

M3

DISCOVERING
REGENERATIVE
MATERIALS

CAS ETH in Regenerative Materials - Essentials

earth - bio-based - reused

04.04 - 08.04.2022



Photo credit: Kurt Hoerbst



Photo credit: Kurt Hoerbst

Anna Heringer

For Anna Heringer architecture is a tool to improve lives. As an architect and honorary professor of the UNESCO Chair of Earthen Architecture, Building Cultures, and Sustainable Development she is focusing on the use of natural building materials. She has been actively involved in development cooperation in Bangladesh since 1997. Her diploma work, the METI School in Rudrapur got realized in 2005 and won the Aga Khan Award for

Architecture in 2007. Over the years, Studio Anna Heringer has realized further projects in Asia, Africa, and Europe. These projects were widely published and exhibited, and have received many prizes. Anna is lecturing worldwide at conferences, including TED and has been visiting professor at various universities such as Harvard and ETH Zurich.

Monday

09:00 - 09:30

HIT E 51

INTRODUCTION

Arnaud EVRARD / ETH Chair of Sustainable Construction

- Introduction to the week's program

09:30 - 12:30

HIT E 51

CONSERVATION OF THE BUILT HERITAGE AND ECO-CONSTRUCTION

Pascal & Sébastien PITTET / Pittet Artisans

- Presentation of the Company
- Presentation of general activities:
 - lime and hemp
 - earth plaster on reed mats
 - insulation with vegetable or animal fibers
- Discussion based on sample, constructive details and market prices

13:30 - 15:00

HIT E 51

SUSTAINABLE BEAUTY

Anna HERINGER / Anna Heringer Architecture

<https://ethz.zoom.us/j/67413475234>

- Projects using bio-based materials
- Discussion with the participants

15:30 - 17:30

HIT E 51

DYNAMIC LIFE-CYCLE ANALYSIS

Guillaume HABERT / ETH Chair of Sustainable Construction

- Methodology of LCA
- Why dynamic?
- Carbon Balance



Überbauung Bombasei

Atelier SCHMIDT GmbH

Photo Credit: © Damian Poffet

Tuesday

Visit of buildings by architecture firm: Atelier SCHMIDT GmbH with Werner Schmidt

07:45 - 09:00

BUS FROM ETH HÖNGGERBERG

Meeting point in front of HPT building at 07:30

09:00 - 10:00

HAUS HONSBERGER

Kleinholz 5, 3378 Graben

10:30 - 11:30

PAVILLON FA.

vonRoll hydrotec AG

Von Rollstrasse 24, 4702 Oensingen

(Lunch will be provided)

13:00 - 14:00

REHABILITATION INDUSTRIAL BUILDING

Complemedis AG

Leinfeldstrasse 59, 4632 Trimbach

15:30 - 16:30

EXHIBITION AND OFFICE BUILDING

Fa. Gartist GmbH

Industriestrasse 3, 8608 Bubikon

17:00 - 18:00

HOUSING DEVELOPMENT BOMBASEI

Jean-Hotz-Strasse 4, 8 8606 Nänikon

18:00 - 18:30

BUS BACK TO ETH HÖNGGERBERG



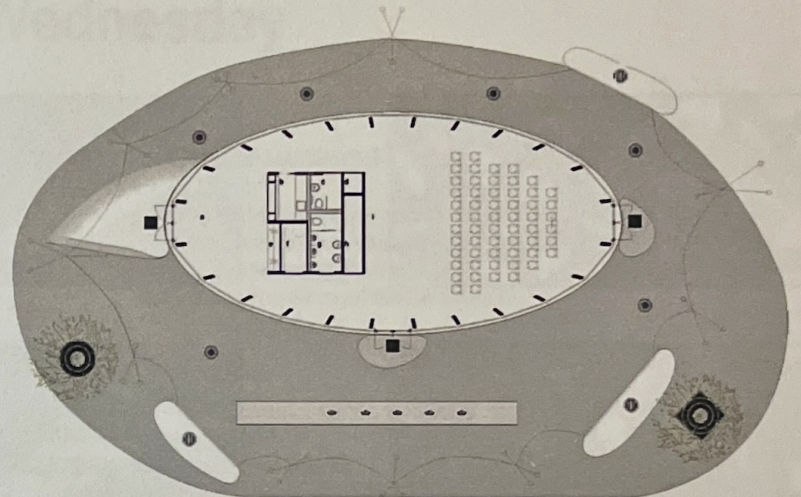
Gartist GmbH
Atelier Werner Schmidt
Photo Credit: © Atelier SCHMIDT GmbH | Atelier Werner Schmidt



