RECICLAGEM do

GRANDE HOTEL

BEIRA MOZAMBIQUE

DESIGN FOR THE RECICLAGEM OF THE GRANDE HOTEL

NOTICE

Besides my great care and commitment, I ask for apprehension as being dyslectic for possible typographical mistakes. I see this assignment as vehicle to improve my English writing skills.
(IWAL client number: 2090940)

TU Delft

GRANDE HOTEL DA BEIRA

ADJUSTMENT OF A VERTICAL SLUM IN MOZAMBIQUE FOR TO IMPROVE THE LIVING CONDITIONS OF THE CURRENT INHABITANTS

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Date:	18-04-2013

Releasing from the vicious circle (Verweij 2011)

DESIGN DESCRIPTION

PAPER ABOUT THE 'RECICLAGEM DO GRANDE HOTEL' GRADUATION DESIGN

Perspective impression over the Mercado de Reciclagem

ABSTRACT

The Grande Hotel Beira was once a luxurious hotel in Beira, Mozambique. It was open from 1954 until 1963 and was had the nickname of the 'Pride of Africa'. Actually, it was a 'white elephant'; it was too big, too expensive, too ambitious hotel on the wrong place and at the wrong moment. During the Mozambican Civil War became the Grande Hotel a military base, later on it transformed into a refugee camp. Today it is a vertical slum that is squatting by approximately 1,000 inhabitants. They live in poverty and bad hygienic conditions. Most of the interior and additive construction materials have been stripped-off and sold to generate income for primary survival. Most of the Grande Hotel inhabitants are only capable of earning an essential living in the informal economic sector. They are, as their nickname 'whato muno' (not from here) indicates, excluded from the urban society as well as from participation in the informal sector of Beira. The growing formal economy in the city also put pressure on the informal economy. It became even harder for the Grande Hotel inhabitants to make a living thus makes it even impossible to get released from the poor living conditions. The intervention of the 'Reciclagem do Grande Hotel'' is designed to disrupt the striking living conditions by providing spatial interventions which lead to new socioeconomic development opportunities for the current inhabitants. The concept consists of the establishment of an informal market in the existing garden of the Grande Hotel. The market bases on the recycling and repairing of existing materials by individually owned workshops. The design of the workshops is based-on a open construction module. It is a low-tech and low-cost construction system that will be constructional manageable for the current inhabitants of the Grande Hotel. Besides the socioeconomic development opportunities, the plan consists also of interventions that will improve the hygienic and social conditions of the Grande Hotel thus turning it into a more permanent living environment.

KEYWORDS

Grande Hotel, Beira, Mozambique, colonial heritage, vertical slum, architectural intervention, Mercado de Reciclagem, recycling, waste management, informality, open construction module, Open Building, self-empowerment, African context

BRIEF HISTORY

The architect Fransico de Castro built the prestigious Grande Hotel between 1953 and 1955. The concept design was by the architect José Porto of the Gabinete de Urbanização Colonial in Lisbon, Portugal. It intended to the main showpiece of success of the fascist Portuguese regime – the so-called 'Estado Novo' – in Beira. It was to provide luxury accommodation for business partners, influential persons, and wealthy tourists coming from Rhodesia, South Africa and the Portuguese colonial empire. The hotel consisted of the finest, most luxurious and most modern materials of that time. The total construction costs rose three times over the original budget. This was worth it according to the ideals of client Arthur Brandão, a highly influential person within the regime. With 116 hotel rooms and a floor surface of 21,000 m² it was never profitable according the most prosperous estimations. From 1954 until 1963 the Grande Hotel was in full operation. The expected tourist numbers never flocked to the industrial harbour city of Beira; they preferred the Krügerpark, Victoria Falls and the Bazaruto archipelago. After 1963, the swimming pool in the garden remained open for the neighbourhood. The hotel building was only used as a conference centre and for large parties. Some argue that the reason for its failure was that it could not obtain a casino license (Rolletta 2006; Lança 2010; Anno. 2011). The regime believed that it was immoral to have gambling places in the African colonies (Newitt 2004). Because of this statement and the fact that the client of the Grande Hotel was a high influential person within the regime, the story of the casino could consider being a myth.

After the Carnation Revolution of April 25, 1974 in Portugal, Mozambique obtains its independence. The communist Fremilo party came to power and the local Revolutionary Committee used the Grande Hotel as its base to establish the communist state in the region. This changed after the Mozambican Civil War (1977-1992) broke out. It became a military base and soldiers started to live on the third floor. In 1981, the city became a part of a neutral zone that was controlled by the Zimbabwean Defence Force (Newitt 2004). They secured the harbour and the Beira Corridor. This infrastructural line became important for to securing the imports and exports of Zimbabwe that did not want to do business with the apartheid-governed South Africa. The safety and the aid supply attracted refugees from the interior where the Renamo and Frelimo fought on a guerrilla basis. The Grande Hotel was transformed into a refugee camp and the soldiers where relocated to the battlefield. Since 1992 Mozambique experience stability and peace. Today, the harbour of Beira is rehabilitated and is experiencing a booming economy duel to the transit of minerals to Asia.

CURRENT SITUATION

Today the Grande Hotel has an overpopulation of approximately 1,000 inhabitants (Ivo 2008) while it officially has 116 rooms. Large families, which can consist of up to nine persons, populate the hotel rooms and in-built shelters. They pay no rent and they cannot claim rights of ownership. The space and architecture of the building does not correspond to the needs of the current population. The internal organisation creates a lack of social relationships within the 'community'. Individualism creates a vicious circle for the internal social participation and relationships under pressure because of mistrust. Respect for the chief also decreased by the holding-off any process by the politicians. They had an advanced three-layered chief structure. Today the local municipal secretary of the neighbourhood – who also lives in the Grande Hotel – is seen as the unofficial chief. He does not have power like any other chief of a community in Mozambique. The only common rule of the Grande Hotel is that you have to respect each other, than is the Grande Hotel open to everybody who is in need for shelter.

The maintenance of the collective space is lacking. This causes garbage humps everywhere and it get never cleaned-up. The rainwater leaks through the building and enters though the window frames which have no glass. All the elevator shafts are now open accessible holes that are dangerous with the large child population. In the garden is the former swimming pool that was the first Olympic swimming pool of Mozambique. Today it contains highly polluted water. It is still in-use for domestic purposes by people who cannot afford to buy water from the private-owned water pump at the Grande Hotel. The pool also consists of a large fish population that is consumed by the inhabitants. According the local Red Cross is there a high risk of cholera, diarrhoea, malaria, and scabies hazards (Vasco 2012). The HIV/AIDS epidemic is only making the situation more problematic.

Most of the Grande Hotel inhabitants are forced to work in the informal economic sector. The nickname of 'whato muno' (not from here) (Stoops 2011) excludes them out-of the social and economic community of Beira. The informal economy is on treat though the growing formal economy by the increasing globalisation of the rehabilitated harbour. This puts pressure on the business circumstances of the informal economy. It makes it even harder for the Grande Hotel inhabitants to make an essential living. They have an insecure income for to afford food on a daily base. Poverty also declined the living comfort in the Grande Hotel. An example is the water, sewer and electricity system that are removed for to obtain some money for a daily living. The parquet floor is used as fuel for cooking. The nickname of 'whato muno' also describes the bad reputation of the Grande Hotel inhabitants in Beira. The Grande Hotel considers to be a place where robbers live and where the police have no authority.

However, the Grande Hotel is a fascinating building. It reflects the recent history of Mozambique. The miserable substandard living conditions make the Grande Hotel an unsustainable dwelling place. Most of the people remain trapped in the Grande Hotel due to poverty; some of them are now the third generation living in the Grande Hotel. The local municipality aims to intervene although they are not the legal owner or responsible for the Grande Hotel. Officially, the Grande Hotel is one of the few properties that is not state-owned. It still belongs to the Grupo Entroposto that is the continuation of the Companhia de Moçambique, an ancient Portuguese institute that colonised the interior of Beira. Today there are no funds and political collaboration with the national government due to the different political parties that govern the municipality and the national government (Makgetla 2010). There is even no investor that is willing to participate in this risky project. The idea of the municipality is to relocate the current inhabitants by providing housing in the slums on the outskirts of the city and to implode the Grande Hotel. The plot could be redeveloped as a place for commercial activities.

Fig. 1 – Historic situation of the Grande Hotel (Stoops 2011:1)

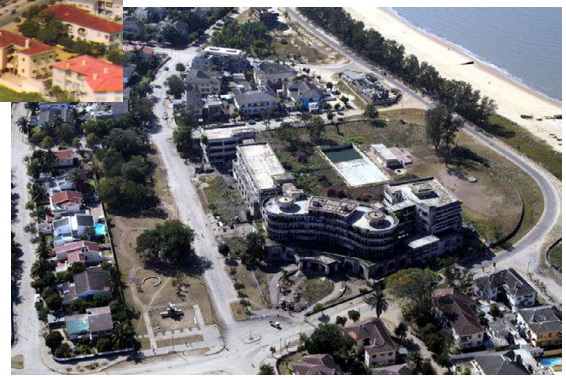


Fig. 2 – Current situation of the Grande Hotel (Verheij 2011)

THE CONCEPT OF MERCADO DE RECICLAGEM

The design goal is to recycle – architectural modification, intervention, transformation – the foreign modern architectural building which has been transformed into a vertical slum and to turn it into a more permanent type of residence for the present community with new socioeconomic development opportunities in the Mozambican neoliberal context. The focus of the design bases on the idea of generating a durable socioeconomic platform on the plot of the Grande Hotel and not directly on improving the living conditions of the individual dwellings in the Grande Hotel building. In the long-term perspective, the increased wealth will lead to improve the living conditions in these individual dwellings.

As mentioned above, is the Grande Hotel inhabitants are forced to compete in the existing fixed informal economy to gain a miserable income. The 'Mercado de Reciclagem' – the recycling market – is a concept that opens up new business opportunities whereby the Grande Hotel inhabitants are able to complement the existing local informal economy to gain a durable and sufficient income. At the Mercado de Reciclagem the Beirians can sell their waste products in a wide range of different workshops. Each workshop is specialised in the transforming or repairing of specific types of goods. The workshop holders for will sell the final product to gain a profit. This socioeconomic concept opens up great possibilities for the Grande Hotel inhabitants to have a sustained livelihood prosperity that will release them from poverty. The city of Beira will also benefit. Besides providing new business opportunities for the existing economy, it will also contribute to the environment. The municipal dumpsite would be less attractive to use for the economical benefit of the Mercado de Reciclagem. They can now earn money with waste. The political interests will be that it generates a positive image by how inhabitants of the city are able to develop and pull themselves out of poverty together in a positive (socio)economic and environmental perspective. The positive drive could be beneficial to the image of the city as a prosperous business climate to attract new companies. The benefit of the Ponta Gêa neighbourhood is that it improves liveability because of all the new activities. The economic activities will contribute to the social integration of the Grande Hotel inhabitants in the urban society of Beira. The new economic complementation will change the negative excluding image of 'whato mundo' towards new social networks that integrate the Grande Hotel into the urban society.

A civil amenity site – also known as a 'household waste-recycling centre' – is a comparative example that explains the organisation of the Mercado de Reciclagem. A civil amenity site is a facility in every municipality of the European Union to which you can take bulk waste. The average civic amenity site consists of a large platform you can drive on top of and in order to distribute and sort the waste into different containers that stand next to the platform (Fig. 3). In the context of the Mercado de Reciclagem each container will be a different workshop that is specialised in the recycling of a specific group of materials or products. Each workshop is owned by a different entrepreneur and will pay each consumer who offers waste, recycles it and resells the final products. During the recycling process a workshop could also obtain other materials linked to its specialisation, which would lead to an internal stream of materials between the workshops (Fig. 4). The diagram of the internal organisation also considers the incoming and outgoing streams as well as the average suspected size and quantity of how the specific materials will be transported, in order: by foot or by car.

Fig. 3 – Civic amenity site of Lelystad, The Netherlands (source: Wikipedia)

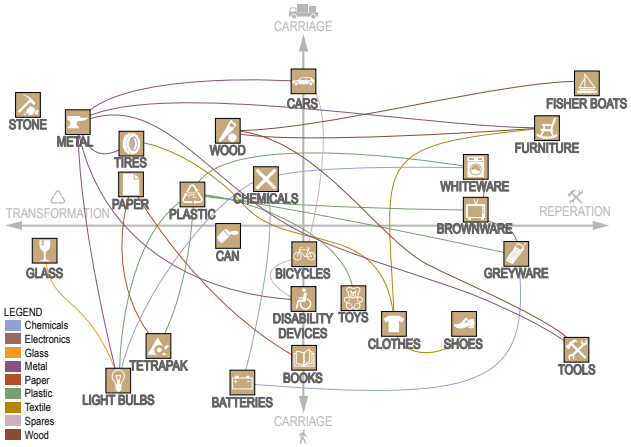
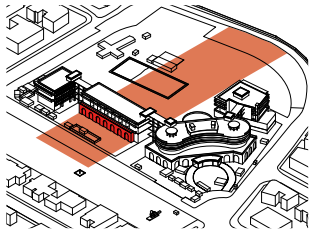


Fig. 4 – Internal organization diagram of the Mercado de Reciclagem

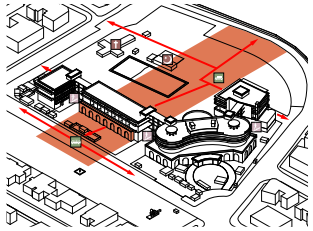
MASTER PLAN

The intervention of the Mercado de Reciclagem on the current site of the Grande Hotel explained visually in the next four steps:



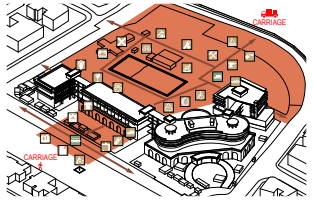
1. INTERVENTION

The garden is polluted by the swimming pool and is mainly unused. The amount of space is suitable for implementing the Mercado. To make the site easily accessible for visitors, the basement and the ground floor level will be cut though in the existing block B. The number of dwellings removed dwellings will be distributed by the addition of the workshops. The intervention also makes an architectural gesture to reclaim the Grande Hotel for the city and implement a new fictive wing as a development for this new era of the Grande Hotel.



2. CONNECTION

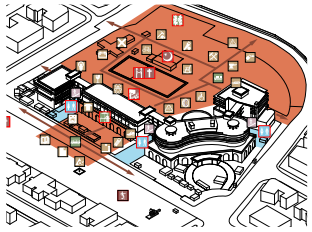
The intervention connects the site of the Mercado de Reciclagem with the existing street on the other side of the existing building. On the street, the Mercado can be connected to the informal public transportation network of so-called chapa's. The other horizontal line will be the access route for incoming and outgoing materials. The existing church and mosque remain on the site. These are the existing gathering places that attract possible consumers. For social and religious reasons it is also an ethical reason remaining the places of worship and integrating them into the plan.



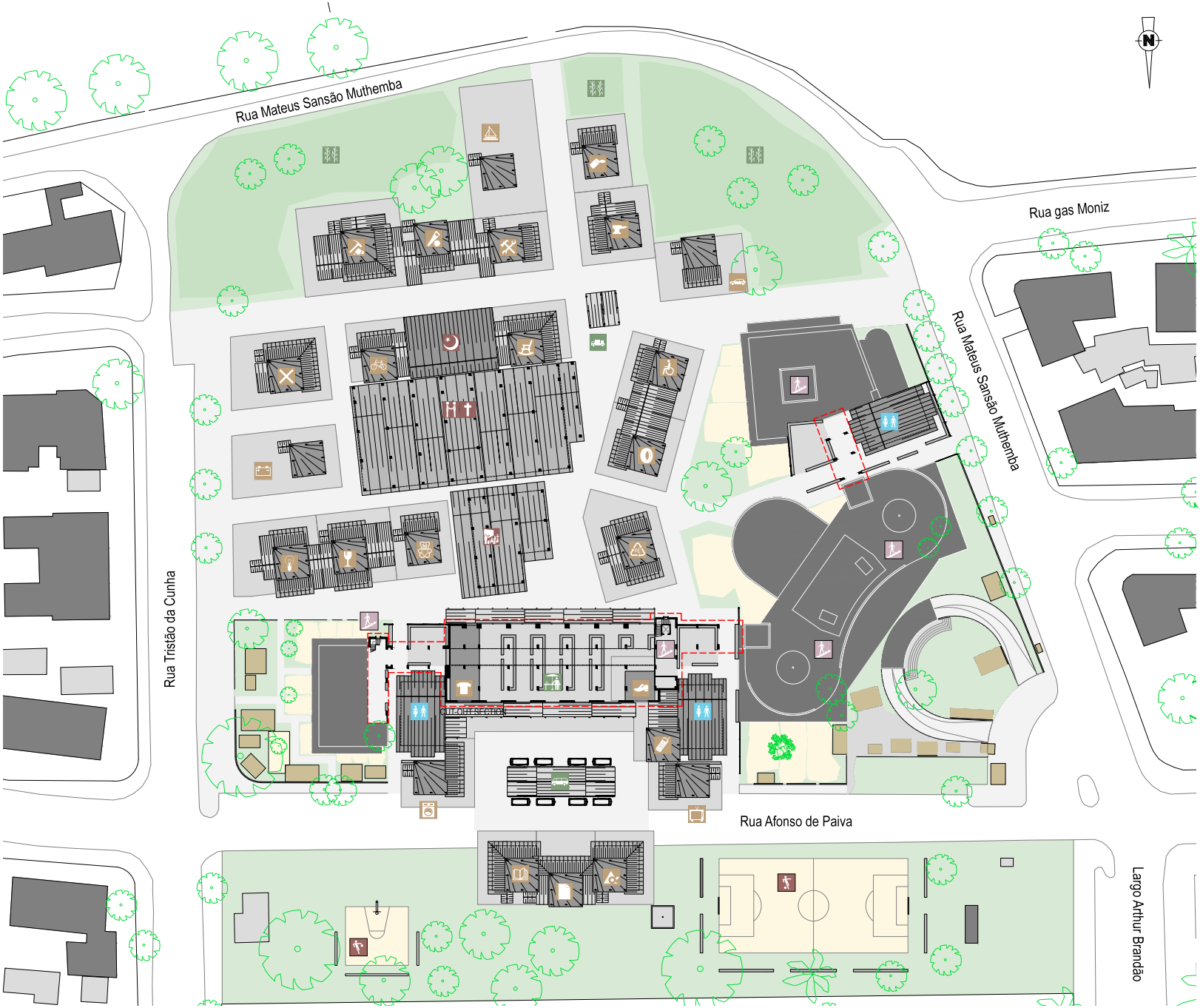
3. IMPLEMENTATION

The different workshops are situated along the connection lines. This is done according to the organisation diagram (Fig. 4) to reduce the internal material streams. The same applies to the incoming and outgoing material streams, as well as the necessary fuel resources for the recycling process: electricity, burning wood, water, etc. The workshops are designed according to the open construction module, which will be explained later on.

