

# AVEI NEWSLETTER



Office of the Auroville Earth Institute (AVEI)

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Read about the completion of our last project, Realization housing, which was built from 2008 to May 2012. A long journey to build 17 apartments.

Discover our research, in collaboration with IIT Madras and WorldHaus, on earthquake resistance with hollow interlocking blocks, page 3 and 4.

See the various conferences attended by Satprem Maini, Director of the Auroville Earth Institute and the trip to Morocco, page 4 and 5.

Keep in touch with our activities (training courses, seminars and outreach activities) and read the summary of the latest events.

Our team is growing! Meet our four new volunteers on page 7.

Check out our training dates on the last page.

Do not hesitate to disseminate this newsletter to your network and spread the knowledge on earth architecture.

Earthily yours.

## Realization Housing, 17 apartments completed

In our first issue of the newsletter in November, we had featured our on-going housing project "Realization". We are now nearing the end of this construction and it has been a wonderful but also a difficult journey and a continuous learning experience. For those of you who missed out on our November edition, here is an introduction to this project:

Realization is a residential project of 17 apartments for about 25 people in Auroville, Tamil Nadu, India.

The aim was to build an entire community with community participation, with climate responsive design and the use of cost effective materials, thus providing sustainable and affordable homes for Auroville.

The project is comprised of three buildings: the South East Block which was completed in June 2010, the North Block completed in October 2011 and the South West Block which has just been finished in May 2012.

It has been a four and a half year rollercoaster ride. The project started in October 2007, with block making by volunteers, and has seen a lot of changes through the years.

The first months of the project saw a few hundred volunteers coming and going for making blocks on site and helping to build the caretaker's house. But this energy faded over the months, and the residents did not participate further in the process. Thus the project shifted from a community-built project to one built by paid labour.

Over the months, there were also many changes requested by clients in the original designs of their apartments.

We thank everyone who has been directly or indirectly involved in this project, starting from the numerous volunteers who helped in the first months to produce blocks, the masons and labourers who built these apartments, the trainees who helped build the vaults and work on site, the site supervisors, the AVEI architects who were involved at the different stages of the project, all the staff at the Institute, and finally the clients.

Now, with all the lessons learned and valuable design inputs from the existing clients – the Auroville Earth Institute is now looking forward to our next project "The Green Casbah". We are raring to get it started!



*North block of Realization Housing with 8 apartments on three floors*

**New dormitory and laboratory at AVEI**

Last month, the Auroville Earth Institute started the construction of a new building at its premises, which will host a laboratory and a dormitory for two people.

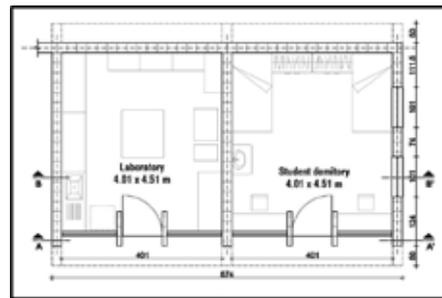
The laboratory – a long-term need of the Institute’s – will provide the space and facilities to allow us to better conduct research testing on topics including, among other things, soil suitability, mechanical behaviour of CSEB, Poured Earth concrete, waterproofing methods, thermal insulation, etc.

The dormitory will host two employees or interns, thus improving the comfort and quality of the current staff quarters.

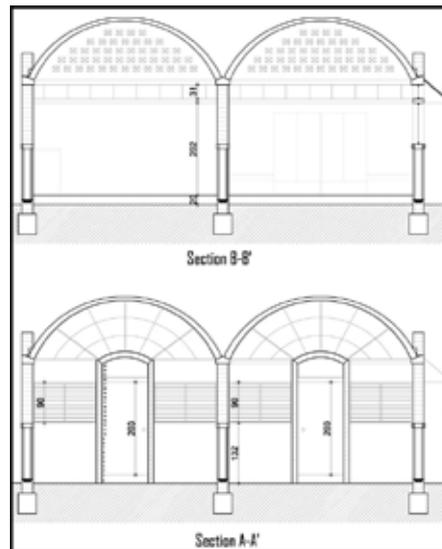
A parallel, research-based goal of this project is to test a new thermal insulation technique for the roof vaults, to reduce cracking which results from the fluctuating temperatures from solar radiation.