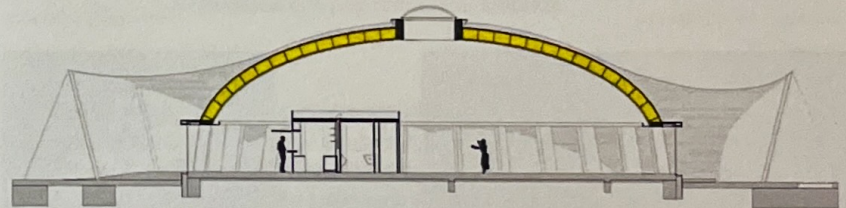
Complemedis AG
Atelier Werner Schmidt
Photo Credit: © Atelier SCHMIDT GmbH | Atelier Werner Schmidt



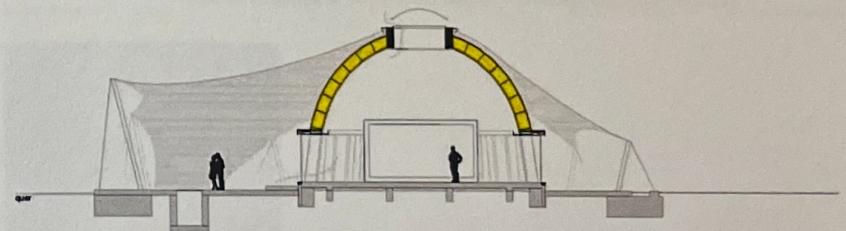
vonRoll hydratec AG
Atelier Werner Schmidt
Photo Credit: © Atelier SCHMIDT GmbH | Atelier Werner Schmidt



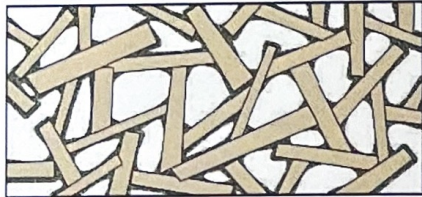
Floorplan



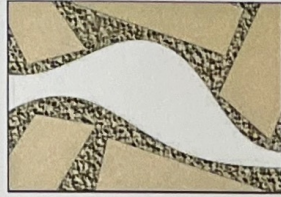
Longitudinal section



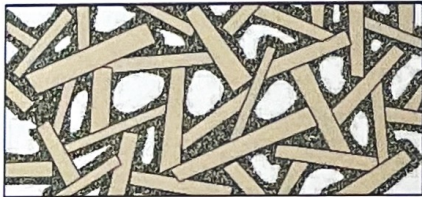
Transversal section



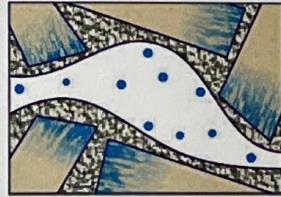
Schematic view of LHM-roof



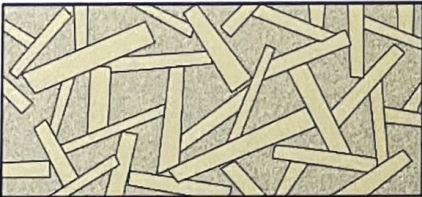
Dry state of LHM



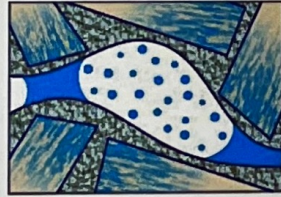
Schematic view of LHM-wall



Hydroscopic adsorption



Schematic view of LHM-plaster/render



Capillary condensation



Over-saturation

Source: Evrard, Arnaud. (2008). Transient hygrothermal behavior of Lime-Hemp Materials.

Wednesday

09:00 - 11:00

HIT E 51

FIRE SAFETY OF BIO-BASED MATERIALS

Michael KLIPPEL / IBI ETHZ

- What are the fire safety objectives?
- Which measures are used in order to guarantee the fire safety?
- What is important for structures?
- Why must fire be regarded in design?