4. ADDITION



Besides the creation of an economic platform, there is also a need for to implement social and hygienic improvements to the exterior of the Grande Hotel. The existing church and mosque are centrally placed in the master plan. The church is relocated above the existing swimming pool. The polluted water is covered by garbage and concrete. The remaining pit is transformed into a stage and is covered by a roofing structure, which makes it a central gathering place like the 'oupale' in the kraal concept (see the Social Conditions paragraphs on the Research page of the Grande Hotel project website). The central gathering place could be used for small or large community meetings, church services, but also for markets. The mosque, however, is not moveable for religious reasons. The existing mosque building is integrated into the new context by adding a new floor for a prayer room for women and a veranda to express the communal character of the building. In the removed section of block B of the existing Grande Hotel building is transformed into a permanent market hall. Here entrepreneurs can establish their businesses to sell food, drinks, household goods, airtime, and other goods that could be attractive to sell to the consumers and Grande Hotel inhabitants. To provide a proper alternative to the swimming pool as well as to solve other hygienic problems, there are three latrine units implemented (the blue icons in Fig. 8). The units are situated between each block of the existing Grande Hotel building and are directly connected to each floor. The latrine unites facilitates: sanitation, bathing, water taps, laundry places, and garbage collection. It also serves to protect the semi-entrances of the Grande Hotel building to the public area of the Mercado de Reciclagem and generates a communal gathering place for the Grande Hotel community itself. All these constructions are based on the open construction module.



RECYCLING WORKSHOPS:

- Batteries
- Bicycles
- Books
- Brown ware
- Can
- Cars
- Chemicals
- Clothes
- Disability devices
- Fisher boats
- Furniture
- Glass
- Grey ware
- Light bulbs
- Metals
- Paper
- Plastics
- Shoes + flip-flops
- Stone
- Tetra Pack
- Tires
- Tools
- Toys
- White Ware
- Wood

ADDITIONAL FUNCTIONS:

- Agriculture (future workshop extension)
- Basketball court
- Cargo bay
- Chapa rank
- Children garden, meeting place
- Church
- Community hall
- Lavatory units
- Market hall
- Mosque
- Soccer Field
- Stairs (existing in Grande Hotel)

Fig. 9 – Masterplan of Mercado de Reciclagem (Scale 1:1500)

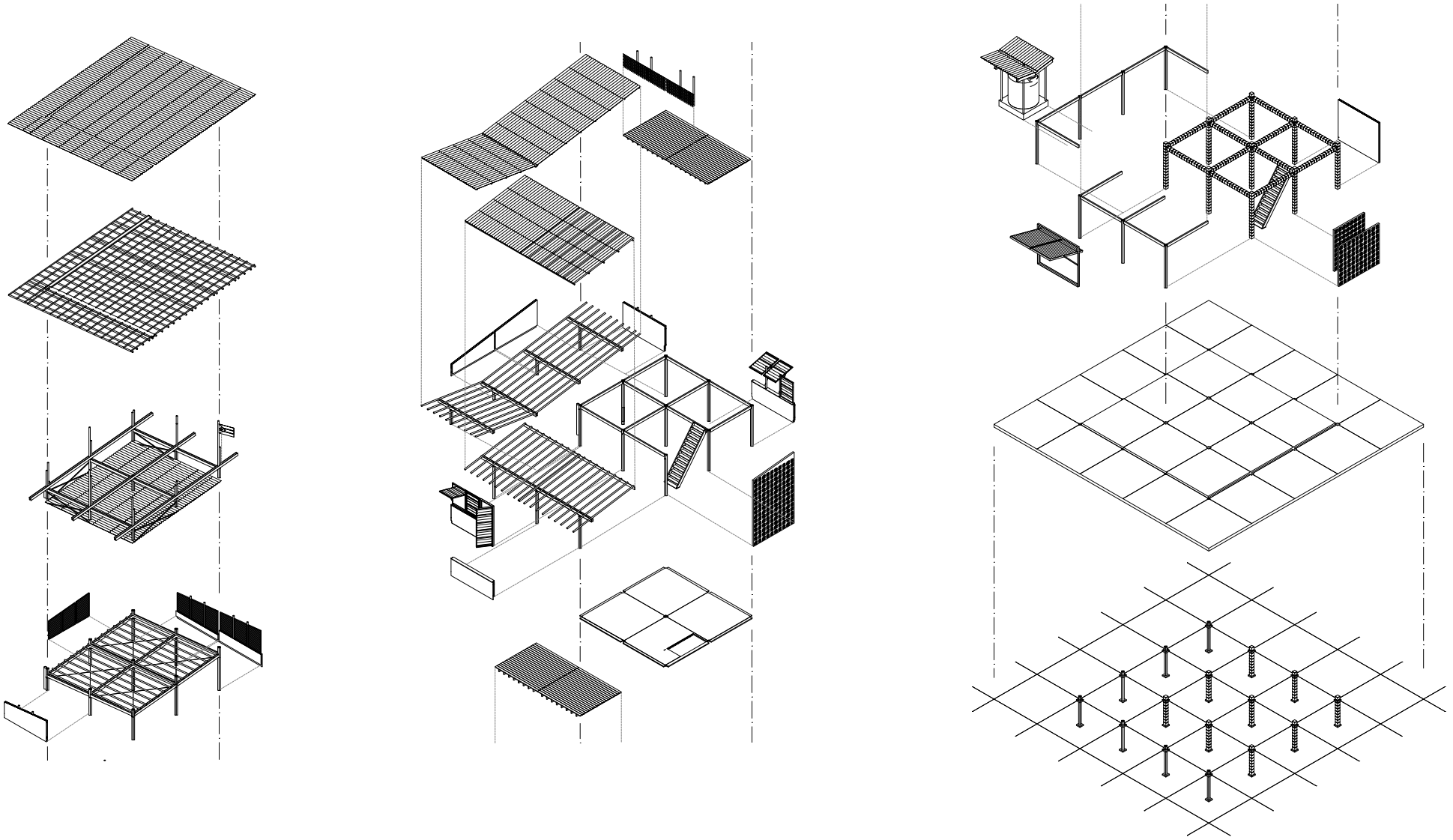


Fig. 10 – Exploded-view of a workshop with different elements of the open construction module

THE OPEN CONSTRUCTION MODULE

The workshops and the additional constructions of the Mercado de Reciclagem are based on the open construction module. It applies low-tech and locally applied construction materials and techniques so that the unskilled Grande Hotel inhabitants are able to build, adjust, replace, and rebuild the various constructions. The module gives the Grande Hotel inhabitants self-control allowing them to arrange their living environment to meet their owns needs and desires, not only at a single point in time but also in future perspective. The 'bottom-up' approach of the design is inspired by the ideology of 'Open Building' of John Habraken (1961). The open module system is based on a grid of 3.50 by 3.50 metres, which can be fit-in into the existing floor plans of the Grande Hotel building.

The workshops consist of a constructive base frame of prefabricated concrete elements that are connected with reinforced in-situ concrete. This makes it resistant to cyclones that are rare in Beira. Each workshop can be extended by means of wooden frame elements construction to a floor plan that suits to the specific needs of the workshop. The dwelling on top of the concrete main frame is also made of a wood frame but it is more restricted to basic rules to sustain a proper internal climate. Each dwelling has an up-wind wedge roof that needs to be orientated in the average dominant north-eastern wind direction. This secures the exhaust of hot air and fire smoke and the supply of fresh air though under-pressure. The secondary outer roof provides insolation. The roof structure does not give convection warmth to the interior though the 1.80 metres open air buffer between both roofs. The overhang of the secondary roof prevents direct sunlight falling on the inner-roof. Another beneficial property of this particular roof shape is the rainwater collection. The lowest point of the roof drains to a water tank. Each workshop has a private water-tank with a minimum capacity of 5,000 litres. The capacity will be sufficient for a household of five persons to be able to rely only on the rainwater collection throughout the year. The shape of the roof forces the owner to situate the water-tank on the shaded southern side of the workshop.

The internal organisation of the dwelling is based on the outcomes of the research concerning the daily use of the current Grande Hotel inhabitants (see The Daily Use paragraph on the Research page of the Grande Hotel project website). The first floor is a large living space that could be adapted to a range of household activities. The central sitting area is situated around a concrete fireplace. The smoke exhaust is via the natural ventilation and under pressure. The smoke is used to prevent malaria mosquito's entering the dwelling. The sleeping area is situated on the second floor. The none-separation of the sleeping place from the living place is a major principle that clashes with the architecture of the hotel room dwelling in de Grande Hotel and its current habitation. The height difference separates the sleeping area from the living area in the workshop, although it benefits from the smoke exhaust as malaria prevention.

The flexibility of the module is also represented in the façades. The façade of each workshop could be composed of various types of different façade elements. Because of the fixed dimensions of the constructive elements can be every façade element placed at every side. In the elaborated design, it is suggested that the stabilisation walls should be made of decorative cement blocks. The closed walls have a plastered surface and are filled with none-biodegradable garbage that creates a lightweight wall that is cheap because of the local material use and it does not absorb as much warmth as conventional walls used for local shelter constructions. On the ground floor are the openable façades made of grates of wood and a steel frame. The grates open by the bascule technique of a balanced self-weight. When the grates are opened, they will reduce the barrier between the internal and external working area to a minimum. This will generate direct contact between the public street and the working area, which will also lead to better mutual social integration.

CONCLUSION

The Mercado de Reciclagem is a socioeconomic platform that will provide solutions for to improve the miserable living conditions of the Grande Hotel. It will generate a durable income, social integration, hygienic, and environmental improvements. It will not only bring prosperity to the Grande Hotel but it will also complement to the socioeconomic and environmental development of the city of Beira. The architecture of the open construction module introduces self-control for the Grande Hotel inhabitants for to arrange their living environment to suit their own needs and desires. Not only in a single point in time but also in the future the module is able to be adjusted, replaced and rebuilt. It consists of low-tech and local applied construction materials and techniques that are mastered by unskilled labour. The design focussed on the implementation of the open construction module on the exterior of the existing Grande Hotel building while the module could also be internally implemented. This was not directly in the design scope of the project, but indirectly is it possible that due to the increased wealth of the Grande Hotel inhabitants they will be able to realise it by themselves. The 'Open Building' concept will make the inhabitants is able to adapt the foreign modern architecture building and transform it to their own needs and desires. The 'bottom-up' approach of the construction module provides a fixed overall frame which secures a general order to provide a healthy built environment but gives the inhabitants the control to adjust their living environment to their specific needs and desires.

REFERENCES

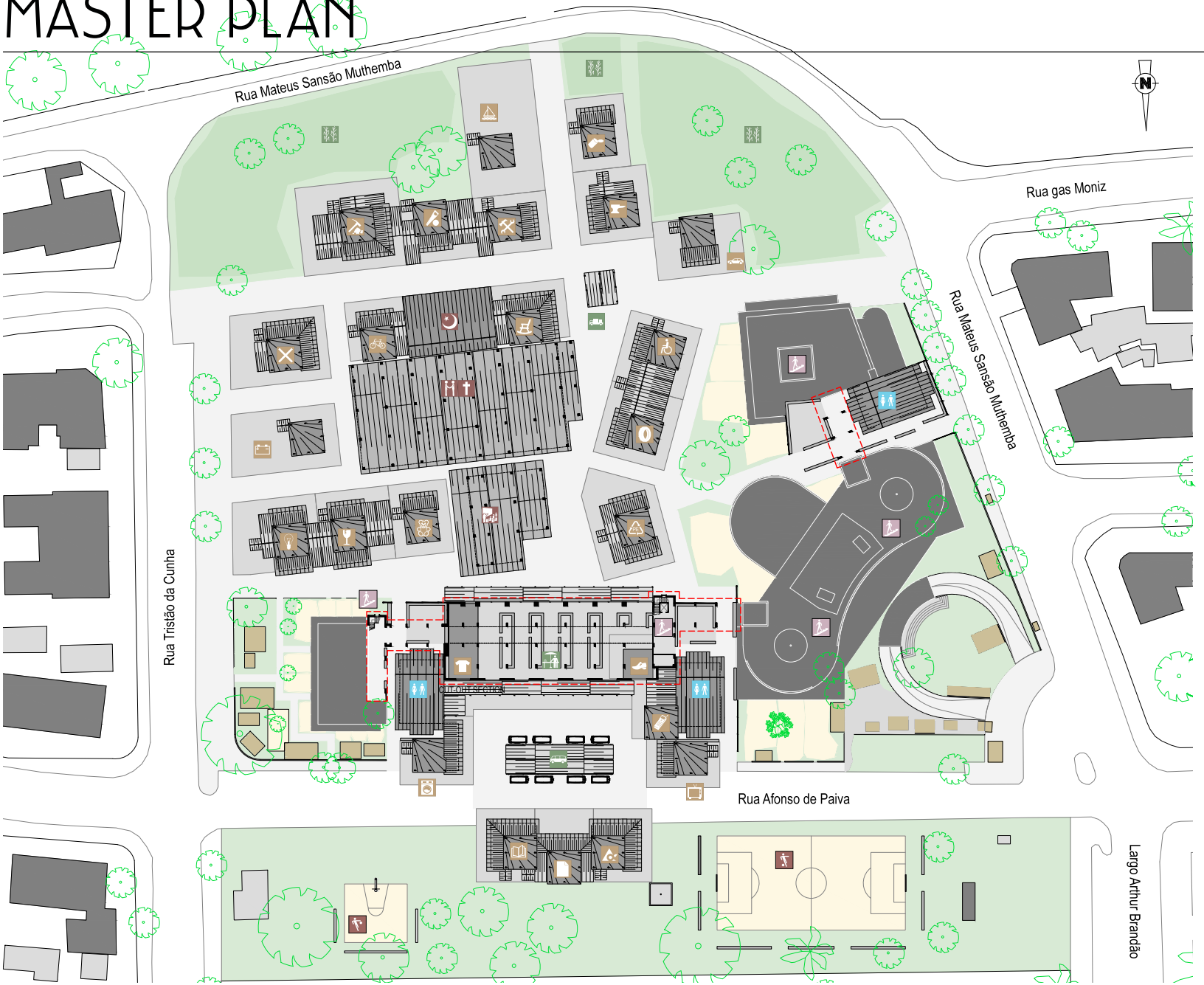
All given references can be found in the Reference-chapter of the Story-part of the thesis, p.169.

Improving the striking conditions (Stoops 2011:1)

DRAWINGS

TECHNICAL DRAWINGS OF THE 'RECICLAGEM DO GRANDE HOTEL' GRADUATION DESIGN

MASTER PLAN



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- Can
- Cars
- Chemicals
- Clothes
- Disability devices
- Fisher boats
- Furniture
- Glass
- Grey ware
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- Plastics
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- Tetra Pack
- Tires
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- Basketball court
- Cargo bay
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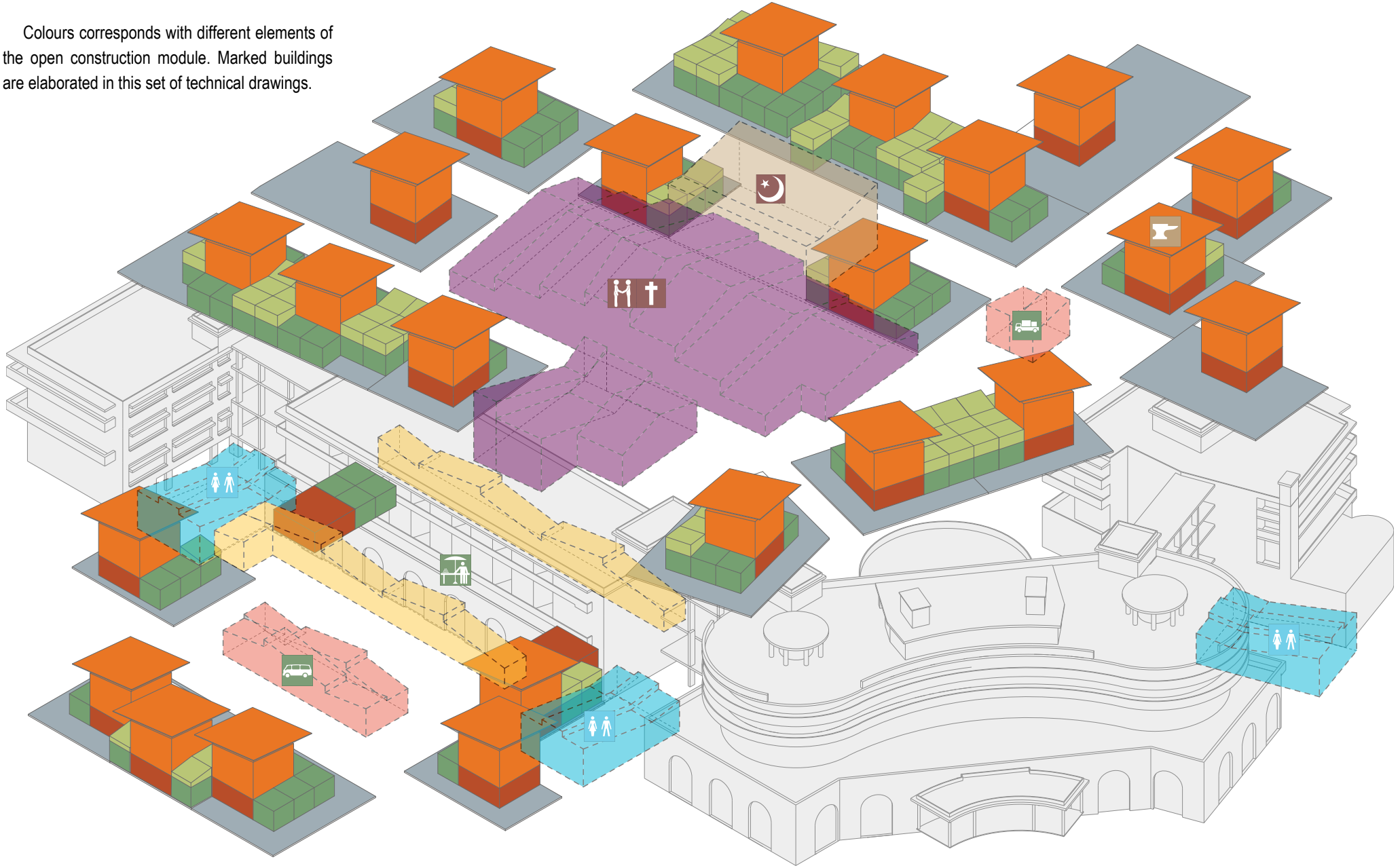
- Children garden, meeting place
- Church
- Community hall
- Lavatory units
- Market hall
- Mosque
- Soccer Field
- Stairs (existing in Grande Hotel)

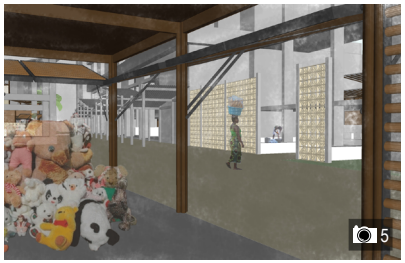
Scale 1:1500

SMARTIES SCHEME

Colours corresponds with different elements of the open construction module. Marked buildings are elaborated in this set of technical drawings.