In addition to the current waterproofing, a new thermal barrier will be added. Basically this will be a 5 cm layer of a mix of polystyrene pellets in a matrix of cement and soil, in a ratio 1 cement : 2 soil (5mm) : 5 polystyrene.

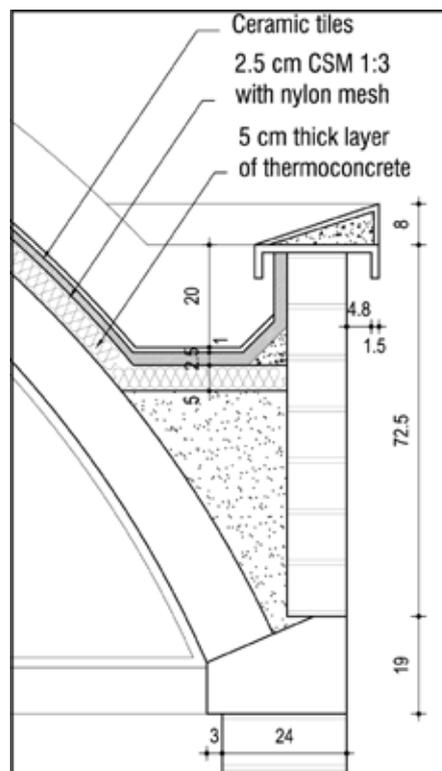
We plan to complete this building in July 2012.



Plan



Section



Details insulation/waterproofing

**Wall testing with hollow interlocking blocks at IIT Madras**

The Auroville Earth Institute visited the Department of Civil Engineering at IIT Madras in April to view the structural testing on the Earth Institute’s CSEB units, to consult on methods for further testing, and to observe full-scale shear testing of a wall assembly built with the Auram Hollow Interlocking Block 300.

Designed for application in seismic zones and certified by the government of Gujarat, India and the government of Iran for severe, post-seismic rehabilitation, this block assembly employs hollow cores, a poured-grout system, and vertical and horizontal reinforcing to resist the lateral loads of seismic events. Even though this trial assembly shear testing was performed without any reinforcing in the sample wall, it performed quite well (4.89 tons before peak loading).

This testing has been supervised by Asst. Professor Arun Menon and VV Ranga Rao (SL Structural Consortium), and observed by Satprem Maini (Auroville Earth Institute), Lara Davis (ETH Zürich), and Daniel Gross (WorldHaus).

The research is being sponsored by WorldHaus, a non-profit organization, which builds affordable, eco-friendly, modular homes for the poor with the use of the Auroville Earth Institute’s interlocking block.

The exchange at IIT Madras has been very productive for on-going research between the Earth Institute, IIT Madras, and ETH Zürich, and the participating researchers are looking forward to continued collaboration.

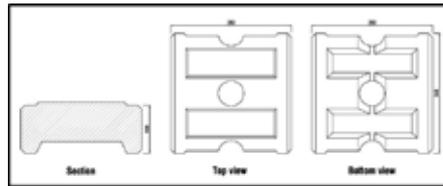


Shear test at IIT Madras

### Testing the new block "Dry Hollow Interlocking D 250"

The versatility of the Auram Press 3000 allows for the use of many moulds. With this new mould the press can now produce about 80 blocks with 18 moulds. This block is especially designed for seismic prone areas. It has a very special profile, which allows it to be dry stacked, and bound with a grout poured into the holes so as to achieve good horizontal and vertical bonds.

This block is square and is a development of the rectangular block D 300. The nominal size of the block is 249 x 250 x 100 mm (L x W x H). Each mould can make 7 different blocks for various wall assemblies, such as corners, wall end and ring beams.



Block D 250 (Nominal size)

This new block was tested in April to verify the optimal grout mix ratio for use in wall assemblies and to see how the grout flowed in between the blocks. The optimal ratio was evaluated in terms of "workability": ease of application, fluidity, and even distribution of the grout between the blocks.



Pouring the grout

Four different mix ratios were poured in the four samples. After that, the walls were dismantled to examine how the grout flowed. The grout which showed the best workability and distribution in between the blocks was a mix of 1 cement : 5 sand : 2.2 water.



Evaluation of the distribution

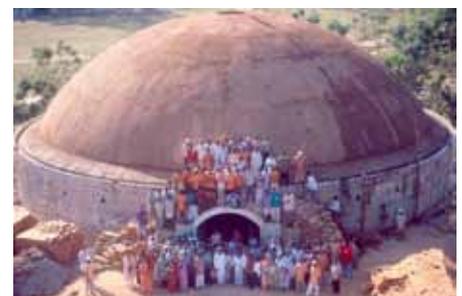
This test showed that the profile of the block had to be revised, so as to enable the grout to flow more evenly between the blocks. The mould is presently being modified for further testing.