11:30 - 12:30

HIT E 51

THYPHA INSULATION

Martin KRUS / Fraunhofer IBP

<https://ethz.zoom.us/j/68566864630>

- *Typha Angustophylla (Cattail)*: An innovative building material
- Insulation Effect and load bearing properties
- Production and environmental benefits

13:30 - 15:00

HIT E 51

BASICS OF HYGROTHERMAL BUILDING PHYSICS

Arnaud EVRARD / ETH Chair of Sustainable Construction

- Why do we need Building Physics?
- What are the main hygrothermal parameters of materials?
- What are the basics of the energy balance of a building?
- How to calculate heat and vapor transfer through walls?



Pete Walker

Pete Walker joined the University of Bath in 1998. He was promoted to Professor in 2006, and he is currently Director of the research Centre for Innovative Construction Materials. His current research interests include bio-based construction materials, materials for improved indoor air quality, and innovative timber engineering. He focuses on the development of low carbon technologies suitable for new and retrofitting applications. He will present an overview of his work on bio-based construction materials and technologies, including straw bale, hemp-lime, structural use of cork, and the development of circular solutions. Examples of practical applications will also be taken from a range of



ModCell® Prefabricated panels

Photo credit: ©ModCell

Wednesday

15:00 - 16:00

HIT E 51

STATIC VS. DYNAMIC MODELS

Arnaud EVRARD / ETH Chair of Sustainable Construction

- Case studies with Ubakus
- Results from dynamic simulations

16:30 - 18:30

HIT E 51

RESEARCH ON BIO-BASED MATERIALS AT U-BATH

Pete WALKER / UBath

<https://ethz.zoom.us/j/69711755395>

- Overview on bio-based construction materials and technologies
- Development of circular solutions
- Examples of practical applications from construction projects
- Discussion with the participants

MONDAY
04.04

TUESDAY
05.04

WEDNESDAY
06.04

THURSDAY
07.04

FRIDAY
08.04

Bus from ETH Höggerberg

Introduction

Haus Honsberger

Fire Safety of bio-based

Bio-based and Light Earth

Constructive details.

Conservation of the built

materials

Workshop

Straw-bales construction

heritage and eco-construction

Private Bus

HIT F 13

HIT F 13

HIT E 51

Pavillon Fa.

Lunch

Typha Insulation

HIT F 13

Private Bus

Lunch

Industrial

Sustainable Beauty

Rehabilitation

Basics of hygrothermal

Bio-based and Light Earth

Hygrothermal parameters of

HIT E 51

Private Bus

Building Physics

Workshop

bio-based insulation

Discussion

HIT F 13

HIT F 13

Static vs. dynamic models

Dynamic LCA

Exhibition and office

HIT F 13

HIT E 51

building

Module Retrospective

Private Bus

Research on bio-based

Housing

HIT F 13

Discussion

Bus back to ETH Höggerberg



Herzogenmühle Zürich

Photo credit: Michael Meier und Marius Hug Architekten Zürich

THURSDAY

08:45 - 09:00
 Herzogenmühlestrasse 25 - 27
 Meeting for coffee

09:00 - 17:30
 Herzogenmühlestrasse 25 - 27
BIO-BASED AND LIGHT EARTH WORKSHOP
 Arnaud EVRARD / ETH Chair of Sustainable Construction
 Thomas Dimov / Zoe Circular
 Juan David Orjuela / CAS20