IMPRESSIONS

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ADDITIONAL FUNCTIONS

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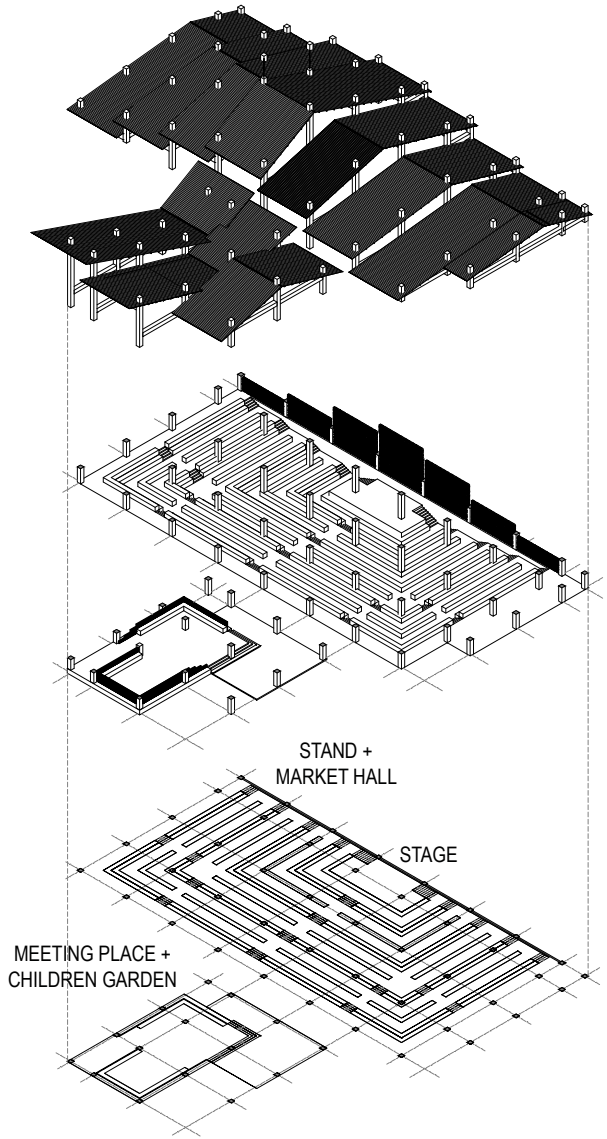
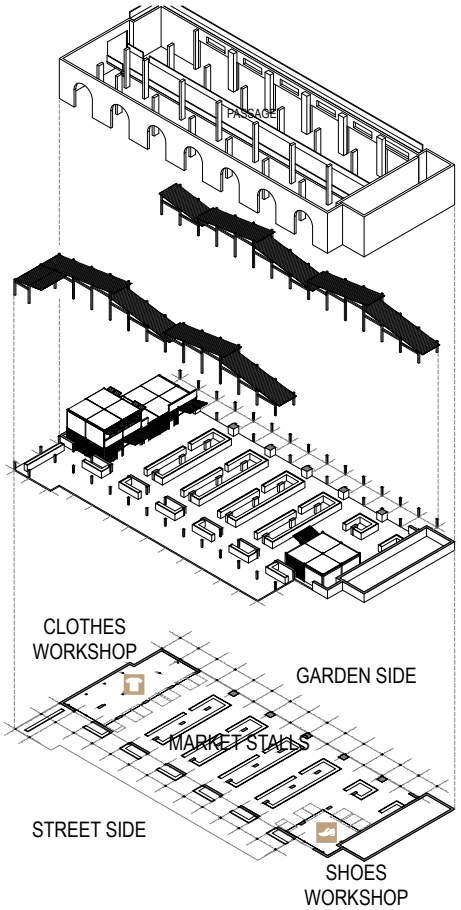
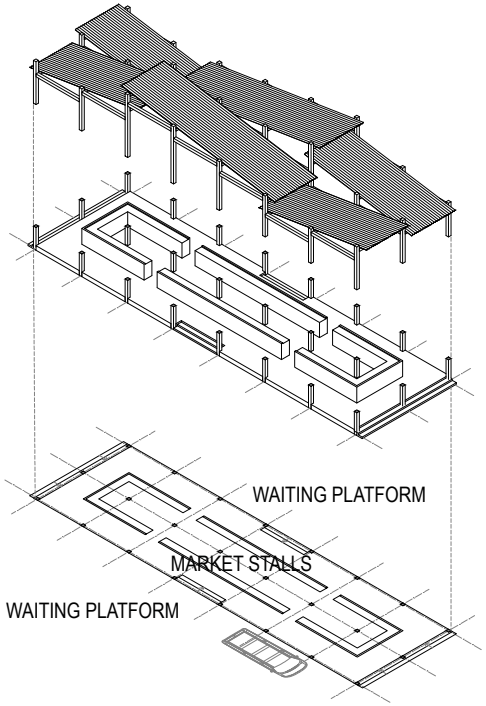
GRID COM. HALL: 7.000 x 7.000 mm
GRID OTHER: 3.500 x 3.500 mm



