

SAM PLADET

# CONCRETISING THE WALL

*CHARGING SENSES AND NEEDS BY ONE GESTURE  
FOR THE KALI DEVI PRIMARY SCHOOL, DOLAKHA, NEPAL*



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## THE IDEAL SCHOOL PROJECT

Interior Architecture  
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KU LEUVEN



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NEXT TO THE PEOPLE OF DOLAKHA, I DEDICATE THIS DESIGN TO MY GRANDMOTHER AND GRANDFATHER, WHICH PASSED AWAY DURING THE NEPAL PROJECT PERIOD.



## FOREWORD

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I want this to be a personal story, about how I lived a simple 24 days, sometimes rich sometimes scarce, in Nepal and especially in Dolakha. I started this journey with a lot of positivism. As days past by in Nepal, I got very ill several times and sometimes quaffed the bitter cup. Was it me not taking care enough of myself, or was it just something more. I lost track of my thoughts several times and created my own filter of looking at the life around me.

A question came from CEPP, an NGO of Nepal, to me, a Belgian interior-architecture student in its master year, to design an ideal school for their country. As we got split up in three groups, each designated one of the three locations in Dolakha, our group was in charge for the ideal school design for the district of Dolakha. But what is an ideal school? Does it exist? In my opinion, in first place, it would be strange to design a school that looks traditional, as for them the look and appearance of the school is one of the most important factors. For me this question comes out of a will to have a Western perspective on things, as they strive our Western influence becoming a part of their culture. I tried to find out what I could do for these people, as I didn't get in touch with many local people of Dolakha, since we had to sleep in tents and didn't get the chance to live close together with them. My designing had to start somehow, so I started to figure out what I could mean in their story. As an Interior-architect it is important for myself, even when designing for other ethnic groups, that I would feel welcome and at home in my own design. Because when designing in Belgium, for people in Nepal, I can't directly obtain the perfect and ideal school, what this project is about. What I can is try to anticipate and see what could be the reaction, after meeting some locals and exchanging thoughts, rather than only think out of their own perspective, because I can't become who they are. There will always be some shifts in ideas, but as a designer I have to be strong of my own thoughts about use of space, and question myself in every step I go through. In this way the final design, in which I create a concrete wall that gives several functions implementing basic needs by this one gesture to its benefitting surroundings, was not created with the intention to make a link or resemblance to the traditional architecture of Nepal in the first place. It is a design that carries the Western signature of a Belgian designer, which puts children, teachers and community on the same level of importance. It is when all basic needs come together and are given by this wall to its benefitting surroundings, that for me the ideal school is obtained.

It is a design for all.



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## CONCRETISING THE WALL

CHARGING SENSES AND NEEDS BY ONE GESTURE, FOR THE KALI DEVI PRIMARY SCHOOL, DOLAKHA, NEPAL

“On April 25, 2015, a massive 7.8-magnitude earthquake devastated Nepal, affecting 39 of the country’s 75 districts and causing 8,622 casualties and 16,808 injured, as well as significant damage to houses, buildings, health facilities, and cultural heritage sites. 2.8 million people were displaced, and thousands of families instantly lost access to household energy for cooking, lighting, heating, and powering. Without power to charge mobile phones, families could not reach loved ones or call for help. Lack of lighting made it unsafe to venture outside at night, and limited critical activities such as working or studying after dark. More than 75,000 households suffered with destroyed or damaged cooking technology which led to an inability to prepare nutritious meals for their families.”<sup>1</sup>

In response to the earthquakes people and organizations all over the world started to raise funds and money to help the country. But after two years, now in 2017, many areas still haven’t been restored. And even those who are restored, were rebuilt in a similar, unefficient way. The architectural side should take into account the huge differences in climate and topography, as in plain and mountain areas. For this problem the Centre for Educational Policies and Practices (CEPP), an NGO which is the continuation of an organization that was established in 1991 in Nepal, asked the KU Leuven (Belgium) to participate in their schooling project. As they are the driving source of our master project, the question from CEPP to us, master students of architecture and interior architecture, comes as a search for an answer how new proposals in architecture could change the educational environment on specific locations in Nepal. The NGO selected three schools in three different areas of Nepal. As we got split up in three teams, the one I was in charge for with 5 other students was the Kali Devi primary school in the district of Dolakha, located in the mountain area on an altitude of 2455m.

After meeting some inhabitants of Dolakha and other people of Nepal, I skipped the idea to design a school that would look traditional in the end, as for them the look and appearance of a school is one of the most important factors.

Striving for progress, the Nepalese people want a modern way of living<sup>2</sup> which is linked to the Western image of modern architecture without losing their own traditions. That is why they want to have cross-pollinated both their own traditions and the Western way of architecture in a way that it can become a part of their own. In my design I wanted to meet this target, by bringing a new perspective on school-designing to Nepal. My studio started with a collaboration with Ege Baki, an architecture student in her third master year. We came up with the conceptual idea of building a wall, which would function as the backbone of the school in a protective way. The wall would become the main focus of the design, around which the edifices and spaces would be raised in order to be able to profit the functions it provides. Later on we started working separately, to give our own perspective on this idea in the end. The following was my perspective on the wall.

## CONCRETISING

The idea of a wall being the main concept behind the design was the result of a conversation with the local people of Dolakha, on the workshop day we organised at the Kali Devi primary school on the 10th of February. After showing them a range of models and pictures from existing schools all over the world, they made it clear they liked the presence of a protective wall, which would give a visible protection to the school. They also stressed their trust in concrete, after seeing several concrete buildings being the only ones still standing after the earthquake. In the end I design a concrete wall that shows as one gesture but that supplies both a visible and a physical protection, as well as several functions that implement basic needs nowadays.

Working with the topography of the mountain area, I connect the wall to the slope, as it becomes a monolithic part of the hill. To make the wall function as an interior on its own, a certain thickness was required. The combination of a reinforced concrete framework filled in with cyclopean concrete, as a link to their traditional stone masonry, was chosen to materialise the wall. This construction method, filling concrete frames with a kind of masonry, is already widely used to reconstruct the houses of Dolakha by the local people themselves after the earthquakes of 2015<sup>3</sup>. It is also used by Emergency architects<sup>4</sup>, a French foundation that has been developing projects around the world to help people in need since 2001, in this area. They

1. SAFE ACCESS TO FUEL AND ENERGY, Nepal Earthquake Energy Response, (2015), Online article: <http://www.safefuelandenergy.org/nepal/>

2. The greater part of Nepal has an ‘ask for modern living’, mentioned by Teeka Bhattarai from CEPP, on the workshop day in Kathmandu on the 5th of February.

3. Dolakha was struck most by the second 7.3-magnitude earthquake on the 12th of May 2015, with the epicenter located in the Dolakha district itself.

4. ARCHITECTES DE L’URGENCE, Study of habitat typologies and Solutions for their seismic reinforcement in Nepal, (2016), Catalogue, Newari house models p. 21-38, Tamang house models p. 39-70. Online available: <http://www.archi-urgent.com/renforcement-sismique-de-lhabitat-au-nepal-21042016/>

use it to show the inhabitants of Nepal some earthquake resistant reinforcement solutions, by respecting local vernacular architecture, ethnic<sup>5</sup> traditions and parasismic rules.

Step-by-step concrete is becoming a part of their building culture and tradition. Convincing them of the material choice and the correct technical use of it is no longer necessary. Since Hilde Bouchez, a mentor of my master studio, explains in a theoretical framework for this master: "When a tradition dies, the inner light simmers away and the authenticity vanishes,"<sup>6</sup> it made me wonder that if we replace their stone masonry work with concrete, would that mean the end of their tradition? I see it as a reincarnation of their tradition rather than being the end of it, and I am almost convinced that the local people of Dolakha look at it in the same way. "A tradition works with what we have now. It doesn't imply being stuck in an enclosed tradition that looks backwards, but implies a tradition that goes on and stays alive in each new trial that comes in its way."<sup>7</sup> It is that at a certain point, a tradition has to admit to new developments, and that parts of it have to make place for other, new ones.

## THE WALL

It is important that the final design was not created with the intention to make a link or resemblance to the traditional architecture of Nepal in the first place. It is a design that carries the Western signature of a Belgian designer, which puts children, teachers and community on the same level of importance. The wall is designed to be one gesture, giving several elements that fill in basic needs of the school: water, fire and an awareness of time and protection. In the first place it is designed as an omnipresent façade, which gives the school a specific presence in the landscape. It is by this means that landmarking<sup>8</sup>, another important factor of a school stressed by Dr Sudha Shrestha (IoE, TU) on the second workshop day in Kathmandu, on the 15th of February 2017, takes place. As a façade, it is connected to the classrooms, the community space and the outdoor space, as a connection in between. The wall activates certain awareness, giving functions and impressions to its benefitting surroundings.

### PROTECTION

The omnipresence of the wall leads to the second function it supports, a means of visual

and physical protection. The value of safety in this area is what I primarily link with designing and building earthquake-proof, knowing Dolakha was one of the most struck Districts by the earthquakes of 2015. By using concrete in a monolithic way, the wall gives a feeling of solidness and virtue. Beside the fact that reinforced concrete is a material which is earthquake-proof-approved, it also has an extremely good time lag<sup>9</sup> (300mm thick has a 12 hour lag) and decrement factor<sup>10</sup> (0.25 for 300mm) which both are suitable to the search of a great thermal mass in a cool temperature climate<sup>11</sup> such as in Dolakha. That is how the wall already protects against cold, and also against rain and wind. As a next step I contacted Rudi Roijackers, Senior Seismic Consultant in projects of ABT<sup>12</sup> Belgium. As the wall has a height of approximately 7,5m, building it against the hillside, the height of impact is restricted to the upper part of the wall. The lower part uses the technique of reinforced earth, which anchors it deep into the soil. The upper part is connected, on the other side of the wall, to a row of concrete buildings on the hill, which gives the wall a façade function. Making as less changes as possible in the use of materials ensures that all parts resonate at the same frequency, as in this story a continuation of the concrete is beneficial. Design wise a certain symmetry is taken into account, especially for the top part of the wall, to make sure there are no weak points as it functions as a coherent entirety. A proper placement of materials, openings and extrusions resulted in an improved condition of the wall. This made the wall an earthquake-proof frame that gives the possibility to fill it in with elements that respond to the basic, local needs.

### THE 'CHIMNEYED' FIRE

In the design, the introduced elements signify a continuation of their tradition. They are present in people's houses and signify more than just primary needs. They arrange life outside and inside, as for example the fireplace is often the centre of a house.

By introducing the mythical elements such as water, fire, earth, air, time... I respect their vernacular architecture, not by making a literal translation, and in the mean time I see it as an important aspect in the design not to build an ordinary wall but one who implies a reflection of most needs in life.

One of the elements is the fireplace. The wall features three kinds of fireplaces: the cooking

5. Tamang and Newar are the two main ethnic inhabiting groups of Dolakha.

6. BOUCHEZ, H., *Wild Studies and The Ideal School: a theoretical framework*, (2016), AOB.

7. BODAR, A., *Geborgen in Traditie*, (2016), Amsterdam: Ambo|Anthos.

8. Definition online on Merriam-Webster: A conspicuous object on land that marks a locality.

9. Thermal capacity means that a material takes a long time to heat up and a long time to let this heat through and to release the heat. This delay is called thermal time lag. In an area as Dolakha, a time lag of minimum 8 hours has to be taken into account.

10. Factor =  $T_i \text{ max} / T_o \text{ max}$ .  $T_o$  (outside) is a constant amount. The bigger the thermal mass, the lower  $T_i$  (inside), the lower the decrement factor so the more constant the temperature is maintained inside.

11. BODACH, S., LANG, W., HAMHABER, J., *Climate responsive building design strategies of vernacular architecture in Nepal*, In: *Energy and Buildings*, (2014), Issue 81, p. 227-242.

12. ABT is a multidisciplinary agency from Belgium, based in Antwerp, which provides a complete package of technical construction services to support the designing process of projects all over the world.

fireplace, the heating fireplace and the open fireplace that also heats, but emphasizes the elemental form of getting warm, to sit in front of the fire. The most important factor of a controlled fire is the chimney. A chimney leads off the smoke and guards the health of those who use it. For the cooking part, it is mostly women who are struck by the smoke, affecting mostly their eyes and lungs. I follow the aim of Global Alliance for Clean Cookstoves<sup>13</sup>, an organization working to improve public health in Nepal, to tackle the problem that household air pollution (HAP) accounts for over 18,000 deaths<sup>14</sup> each year. This number includes around 7,500 Nepali children<sup>15</sup>, who die of pneumonia and respiratory tract infections mainly caused by indoor smoke. The implementation of a chimney for these fires into the wall, following the principles of the Nepalese Chulo, is an important solution to a healthier environment, where adults and children can stay without worrying. The Chulo cooking stove is located in the sheltered community space, a space double the size of a classroom where people can gather. It can also be used for providing the children of their meals during the school hours so that they can keep up their strength. It will be an extra stimulants to come to school instead of deciding to stay home when they weaken during the day. For the heating system, the principles of the Roman hypocaustum, the Chinese Kang bed-stove, the Austrian tile-stove and the rocket stove were analyzed to search an optimal implementation on site, to heat the walls in between classrooms.

## WATER

A second element that I incorporated into the wall is water, as in water capitation, drainage and purification. A study<sup>16</sup> of 2017, made in neighbouring districts Dolakha and Ramechhap, points out that a total of 75% of school drinking water source samples and 76.9% point-of-use samples (water bottles) at schools, 39.5% water source samples in the community and 27.4% point-of-use samples at household levels were contaminated with thermotolerant coliforms<sup>17</sup>. Purifying the water by means of the wall tackles another problem for the school and the community. CAWST<sup>18</sup> is an organization, active worldwide, to satisfy the global need for safe drinking water. By introducing two of their Biosand filters, it is possible to disinfect around 180 liters of water a day. The sand removes pathogens and suspended solids from contaminated water, as river water and rainwater. A narrow river already crosses the school site, which provides it

from water. When water is scarce a rainwater tank, linked to one of the rain gutters of the school buildings, provides a supply of water closer to the purification station.

