jetavana Stupa, a "nearly perfectly ellipsoidal" dome, is the largest ancient stupa in the world.

The lecture was well attended and also afforded the opportunity to purchase *Idioms of Sustainability in Ancient Anuradhapura*, written by Prof. Ghosh and two of his students. This publication has been added to the Earth Institute's library collection. ■

A recording of the lecture can be heard from Auroville Radio: www.aurovilleradio.org/the-sustainable-anuradhapura/



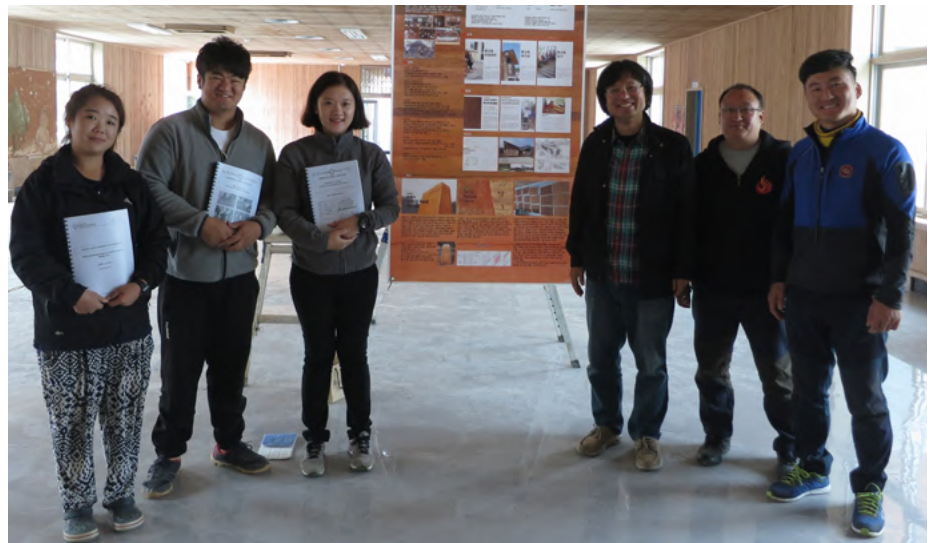
Satyajit Ghosh, Tushar Agarwal & Akash Goenka, "Idioms of Sustainability in Ancient Anuradhapura"

Hilary's Visit to TerraKorea

During a visit to South Korea in November, Hilary, the Earth Institute's librarian, had the opportunity to meet with members of the TerraKorea team. TerraKorea is an organization that promotes earthen architecture in Korea through a diverse array of activities, including conferences, competitions, and support of faculty and practitioners of earthen architecture. One of its important initiatives is the "School of UNESCO Chair Earthen Architecture in Korea". This school provides the opportunity for laypeople to learn the skills necessary to build their own houses out of earth. The majority of the students are middle-aged, and therefore are looking to build their retirement homes. For the graduation of the first class of students, Satprem traveled to Korea to participate in the ceremony and also signed a Memorandum of Understanding for knowledge exchange between the Earth Institute and TerraKorea (see **Issue 14** of the newsletter). →



Director Soonwung Kim of the School of “UNESCO Chair Earthen Architecture in Korea” gave Hilary a tour of the school’s campus in Wanju, Jeonbuk, which included the future offices of the school, a large indoor hall for practical exercises, and two small buildings and assorted walls built by the students as part of their coursework. A further small building had been made in a neighboring rural village to serve as a social space for the retired people in the community.



The TerraKorea team in the masonry practice hall

The day continued with a tour of the historical quarter of Jeonju, the city closest to Wanju. Here the traditional “Hanok” architecture was well demonstrated, showing the ingenuity of Korean builders to create beautiful buildings that respond well to the diverse weather conditions of Korea, which fluctuate between bitterly cold winters with subzero temperatures and hot summers with heavy rain and humidity.