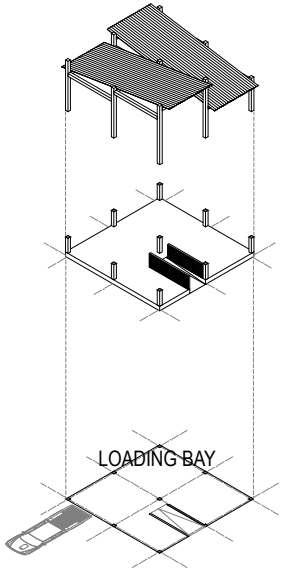
COMMUNITY HALL + CHURCH



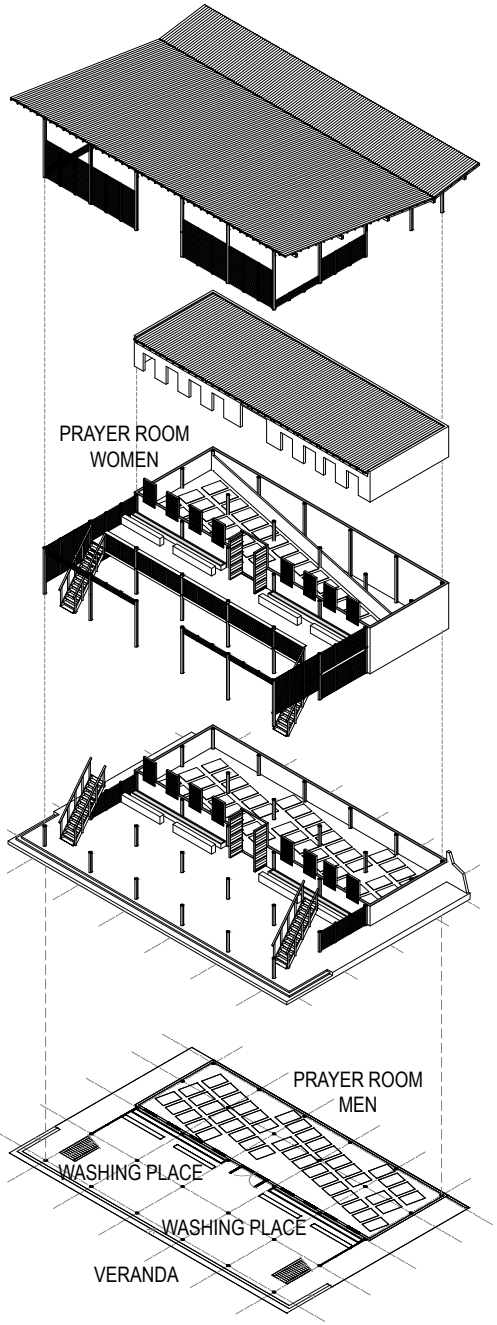
MARKET HALL



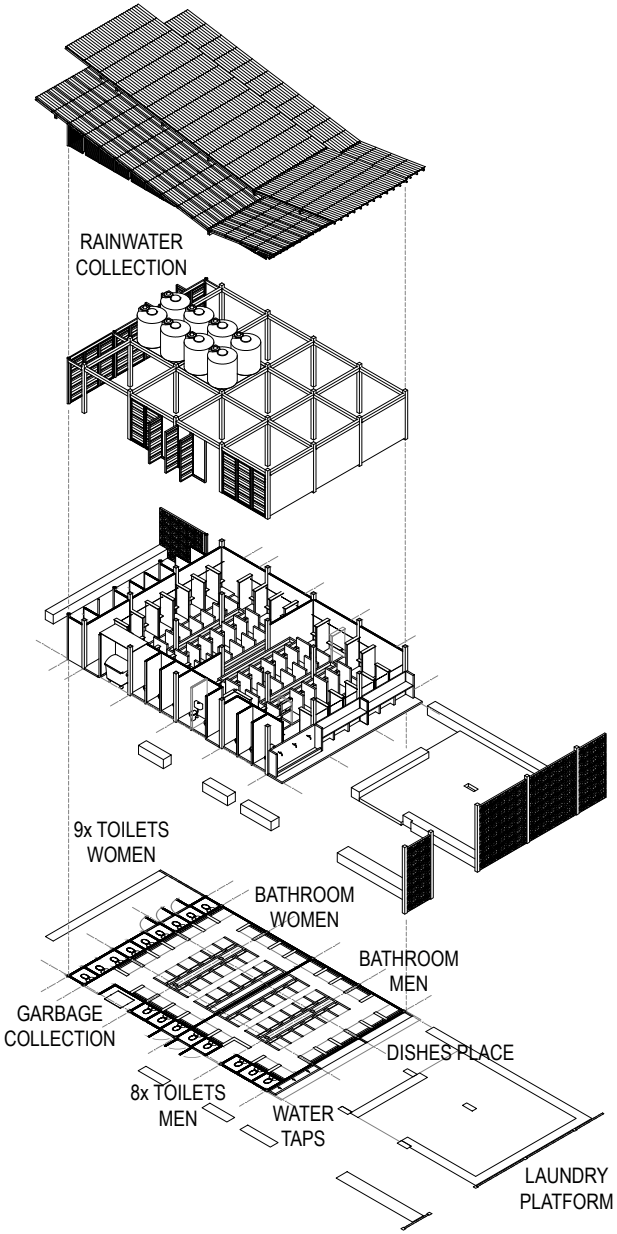
CHAPA RANK



CARGO BAY



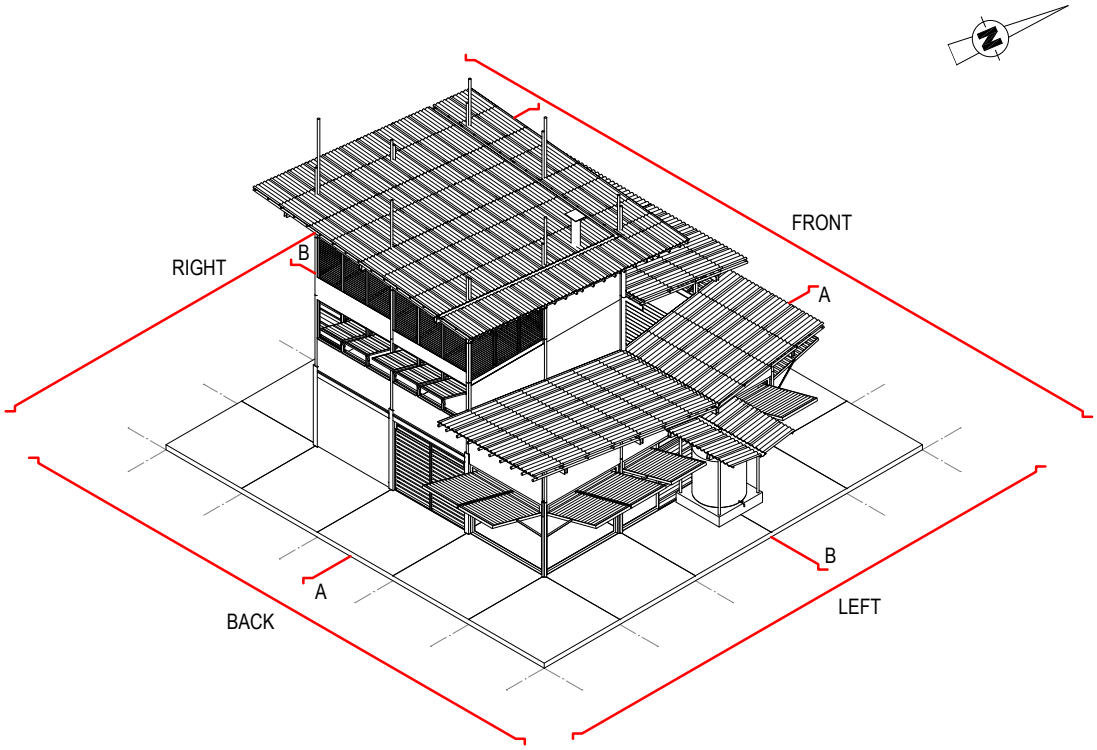
MOSQUE



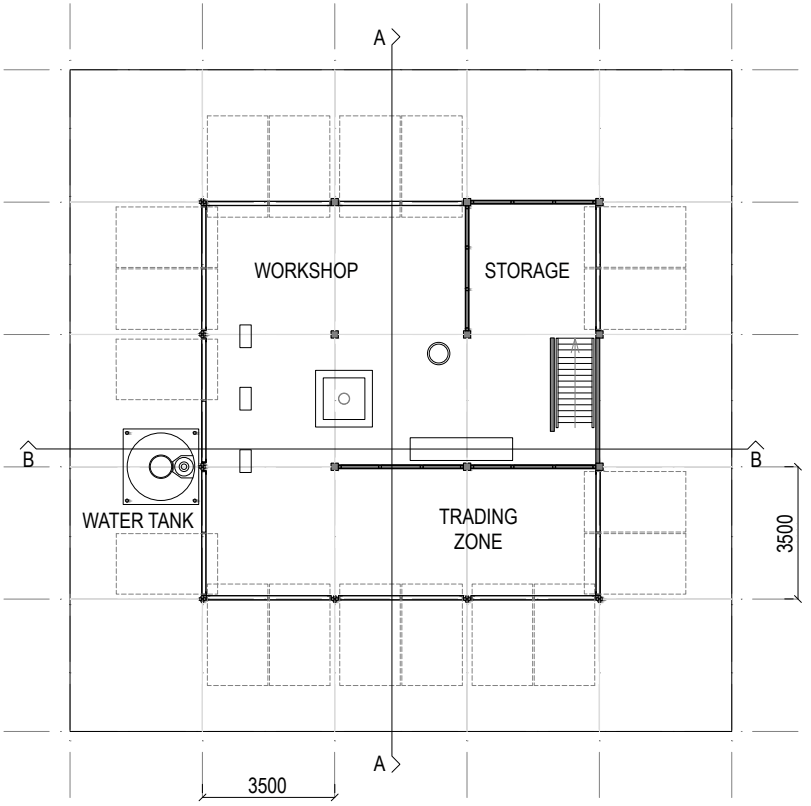
LAVATORY UNITS

PLANS METAL WORKSHOP

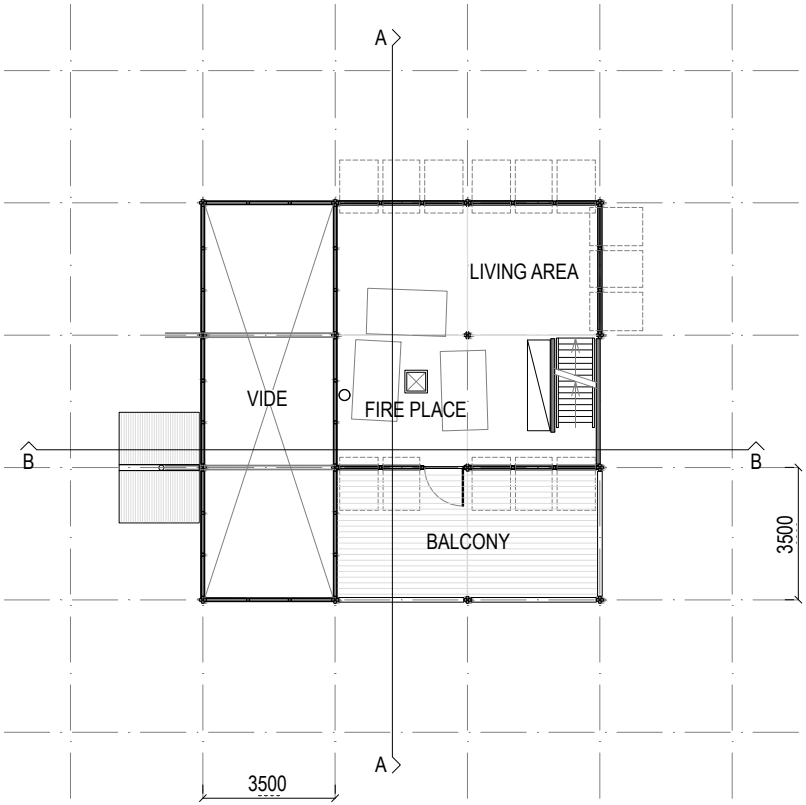
SCALE: 1:400



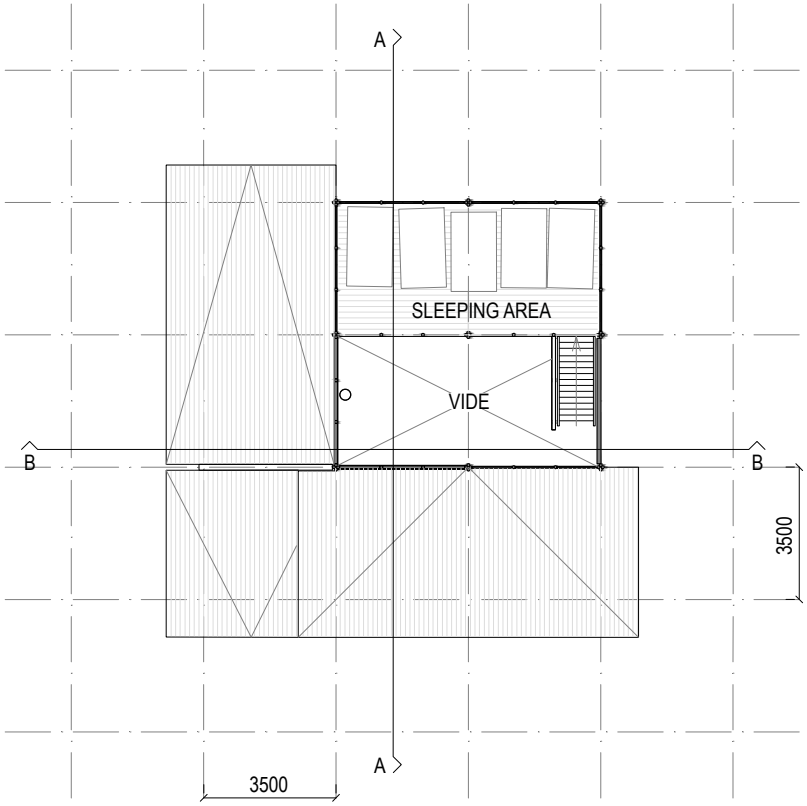
ISOMETRY



GROUND FLOOR

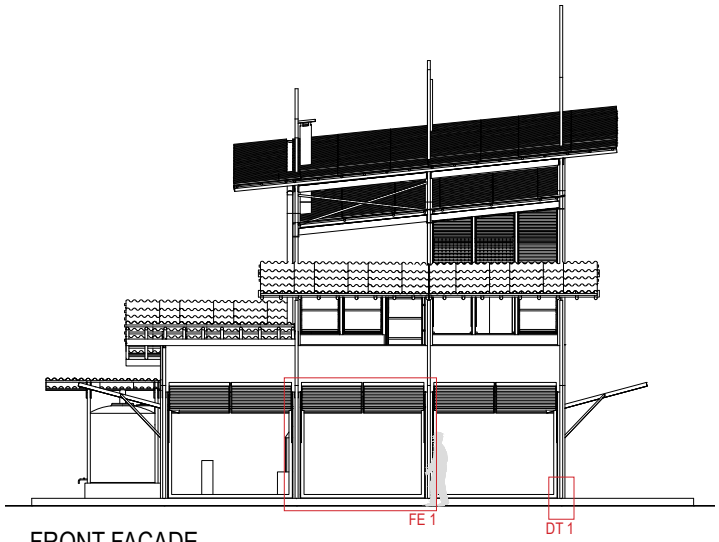


FIRST FLOOR

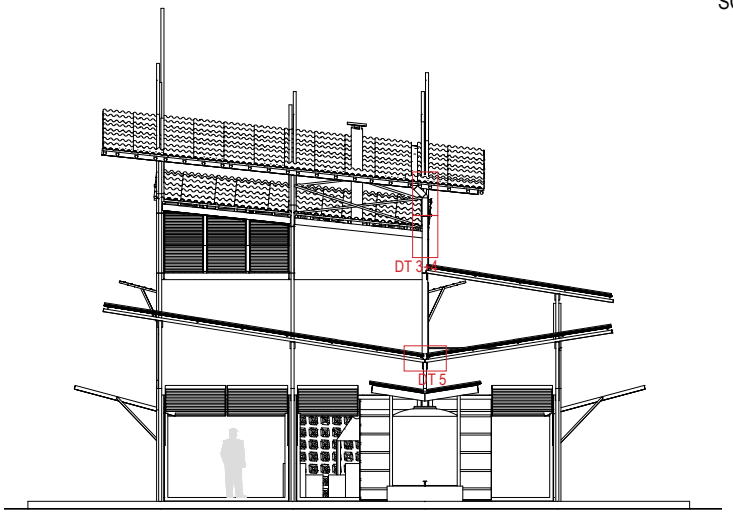


SECOND FLOOR

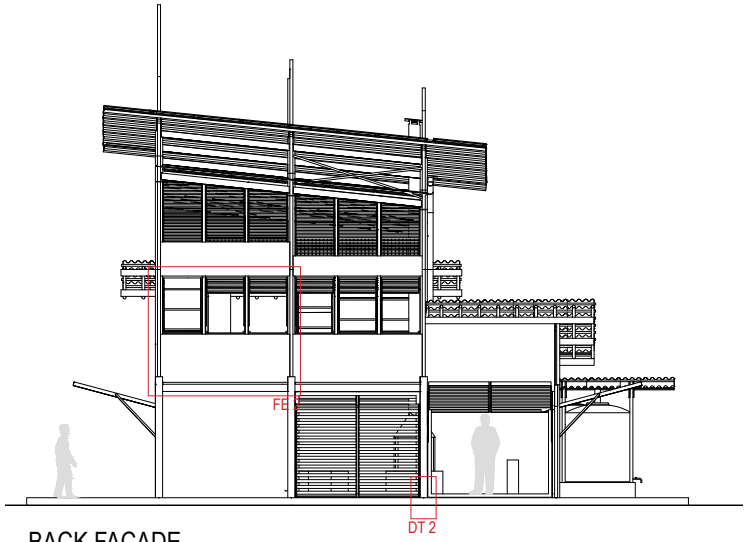
SCALE: 1:400



FRONT FAÇADE



LEFT FAÇADE



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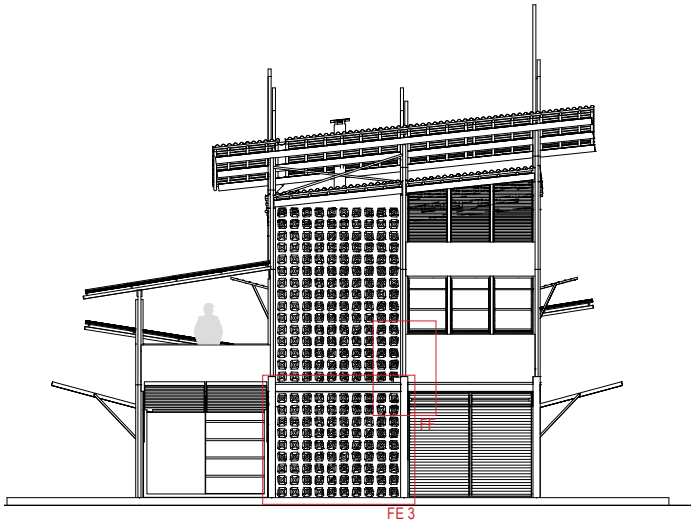
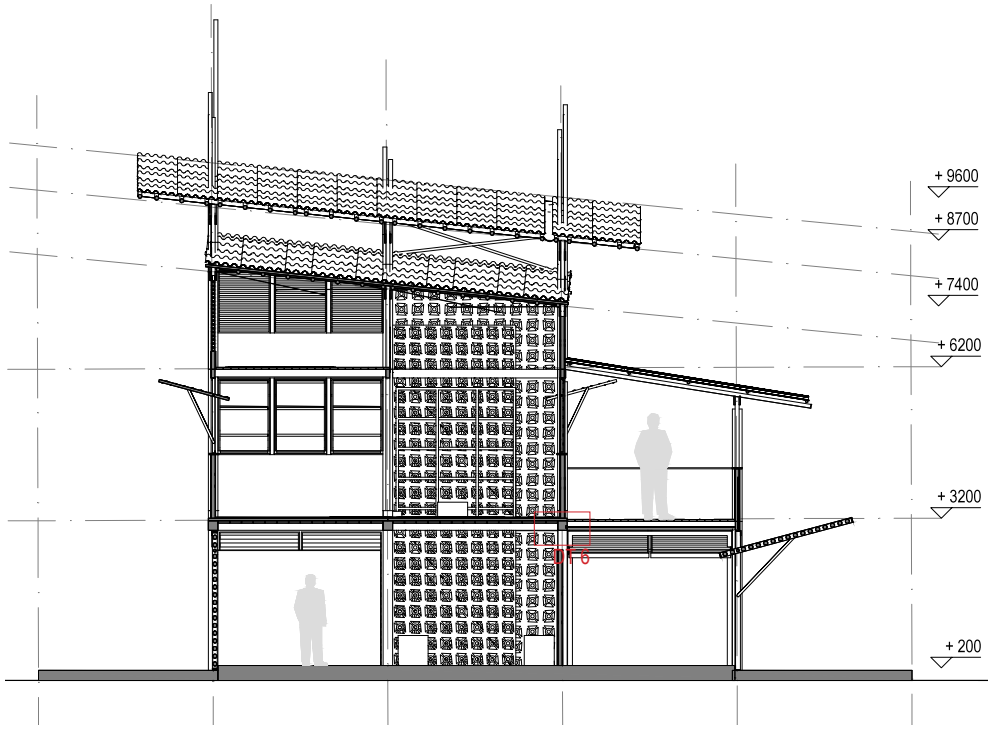