## TIME

A third element that is incorporated into the wall is the bell. A bell can signalize time and gives an awareness of time passing by. A bell can also signalize a special event, and can function as a signal to the village. In Nepal, bells<sup>19</sup> are most commonly used as temple bells. As a school is called a 'Bidyamandir' in Nepal, which means 'knowledge temple', introducing a bell in a school isn't strange. In case of a school, instead of devotees signaling to the gods their attendance to the sanctum, I use the bell for people's awareness. Hanging a bell in a conspicuous place is quite common in Nepal as it is frequently used as an ornament to outdoor spaces. In the design I use the original bell of the school, which is more a kind of a gong, inside an extrusion of the wall. It is a central place linked to the staircase, where people of the community can show their awareness and presence to each other.

## GIVING MEANING THROUGH COLOUR

As a last step I started to design or upgrade the buildings connected to the wall. In the design I keep the already existing building, which features three classrooms in a concrete frame/brick masonry construction, next to the lower part of the wall. On top of the hillside, next to the upper part of the wall, I create a new building covering approximately 90 percent of the wall, featuring three new classrooms and a community space. The majority of this building is made out of concrete, as it resonates equally with the wall (cfr. earthquake-resistance) and in this way functions as a unity. All roofs are connected to the water gutters with corrugated steel plates. As I remove all temporary school buildings on site, I use the remaining corrugated steel plates also as opening shutters. The shutters are painted, as I also paint the brick surfaces created by the concrete grid of the already existing building. Research<sup>20</sup> indicates the fact that younger children, as the school is a primary school only, find high contrast and bright colours stimulating. They prefer a warm, bright colour scheme that compliments their natural extroverted nature. The colours I use are derived from a painting called 'Colours of the World', made by Tantric practices in India since the 17th century.

13. GACC is a non-profit organization operating under the support of the United Nations Foundation, established in 2010.

14. GLOBAL ALLIANCE FOR CLEAN COOKSTOVES, *Maximizing the health benefits of clean household energy in urban Nepal*, (2017), Online article available: [www.cleancookstoves.org/about/news/04-26-2017-maximizing-the-health-benefits-of-clean-household-energy-in-urban-nepal.html](http://www.cleancookstoves.org/about/news/04-26-2017-maximizing-the-health-benefits-of-clean-household-energy-in-urban-nepal.html)

15. DIXIT, K., *It is Rocket science*, (2013), Online article available: [www.nepalimes.com/article/nation/It%20-s-Rocket,295](http://www.nepalimes.com/article/nation/It%20-s-Rocket,295)

16. HASSAN, S.M., *Water Quality, Sanitation, and Hygiene Conditions in Schools and Households in Dolakha and Ramechhap Districts, Nepal: Results from A Cross-Sectional Survey*, In: *International Journal of Environmental Research and Public Health*, (2017), p. 1. Online available: [www.mdpi.com/1660-4601/14/1/89](http://www.mdpi.com/1660-4601/14/1/89)

17. There are many different types of disease-causing bacteria, and they are usually present in low numbers which do not always show up in tests. Thermotolerant coliforms are present in higher numbers than individual types of pathogenic bacteria, as they can survive in water on their own, especially in tropical regions. Source: Wikipedia.

18. The Centre for Affordable Water and Sanitation Technology is a Canadian charity and licensed engineering firm founded in 2001.

19. The information on the meaning of a bell in Nepal comes out of an online conversation I had on the 9th of May 2017 with Shikha Jha, an architecture student I met in Nepal during the Ideal School Project.

20. ENGELBRECHT, K., *The Impact of Color on Learning*, (2003), For: Perkins & Will, p. 4.

ry. This painting was a personal choice, as I was struck by its beauty. It reminded me of a certain joy I could relate to. The use of colour is something very subjective in Nepal. Comparing Nepal to for example Belgium, the rich use of colour on building facades is something we don't know, because it is not part of our culture. For Nepal, it is a kind of personal expression, of personal taste with no clear significance. In case of Dolakha, outdoor colour use was lost after the earthquake, but certain remains as temples and some of the houses still give a glimpse of how it was before or how they still tried to keep this aspect in their temporary houses. In this way I wanted to bring back the colours to Dolakha, which brighten up the school area and create an interesting and intriguing contrast to the school buildings with the monolithic concrete wall.

I also want to stress the use of healthy paint, because the use of colours not only has a positive impact in Nepal. A study<sup>21</sup> published in 2015 shows that over 70 percent of paints in Nepal contains high levels of lead, as an example of 130,000 parts per million (ppm), which is alarming knowing the internationally accepted standard for lead in paints is 90 ppm. Dust samples collected from school classrooms in Nepal were found to be contaminated with lead, causing approximately 73 percent of detectable blood levels of primary school-going Children in Kathmandu. Keeping this in mind doesn't affect the colour use. It's just a matter of choosing the right paint.

Interior wise, in my opinion a school has to settle down. The space that is mainly used during classes, has to be as open and light as possible. The side walls are painted in a neutral colour and the end walls in a midtone colour that allows the students and teachers to intermittently rest their eyes. The wall itself gives qualities to the interior spaces, providing for example sitting niches that also function as large window openings. As pieces of furniture I use the idea of the ABC House<sup>22</sup>. In their interior, tabletops are supported by tumbling structures, which are designed to shift between high and low, between sitting, standing or laying. Therefore straw mats, also called 'sukul' in Nepal, are provided on the ground, as it makes it more pleasing to get in touch with the ground. The coldness of the concrete foundation otherwise could also affect the health of the children, causing diarrhoea after a prolonged, cold contact between the human body and the floor. The mats also invite to take off the shoes, out of respect and for a more intimate feeling.

In the design the main focus is on the wall, keeping the benefitting spaces as simple as possible, but uplifting them from the monolithic wall by the use of colour. By doing all of this I tried to make the school area something of aesthetic interest, with both links to familiar factors and new perspectives, which hopefully would be preserved by all (cfr. landmarking). The design makes several functions accessible for the whole community, in one gesture: by means of a wall. In the end, the wall shows how simple, affordable solutions can help obtain a healthier environment, which could be taken home and applied by the local people themselves. By doing this, the school can make a difference, which was a main focus point by Dr Sudha Shrestha (cfr. second workshop day). By involving the local people into the school's building process we could show them ideas they can take home. Offering them a space dedicated to be used by their children and the whole community any time of the year to cook, to gather, to learn, etc. means a great deal to all of them. The Ideal School for me is obtained.

21. CHARITRA SAH, R., *Colour of Health*, (2015), For: The Kathmandu Post, Online available: [www.kathmandupost.ekantipur.com/printedition/news/2015-01-19/colour-of-health.html](http://www.kathmandupost.ekantipur.com/printedition/news/2015-01-19/colour-of-health.html)

22. I visited the ABC House on the 7th of April 2017, a place in Brussels that tries to activate the creativity of different generations, from children to adults. My contact person was Janne Daeveloose, member of the ABC-team. She gave me a comprehensive tour and explanation inside and outside the building.



# BASICS

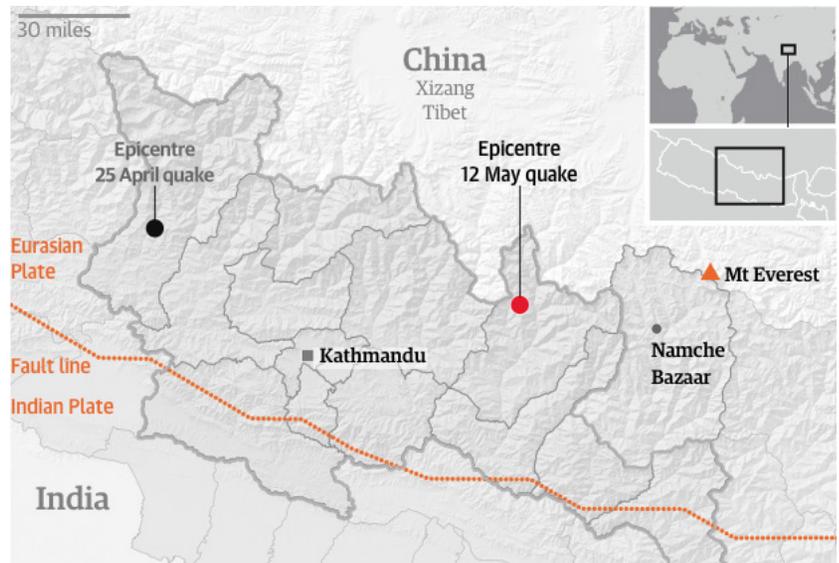


## THE 2015 EARTHQUAKE, NEPAL

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On April 25, 2015, a massive 7.8-magnitude earthquake<sup>1</sup> devastated Nepal, affecting 39 of the country's 75 districts and causing 8,622 deaths and 16,808 injuries, as well as significant damage to homes, buildings, health facilities, and cultural heritage sites. 2.8 million people were displaced, and thousands of families instantly lost access to household energy for cooking, lighting, heating, and powering. Without power to charge mobile phones, families could not reach loved ones or call for help. Lack of lighting made it unsafe to venture outside at night, and limited critical activities such as working or studying after dark. More than 75,000 households saw their cooking technology damaged or destroyed, leading to an inability to prepare nutritious meals for their families.

It was the second, 7.3-magnitude earthquake<sup>2</sup> on the 12th of May 2015 that struck the Dolakha District the most, with the epicenter located in the Dolakha district itself. This earthquake is considered to be a shallow earthquake, having a depth of only 15 km. Shallow earthquakes of this nature typically cause more damage than those of a similar magnitude at a greater depth. It destroyed more than 80 percent of the Houses on Dolakha, resulted in more than 50 deaths and 1,261 injuries. It had also a great impact in other districts all over Nepal, especially on buildings that had been weakened by the April 25 earthquake.



An aerial view of an earthquake-affected area of Dolakha

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1. SAFE ACCESS TO FUEL AND ENERGY, *Nepal Earthquake Energy Response*, (2015), Online article: [www.safefuelandenergy.org/nepal/](http://www.safefuelandenergy.org/nepal/)  
2. VAN LEUVEN, C., *7.3 Earthquake in Nepal*, (2015), Online article: [www.alpinist.com/doc/web15s/newswire-7.3-nepal-earthquake](http://www.alpinist.com/doc/web15s/newswire-7.3-nepal-earthquake)

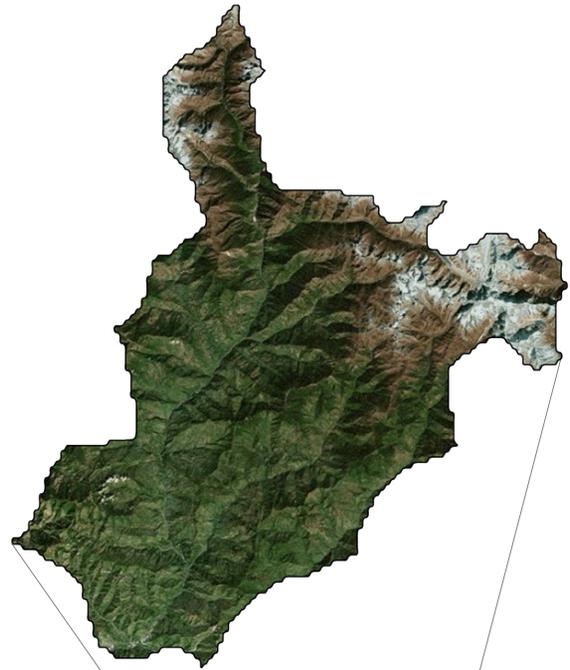
## ABOUT DOLAKHA, NEPAL

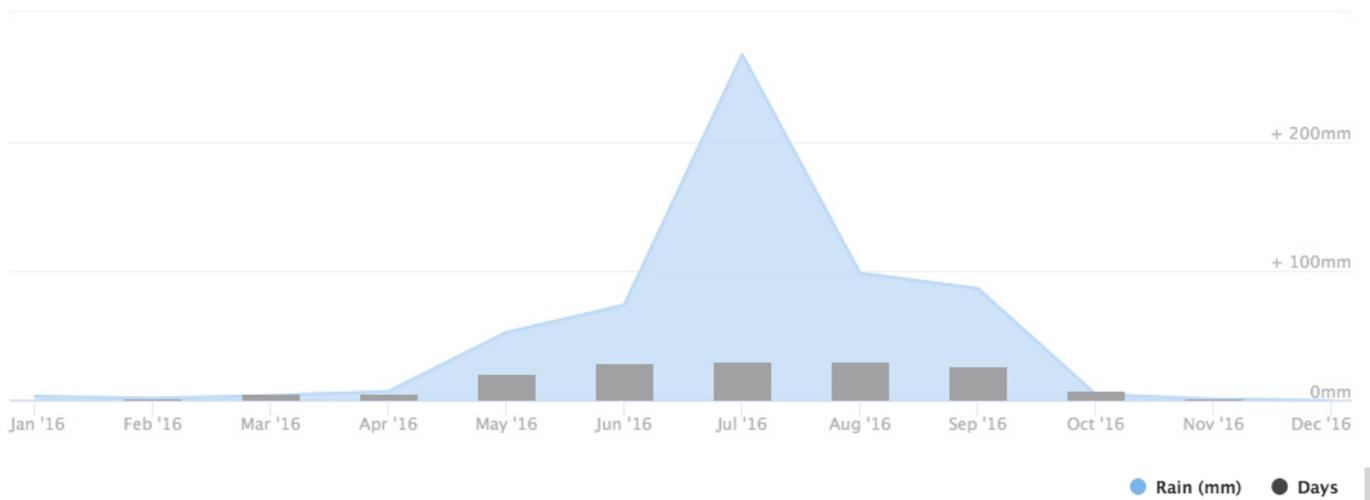
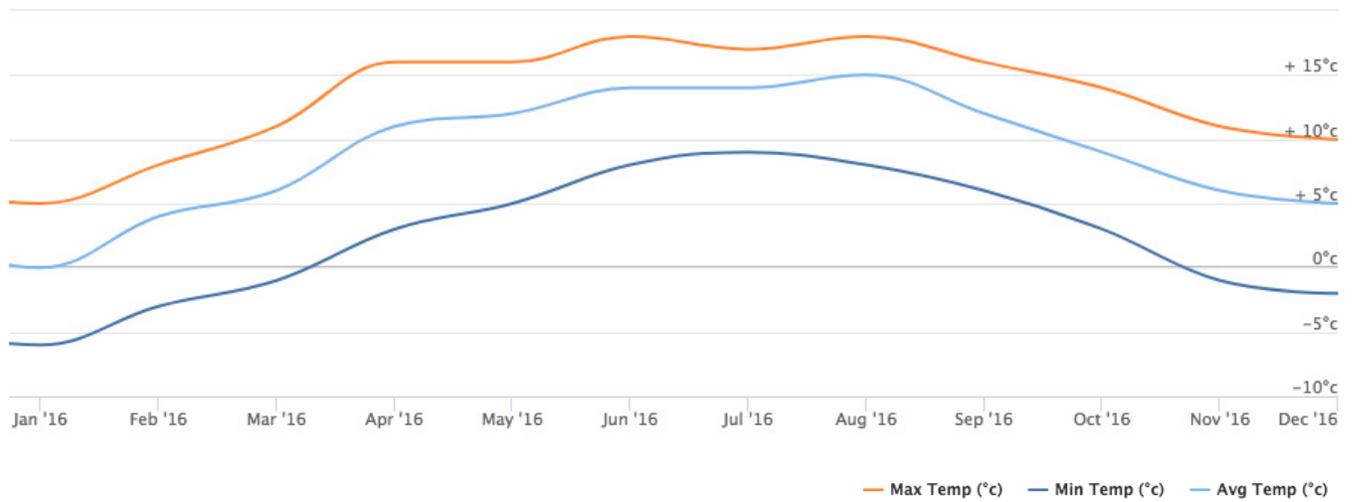
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Dolakha is one of the seventy-five districts of Nepal. The district, with Charikot as its district headquarters, covers an area of 2,191 km<sup>2</sup> and has a population of 200.000 people. The most common ethnic groups inhabiting this district are Newar and Tamang.