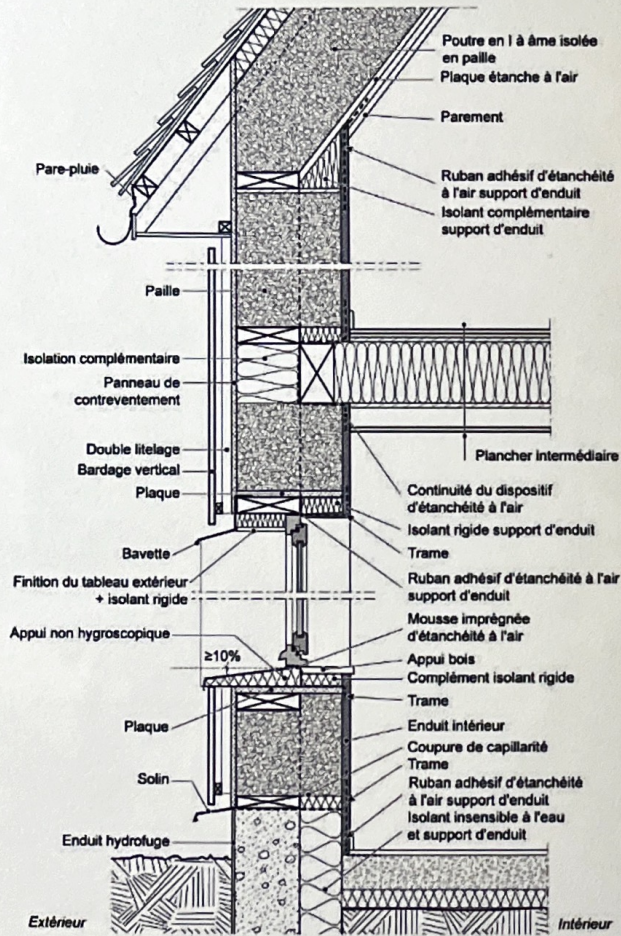
- Presentation of Zoe Circular
- 4 groups will fill 4 timber framed elements:
 - Clay-Hemp mixture
 - ISO stro
 - Clay-Hemp Adobe
 - Zoe Straw-bale
- Clean-up

(Lunch will be provided)



Route from ETH Höggerberg to Herzogenmühlestrasse

Source: SBB



Example of a vertical section of a wall with simple frame offset to the outside

Source: RFCP (2018). Règles Professionnelles de la construction en paille

Friday

9:00 - 12:30

HIT F 13

CONSTRUCTIVE DETAILS: STRAW-BALES CONSTRUCTION

Vincent PIERRÉ

<https://ethz.zoom.us/j/68756850980>

- Techniques of Straw Bale construction
- From the field to the wall
- Diversity of techniques
- Straw Bale case studies

13:30 - 16:00

HIT F 13

HYGROTHERMAL PARAMETERS OF BIO-BASED INSULATION

Arnaud EVRARD / ETH Chair of Sustainable Construction

- Diversity of insulation materials
- How to assess their hygrothermal parameters?
- Discussion

16:00 - 16:30

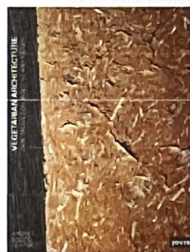
HIT F 13

MODULE 3 RETROSPECTIVE



Dirk E. Hebel
Felix Heisel

-
Cultivated Building Materials*
2019
EN



Andrea
Bocco Guarneri

-
Vegetarian Architecture. Case
Studies on Building and Nature*
2020
EN



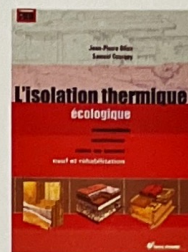
Réseau Français de la
Construction
en Paille