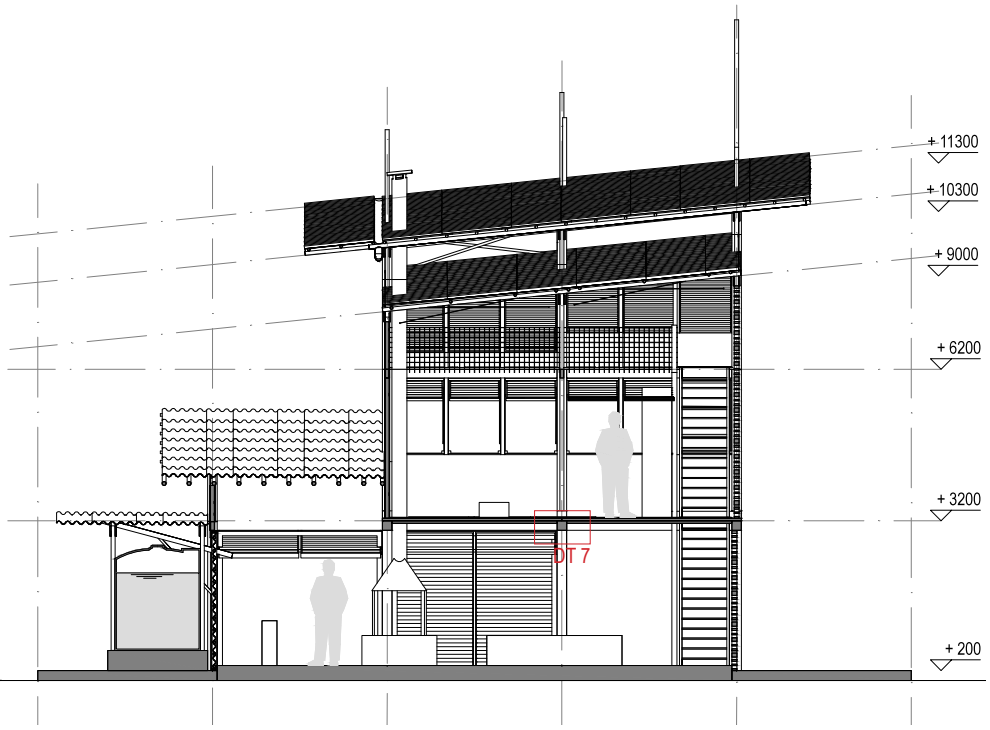
RIGHT FAÇADE

SCALE: 1:150



SECTION A-A

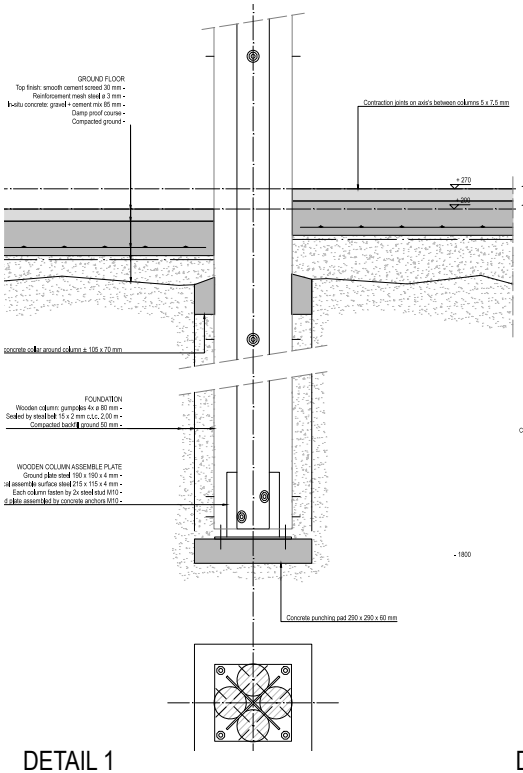
SCALE: 1:400



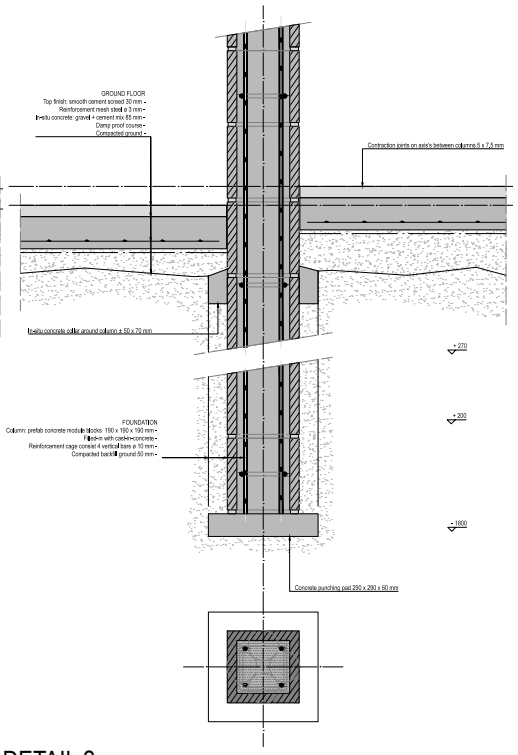
SECTION B-B

DETAILS METAL WORKSHOP

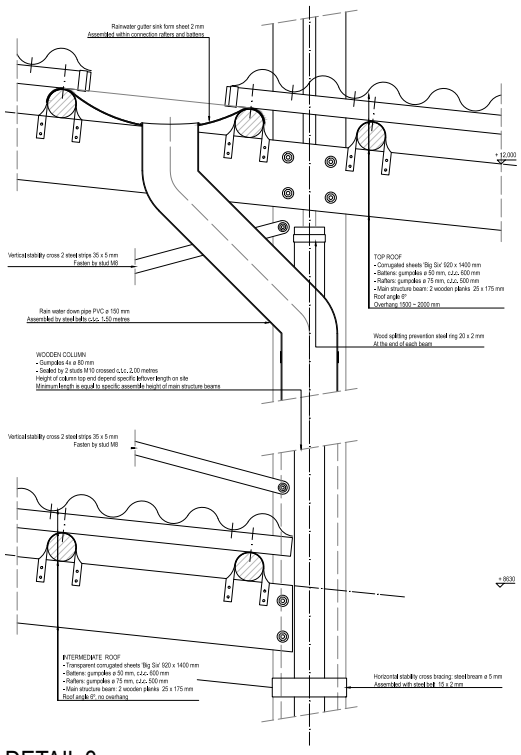
SCALE: 1:40



DETAIL 1



DETAIL 2



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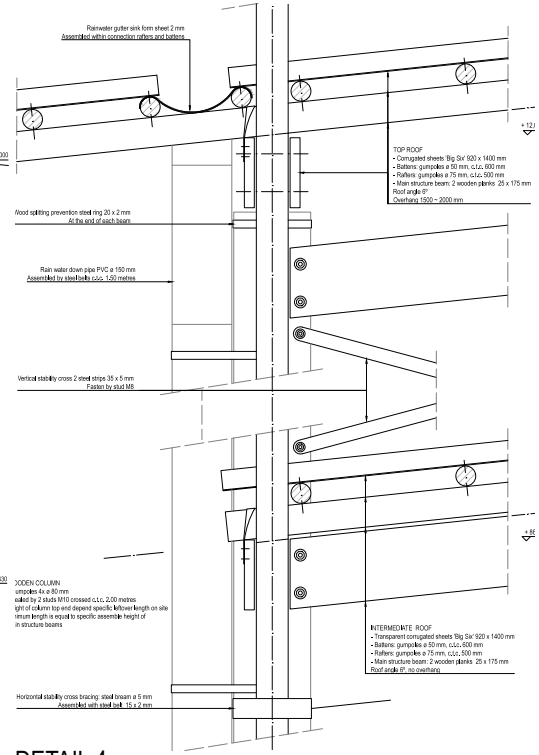
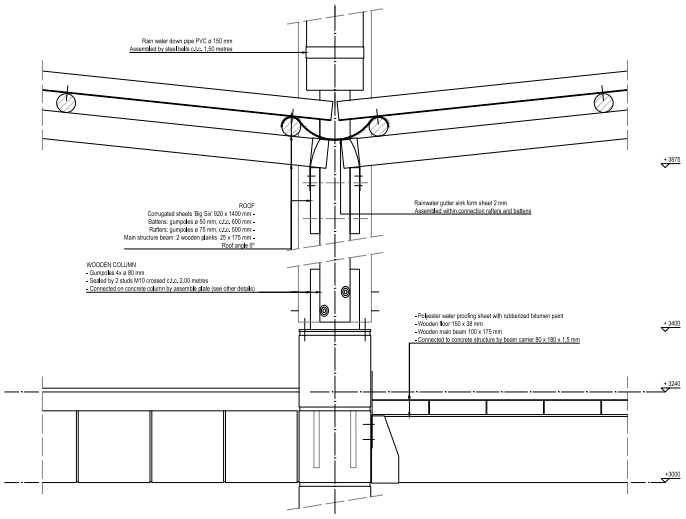
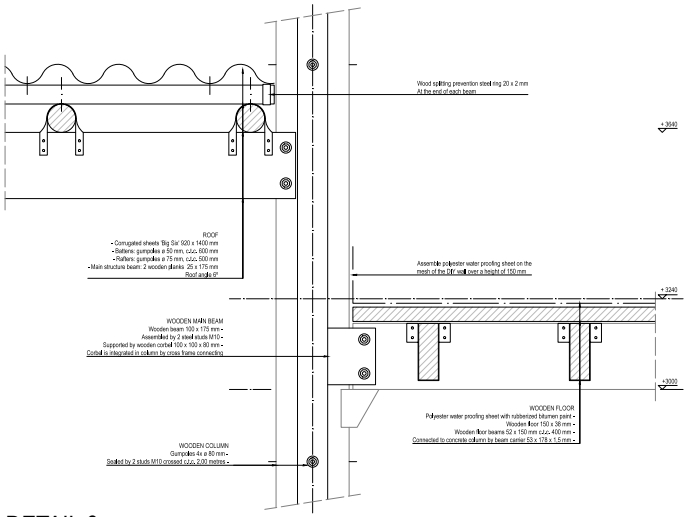


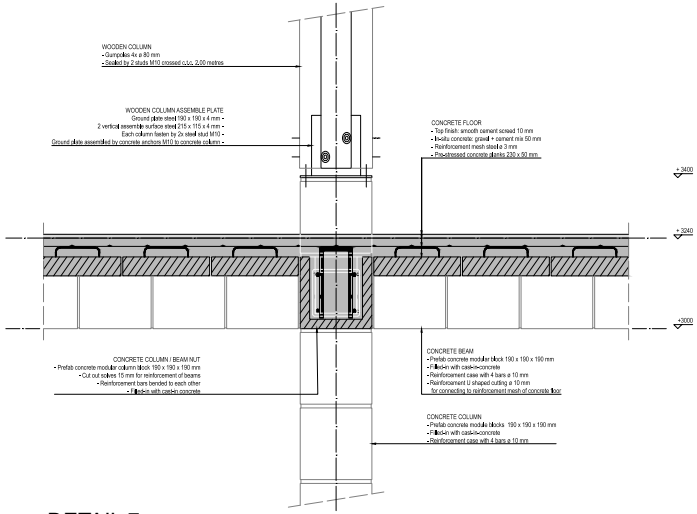
DETAIL 4



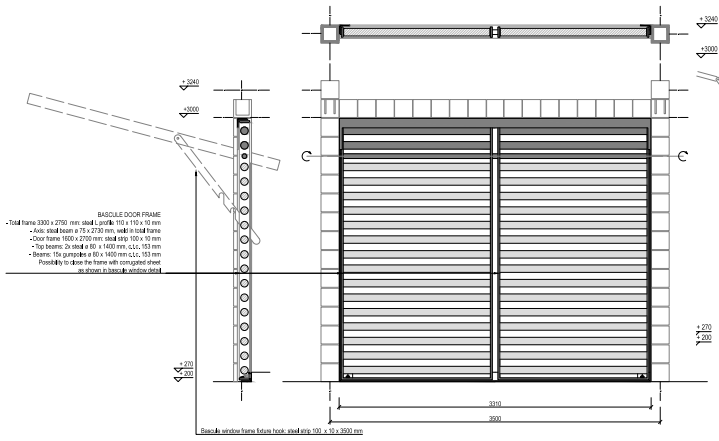
DETAIL 5



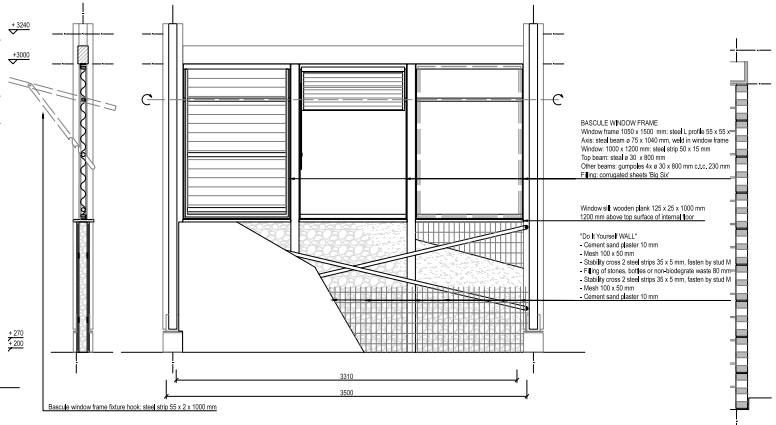
DETAIL 6



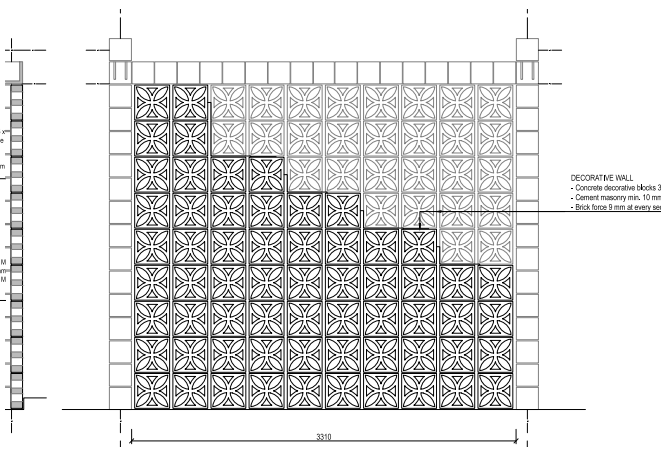
DETAIL 7



FAÇADE ELEMENT 1 - BASCULE DOOR FRAME

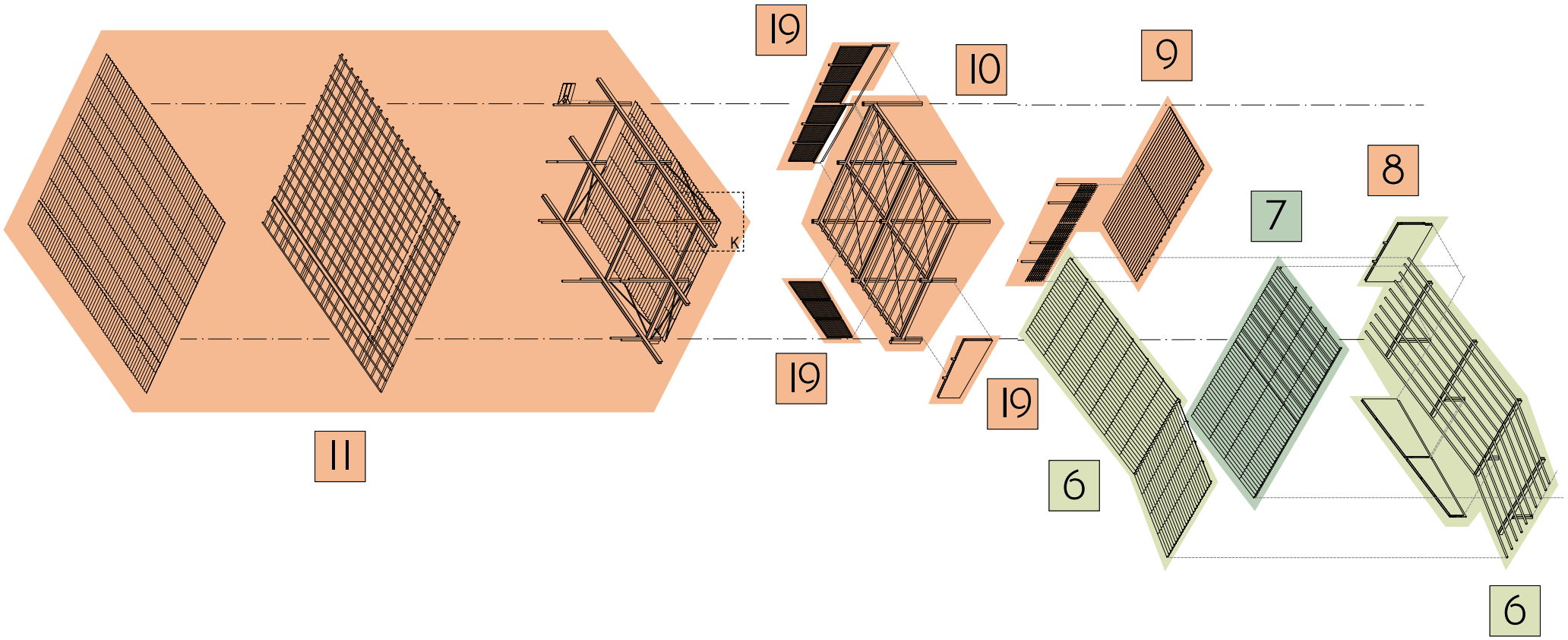


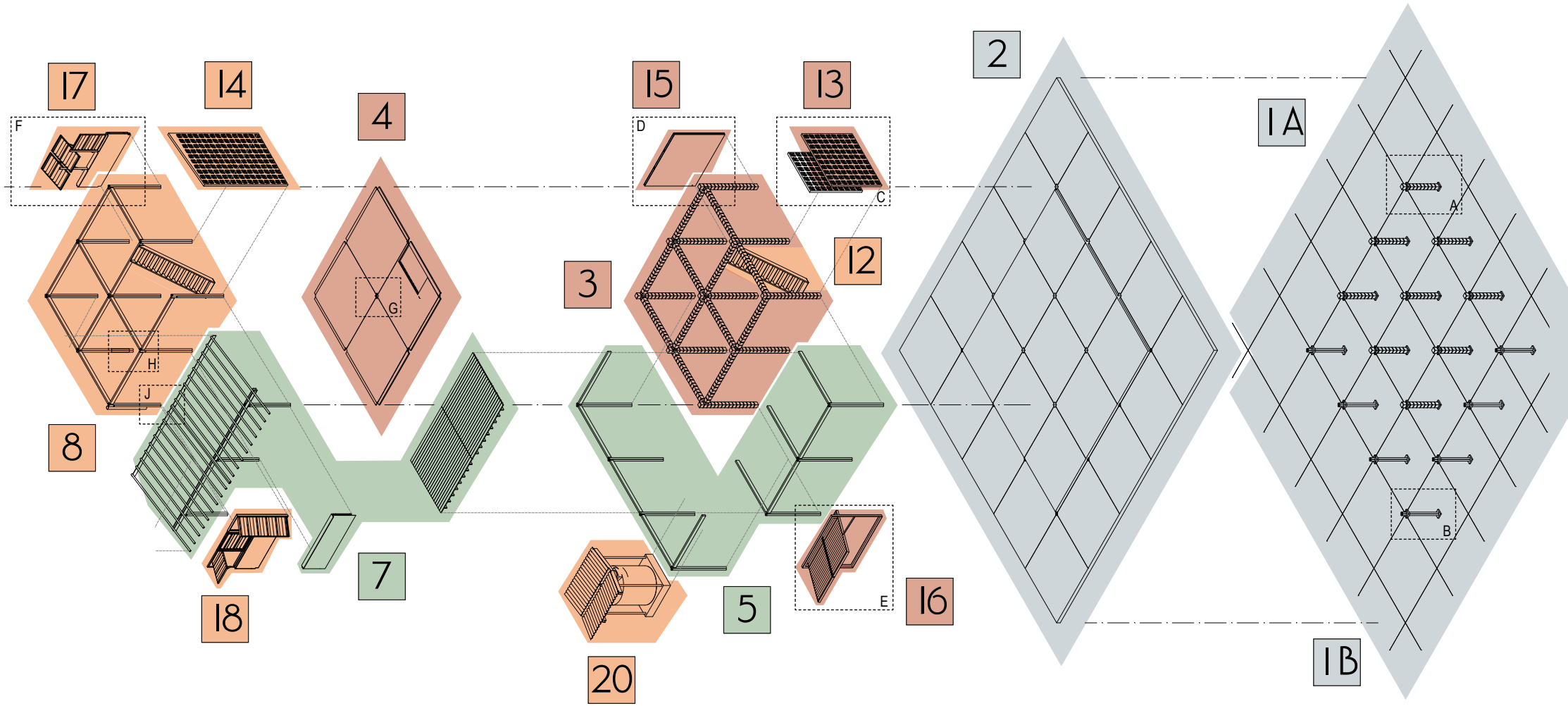
FAÇADE ELEMENT 2 - BASCULE WINDOW FRAME



FAÇADE ELEMENT 3 - DECORATIVE WALL

OPEN CONSTRUCTION MODULE




17
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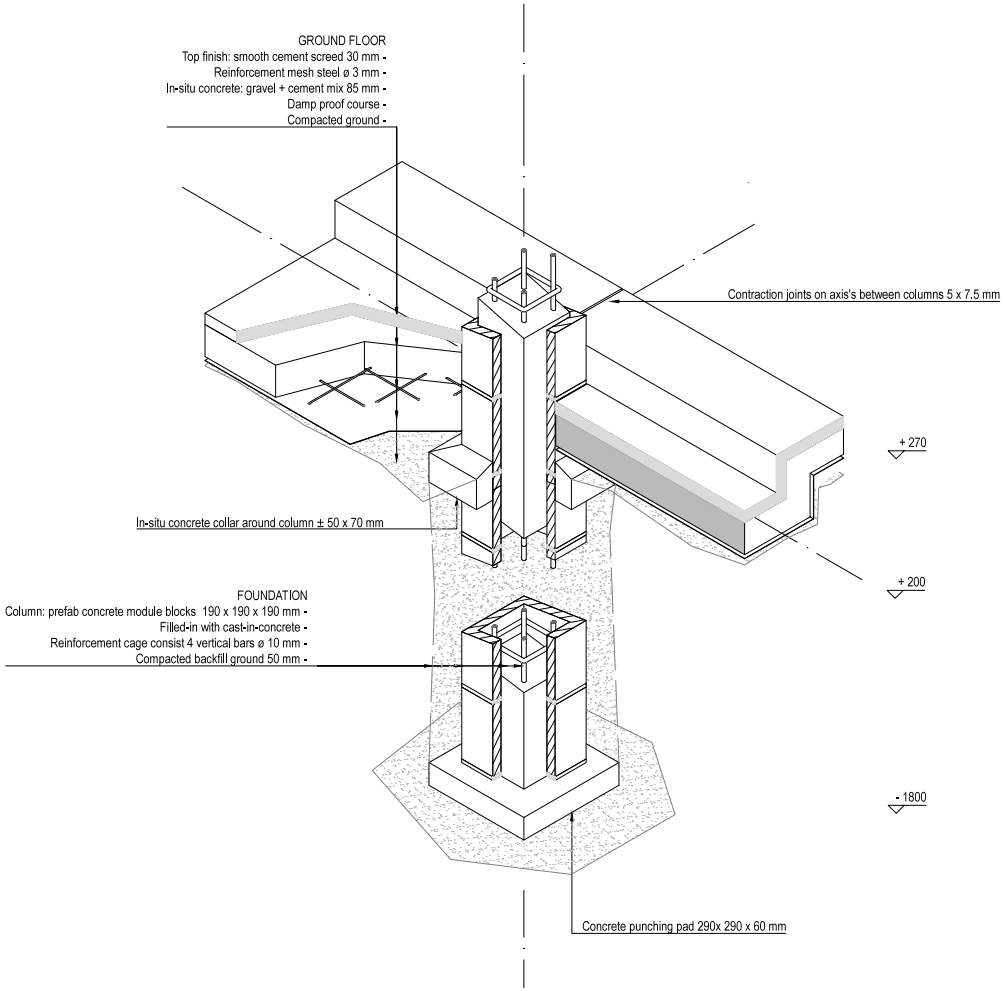
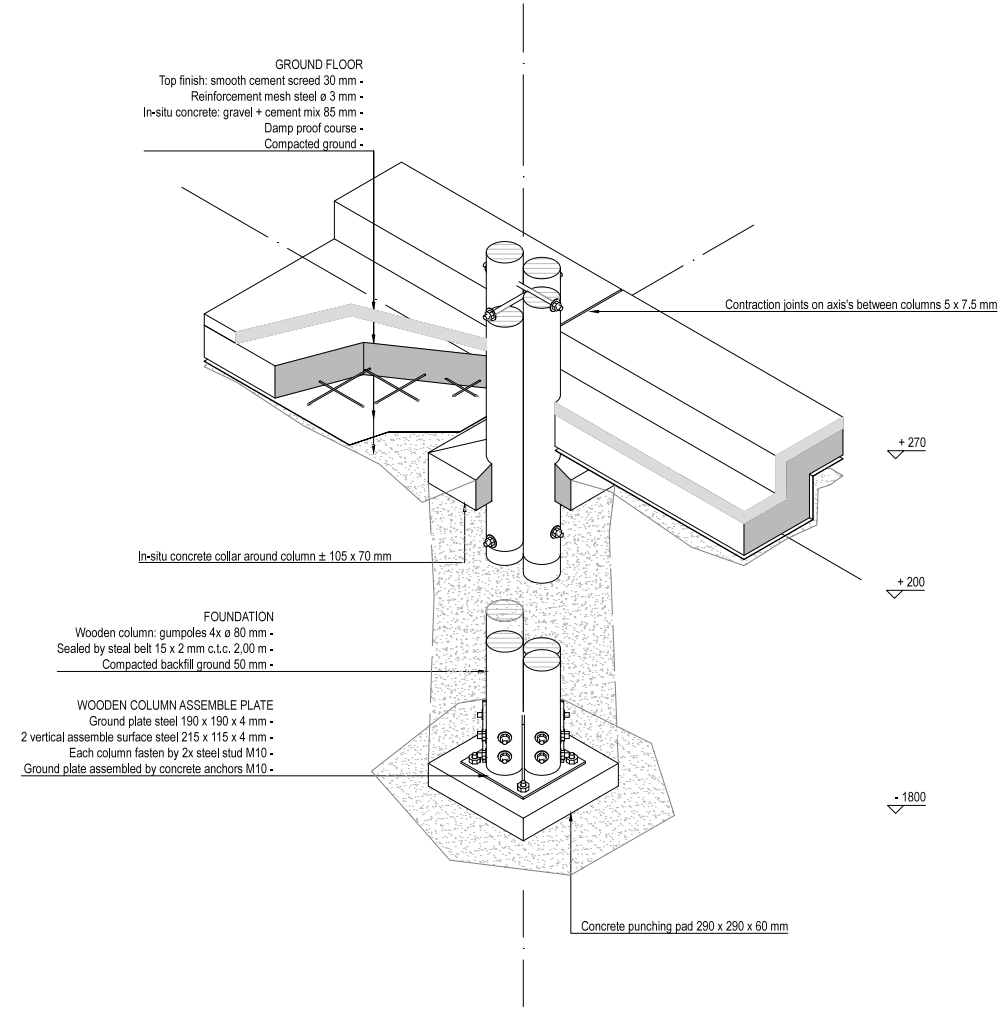
B
1B