Dolakha is an area located in the Fore Himalaya, as it varies in heights between 2000 and 5000m. This results in a cool temperature climate<sup>1</sup>, with temperatures around 18°C in summer and temperatures that can go lower than -5°C in winter times. During the summer monsoon, which starts around the month of June, a precipitation of approximately 250mm can be expected. Protection from heavy rains, as well as adequate rainwater drainage is necessary.

Due to high solar radiation in winter, solar passive heating combined with thermal mass (heavy walls and floors with thermal time-lag of more than 8 h) can reduce the need for conventional heating considerably. For this, the traditional architecture<sup>2</sup> of Newar and Tamang people in this area is based on stone masonry, which have a great thermal lag time and decrement factor (see topic 'A trust in concrete'). As temperatures aren't extremely high, and a certain thickness of the walls is taken into account, over-heating of for example a school building is not applicable. Shade is something not of big importance, which results in no wide roof overhangs. Natural ventilation by for example opposite window and door openings are beneficial. Buildings commonly have an elongated plan, situated on the sunny slope of the hills with the longer facade facing toward the south, south-east or south-west.






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1. BODACH, S., LANG, W., HAMHABER, J., Climate responsive building design strategies of vernacular architecture in Nepal, In: Energy and Buildings, (2014), Issue 81, p. 227-242.

2. ARCHITECTES DE L'URGENCE, Study of habitat typologies and Solutions for their seismic reinforcement in Nepal, (2016), Catalogue, Newari house models p. 21-38, Tamang house models p. 39-70. Online available: <http://www.archi-urgent.com/renforcement-sismique-de-lhabitat-au-nepal-21042016/>

## WORKSHOP DAYS IN KATHMANDU

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With a group of 9 Interior Architecture students and 10 Architecture students we headed to Nepal on the 31st of January. With us, in our backpack, we brought some models of existing schools from all over the world (see picture on the right), to show to the local people which we would meet later on. We had the chance to discover Nepal, several days before leaving in groups of 6 students to our designated school location. On the 5th of February, the first day we got in touch with Michael Rai and Teeka Bhattarai from CEPP, some inspiring things were said as an introduction to our journey in Nepal, but also in designing. I summarized it in several key words: new proposals, community space, design for all, landmark, earthquake resistance and modern living. Design wise, in the first place they stressed this 'ask for modern living', as a striving from Nepal to progress. In this way, modern living gives a direct link to a 'Western design' for them, which already explains their question to us to design a school. In this way new perspectives on designing a school would be obtained by our new design proposals, at the end of the Master year.



As a part of education, Teeka stressed that teachers and parents could for example teach by cooking and gardening, and for this a community space could be very suitable, as it is important to involve the community also in school. By this a means is given to the community to re-evaluate the situation, which should not only be a trick of money but could be done by a well-arranged site plan or by adding extra functions to the school. Teeka explained that for the community, most of the times, it is more important to look at the structural story and the influence on its surroundings, as it also landmarks (see topic 'Landmarking the area'), rather than thinking about ergonomics and thinking that a solution can be given by only a building. There has to be something more to it, a well considered design, as a building has the power to influence our behavior. For this part there was made a reference to a quote by Winston Churchill: "We shape our buildings, and afterwards, our buildings shape us," which made me once more aware that we may not forget that every step we take, can have a huge influence on the user.

On the 6th of January, the workshop opening of the Ideal School Project, guest speakers as Nripal Adhikari from Abari, gave design examples from its own curriculum and encouraging words to enrich our design view. Professor Sudarshan Tiwari, of the IoE Department of Architecture, touched me with his words that this project in his eyes is an opportunity to make a story that

NEW PROPOSALS  
COMMUNITY SPACE  
DESIGN FOR ALL  
LANDMARK  
EARTHQUAKE RESISTANCE  
MODERN LIVING



The first workshop day on the 5th of February

is remembered. As for myself a building is a kind of theater setting, a tool, which in turn gives back a selection of tools that makes it in the end a functioning whole.

Also on the closing day of the workshop on the 15th of February, after each group presented several quick design proposals for their specific location to the people attending the presentations, it was clear that it is not for example ergonomics that are put on the first place in criticizing the designs. That for example safety and the use of local climate, topography and materials evoke a more prominent interest in the part of the design for them. And also, using 'original' and unexpected choices in design is for the people of Nepal more interesting, as it starts questioning themselves.

Sudha Shrestha, professor of the IoE Department of Architecture, told us that a school could mean a huge difference to a community, and that for this we had not to fear while designing, as fear is intuition, not something in our minds. And if the question comes: "How can the people of Nepal believe in it?", then therefore they have to trust it. And that starts with us, trusting our own abilities.



Presenting design proposals for Dolakha on the last workshop day on the 15th of February



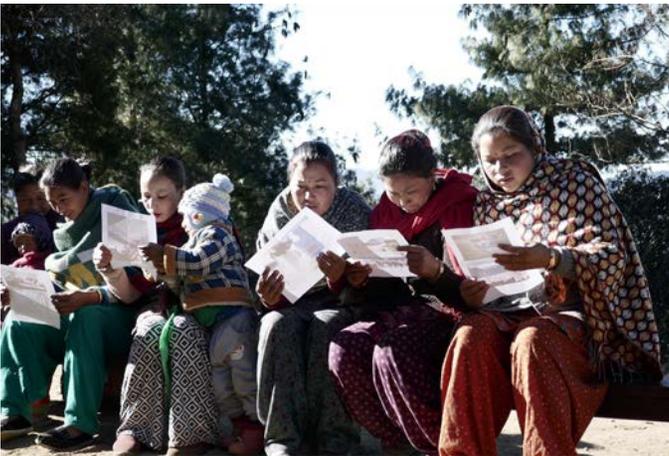
Finishing the last workshop day on the 15th of February

## WORKSHOP DAYS IN DOLAKHA

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With a group of 6 six students, 3 Interior Architecture and 3 Architecture students, we went to the Dolakha District by jeep. After being for three days as a guest in the village of the Kallidevi Primary school we organised a workshop day at the school on the 10th of February. It was on this moment we presented to the local people our selection of schools from which we each brought a model with us. We not only got in touch with some of the parents, but also people in charge for the school organisation and other people from the community.

We presented each school, with photographs and the model as a visual support. During each presentation we got feedback by the locals, which can also be summarized in several key words: earthquake resistance, a trust in concrete, communal space, warmer classes, colour and a visible protection.



As the earthquake resistance and the communal space were already mentioned at the workshop day, it was the ask for colour, concrete, warmer classes and a visible protection which stood out. The idea of a wall being the main concept behind the design was the result of a conversation with the local people of Dolakha.

They pointed us on the fact that they liked the presence of a protective wall, which would give a visible protection to the school. This became the main concept and starting point for my school design. Working with the other comments of the locals, in the end I designed a concrete wall as a backbone for the school buildings. The wall gives not only a visible protection, but also a physical protection and several functions that implement basic needs, as for example heat, to its benefitting surroundings. I see it as a design by one gesture, being the wall.



## EARTHQUAKE RESISTANCE

NO TO GLASS, BAMBOO

YES TO **CONCRETE**, MASONRY

**ABILITY AND TRUST** TO USE THE MATERIALS

## COMMUNAL SPACE

PRESENCE DURING SCHOOL

## WARMER CLASSES

## EDUCATIONAL CONTENT

“MORE THAN JUST TEXT!”

## COLOUR

## PHYSICAL BORDER

SAFETY

**THE WALL**

**VISIBLE PROTECTION**

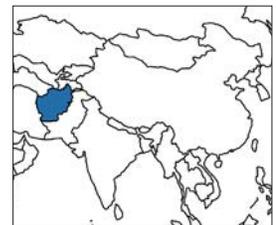
## CHOSEN CASE STUDY

The school I chose to do a research on, and make the architectural model from, was the Maria Grazia Cutuli Primary School in Herat, Afghanistan. The school, designed by four Italian architectural offices, was donated by the Maria Grazia Cutuli Foundation in 2011.

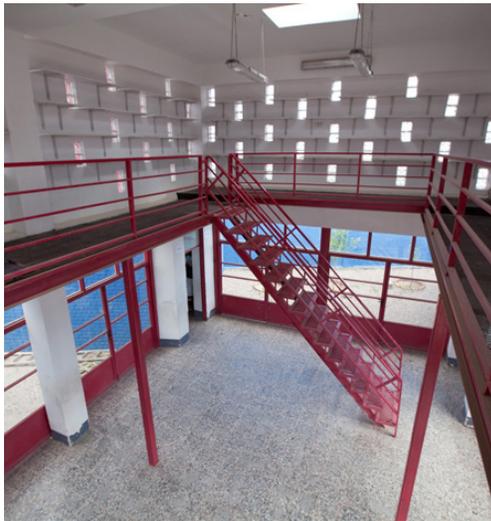
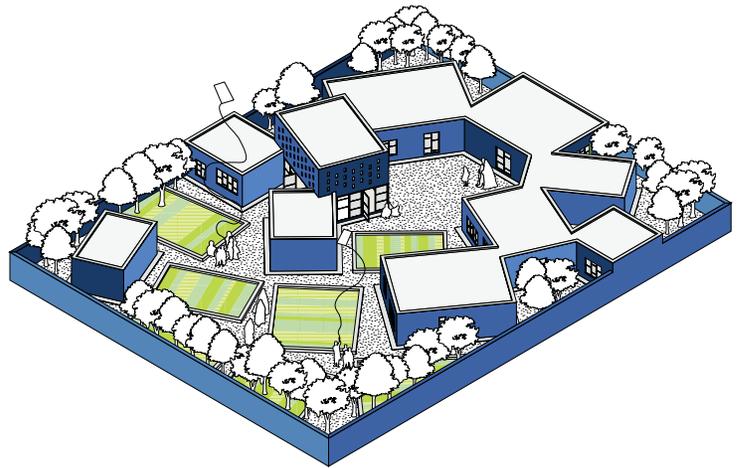
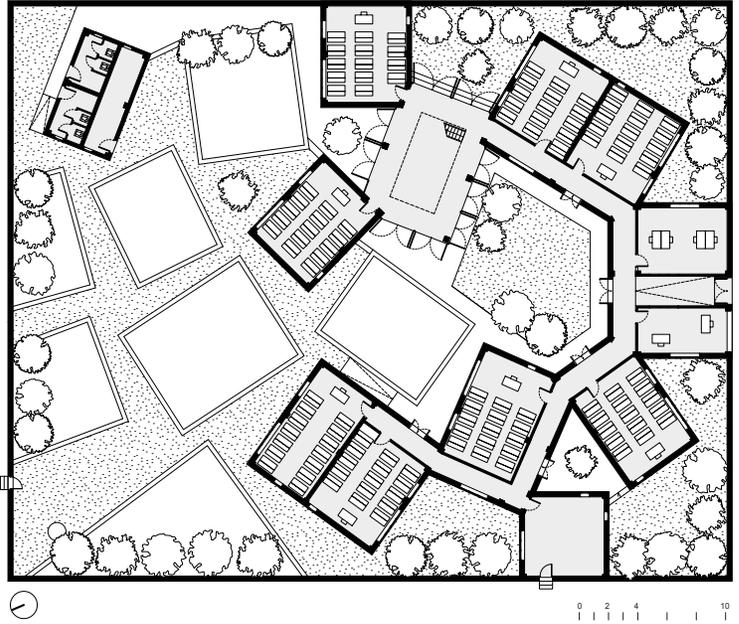
The choice to use this school as a reference project is because of its colour use, which stands out compared with its sandy surroundings. For me it is interesting that local people of Herat learnt on a quick basis how to work with concrete to build the school on their own, as this proves it is a very accessible material. Also the people of Nepal pointed this school out as one of their favorites. The wall that surrounds the school is something that gives a visible protection to the school, while the school buildings themselves give it the feeling of a strong, fortified whole. In Dolakha a wall as a border isn't necessary as nature already defines the school its borders. But a wall as a visible protection became the main concept of my school design for Dolakha in Nepal.

Also the school its architecture is very interesting. The composition of the one-storey blocks and raised garden zones could refer to Herat's traditional villages, clustered together as if without conscious planning. The roofs are used for military surveillance and water captation. Multiple functions are thus given by one element, which I'll try to do with the wall in my design. The double-height library is the only building visible from outside the wall, acting as a landmark. It is intended to be used by the entire village, part of an effort to win local support for the school. As a school should participate in landmarking, the wall in my design becomes a conspicuous element which landmarks the whole.