A small building constructed by students during a recent training course

Hilary greatly appreciated Director Kim’s informative visit of both the modern and traditional earthen architecture around Wanju and Jeonju, and the opportunity to continue the relationship of knowledge exchange between the Earth Institute and TerraKorea. ■

TerraKorea (in Korean):
www.terrakorea.com/

Terra Korea Blog (in Korean):
cafe.naver.com/eartharchitecture/



Traditional Hanok architecture in Jeonju’s historical quarter

New Team Member

The Earth Institute has welcomed a new research intern to the team.

Anahita Aryan

I'm an Italian architect and I work in Rome. I'm originally from Iran and thanks to my origin, I could discover the ancient Persian adobe architecture. This leads me to find out more about my work and my identity.

One year ago, I went to Iran for 6 months, funded by a European grant. It was first time in my original land and first time that I started to research about the energy efficiency and the old adobe technology system. Over there I was charmed by the desert architecture (wind tower, historical houses, water tank, water mills, qanat, caravansaries, refrigerator) and the adobe solution.

I could become part of the first Earthen Architectural Festival, organised by the University of Yazd and CraTERRE. I could feel straight in me, the growing up of this passion. This material "the earth" resonated with my body; finally I found the perfect healthy environment where to stay and live.

When I got back to Italy, I found the UNESCO chair PhD Maddalena Achenza and I had attended a workshop named "Building With

Earth" at Parma (Italy). Her great knowledge and her kindness could let me discover how an alternative way of construction could exist even in the western part of the world. She has also a centre of research and training in Sardinia Samassi (Italy).

That's why I felt a deep need to increase my knowledge and improve myself in this field. She suggested me to go and make some other experience at the Earth Institute of her friend and colleague Satprem in Auroville (India). This research centre arrived to create a good definition of earth block presses.

Very grateful, I've been funded by a European Grant again and I could finally begin this new experience that will last six months.

"Earth turns to gold in the hands of the wise," Gialal al-Din Rumi ■



1st Earthen Architecture Festival at the University of Yazd, Iran

News from Nepal



The newly-arrived Auram 3000 happily welcomed by Conscious Impact volunteers (Photo credit: Conscious Impact)

Yuwa Unity Nepal ("Youth Unity Nepal") posted some news on their efforts to rebuild schools in Nepal with CSEB. They are working with partner organization Conscious Impact to rebuild the schools of Nawalpur VDC, Ward 4, Sindhupalchok, where there was a collapse rate of 99% in the devastating Nepal Earthquake. The groups' common aims are to get children back to school in earthquake-safe buildings through owner-driven empowerment construction projects and the use of sustainable earth materials. They came to AVEL in August for a special training course offered on seismic-resistant design with CSEB. ■

Yuwa Unity Nepal:
yuwaunitynepal.org/2015/11/patience-is-bitter-but-its-fruit-is-sweet/

Conscious Impact:
www.consciousimpact.org/

**AVEI Training Course
Schedule for 2015-16**

2015

December

(Nov) 30th to 5th: Ferrocement
7th to 12th: AVD Theory
14th to 19th: AVD Masonry

2016

February

1st to 6th: CSEB Design
8th to 13th: CSEB Intensive
15th to 20th: AVD Intensive

April

11th to 16th: CSEB Production
18th to 23rd: CSEB Masonry

June

6th to 11th: Ferrocement
13th to 18th: AVD Theory
20th to 25th: AVD Masonry
27th to 2nd (July): CSEB Design

August

1st to 6th: CSEB Intensive
8th to 13th: AVD Intensive

September

5th to 10th: CSEB Production
12th to 17th: CSEB Masonry
19th to 24th: AVD Theory
26th to 1st (Oct): AVD Masonry

December

5th to 10th: CSEB Intensive
12th to 17th: AVD Theory
19th to 24th: AVD Masonry

AVEI Newsletter

Issue 25 - November 2015
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Casting Poured Earth Concrete foundations at Sharanam