ELEMENTS AND CONSTRUCTION CONNECTION DETAILS

SCALE: 1:20

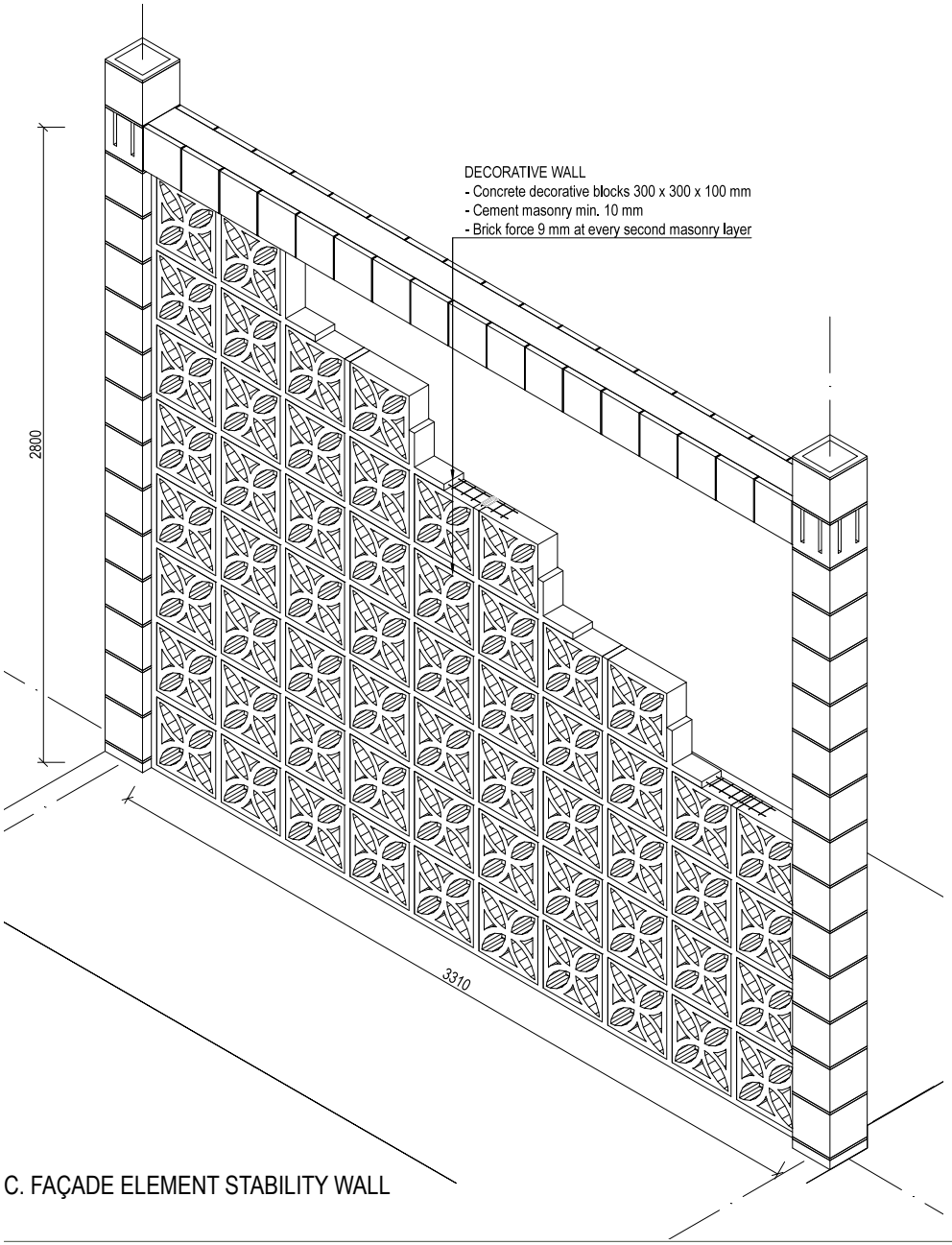


A. FOUNDATION CONCRETE COLUMNS

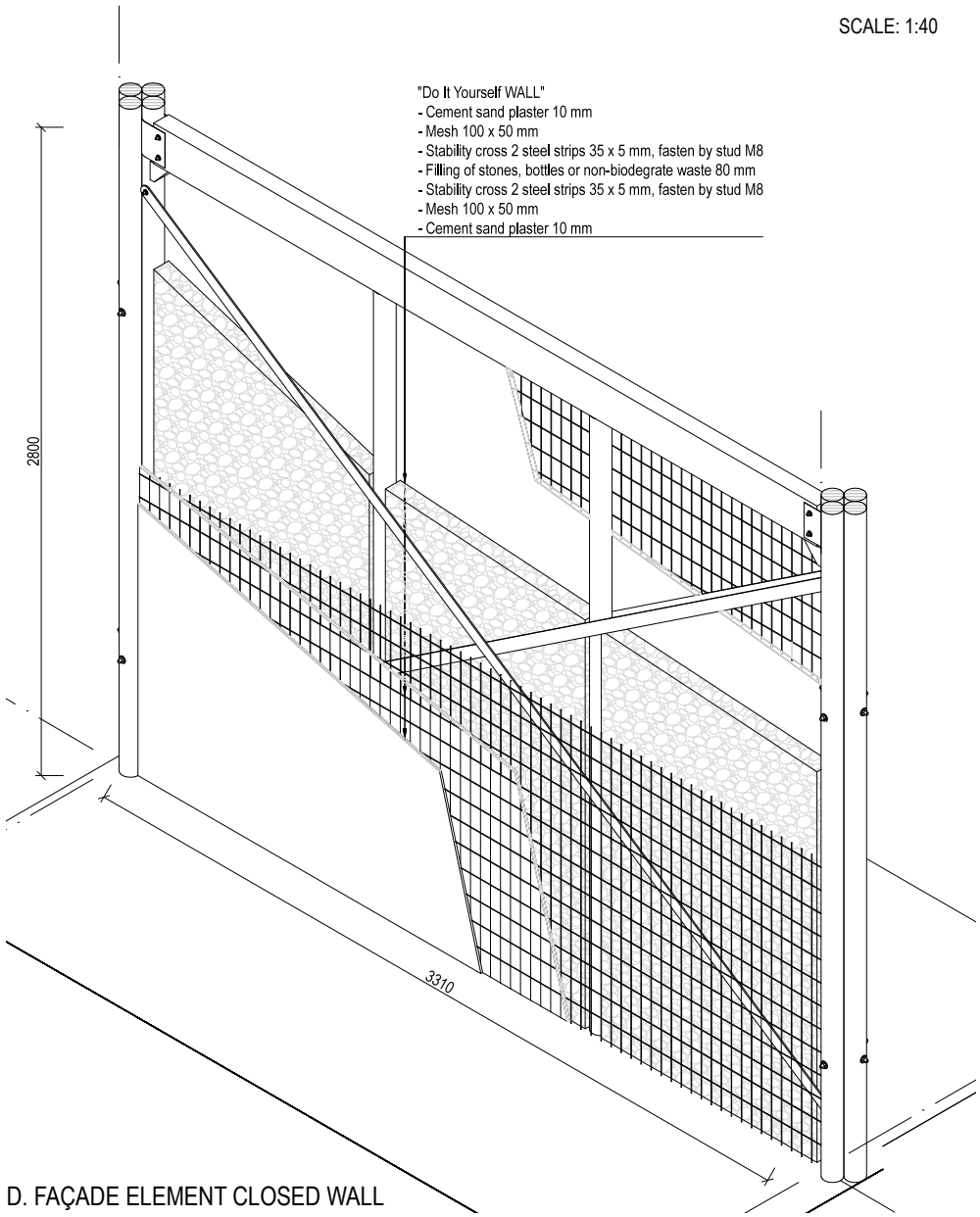


B. FOUNDATION WOODEN COLUMNS

SCALE: 1:40

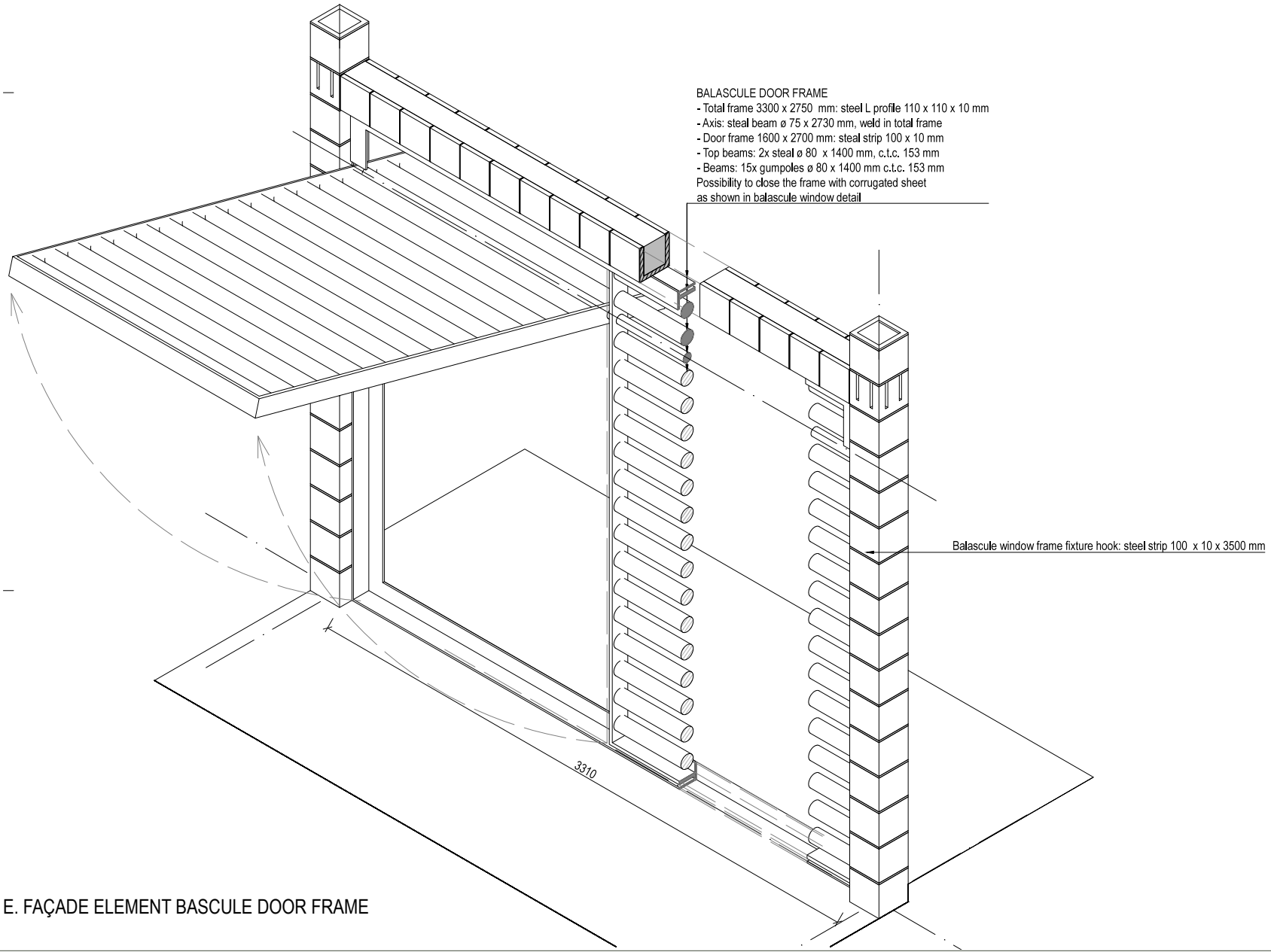


C. FAÇADE ELEMENT STABILITY WALL



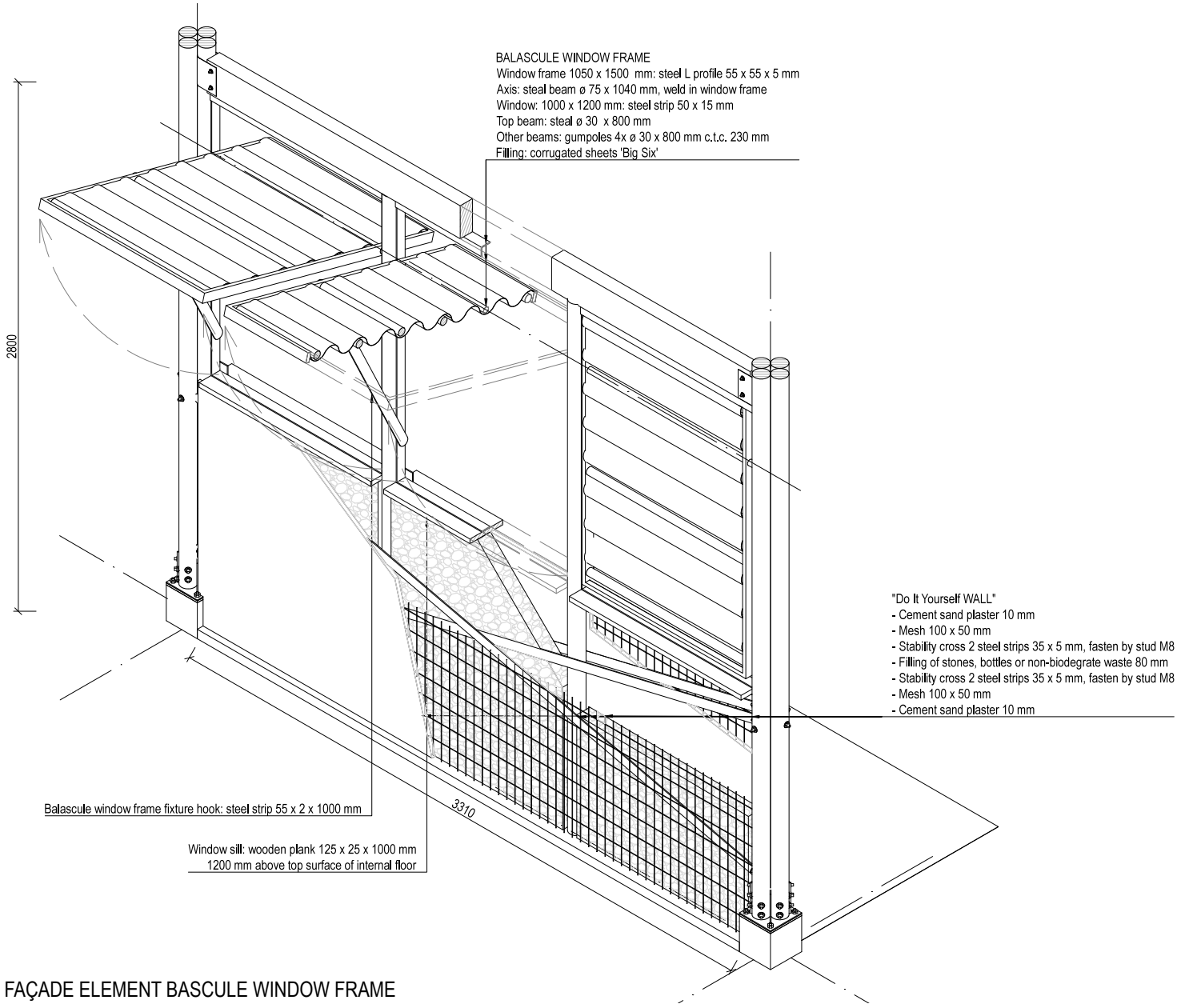
D. FAÇADE ELEMENT CLOSED WALL

SCALE: 1:40



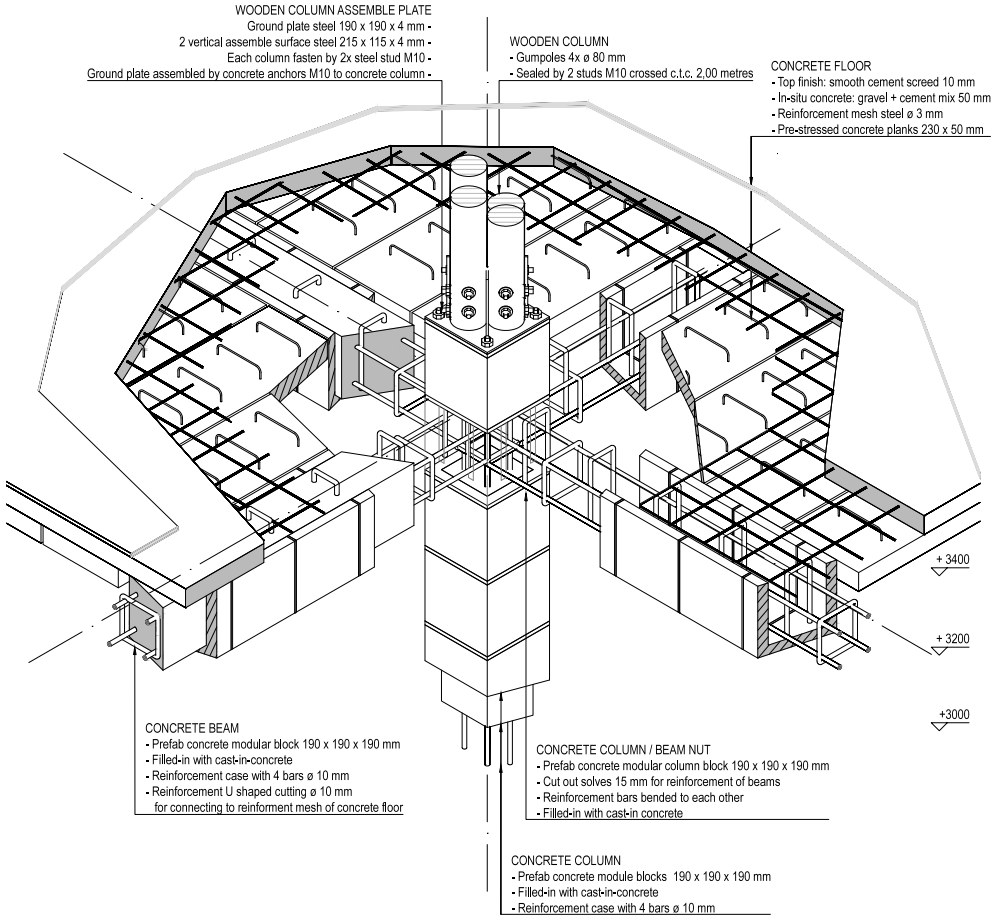
E. FAÇADE ELEMENT BASCULE DOOR FRAME

SCALE: 1:40

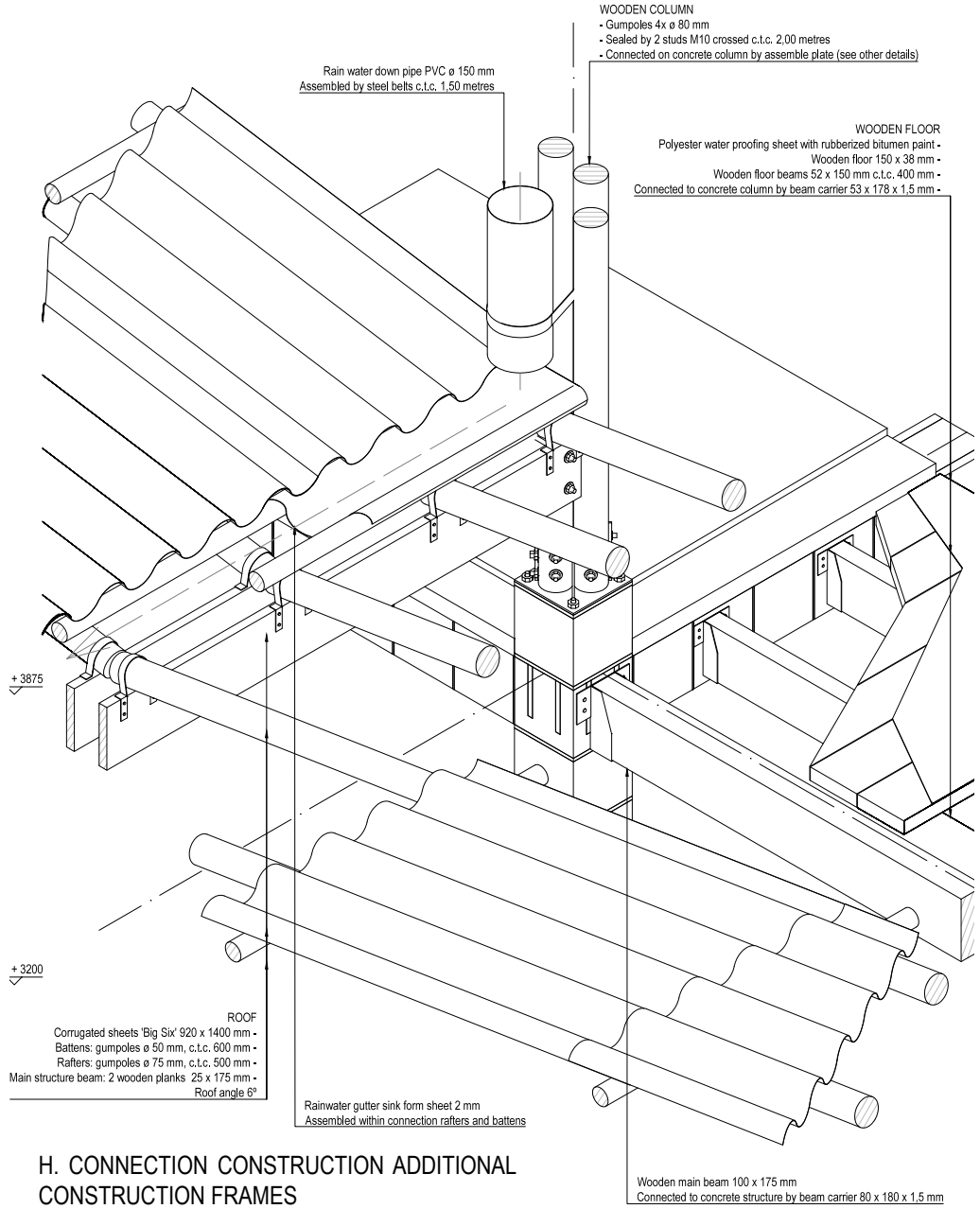


F. FAÇADE ELEMENT BASCULE WINDOW FRAME

SCALE: 1:40

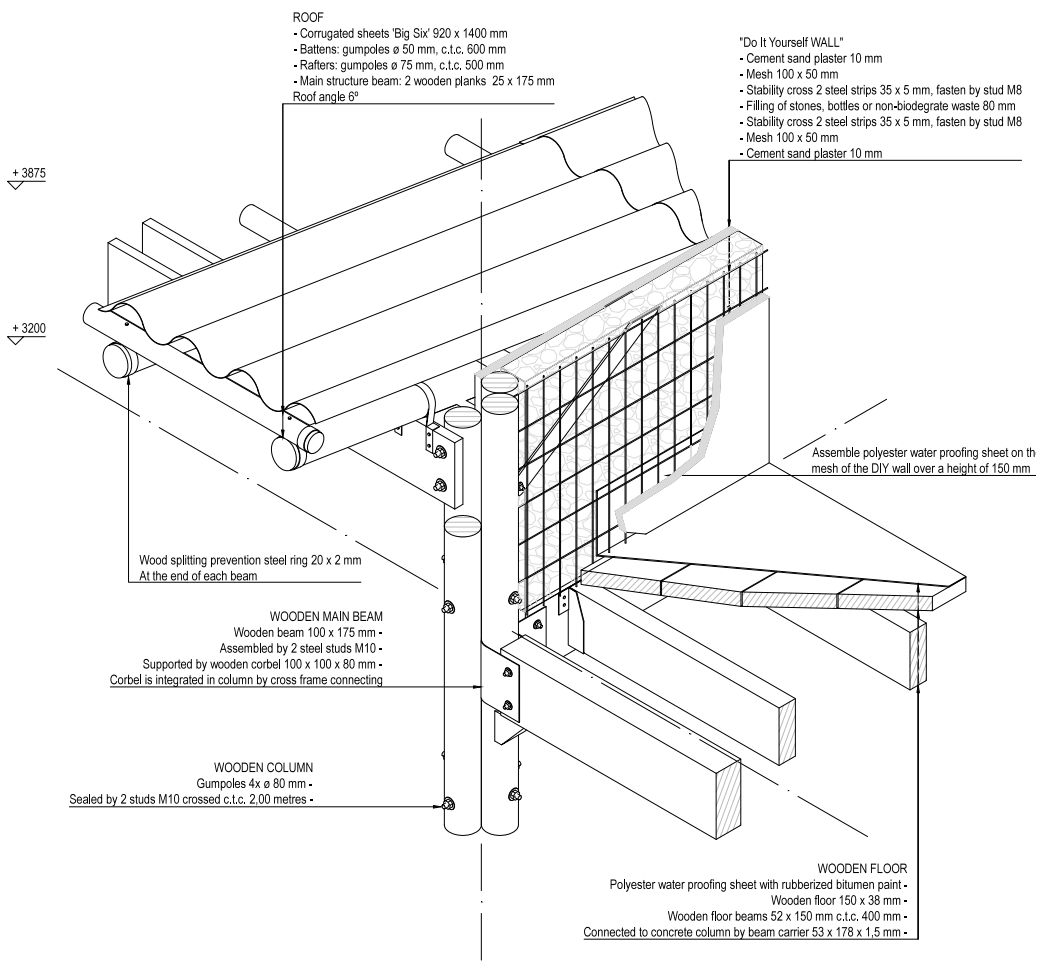


G. CONCRETE MAIN CONSTRUCTION FRAME

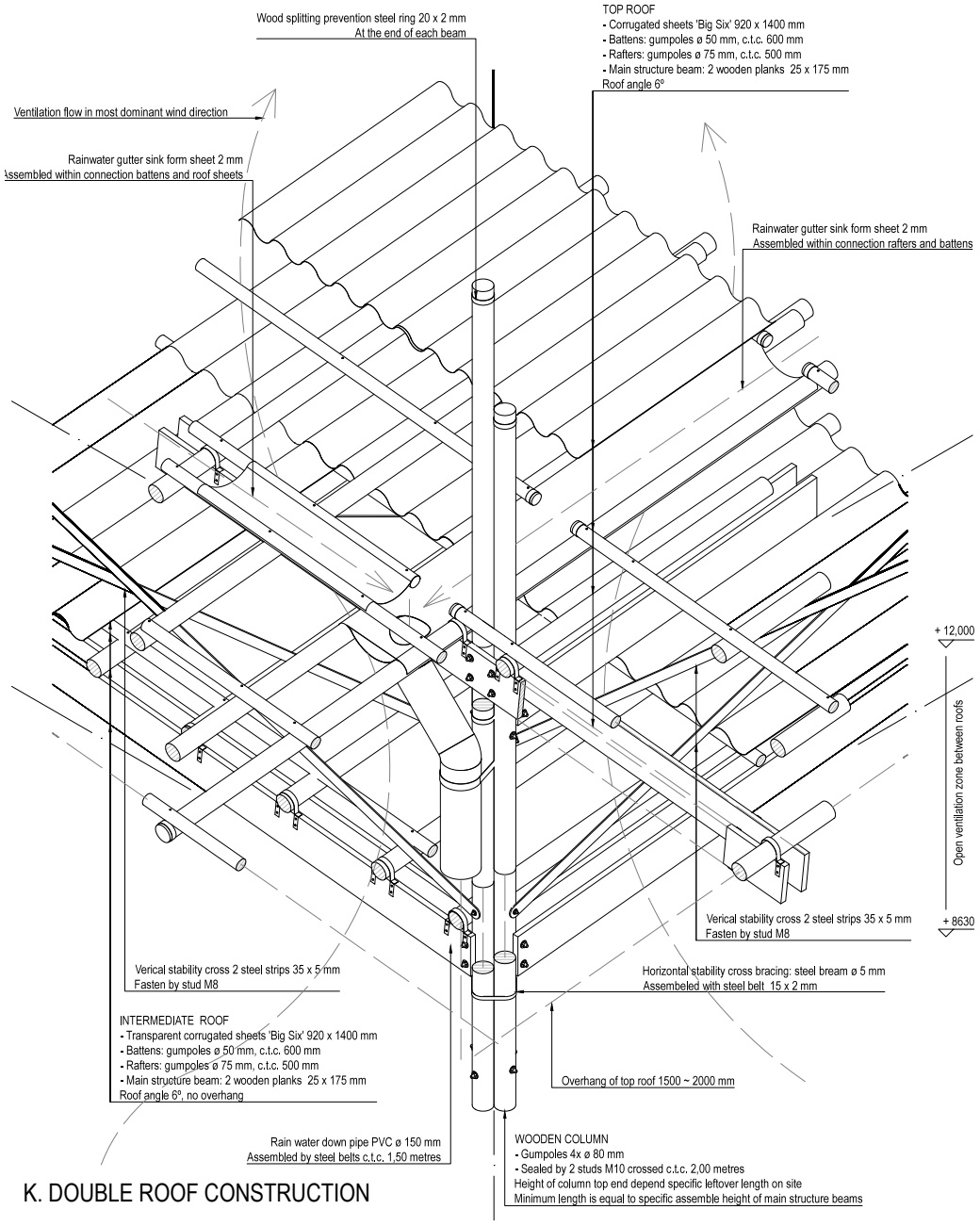


H. CONNECTION CONSTRUCTION ADDITIONAL CONSTRUCTION FRAMES

SCALE: 1:40



J. CONNECTION OF CONSTRUCTION ELEMENTS ON ADDITIONAL CONSTRUCTION FRAME



K. DOUBLE ROOF CONSTRUCTION

ELEMENTS SCHEME

1. FOUNDATION

1a. Concrete footing – 9 elements

Material	Quantity per object	Quantity total	Unit
Excavation for footings 0,96 x 0,96 x 1,8 m	0,15	1,35	m³
Cement for concrete	0,16	1,50	bags
Gravel for concrete	0,14	0,12	m³
Prefab concrete column blocks 190 x 190 x 190 mm	10	90	pcs
Reinforcement cage ø 10 150 x 150 mm	2	18	m
Compacted backfill of ground	0,25	1,95	m³

1b. Wooden footing – 7 elements

Material	Quantity per object	Quantity total	Unit
Excavation for footings 0,96 x 0,96 x 1,8 m	0,15	3,50	m³
Cement for concrete	0,10	1	bag
Gravel for concrete	0,01	0,10	m³
Steel assemble plate 190 x 190 x 215 x 4 mm	1	7	pcs
Concrete anchors M10 100 mm	4	28	pcs
Steel stud M10 200 mm	10	70	pcs
Nuts M10	14	98	pcs