The exteriors of the whole complex in Herat were painted in three shades of blue, a reference to the local lapis lazuli pottery. The ultramarine blue is an important colour in the tradition of Afghanistan, which is widely used for decoration for the mosques and other important buildings. The people that live in the area could subsequently link the architecture to something they can use as a symbol after the war. In Nepal, most of the facades of the houses were originally painted in bright colours, which had gone lost after the earthquake. In my design, I use colour on the facades of the schoolbuilding, as a symbol after the earthquake.



Architect	22A + P/A, Maria Cutuli, laN+, ma0 Rome, Italy
Client	Maria Grazia Cutuli Foundation Rome, Italy
Programme	Built in honour of Italian journalist Maria Grazia Cutuli, murdered in Afghanistan in 2001, the complex represents an alternative approach to emergency school design for war-torn areas. Like a small village, it is intended to resemble an unplanned juxtaposing of elements enclosed by a boundary wall. It accommodates eight classrooms, various staff accommodation, a double-height library and a garden which acts as a 'green classroom'.
Materials	Reinforced concrete, clay bricks, glass bricks, 'lapis lazuli' and red paint (not rendered, lower cost).
Floor / Site	700 m <sup>2</sup> / 2000 m <sup>2</sup>
Classrooms	8
Costs	€ 177.947



Photos & drawings:

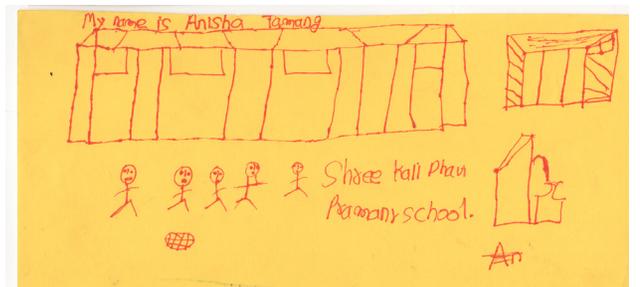
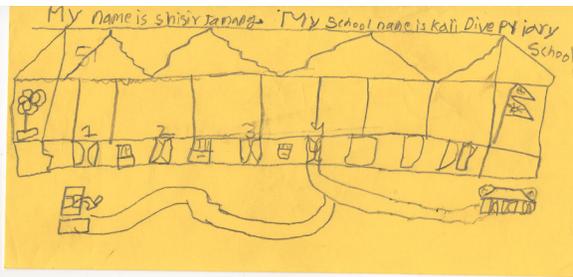
1. [www.archnet.org](http://www.archnet.org)
2. [www.archdaily.com](http://www.archdaily.com)
3. [www.2ap.it](http://www.2ap.it)

## THE CHILDREN'S IDEAL SCHOOL

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During the days we visited the Kali Devi Primary school we organised a moment where we asked the children to draw their Ideal School, as they weren't able to explain it to us in words. The children were very enthusiastic to get a collective outdoor class, as we invited the nursery class and all of the five grades. In the end the drawings that were made didn't give us lots of information, which we hoped to get, but it was clear that even during winter times the children like to be outdoors, where the sun is more present than inside the classrooms. Their ideal school is in the little details they added to the drawings, as a closeness of the buildings and the connection with its surrounding nature. The most interesting part was the fact that several children had drawn an element that foresees (clean) running water on site, which fills in one of their basic needs.







# RESEARCH

## THE KALI DEVI PRIMARY SCHOOL

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The Kalidevi primary school is a school located on a height of 2455m in the fore Himalayan zone of Nepal. The school consists out of a nursery class and 5 primary school grades, which in total counts 46 students. In charge of the school are 5 teachers and one volunteering teacher. At the welcoming ceremony all the permanent teachers were present, as the next days only three or four teachers, including the volunteering one, showed up. In first case the amount of teachers didn't seem as a problem, as each class could have one of the 6 teachers in charge.

The school site is a flattened zone, which is an artificial creation by digging away a part of the hill. This is visible in the back of the two new school buildings, as they are located approximately 1,5m from the slope. Looking at the buildings of the school, it is clear that after the earthquake none of the buildings survived. The site counts 2 temporary learning shelters, made out of wooden structures with corrugated steel plates, and two new buildings of which one is in use. The building that is not in use, the biggest one if the two, is the building with the most potentials as it features a good construction and thick walls, which can function as thermal mass. It features a concrete framework filled in with brick masonry imported from Kathmandu.

The roof is the biggest problem of this building, as it blocks the sunlight at the upper edges and has a wide roof overhang which creates too much shadow. In this way, the interiors of these classrooms are very cold and dark, which asks for an upgrade.

The other new building, which is used by the nursery class, is the best functioning class of them all, as it opens up to sunlight. But being constructed out of a metal framework covered with wooden panels it isn't the most suitable construction. By removing the building, its materials could be used as parts of furniture, as the flat panels are very suitable to use as table tops and the steel as supporting structures. In this way it also forms a platform by its remaining foundation and adds more sunlight to the south-east facade of the new, concrete/masonry building.

The toilets are located next to the flattened terrain, using the slope of the mountain as a means of draining. Next to this beneficial factor it they are located on a suitable distance from the school buildings.



5 GRADES  
5 TEACHERS (1M, 4F, 1V)  
46 STUDENTS  
G5: 9, G4: 6, G3: 8, G2: 3, G1: 9  
NURSERY: ± 10  
ETHNICITY: NEWAR + TAMANG



# THE KALI DEVI PRIMARY SCHOOL

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ENTRANCE FROM DOWNHILL



PICTURE CLOSER TO THE SCHOOL



MORNING RITUAL



2 NEW + 1 TLC



1 TLC



TOILETS



OVERVIEW



NEW BUILDING CLOSE TO THE SLOPE



NEW BUILDING CLOSE TO THE SLOPE



ON THE SLOPE: NEW BUILDINGS VIEW



ON THE SLOPE: TLC VIEW

# THE KALI DEVI PRIMARY SCHOOL

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NEW BUILDING 1



1: CONCRETE - STEEL DOOR - BRICK MASONRY



CORRUGATED SHEETS BLOCK THE LIGHT



TRANSPARENT SHEET AS THE ONLY LIGHT SOURCE



STRANGE LIGHTING



LIGHT EXPERIENCE



NEW BUILDING 2



2: WOODEN PANEL - STEEL STRUCTURE - WOODEN PANEL



STRUCTURE FROM THE INSIDE



CHILDREN SEARCH FOR LIGHT



CLASSES ARE GIVEN IN THE SUNLIGHT ZONES

## LOCAL CRAFTS

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A walk through the village showed us that dolakha has three local crafts which are helpful in architecture. One is the bamboo and straw weaving. It is used to make deiving surfaces, but in daily life mostly used to make bamboo panniers. One morning, one of the male locals visited our tents and showed us his skills, which he used to make a woven, bamboo trash bin. The bamboo that is used for this has a diameter of approximately 2cm, as larger diameter bamboo doesn't grow in this area at the moment. Also straw weaving, a technique that is used to make carpets called 'sukul', is a technique known by many locals, especially by women.

The second local craft is the carpenter. There were several carpenters to find in the are. It was interesting to see that they also had large, flat wooden panels available, which are very suitable as tabletops for the primare school (later more

on this topic).

The third craft is the iron tools maker. When visiting his atelier it was clear that he not only had the equipment to make for example knives, which are later on sold in Kathmandu, but also to make door and window frames for example.

As on first sight Dolakha seemed to be a village that had stopped in time since the earthquake, these local crafts became part of a beacon of life. All these makers were proud to show their atelier and how their skills would result in a well-functioning element.



BAMBOO BASKET WEAVING



WOVEN BAMBOO SURFACE



ARCHITECTURAL IMPLEMENTATION



A SUKUL



ARCHITECTURAL IMPLEMENTATION



LOCAL CARPENTER



THE AVAILABILITY OF FLAT WOODEN PANELS



IRON TOOLS MAKER



EQUIPMENT

## A TRUST IN CONCRETE

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As already mentioned we had a conversation with the local people of Dolakha, on the workshop day we organised at the Kali Devi primary school on the 10th of February. Next to other topics, they stressed their trust in concrete, after seeing several concrete buildings being the only ones still standing after the earthquake. Sudha Shrestha, professor of the IoE Department of Architecture, told us on the closing Workshop on the 15th of February that if the question comes: “How can the people of Nepal believe in it?”, then therefore they have to trust it. In the end I use concrete to materialise the wall, as they already trust the material.

Working with the topography of the mountain area, I connect the wall to the slope, as it becomes a monolithic part of the hill. To make the wall function as an interior on its own, a certain thickness was required. The combination of a reinforced concrete framework filled in with cyclopean concrete, as a link to their traditional stone masonry, was chosen to materialise the wall. This method, filling concrete frames with a kind of masonry, is already widely used to reconstruct the houses of Dolakha, by the local people themselves after the earthquakes of 2015.<sup>2</sup> It is also this method that Emergency architects, a French foundation that has been developing projects around the world to help people in need since 2001, use as a construction method<sup>2</sup> in this area. It is to show to Nepal earthquake resistant reinforcement solutions, by respecting local vernacular architecture, ethnic<sup>3</sup> traditions and parseismic rules.

Concrete is step-by-step becoming a part of their building culture and tradition. Convincing them of the material’s use and how to work with it in a technical way is not necessary anymore. As Hilde Bouchez explains in a theoretical framework for this master: “When a tradition dies, the inner light simmers away and the authenticity vanishes.”<sup>4</sup> This made me question that, if we replace their stone masonry work with concrete, if that would mean the death of this tradition. I see it as a reincarnation of their tradition, not their death, and I am sure that the local people of Dolakha look at it the same way. “A tradition works with what we have now. It doesn’t imply being stuck in an enclosed tradition that looks backwards, but implies a tradition that goes on and stays alive in each new trial that comes in its way.”<sup>5</sup> It is that at a certain point, a tradition has to admit to new developments, and that parts of it have to make place for others.



HOUSE THAT SURVIVED



AVAILABILITY OF BIG STONE CHUNKS FOR CYCLOPEAN CONCRETE



BIGGER STONES ARE CHOPPED TO HAVE THE RIGHT SIZE OF STONES

By using concrete in a monolithic way, the wall gives a feeling of solidness and virtue. Next to the fact that reinforced concrete is a material that is earthquake-proof-approved, it is a material that has an extremely good time lag<sup>6</sup> (300mm thick has a 12 hour lag) and decrement factor<sup>7</sup> (0.25 for 300mm) which both are suitable to the search of a great thermal mass in a cool temperature climate<sup>8</sup> as in Dolakha. In this way the wall already protects against cold, but also against rain and wind.

As a next step I got in contact with Rudi Rojakkers, Senior Seismic Consultant in projects of ABT Belgium. As the wall would have a height of more than 7m, by building the wall against the hillside, the height of impact is restricted to the upper part of the wall. The lower part uses the technique of reinforced earth, which anchors it deep into the soil. The upper part should be connected, on the other side of the wall, to a row of concrete buildings on the hill, which make the wall function as a façade. It is important to make as less changes as possible in the use of materials, as it makes all parts resonate at the same frequency, as in this story a continuation of the concrete is beneficial. Design wise has certain symmetry is taken into account, especially for the top part of the wall, to lead to no weak points as it function as a coherent whole. A right placement of materials, openings and extrusions would result in an improved condition of the wall. This made the wall an earthquake-proof frame that gave the possibility to fill it in with elements, which responded to the basic, local needs.

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1. Dolakha was struck most by the second 7.3-magnitude earthquake on the 12th of May 2015, with the epicenter located in the Dolakha district itself.
  2. ARCHITECTES DE L'URGENCE, Study of habitat typologies and Solutions for their seismic reinforcement in Nepal, (2016), Catalogue, Newari house models p. 21-38, Tamang house models p. 39-70.
  3. Tamang and Newar are the two main ethnic inhabiting groups of Dolakha.
  4. BOUCHEZ, H., Wild Studies and The Ideal School: a theoretical framework, (2016), AOB.
  5. BODAR, A., Geborgen in Traditie, (2016), Amsterdam: Ambo|Anthos.
  6. Thermal capacity means that a material takes a long time to heat up and a long time to let this heat through and to release the heat. This delay is called thermal time lag. In an area as Dolakha, a time lag of minimum 8 hours has to be taken into account.
  7. Factor =  $T_i \max / T_o \max$ .  $T_o$  (outside) is a constant amount. The bigger the thermal mass, the lower  $T_i$  (inside), the lower the decrement factor so the more constant the temperature is maintained inside.
  8. BODACH, S., LANG, W., HAMHABER, J., Climate responsive building design strategies of vernacular architecture in Nepal, In: Energy and Buildings, (2014), Issue 81, p. 227-242.



FOUNDATION TRENCHES



IMPROVED TOOL TO BEND THE STEEL REINFORCEMENT BARS



THE TECHNIQUES, TO WORK WITH REINFORCED CONCRETE, ARE ALREADY KNOWN

## CONCRETE: REFERENCE PROJECT

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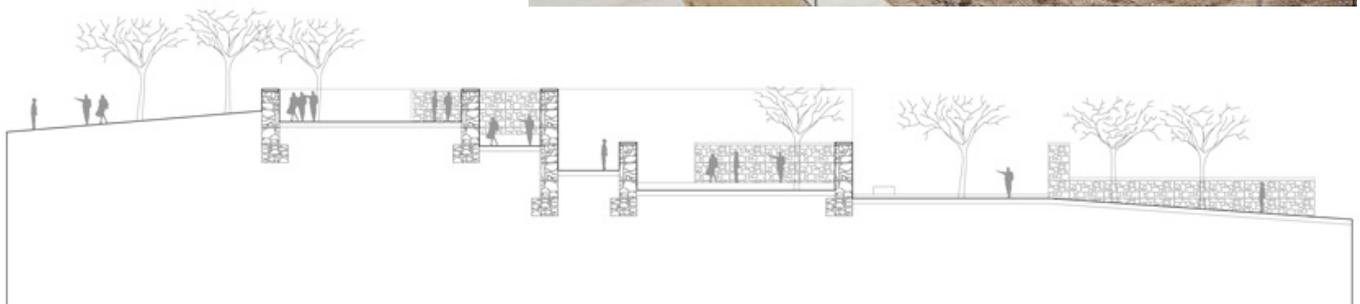
To materialise the wall for Dolakha I chose to use the same techniques as in this project: a reinforced concrete framework filled in with cyclopean concrete. The Valdefierro Park, designed by Héctor Fernández Elorza and Manuel Fernández Ramírez, is a Park in Spain realised in 2012.