### Congress "Domes in the World" at Florence, Italy



"El Duomo from Brunelleschi", 45 m

Satprem Maïni, director of the Auroville Earth Institute, participated from March 19 to 23 in the first International Scientific Congress on domes at Florence. He was a member of the Scientific Committee and he presented "Building Optimised Domes without Formwork" which detailed his stability calculation method that he has developed to optimize arches, vaults and domes. His presentation explained how to build vaulted structures without formwork. He presented the construction of the Dhyanalinga temple's dome with its 22.16 m diameter that he built in 9 weeks.



Dhyanalinga temple, 22.16m

About 70 professionals, including architects, engineers, historians and students from 28 countries attended his presentation.

## Trip to Morocco

Satprem Maïni was invited from April 25 to 28 to Fès to the Symposium of Moroccan ecological architecture. This symposium was organised by the "Fondation l'Esprit de Fès with partnership with the Ministry of Habitat and Urbanism, Morocco. His presentation was attended by about 100 Professionals and students, mostly from Morocco with some French professionals. He was interviewed by the Moroccan Radio.

After that he was invited to Marrakech to present his works to the regional chapter of the Council of Architects. People at both conferences were enthusiastic and made comments such as "breathhtaking, impressive, Hassan Fathy spirit". He was welcomed by very friendly people, such as Ar. Rachid Bouqartacha, Ar. Viviane Cohen, Ar. Mohamed Anbassi and Eng. Oussama Moukmir with whom he signed a partnership agreement to collaborate on future projects.

Ar. Viviane and Eng. Oussama were kind enough to organise a trip in the North atlas, up to Ouarzazate to visit traditional sites built with rammed earth.



*Kasbah Taourirte at Ouarzazate*

Ar. Rachid Bouqartacha, had the initiative to create an association for the Development of Ecological Architecture and appropriate Building Technologies within the National High School of Architecture of Rabat (ENA Rabat). The founding members are himself, Ar. Mohamed Anbassi, President of the Regional council of Architects of Marrakech and Satprem Maïni, Director of AVEI. More than 300 members have already signed: Architects and students of architecture.

Collaboration is being set up with Ar. Rachid Bouqartacha, Ar. Mohamed Anbassi and AVEI so that Satprem will go teaching earthen architecture to of architecture students at the ENA Rabat.

## They are talking about us

### **Hungarian documentary by Mark Szucs and Aniko Rimoczi**

This reportage "The Next Revolution" of 38 min. shows experiments in Auroville in organic farming, alternative systems and earth architecture. A four minute interview with Satprem Maïni, director of the Auroville Earth Institute, can be seen towards the end (starting at 30 Min. & 24 sec.) on this link: <http://www.youtube.com/watch?v=5yQqs-xla7g>

### **Article in the newspaper "The Hindu" by Rini Mukkath**

Mukkath published an article on the 21<sup>st</sup> of April entitled *Quake proof your home*. She reported the R&D done by the Auroville Earth Institute on earthquake resistance with hollow interlocking blocks, which are used to construction reinforced masonry resisting seismic impacts.

This system was used to a large extent in Gujarat, after the 2001 earthquake, where several thousands of houses were built by various NGOs. This technology, developed by the Auroville Earth Institute, has been approved by three governments in the aftermath of their respective disasters: Gujarat, and Tamil Nadu in India and Iran.

### **French TV reportage by Beatrice Schonberg**

During the month of April, a team of the French Channel TV 2 did reportage on a couple, Flore and Christian, who settled in Auroville. Their young daughter of 12 years old, Eurydice was filmed by the team while she was following our training course on masonry with CSEB.

Eurydice, despite her young age, wants to become an architect, and she found during our course one more reason to become what she dreams of. This reportage was part of the series named "histoires en série" (stories in serie), and it was aired on the 1<sup>st</sup> May.