Gumpoles ø 80 x 2000 mm (1 column = 4 gumpoles)	4	7	pcs
Compacted backfill of ground	0,25	1,95	m³

2. GROUND FLOOR

25 stretches of 3,50 x 3,50 m – total surface: 306,25 m²

Material	Quantity per object	Quantity total	Unit
Ground compacting	2,40	60	m³
Damp proof course	12,25	310	m²
Inner floor uplifting by bricks 106 x 222 x 85 mm		142	pcs
Cement for base floor 85mm	8	200	bags
Gravel for base floor 85 mm	960	24030	m³
Reinforcement mesh ø 3 mm	12,25	310	m²
Cement for smooth cement screed topping 30 mm	0,06	1,20	bags
Sand for smooth cement screed topping 30 mm	0,18	4,50	m³
Contraction joints [no material needed]			

3. CONCRETE MAIN CONSTRUCTION FRAME

9 columns and 12 beams

Material	Quantity per object	Quantity total	Unit
Prefab concrete column blocks 190 x 190 x 190 mm	14	126	pcs
Cement for mortar between column blocks 10 mm	0,07	0,62	bag
Lime for mortar between column blocks 10 mm	0,70	6,20	m³
Sand for mortar between column blocks 10 mm	8,95	80,6	m³
Reinforcement cage ø 10 150 x 150 mm for column	3	27	m
Cement for concrete for cast-in column	0,50	5	bags
Gravel for concrete for cast-in column	66	600	m³
Prefab concrete beam blocks 190 x 190 x 190 mm	16	192	pcs
Cement for mortar between beam blocks 10 mm	0,05	0,62	bag

Material	Quantity per object	Quantity total	Unit
Lime for mortar between beam blocks 10 mm	0,05	0,62	m³
Sand for mortar between beam blocks 10 mm	0,25	3,10	m³
Reinforcement cage ø 10 150 x 150 mm for beam	3,20	38,40	m
Cement for concrete for cast-in beam	0,61	7,26	bags
Gravel for concrete for cast-in beam	1,82	21,81	m³
Reinforcement U shaped cutting ø 10 mm	15	200	pcs