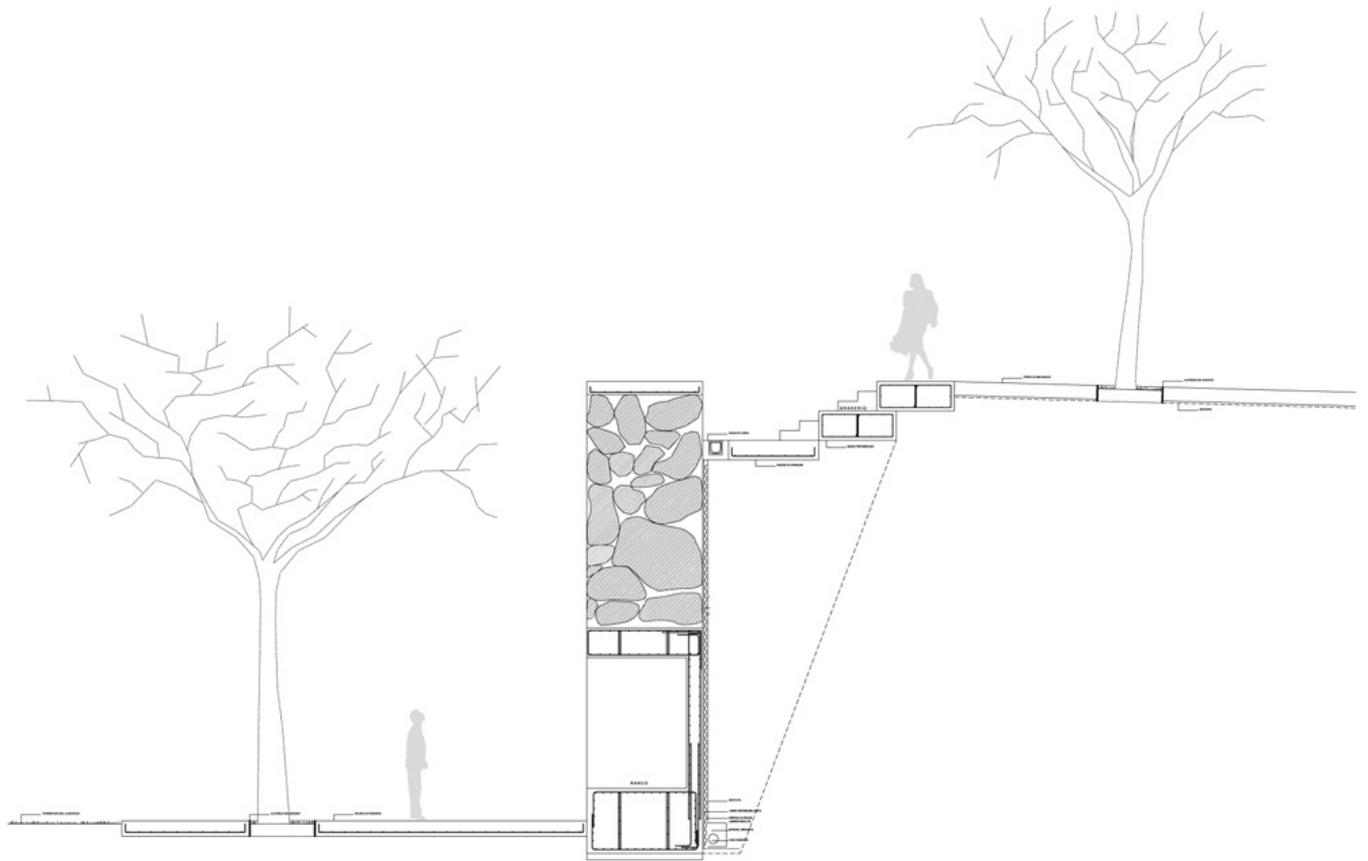
Design wise, the context of the site determined the use of materials. The cyclopean walls outline the topography, constructed from the very stone and soil of the site, led to construct the project with the geometry of a system of walls. The gravel and rubble were mixed with cement to construct very thick cyclopean walls. These unreinforced walls, which on account of gravity vary in depth according to their height, distribute the layout of the site into terraces and determine the topography of the park.

The walls have a thickness up to 1.80m and a height of 9m. The smooth, polished texture produced by the metallic casting of the moulded sections contrasts with the rough surface of the thick Cyclopean walls, whose internal texture has been revealed by the abrasive action of a rotary crown gear.



4





## LANDMARKING THE AREA

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On the second workshop day, on the 15th of February 2017, Dr Sudha Shrestha (IoE, TU) touched me with his story in his introduction. He talked about a school being the pride of a village, and that it stands as a landmark to give directions in the village: “When people ask my mother where I live, she tells them to ‘Turn right at the school, downhill...’” This is how ‘landmark’ became one of my main topics. A landmark<sup>1</sup> is:

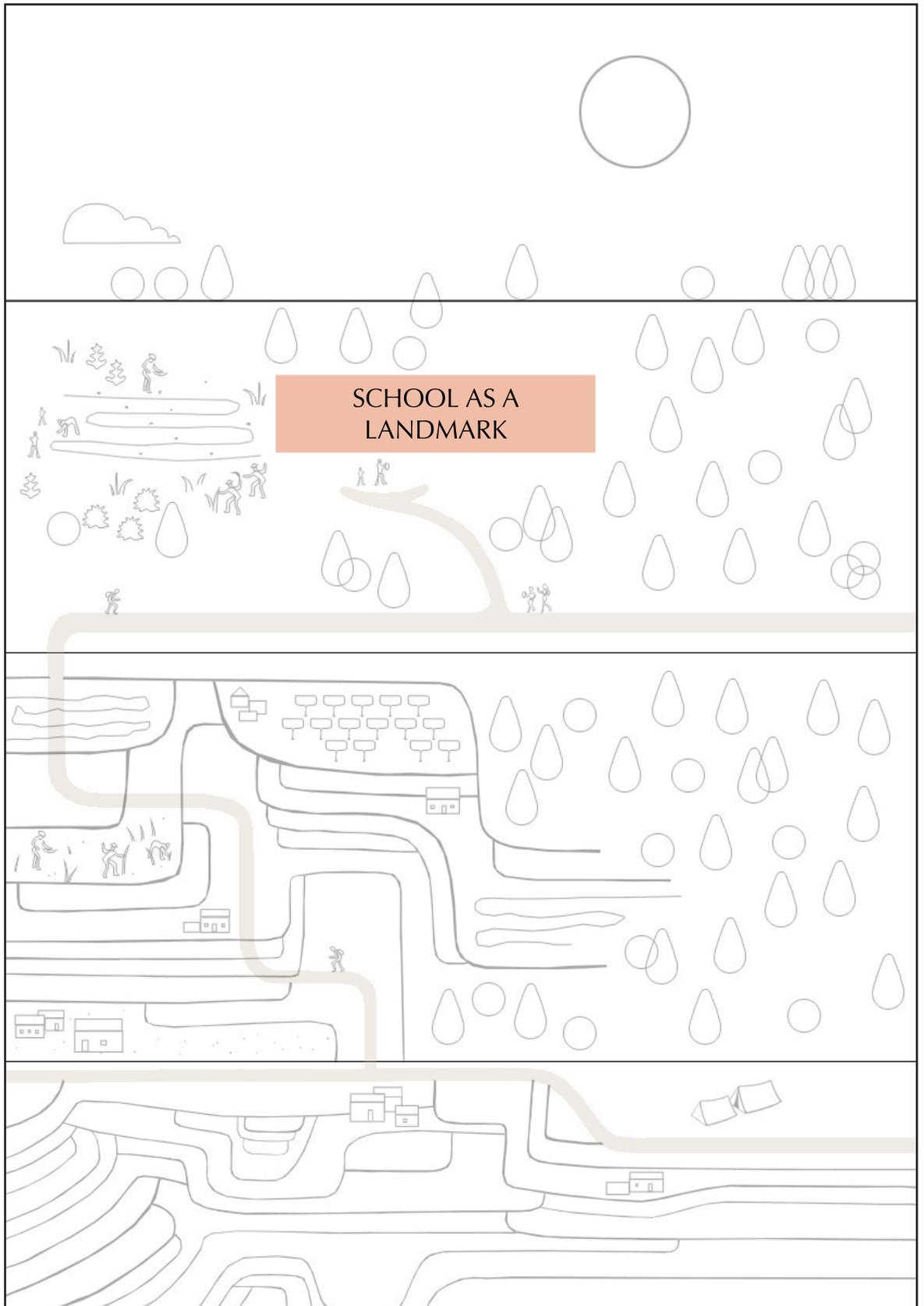
1. An object (such as a stone or tree) that marks the boundary of land.
2. A conspicuous object on land that marks a locality.
  - a: A conspicuous object on land that marks a locality.
  - b: An anatomical structure used as a point of orientation in locating other structures.
3. An event or development that marks a turning point or a stage.
4. A structure (such as a building) of unusual historical and usually aesthetic interest; especially: one that is officially designated and set aside for preservation.

As a landmark the school has to mean something important for the whole community, so that proudness appears all over the village. This means that the school has to give something to the community, but that the community can also become part of it. In this way there are some responsibilities that are given to the school organisation and to the community, as for example by building together. Looking at the definition it is interesting to see that it is described as something conspicuous and/or something of aesthetic interest that is preserved by all. A public school is already a landmark of a village because it is shared, but when a community is not proud of it they won't talk that much about it. I assume people would like to get involved in realising the school, as it can become an example and a challenge for the whole community.

By building a wall, that is a black sheep in between all the white ones, the conspicuous aspect can already be obtained. The design makes several functions accessible for the whole community, in one gesture: by means of a wall. In the end, the wall would show how simple, affordable solutions can help obtain a healthier environment, which could be taken home and applied by the local people themselves. By doing this, the school can make a difference.

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1. Definition online on Merriam-Webster.



SCHOOL AS A  
LANDMARK

OWN DRAWING OF THE SITE OF DOLAKHA, FRONT VIEW OF THE HILLSIDE

## A LOSS OF COLOUR

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The aspect that I want to bring back to Dolakha is the aspect of colour. Therefore 'Colour' is another important aspect of my design. This choice was made after being on site and realising that after the earthquake, temporary tin sheds were built, as they are weedage that has to be torn away and replaced by descent ones. I couldn't imagine that they felt a 100 percent at home in these houses, as they sometimes referred to the coloured facades that were there before the shake, this large variety which made the area a joyful place. I reintroduce colours, which previously already brought life into the image of the village. As a landmark, colour will absolutely make the school something conspicuously present. It would also make an interesting contrast with the roughness and wildnes of the concrete wall.

"Colours do not exist on the surface for they are manufactured in the mind's eye. Our experience of colour is a subjective sensation conveyed through the medium of wavelengths, namely energy in the form of light radiations within the visible spectrum. Without an observer, light rays do not, themselves, constitute colour."<sup>1</sup>

From the beginning I realised that colour is a topic that is very difficult to get a grip on, because colour in architecture is very subjective. But we cannot enjoy colour at its best if we neglect or fear the use of it. One of the most important aspects of colour is the experience. As Faber Birren (1900-1988), a colour consultant who read and analysed tastes in the hues deemed most suitable for one's surroundings, I want to stress that "taste in colours, although occurring in fashionable cycles, is highly personal, with no two people responding the same way."<sup>2</sup> There are three important factors that influence the resulting experience.<sup>3</sup> One is the lighting conditions under which colour is viewed, two is the spectral characteristics<sup>4</sup> of the object in view and three is our perception of colour. How we link colours for example with something else, or a certain feeling.

When picking the most delicate one of the three, one is absolutely it. Because a building is never experienced in isolation, it is perceived within its wider setting. Therefore, before selecting, colours should normally be tested under the light form they will be exposed to, daylight and/or artificial light, in situ. Because, as Jean-Philippe Lenclos said, "a building its colour is not static: it evolves, shifts and changes seasonally as a result of changes in light, air, humidity, rain and drought."<sup>5</sup> That is why, designing from behind my desk in Belgium for a Nepalese site, the best

reaction of colour will not be found. But for now I want to make a proposal.

A next step was to look up the colour use of the people of Nepal. For this I searched the Internet, libraries and asked people working in Nepal or India. Nothing gave me a specific clue of colour use in Nepal. Even not in India, a country that has a lot in common with Nepal. The only answers I got were about the colours of the lungta flags, which are widely used while expressing religion: blue, white, red, green and yellow in a row. Three of them are primary colours, as yellow a green-red combination and white as a combination of all three. These colours are used in different values and hues all over Nepal on building facades, but they aren't the only ones. Also in the pictures by Vincent Leroux, of building façades in India, it is clear that colour is a personal expression, with a kind of extravagance to show pride and happiness. Colour is as an expression of the designer or user of the building. It is personal, but at the same time shared to the outside world.

In my search for colours of Nepal, I ran into the beauty of the images made by the practice of Tantrism, images that have a close resemblance to Minimalist art of the 20th century. They already exist since the 17th century, created in the North of India copied generation from generation. Each image is an expression of somebody anonymous, could be Buddhist, could be Hindu, to become more aware of oneself. "Tantric art is first of all a practice. First for the "artist" himself when he paints a piece, and then for the people who are later going to work on seeing this image."<sup>6</sup> It is thus also a shared form of expression, and in a way it is wrong to describe them as art. They have to be described as a sort of experiencing image, which activates something inside. "They are things of beauty, 'a joy forever'."<sup>6</sup> This is what I wanted to do, reintroduce colours as they previously made the area Dolakha a more joyful place.