-
Regles Professionnelles de
Construction en Paille*
2018
FR



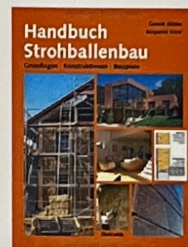
Luc
Floissac

-
La Construction en Paille*
2012
FR



Jean-Pierre Oliva
Samuel Courgey

-
L'isolation thermique écologique*
2010
FR



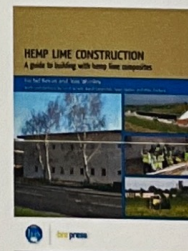
Gernot Minke
Benjamin Krick

-
Handbuch Strohballenbau.
Grundlagen - konstruktionen -
beispiele
2014
DE



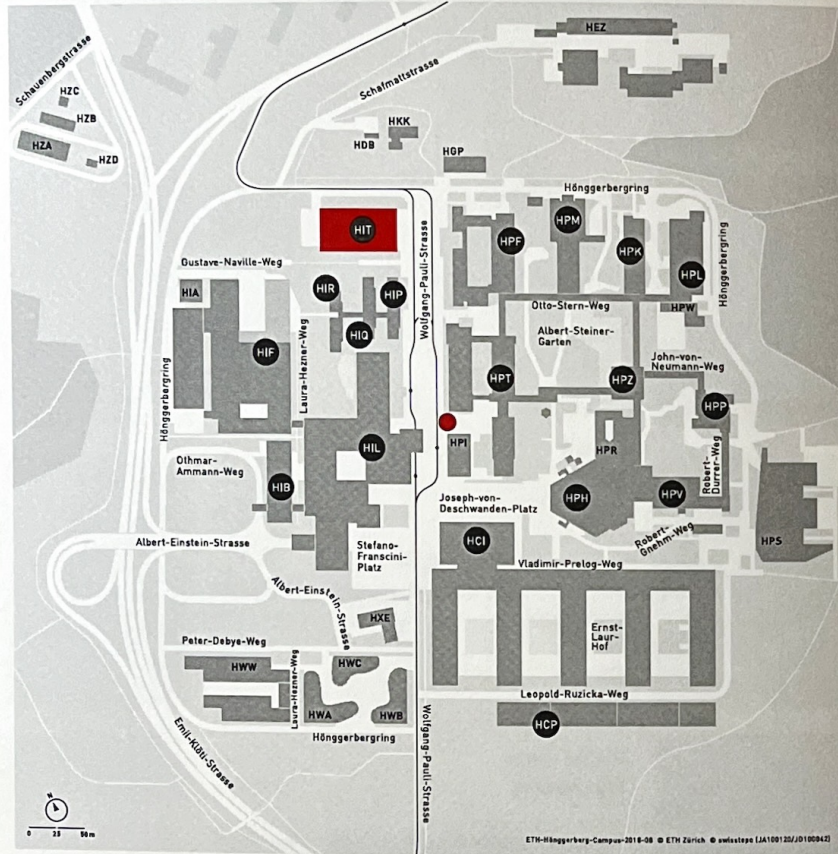
Gernot
Minke

-
Building with Bamboo. Design
and Technology of a Sustainable
Architecture
2016
EN



Rachel Bevan
Tom Woolley

-
Hemp Lime Construction. A Guide
to Building with Hemp Lime
Composites
2008
EN



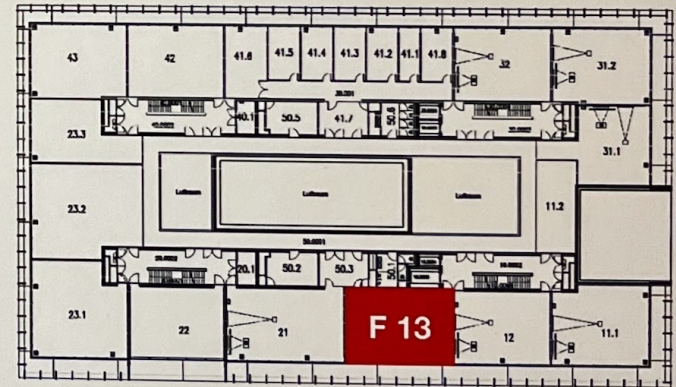
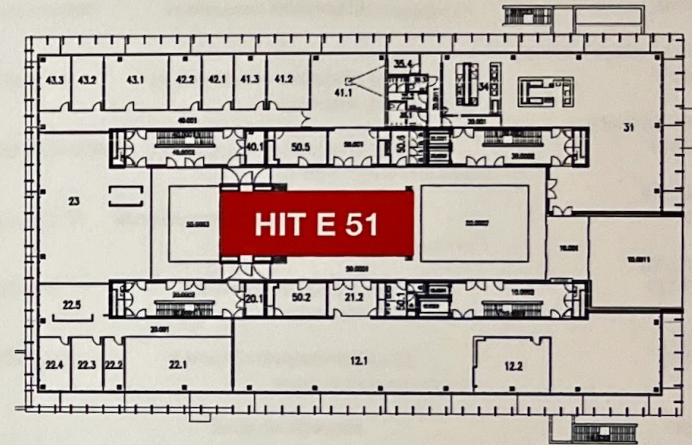
ETH-Hönningerberg-Campus-2018-08 © ETH Zürich © swissinfo.ch LAA100120J/D100041



Lectures, Discussions and Guest Lectures



Meeting point on Tuesday



GUESTS

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