***A Holistic Approach to Design  
with the CSEB Design course,  
by Lara Davis - M. Arch, MIT  
PhD Candidate, ETH Zürich***

In the curriculum of Western architectural education, holistic design has long since fallen to the wayside. Since early Modernism, architectural pedagogy has been highly contended and often reinvented in the world's best schools of architecture. Yet, each time reinvented, academic design has failed or refused to achieve a holistic re-integration of the most critical disciplines in practice: structural engineering, material science, geo-climatic design, passive energy, infrastructure, natural resource management, fabrication, construction, and project management. It is much easier rather to teach specialists to throw their drawings "over the transom", as they say, to the next expert for retrofit solutions of poorly conceived plans. Yet the architect should also be more than technician. The greatest challenge in architectural pedagogy lies in setting rules and constraints, through which a young architect may come to invent something new.

It was refreshing to sit in on this new design course offered at Auroville Earth Institute – it is the kind of course that some of the world's best schools of architecture fail to teach, simply because many academic architects do not have a deep knowledge of their building materials or are perhaps not so interested in the logics and constraints of these materials.

CSEB Design – Compressed Stabilized Earth Block – it is a material which demands a rigor of design, a comprehensive understanding of its strengths and weaknesses, a robust knowledge of the material science of soils, stabilizers and mortars, a creative application of uncommonly taught graphical form-finding tools for structural masonry analysis, a fastidious approach to the systems and sequences of construction.

In short, CSEB design demands a holistic approach to design, one which crosses the diversified territories of material science, structural engineering, construction and architectural design. Such a course must take detours from the logics of masonry bond pattern design into the sequenced-based constructional principles of masonry as it is laid in the field by the masons. These parallel procedural logics of design and construction create an exciting intersection of the various other AVEI courses.

It presents a rigorous and ordered architectural logic – which may be plastic for the technician and for the form-maker. It must swallow 5 different disciplines into itself, and be prepared to direct the young designer and the laymen towards a basic knowledge of good design practice – by way of sketching or CAD drawing, by way of calculation, by way of an examination of building materials at full scale in three dimensions.

This design course is for young architects seeking an expert material and tectonic understanding of a construction technology with tremendous arguments for global sustainability and stewardship – natural, local materials use, low embodied energy, reduced carbon emissions.

The contribution of CSEB design methods to sustainable building praxis and the challenges of its climate-responsive design combine for an approach to strategic, environmental management of water and material resources.

Global experts in sustainable building practice can now agree that critical overlaps must be trained into the thinking of young architects and engineers, so that they can problem-solve outside of the bounds of their focus areas, so that they have a basis to communicate and coordinate with other specialists.

As global politics, economics and popular culture increasingly acknowledge the pressing demands of climate change, the discipline of architecture will be called towards such pioneering practice in holistic design. And with nearly 9 percent of total global CO<sub>2</sub> production coming from the use of concrete in the building industry, it is certain that stabilized earthen masonry will be a leading alternative.

## Training courses' summary

37 Trainees from the School of Architecture of the Mohamed Sathak Engineering College at Keelakarai attended at the end of March a half day awareness programme on "Earth Architecture for sustainable habitat".

During the first weeks of April our classic two-week course on "Production and use of CSEB" was conducted for 24 trainees (14 Indians, 1 Australian, 2 British, 2 French, 1 Malayan, 2 Swiss and 2 Americans). The training course consisted of theoretical classes and practical production of blocks, and hands-on exercises for masonry with CSEB and other stabilized earth techniques.

During the third week, 14 trainees (11 Indians, 1 Australian, 1 French and 1 Swiss) learned how to design with CSEB. This was the first time that AVEI conducted this course. During the first two days, students and architects were given all the basics on designing with CSEB and the particular techniques developed by the Auroville Earth Institute. The last four days consisted of a studio, where AVEI techniques were explored through student design projects.

We welcome also three more interns: Ms. Lara Davis, Mr. Dorian Vauzelle and Mr. Jonathan R. Evans. See their profiles here.

## Meet our new Volunteers and Interns!

### *Lara K. Davis*

Lara is an architect, a vault builder and a PhD student at the Department of Architecture at the ETH Zürich, Switzerland. She received a Masters of Architecture from MIT in 2010, where she studied structural design for thin-shell masonry vaulting and served as a construction manager for the MIT Masonry Research Group.

In the last 11 years, she has worked professionally as a mason and foreman in non-structural masonry, and as a designer, junior engineer, project manager and foreman for vaulted structures. She has built vaults and taught workshops on timber vault construction in Ethiopia, Zürich (Switzerland), Cambridge (UK), Boston and New York (USA). She has exhibited work at the MoMA, the MIT Museum, and the Cooper-Hewitt National Design Museum.