FAÇADES IN TIRUNNAMAVALAI, INDIA, BY VINCENT LEROUX (2014)



A TEMPLE AND A HOUSE OF DOLAKHA, TWO OF THE REMAINS PROVING THE USE OF COLOUR IN THE PAST

As I want to use bright colours in my design, I choose to work with the colours of this image called “Colours of the World”, one of the images collected by the French poet Franck André Jamme. It is described as a snapshot of the unceasing development of all colours, all grains. It contains bright colours, but testifies to a good balance and unity. When complementary colours, as blue and yellow in this image, are placed together, the characteristics of each hue is intensified by the presence of the other. It is called ‘simultaneous contrast’, the phenomenon when a colour will look lighter when paired with a darker colour and darker when paired with a lighter colour.

My choice for this sort of colours was also following the research I did around colour use in schools, which gave a view on which kind of colours could be used on the facades of the buildings. “Younger children find high contrast and bright colours stimulating... Preschool and Elementary school prefer a warm, bright colour scheme that compliments their natural extroverted nature.”<sup>7</sup> By using the colours of the Tantric image, I try to brighten up the school area for the children, as it also can update the already existing building. Out of the functions of colour in architecture<sup>8</sup> I work with colour detachment rather than colour attachment, to intensify the experience,

As in the study of Kathie Engelbrecht and looking to the hues Faber Birren proposes, interior wise a calm pale neutral colour in a tint such as oyster white, sandstone or beige works for most of the classroom, with the front wall in a functional midtone (50 to 60 percent reflectance) that allows the students to intermittently rest their eyes from the high contrast of the text they are absorbing. To take it a step further, a support colour can come into play at the back of the room to give the teachers a lift, since their back is usually to the front wall. End walls are thus also better treated in midtone colours. It is not that these colours have to be obtained only by painting, but by using a well-considered render such as a clay or lime render the desirable tone can already be present.

“In hands of the designer colour can regulate the perception of buildings; in the hands of the occupier it is a way of involving themselves at first-hand in the articulation of their habitat.”<sup>10</sup> Then comes the question: why not choose other colours? Which colours are right? Which colours are wrong? When designing with colours there once have to be choices made, there is no direct right or wrong, because “the variety of nuances does not dilute the amazing power of colour on humans and it’s ability to enhance our experience of the learning environment.”<sup>9</sup> This choice of colours is my design proposal, which for me suits the school area after visiting Nepal.



COLOURS FOR LES LINANDES, CERGY-PONTOISE. APPLICATION BY JEAN-PHILIPPE LENCLOS ON SITE BEFORE THEIR FINAL APPLICATION. TESTING THEIR EFFECT UNDER THE CHANGING QUALITY OF LOCAL LIGHT CONDITIONS AND PREVIEWING PUBLIC REACTION.



FUNCTIONAL COLOURS FOR SCHOOLS BY FABER BIRREN



COLOURS OF THE WORLD

1. PORTER, T., *Colour Outside*, (1982), London: The Architectural Press, p. 77.
2. SAXON, W., *Obtuary: Faber Birren*, 88, *Expert on Color*, In: *New York Times*, (December 31, 1988), Online beschikbaar: <http://www.nytimes.com/1988/12/31/obituaries/faber-birren-88-expert-on-color.html>
3. PORTER, T., *Colour Outside*, (1982), London: The Architectural Press, p. 77.
4. The ability of a substance to absorb, reflect or transmit light. Natural material colours of wood, concrete, clay, ... reflect colour. Colours will also look darker and saturated from a glossy surface than from a matt surface.
5. PORTER, T., *Colour Outside*, (1982), London: The Architectural Press, p. 78.
6. JAMME, F.A., *Tantra Song*, (2011), Los Angeles: Siglio, p. 11 & 14.
7. ENGELBRECHT, K., *The Impact of Color on Learning*, (2003), For: Perkins & Will, p. 4.
8. 1. Decorative, 2. Colour attachment: blend with the environment, 3. Colour detachment: intensify our experience of it, rather active than passive, 4. Graphic, 5. Coding: language of colour f.e. the function of an element, where to go, ... The source: PORTER, T., *Colour Outside*, (1982), London: The Architectural Press, p. 109-125.
9. ENGELBRECHT, K., *The Impact of Color on Learning*, (2003), For: Perkins & Will, p. 2.
10. PORTER, T., *Colour Outside*, 1982, London: The Architectural Press, p. 125.

TESTING THE TANTRIC IMAGE COLOURS:  
BY MEANS OF COLLAGES

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TESTING THE TANTRIC IMAGE COLOURS:  
BY MEANS OF COLLAGES

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## FURNITURE

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As a further step for the interior, next to the right colour use, I wanted to see which effect furniture could have on the use of space. In the Kali Devi School, I made some drawings and took some drawing of the furniture used inside the classrooms and how they are used.

Unfortunately this use wasn't very well considered. Some of the benches were fixed to the table tops, which didn't give the users (most of the times children) the opportunity to change position and for example come closer to the tables. Other pieces of furniture showed.

Interesting was that in several classrooms, mainly in the lower grades, children sat on the ground during the classes, while using the sitting benches as tables. The depth of such a bench has a maximum of 30 cm, which didn't give much space to work on. The floors were covered with carpets, to prevent contact with the cold, concrete floor. By this, the children were triggered to take off their shoes, which in Nepal is also a sign of respect.

It wasn't pleasing to see that the teachers had a separate chair to sit on, which also made them sit higher than the students. This isn't the image a teacher has to give to his/her students, as it transfers a kind of power.



BENCHES OF THE 4TH GRADE



SIDE VIEW



TEACHER SITTING IN A HIGHER POSITION



THE CRAMPED POSITION



TAKING OFF THEIR SHOES TO ENTER THE CARPETED CLASSROOM



SITTING ON THE GROUND, A BENCH AS A TABLE



THE CARPETS INVITE TO SIT DOWN



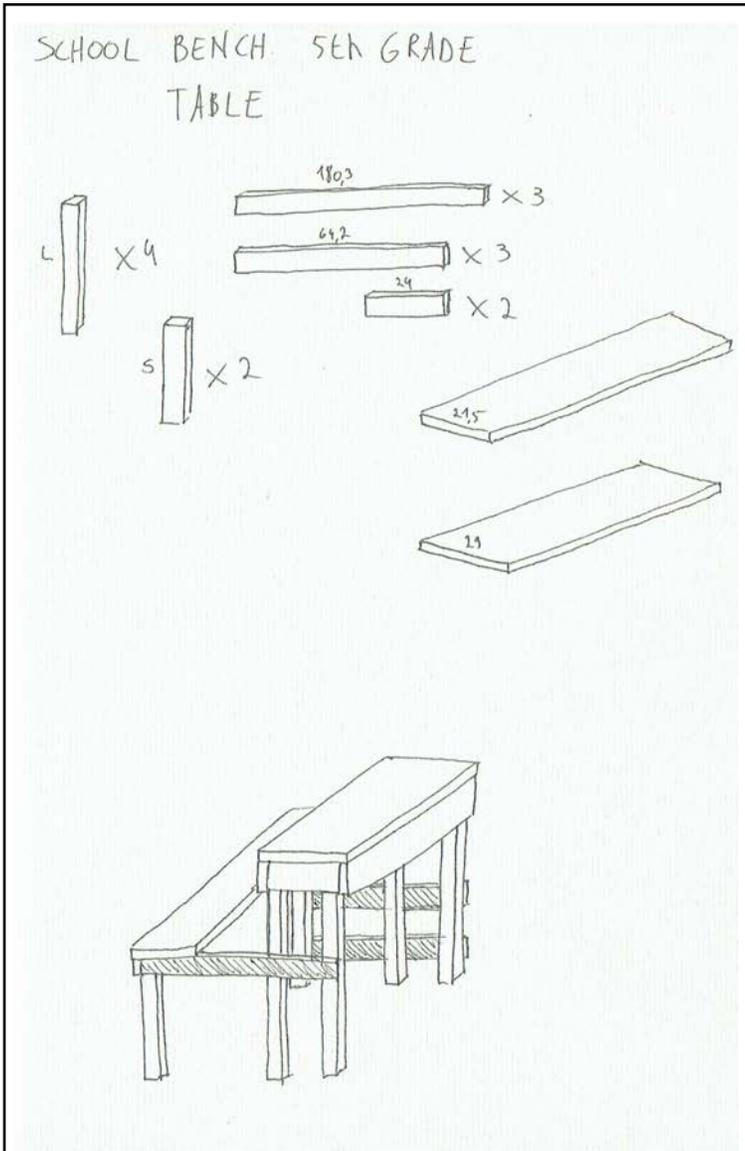
THE BENCH FIXED TO THE TABLE IN THE 5TH GRADE



LOCAL CARPENTER

# FURNITURE

These are the drawings I made in Dolakha and the first Idea's I had presented by collages.

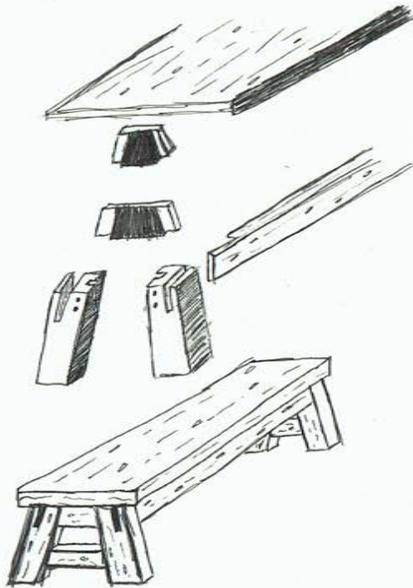
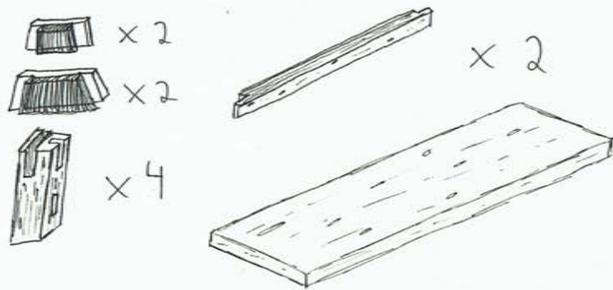


DRAWING ON THE LEFT

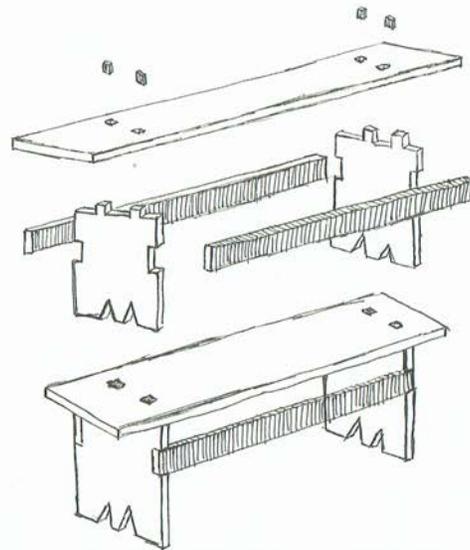
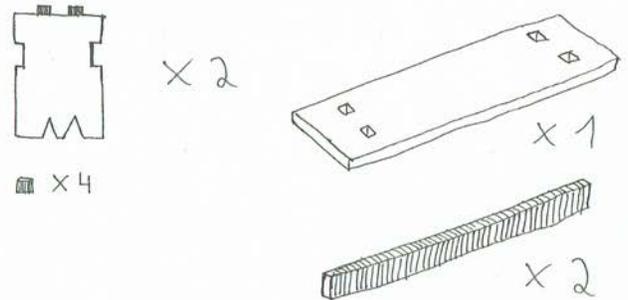


DRAWINGS ON THE RIGHT

SCHOOL BENCH 4th GRADE TABLE  
 L 176,5  
 B 22  
 H 31



SCHOOL BENCH 4th GRADE  
 L 173,5  
 B 29,3  
 H 54,7



# FURNITURE

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TUMBLING STRUCTURES IN A HIGH POSITION



TUMBLING STRUCTURES IN A LOW POSITION



STACKING THE CHAIRS AS THEY BECOME A STORAGE RACK



PROVIDING ANOTHER MATERIAL TO SIT ON

## FURNITURE

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To change this situation of Dolakha, I wanted to see which effect furniture could have on the use of an educational space. I knew that ABC House, a creative learning center in Brussels, had its own way of designing a learning environment by playing a lot with interior elements. I visited the ABC House on the 7th of April 2017. My contact person was Janne Daeveloose, member of the ABC-team. She gave me a comprehensive tour and explanation inside and outside the building.

After my visit, I kept in mind their idea of using a structure that could be used to form a high and a low table. I call it myself a 'tumbling table'. The legs of the tables are in this case metal structures, detached from the table tops. In one position they form a table to stand around or sit around with a chair, in another position people can sit around it on the floor. This means that a shift between high and low, between sitting, standing or laying is possible.

Also the children of the Kali Devi Primary school, especially the nursery class, and the first, second and third grade had these carpets inside their classrooms, which invited them to sit on the ground. But there, only sitting benches formed lower table tops, which gave very limited space to write, draw or work on. I found this very interesting because, when I was in primary school, I always had to sit behind a tiny desk on a chair, which for me gave an interesting contrast. We never had the opportunity to sit on the ground and work around a lower table with others. As this is already something that lives in the schools of Nepal, which is great, I take it with me in my design, and in this case especially to Dolakha. On the ground sukuls will be provided, the woven straw mats made by local craftsmen. Also in the ABC House carpets covered the ground. The covering of the floor in Nepals is to prevent that the children or other locals get ill due to a prolonged, cold contact between the human body and a concrete floor could cause for example diarrhoea. It also invites to take of your shoes before entering the room, as said before also seen in Nepal as a sign of respect, as it is also done by entering for example a temple.