She came to Auroville Earth Institute to partner with the global experts in earthen arch, vault and dome construction, in order to further her PhD research on vaulting as an appropriate building technology for low-cost housing in developing contexts.

Her six months study will focus on strategic, climate-sensitive design of earthen masonry vaulting in the tropical monsoon climates of India and Ethiopia.

While she is here for research, the threads which have drawn her to Auroville are manifold. For her, work and personal evolution are not separate entities – they are what combine for a deeper recognition of global citizenship and service.

### *Dorian Vauzelle*

Dorian is a young architect who graduated from the ENSAM School of architecture of Montpellier, France. After his studies he wanted to focus his work on earth construction in order to enter the CRATerre program in Grenoble.

In 2010 he went to Argentina as a volunteer, and participated in projects using adobe and earth. This experience corresponded to his wish to learn how to build sustainable housing.

He has had experience working as an architect in Brazil, French Guyana, Portugal, and in Montpellier, France, specialising in housing and public buildings. During this period, Dorian's main objective was to expand his knowledge of earth construction and sustainable architecture. He joined AVEI for three months of work, to learn from Satprem Maïni and participate as a volunteer within the office.

His plan is to learn about construction with CSEB as well as having a new professional experience here

in Auroville. Dorian heard about these projects through friends and colleagues he has met along the way.

Also the human dimension is an important aspect in his approach. Auroville, as an evolving city, is a particularly interesting subject for Dorian, who is searching for solutions for the major problems of society that face us today. He is specifically looking at collective housing, how people are sharing the public spaces and are living together. This experience will influence his approach to architecture and will be a great opportunity for him to meet many skilled-people from around the world who are aware of sustainability and other ways of living.

### **Jonathan R Evans**

Jonathan is a recent graduate in architecture from The University of Bath, England. He is currently exploring the design of relevant, responsible and responsive human interventions in our environments. This work is contributing to his continued life education in sustainability and will also be beneficial to future practice as well as his oncoming march.

Recently Jonathan has been working as a carpenter as he believes it is vitally important to learn from direct experience.

This role has greatly enhanced his understanding of the construction process and the working natural materials.

For his final degree project Jon designed a live-work community for the city of Bath which was primarily concerned with the relationship between man and nature. The place was greatly inspired by the ideas of an Ashram as a positive intentional settlement. During this time he became aware of Auroville through an interest in community living, karma yoga and architecture of greater consciousness.

He decided to visit Auroville to continue this learning and was delighted to find employment for four months at the AVEI as a trainee. Within the office he will be part of the design team for the Green Casbah seeing the proposals through to site. He is also very excited about attending some CSEB and AVD workshops to learn practical skills in earth building. This work will allow him to live for a sustained period as part of the Auroville project as well as contributing to the development of the embryonic town.

### **Bamboo House Webpage**

The Bamboo House project was built at the Auroville Earth Institute premises in 2009, as a demonstration of earth and bamboo construction that can be used as a temporary housing unit in tropical regions. Visit our new webpage to see a report on this experiment: [http://www.earth-auroville.com/bamboo\\_house\\_en.php](http://www.earth-auroville.com/bamboo_house_en.php)

### **Remaining Training Courses in 2012**

#### *June*

4<sup>th</sup> to 9<sup>th</sup> - Ferrocement  
11<sup>th</sup> to 16<sup>th</sup> - AVD Theory  
18<sup>th</sup> to 23<sup>rd</sup> - AVD Masonry

#### *July*

2<sup>nd</sup> to 7<sup>th</sup> - Designing with CSEB  
9<sup>th</sup> to 14<sup>th</sup> - CSEB Intensive  
16<sup>th</sup> to 21<sup>st</sup> - AVD Intensive  
23<sup>rd</sup> to 28<sup>th</sup> - CSEB Intensive

#### *September*

3<sup>rd</sup> to 8<sup>th</sup> - CSEB Production  
10<sup>th</sup> to 15<sup>th</sup> - CSEB Masonry  
17<sup>th</sup> to 22<sup>nd</sup> - AVD Theory  
24<sup>th</sup> to 29<sup>th</sup> - AVD Masonry

#### *December*

10<sup>th</sup> to 15<sup>th</sup> - AVD Theory  
17<sup>th</sup> to 22<sup>nd</sup> - AVD Masonry

### **AVEI Newsletter**

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