ONE OF THE COURTYARDS OF THE ABC HOUSE WITH THE LOGO



OVERVIEW OF ONE OF THE SPACES



SITTING AROUND A LOWER TABLE, DIFFERENT STRUCTURES VISIBLE



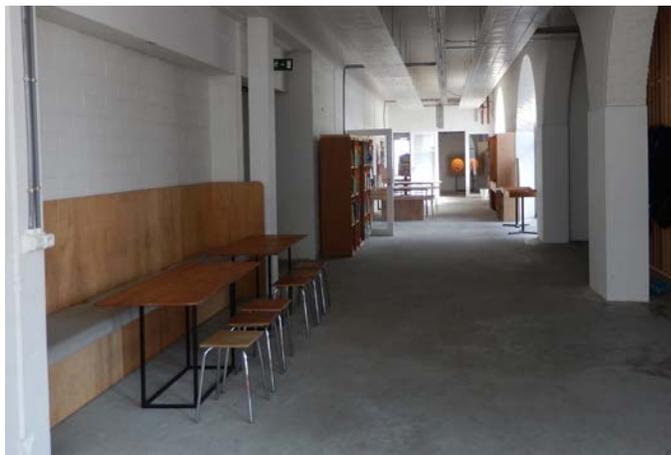
THE ADULT BEING ON SAME HEIGHT



THE CARPET INVITES TO SIT



SITTING AROUND THE TABLE GIVES ANOTHER WORKING ATMOSPHERE



TUMBLING STRUCTURES IN A HIGH POSITION



TUMBLING STRUCTURES IN A LOW POSITION



# THE DESIGN

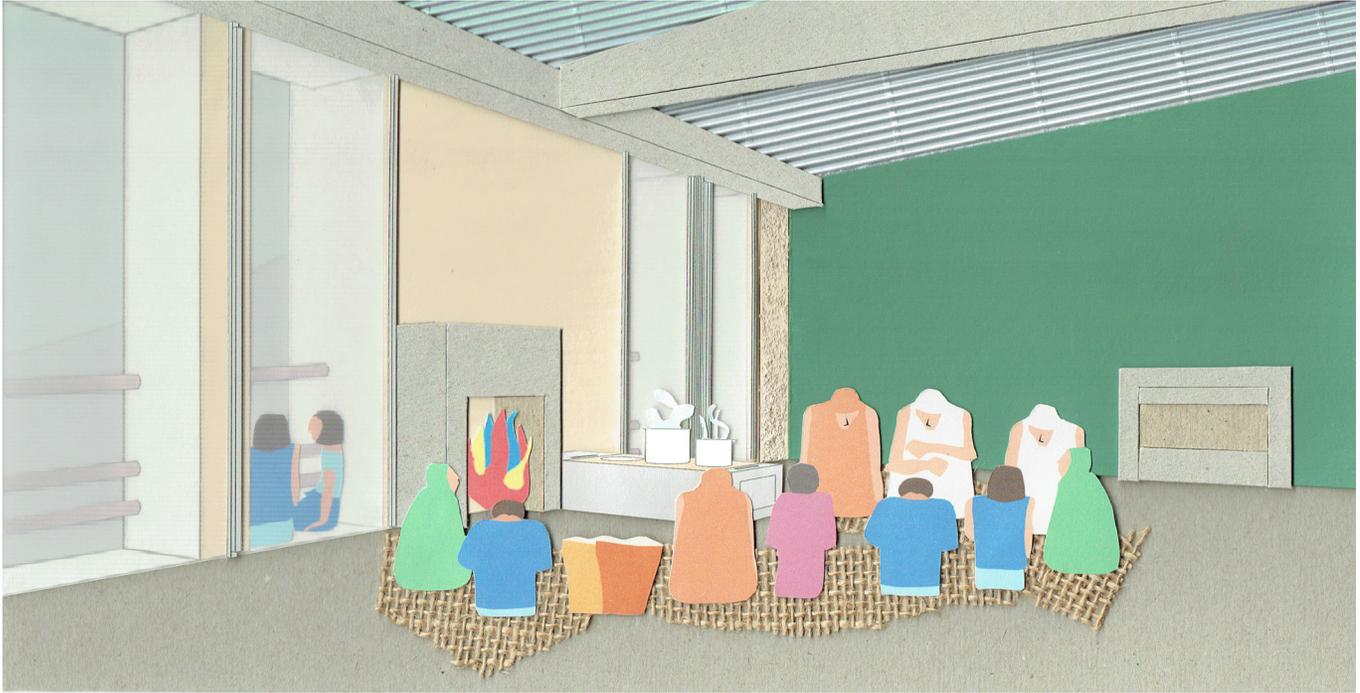
## MY PROPOSAL

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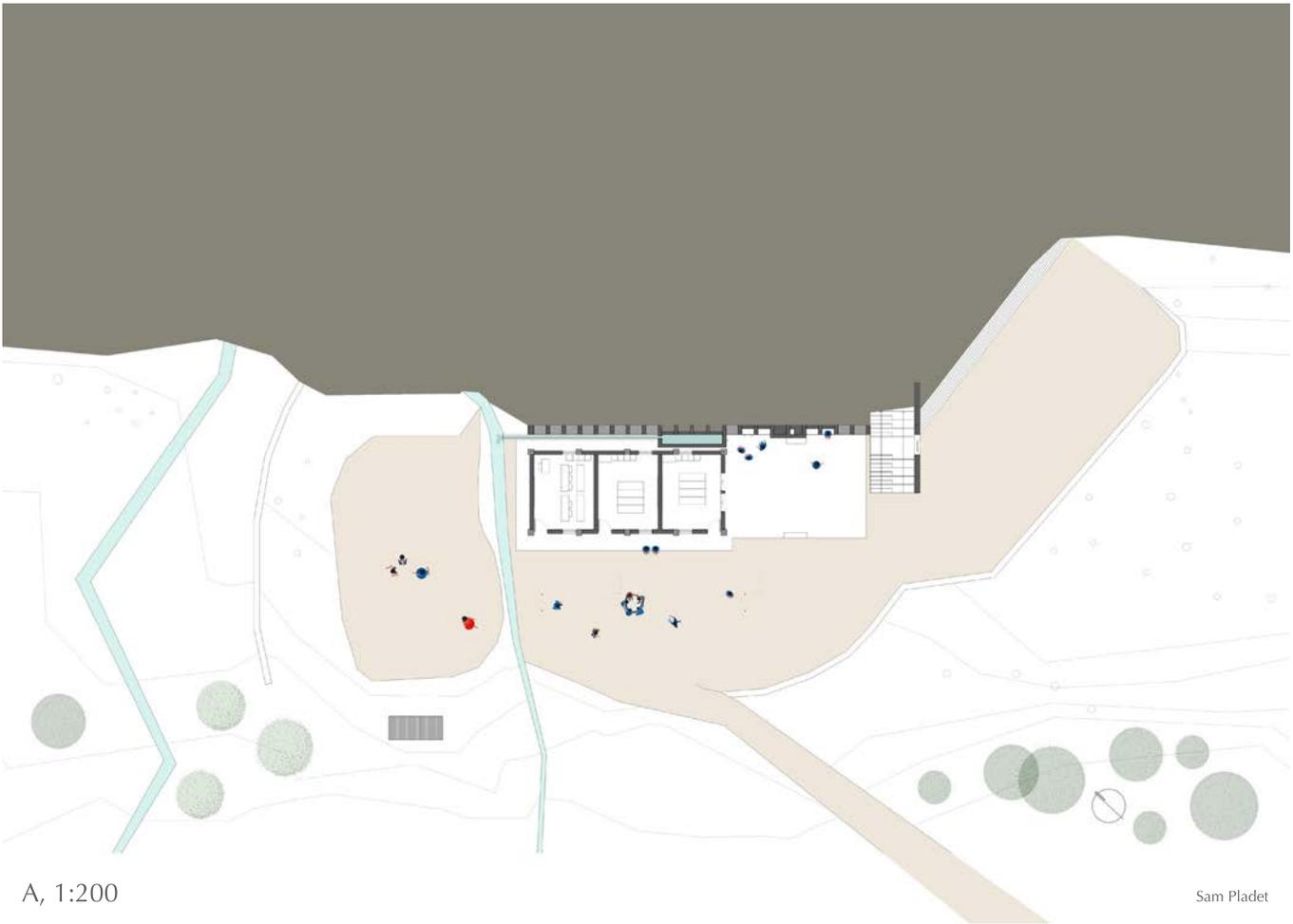
The studio text in the beginning of the book is a guide through the images of my design.





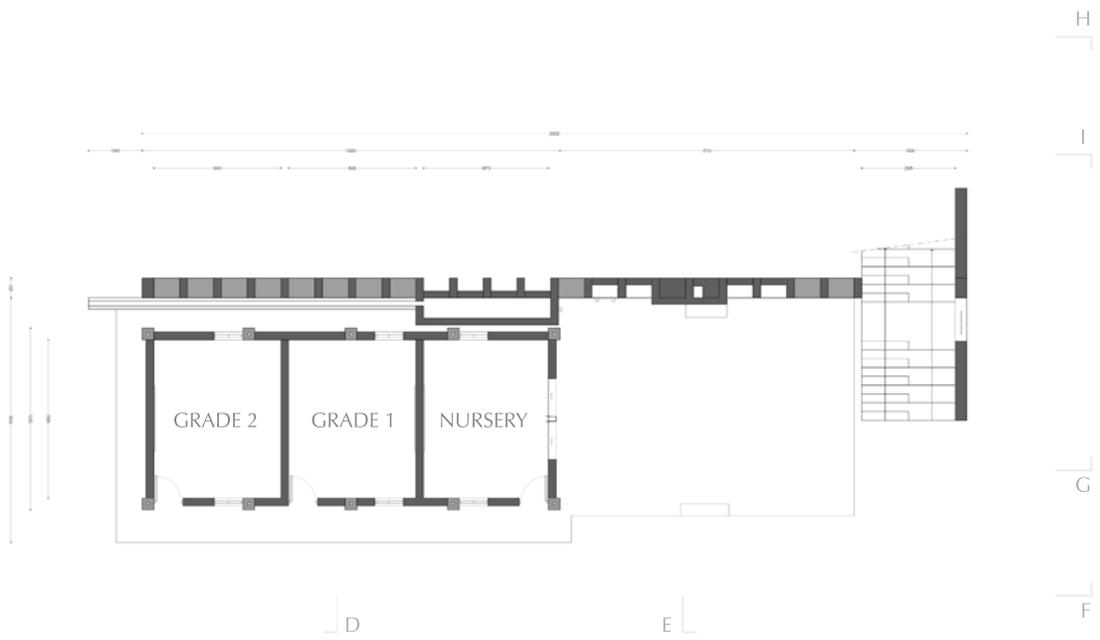






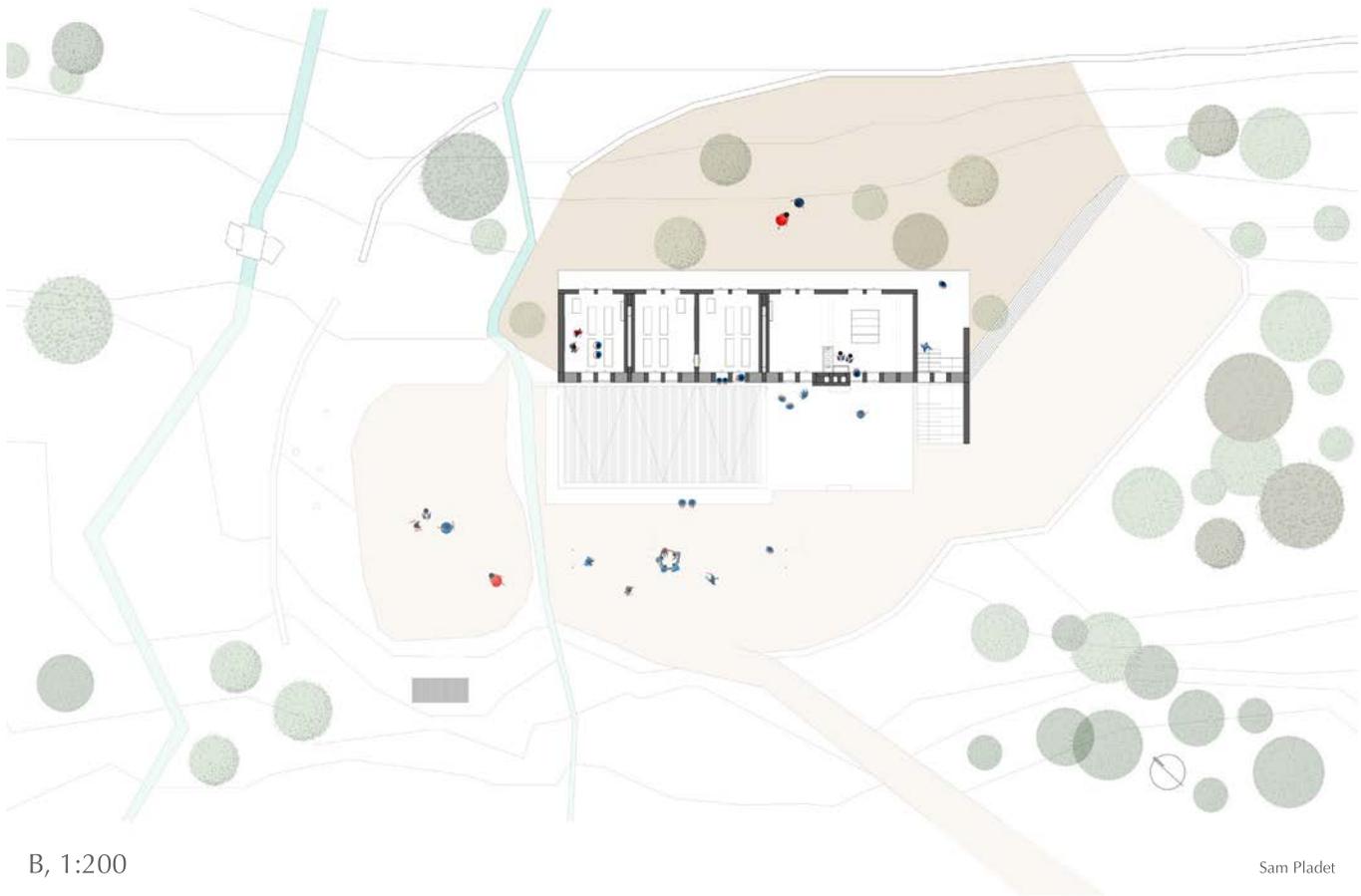
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Sam Pladet



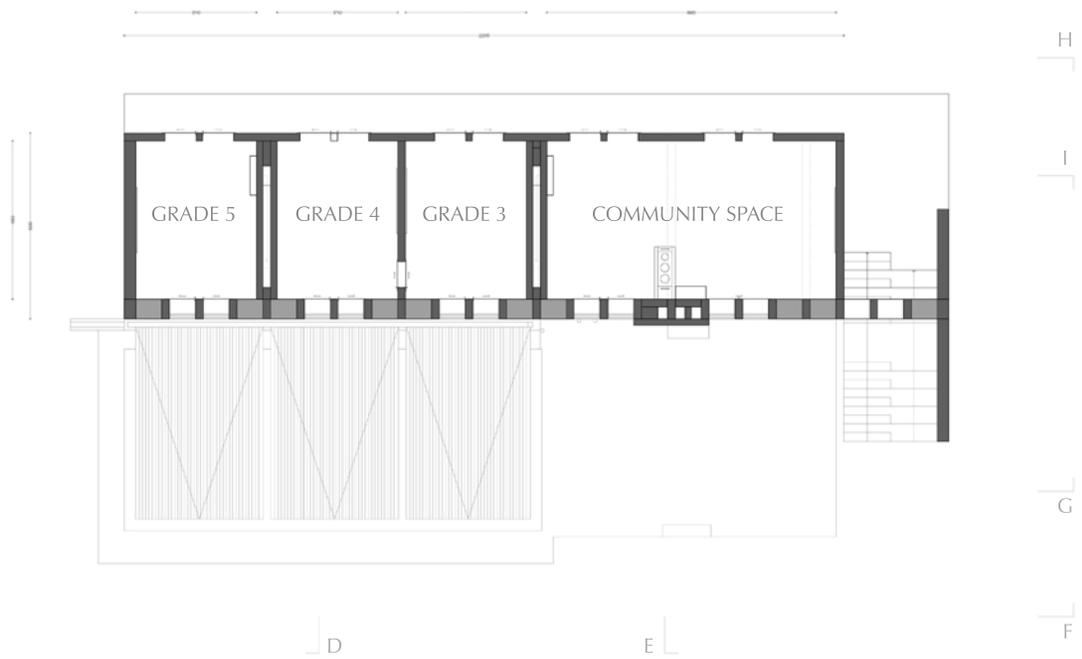
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Sam Pladet



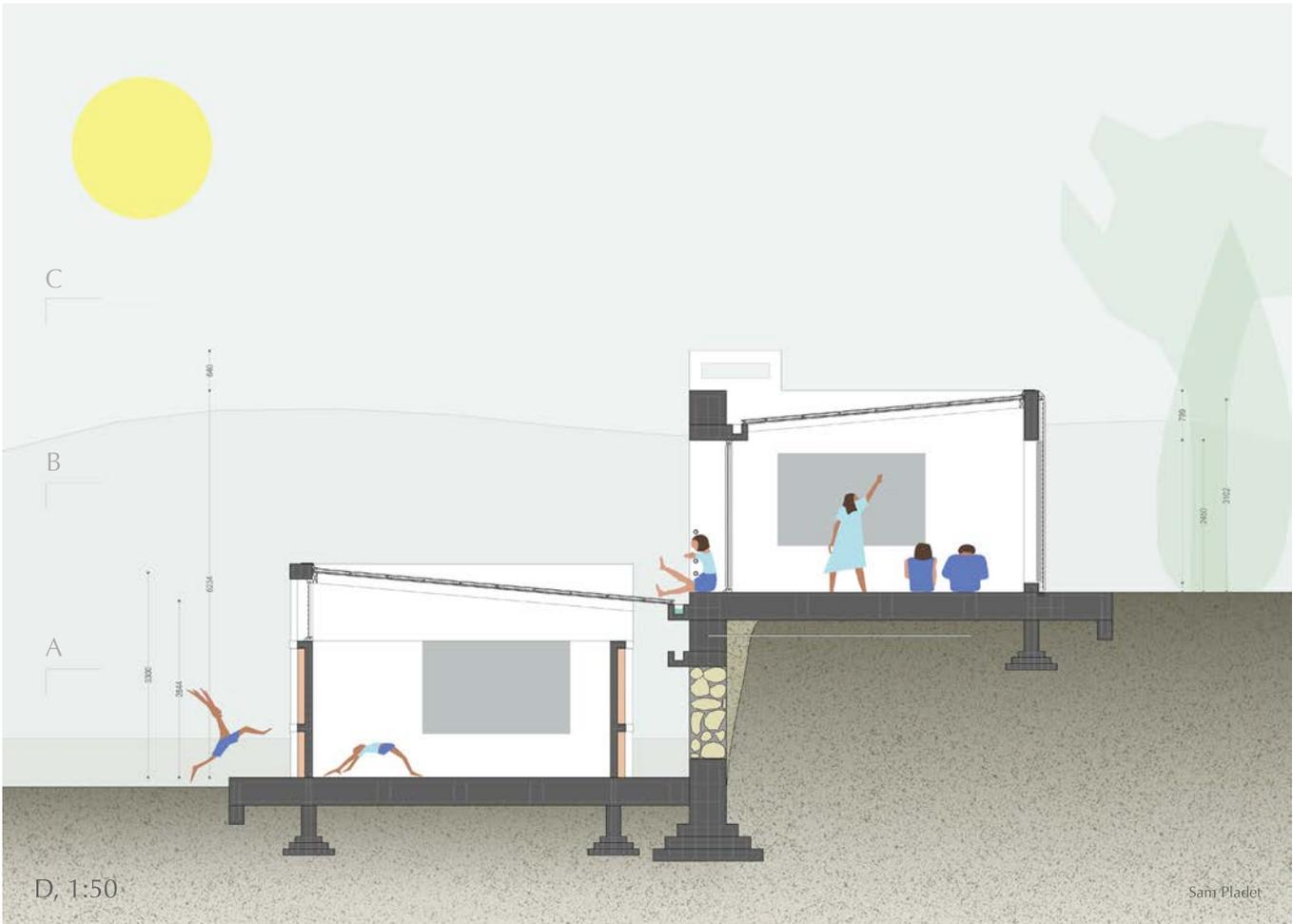
B, 1:200

Sam Pladet



B, 1:100

Sam Pladet



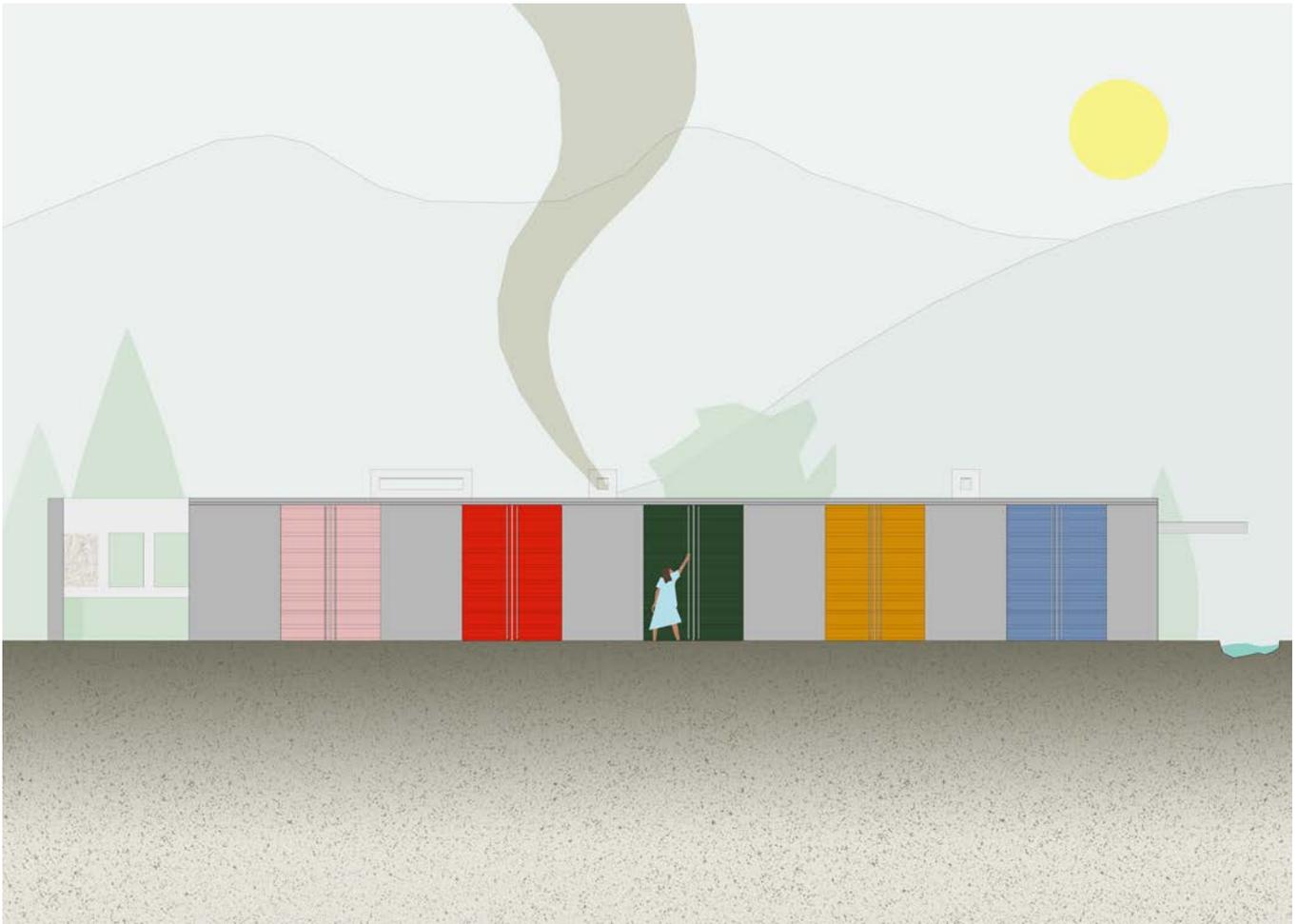




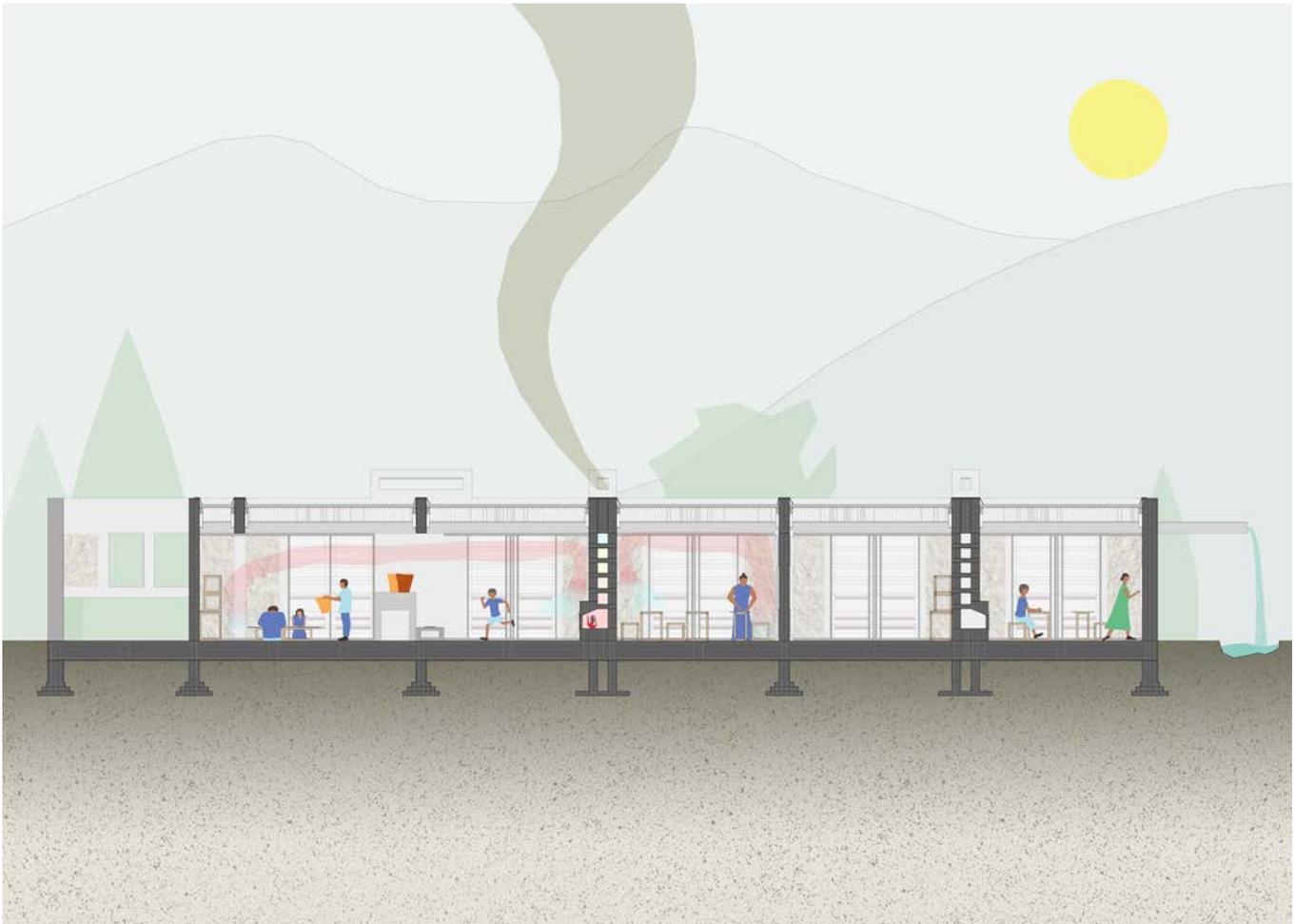


G, 1:100

Sam Plarlet











## IMAGE LIBRARY

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6. Tom Porter, *Colour Outside*, (1982), p. 104.
7. Faber Birren, *New Horizons in Color*, (1956).
8. Franck André Jamme, *Tantra Song*, (2011), p. 88.