4. CONCRETE CEILING FLOOR

4 stretches of 3,50 x 3,50 m – total surface: 50 m²

Material	Quantity per object	Quantity total	Unit
Pre-stressed concrete planks 230 x 50 x 3200 mm	14	56	pcs
Reinforcement mesh ø 3 mm	12,25	50	m²
Cement for floor 50 mm	4,70	18,85	bags
Gravel for floor 50 mm	14	56	m³
Cement for smooth cement screed topping 10 mm	0,95	3,80	bags
Sand for smooth cement screed topping 10 mm	2,85	11,40	m³

5. CORE FOR ADDITIONAL STRETCH

5 stretches of 3,50 x 3,50 m

Material	Quantity per object	Quantity total	Unit
Gumpoles ø 80 x 3000 mm (1 column = 4 gumpoles)	8	36	pcs
Wooden beam 100 x 175 x 3200 mm	3	15	pcs
Wooden corbel 100 x 100 x 80 mm	4	20	pcs

Material	Quantity per object	Quantity total	Unit
Steel assemble plate for at wooden column 15 x 30 x 1,5 mm	4	20	pcs
Steel beam carrier 80 x 180 x 1,5 mm	2	10	pcs
Studs M10 200 mm	36	180	pcs
Nuts M10	72	360	pcs
Concrete anchors M8 100 mm	8	40	pcs
Nuts M8	8	40	pcs

6. ROOFING OF ADDITIONAL STRETCH

3 stretches of 3,50 x 3,50 m – 6 wall elements

Material	Quantity per object	Quantity total	Unit
Column low ridge: gumpoles ø 80 x 1500 mm (1 column = 4 gumpoles)	4	12	pcs
Column high ridge: gumpoles ø 80 x 1800 mm (1 column = 4 gumpoles)	4	12	pcs
Beam: wooden planks 25 x 175 x 4500 mm (1 beam = 2 planks)	4	12	pcs
Rafters: gumpoles ø 75 x 4000 mm (c.t.c. 500 mm)	9	27	pcs
Batters: gumpoles ø 50 x 4500 mm (c.t.c. 600 mm)	7	21	pcs
Corrugated sheets 'Big Six' 920 x 1400 mm	36	108	pcs
Sink plate for rainwater cutter 400 x 4500 x 2 mm	1	1	pcs
Intermediate column 'DIY' wall: gumpoles ø 80 x 1600 mm	2	12	pcs
None biodegradable garbage filling for 'DIY' wall elements	50	300	m³
Reinforcement mesh ø 3 mm 3400 x 1600 mm for 'DIY' wall elements	2	12	pcs
Stability cross: steel strips 35 x 5 x 3500 mm for 'DIY' wall elements	4	24	pcs
Cement for plastering 10 mm	0,64	3,84	bags
Lime for plastering 10 mm	0,64	3,84	m³
Sand for plastering 10 mm	3,20	19,20	m³

Material	Quantity per object	Quantity total	Unit
Steel assemble strip for rafters on beams 20 x 150 x 1,5 mm	18	54	pcs
Steel splitting prevention ring ø 75 x 20 x 2 mm	9	27	pcs
Steel splitting prevention ring ø 50 x 20 x 2 mm	7	21	pcs
Studs M10 200 mm	12	36	pcs
Nuts M10	24	72	pcs
Studs M8 120 mm	4	24	pcs
Nuts M8	4	24	pcs
Leg bolts M5 10 mm	72	216	pcs
Leg bolts M8 100 mm	63	190	pcs
Wood screws M8 50 mm	500	1500	pcs

7. BALCONY ON ADDITIONAL STRETCH

2 stretches of 3,50 x 3,50 m – 3 wall elements

Material	Quantity per object	Quantity total	Unit
Wooden floor beams 150 x 38 x 3200 mm (c.t.c. 400 mm)	8	16	pcs
Wooden planks 150 x 38 3500 mm	23	46	pcs
Polyester water proofing sheet	12,75	25,50	m²
Rubberised bitumen paint	12,75	25,50	m²
Steel beam carrier 53 x 178 x 1,5 mm	16	32	m²
Leg bolts M5 10 mm	64	128	pcs
Wood screws M8 50 mm	300	600	pcs
Column: gumpoles ø 80 x 2500 mm (1 column = 4 gumpoles)	8	12	pcs
Intermediate column ‘DIY’ wall: gumpoles ø 80 x 1200 mm	2	36	pcs
None biodegradable garbage filling for ‘DIY’ wall elements	5	15	m³
Reinforcement mesh ø 3 mm 3400 x 1200 mm for ‘DIY’ wall elements	2	6	pcs
Stability cross: steel strips 35 x 5 x 3500 mm for ‘DIY’ wall elements	4	12	pcs
Wooden plank 125 x 25 x 1200 mm for covering ‘DIY’ wall elements	2	6	pcs
Cement for plastering 10 mm	0,50	1,5	bags
Lime for plastering 10 mm	0,5	1,5	m³
Sand for plastering 10 mm	2,50	7,50	m³
Beam: wooden planks 25 x 175 x 4500 mm (1 beam = 2 planks)	3	6	pcs
Rafters: gumpoles ø 75 x 4000 mm (c.t.c. 500 mm)	9	18	pcs
Battens: gumpoles ø 50 x 4500 mm (c.t.c. 600 mm)	7	14	pcs
Corrugated sheets ‘Big Six’ 920 x 1400 mm	24	48	pcs
Steel assemble strip for rafters on beams 20 x 150 x 1,5 mm	18	36	pcs
Steel splitting prevention ring ø 75 x 20 x 2 mm	9	18	pcs
Steel splitting prevention ring ø 50 x 20 x 2 mm	7	14	pcs
Studs M10 200 mm	2	4	pcs
Nuts M10	4	8	pcs
Studs M8 120 mm	4	8	pcs
Nuts M8	8	16	pcs
Leg bolts M5 10 mm	72	144	pcs
Leg bolts M8 100 mm	63	126	pcs
Wood screws M8 50 mm	28	56	pcs

8. WOODEN CORE OF FIRST FLOOR

4 stretches of 3,50 x 3,50 m

Material	Quantity per object	Quantity total	Unit
Gumpoles ø 80 x 3000 mm (1 column = 4 gumpoles)	8	36	pcs
Wooden beam 100 x 175 x 3200 mm	4	12	pcs

Material	Quantity per object	Quantity total	Unit
Wooden corbel 100 x 100 x 80 mm	8	24	pcs
Steel assemble plate 190 x 190 x 215 x 4 mm	4	9	pcs
Steel assemble plate for at wooden column 15 x 30 x 1,5 mm	8	24	pcs
Studs M10 200 mm	56	346	pcs
Concrete anchors M10 100 mm	16	36	pcs
Nuts M10	128	728	pcs

9. WOODEN SECOND FLOOR

2 stretches of 3,50 x 3,50 m

Material	Quantity per object	Quantity total	Unit
Wooden floor beams 150 x 38 x 3200 mm (c.t.c. 400 mm)	8	16	pcs
Wooden planks 150 x 38 3500 mm	23	46	pcs
Steel beam carrier 53 x 178 x 1,5 mm	16	32	pcs
Steel assemble strip for rafters on beams 20 x 150 x 1,5 mm	4	8	pcs
Leg bolts M5 10 mm	68	136	pcs
Wood screws M8 50 mm	300	600	pcs
Intermediate column 'DIY' wall: gumpoles ø 80 x 2000 mm average	2	4	pcs
Reinforcement mesh ø 3 mm 3400 x 1200 mm	1	2	pcs

10. 2ND FLOOR CORE + INTERNAL ROOF

4 stretches of 3,50 x 3,50 m

Material	Quantity per object	Quantity total	Unit
Gumpoles ø 80 x 1500 ~ 3000 mm (1 column = 4 gumpoles)	8	36	pcs
Horizontal stability cross barging: steel bar ø 5 mm x 4500 mm	2	8	pcs
Horizontal stability cross barging: steel assemble belt 15 x 2 mm	4	16	pcs
Beam: wooden planks 25 x 175 x 3500 mm (1 beam = 2 planks)	8	24	pcs
Rafters: gumpoles ø 75 x 3500 mm (c.t.c. 500 mm)	7	28	pcs
Batters: gumpoles ø 50 x 3500 mm (c.t.c. 600 mm)	6	24	pcs
Transparent corrugated sheets 'Big Six' 920 x 1400 mm	24	96	pcs
Steel assemble strip for rafters on beams 20 x 150 x 1,5 mm	14	56	pcs
Steel splitting prevention ring ø 75 x 20 x 2 mm	7	28	pcs
Steel splitting prevention ring ø 50 x 20 x 2 mm	6	24	pcs
Studs M10 200 mm	56	114	pcs
Nuts M10	112	228	pcs
Leg bolts M5 10 mm	56	224	pcs
Leg bolts M8 100 mm	42	672	pcs
Wood screws M8 50 mm	192	768	pcs

11. TOP ROOF

4 stretches of 3,50 x 3,50 m

Material	Quantity per object	Quantity total	Unit
Gumpoles ø 80 x 2000 ~ 5000 mm (1 column = 4 gumpoles)	8	36	pcs
Stability cross: steel strips 35 x 5 x 3500 mm		8	pcs
Beam: wooden planks 25 x 175 x 5000 mm (1 beam = 2 planks)	8	24	pcs
Rafters: gumpoles ø 75 x 5000 mm (c.t.c. 500 mm)	10	40	pcs
Battens: gumpoles ø 50 x 5000 mm (c.t.c. 600 mm)	9	36	pcs
Corrugated sheets 'Big Six' 920 x 1400 mm	16	64	pcs
Sink plate for rainwater cutter 400 x 8000 x 2 mm		2	pcs
Lighting conductor along highest column + relevant assembling		16	m

Material	Quantity per object	Quantity total	Unit
Steel assemble strip for rafters on beams 20 x 150 x 1,5 mm	14	56	pcs
Steel splitting prevention ring ø 75 x 20 x 2 mm	10	40	pcs
Steel splitting prevention ring ø 50 x 20 x 2 mm	9	36	pcs
Studs M10 200 mm	16	42	pcs
Nuts M10	32	84	pcs
Studs M8 150 mm		8	pcs
Nuts M8		16	pcs
Leg bolts M5 10 mm	80	320	pcs
Leg bolts M8 100 mm	90	360	pcs
Wood screws M8 50 mm	192	768	pcs

12. STAIRS

2 entities

Material	Quantity per object	Quantity total	Unit
Carrier: wooden plank 250 x 150 x 5000 mm	2	4	pcs
Steps: wooden plank 1000 x 400 x 100 mm	14	28	pcs
Steel assemble plate 1100 x 500 x 2 mm	1	2	pcs
Wood screws M5 100 mm	60	120	pcs
Leg bolts M8 50 mm	4	8	pcs
Concrete anchors M8 100 mm	4	8	pcs

13. DECORATIVE WALL SEGMENT

1 segment

Material	Quantity per object	Quantity total	Unit
Cement breeze block 300 x 300 x 100 mm	72	72	pcs
Cement for mortar	1,50	1,50	bag
Lime for mortar	1,50	1,50	m³
Sand for mortar	7,50	7,50	m³
Brick force 9 mm on every second mortar layer	13,25	13,25	m

14. DECORATIVE WALL SEGMENT

Only at dwelling segment

Material	Quantity per object	Quantity total	Unit
Cement breeze block 300 x 300 x 100 mm	150	150	pcs
Cement for mortar	2,60	2,60	bag
Lime for mortar	2,60	2,60	m³
Sand for mortar	12	12	m³
Brick force 9 mm on every second mortar layer	26,50	26,50	m

15. ‘DO IT YOURSELF’ WALL

3 segments

Material	Quantity per object	Quantity total	Unit
Intermediate columns : gumpoles ø 80 x 2800 mm	2	5	pcs
None biodegradable garbage filling for ‘DIY’ wall elements	10	15	m³

Material	Quantity per object	Quantity total	Unit
Reinforcement mesh ø 3 mm 3400 x 2800 mm for 'DIY' wall elements	2	5	pcs
Stability cross: steel strips 35 x 5 x 5000 mm for 'DIY' wall elements	4	12	pcs
Cement for plastering 10 mm	1,12	3.36	bags
Lime for plastering 10 mm	1,12	3,36	m³
Sand for plastering 10 mm	5,60	16,80	m³
Studs M8 120 mm	4	12	pcs
Nuts M8	8	24	pcs

16. BASCULE DOOR FRAME

10 segments

Material	Quantity per object	Quantity total	Unit
Fixed door frame: steel L profile 110 x 110 x 10 mm	72	720	m
Steelplates 100 x 100 x 10 mm for assembling of padlock	4	40	pcs
Steel ring, depend on choose size padlock	2	20	pcs
Axis: steel beam ø 75 2730 mm	1	10	pcs
Rotatable door frame: steel strip 100 x 10 mm	17,50	175	m
Top beams: steel ø 80 x 1400 mm	4	40	pcs
Beams: gumpoles ø 80 x 1400 mm (c.t.c. 153 mm)	30	300	pcs
Fixture hook: steel strip 100 x 50 x 3500 mm	2	20	pcs
Wood screws M8 100 mm	60	600	pcs
Bolt M5 80 mm	4	40	pcs
Nuts M5	2	20	pcs

17. 'D.I.Y.'-WALL WITH WINDOW FRAMES

4 segments

Material	Quantity per object	Quantity total	Unit
Intermediate column: gumpoles ø 80 x 2800 mm	2	8	pcs
None biodegradable garbage filling for 'DIY' wall elements	5	20	m³
Reinforcement mesh ø 3 mm 3400 x 1200 mm for 'DIY' wall elements	2	8	pcs
Stability cross: steel strips 35 x 5 x 3500 mm for 'DIY' wall elements	4	16	pcs
Wooden plank 125 x 25 x 1200 mm for covering 'DIY' wall elements	3	12	pcs
Cement for plastering 10 mm	0,50	2	bags
Lime for plastering 10 mm	0,5	2	m³
Sand for plastering 10 mm	2,50	10	m³
Studs M8 120 mm	4	16	pcs
Nuts M8	8	32	pcs
Fixed window frame: steel L profile 55 x 55 x 5 mm	15,30	61,20	m
Axis: steel beam ø 75 x 1040 mm	3	12	pcs
Rotatable door frame: steel strip 50 x 15 mm	13,20	52,80	m
Top beams: steel ø 30 x 800 mm	3	12	pcs
Beams: gumpoles ø 30 x 800 mm (c.t.c. 153 mm)	12	48	pcs
Corrugated sheets 'Big Six' 920 x 1400 mm	6	24	pcs
Fixture hook: steel strip 55 x 2 x 1000 mm	6	24	pcs
Door hook 50 mm + ring	6	26	pcs
Wood screws M5 100 mm	24	96	pcs
Bolt M3 80 mm	6	24	pcs
Nuts M3	3	12	pcs

18. ‘D.I.Y.’-WALL WITH DOOR TO BALCONY

1 segment

Material	Quantity per object	Quantity total	Unit
Intermediate column: gumpoles ø 80 x 2800 mm	2	2	pcs
None biodegradable garbage filling for ‘DIY’ wall elements	5	5	m³
Reinforcement mesh ø 3 mm 2300 x 1200 mm for ‘DIY’ wall elements	2	2	pcs
Stability cross: steel strips 35 x 5 x 2000 mm for ‘DIY’ wall elements	4	4	pcs
Wooden plank 125 x 25 x 1200 mm for covering ‘DIY’ wall elements	2	2	pcs
Cement for plastering 10 mm	0,33	0,33	bags
Lime for plastering 10 mm	0,33	0,33	m³
Sand for plastering 10 mm	1,63	1,63	m³
Studs M8 120 mm	4	4	pcs
Nuts M8	8	8	pcs
Fixed window frame: steel L profile 55 x 55 x 5 mm	10,20	10,20	m
Axis: steel beam ø 75 x 1040 mm	2	2	pcs
Rotatable door frame: steel strip 50 x 15 mm	8,80	8,80	m
Top beams: steel ø 30 x 800 mm	2	2	pcs
Beams: gumpoles ø 30 x 800 mm (c.t.c. 153 mm)	16	16	pcs
Corrugated sheets ‘Big Six’ 920 x 1400 mm	4	4	pcs
Fixture hook: steel strip 55 x 2 x 1000 mm	2	2	pcs
Door hook 50 mm + ring	4	4	pcs
Wood screws M5 100 mm	32	32	pcs
Bolt M3 80 mm	4	4	pcs
Nuts M3	2	2	pcs
Fixed door frame: steel L profile 55 x 55 x 5 mm	7,50	7,50	m
Rotatable door frame: steel strip 50 x 15 mm	7,20	7,20	m
Steel plates 100 x 100 x 10 mm for assembling of padlock	1	1	pcs
Steel ring, depend on choose size padlock	1	1	pcs
Axis: steel beam ø 35 x 2700 mm	1	1	pcs
Assemble rings for rotatable doorframe: steel 50 x 50 x 15 mm, hole ø 40 mm	4	4	pcs
Conductor rings on axis: steel ø 35 / 45 x 20 mm	4	4	pcs

19. VENTILATION UNDERNEATH CEILING

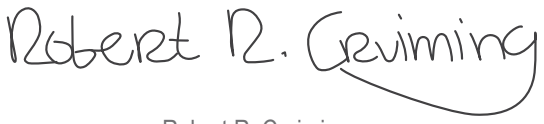
1 segment – obligated in combination with the top roof segments (10 and 11)

Material	Quantity per object	Quantity total	Unit
Intermediate column: gumpoles ø 80 x 1200 ~ 2700 mm	12	12	pcs
None biodegradable garbage filling for ‘DIY’ wall elements	10	10	m³
Reinforcement mesh ø 3 mm 2300 x 1500 mm for ‘DIY’ wall elements	4	4	pcs
Stability cross: steel strips 35 x 5 x 2000 mm for ‘DIY’ wall elements	4	4	pcs
Wooden plank 125 x 25 x 1200 mm for covering ‘DIY’ wall elements	18	18	pcs
Cement for plastering 10 mm	0,81	0,81	bags
Lime for plastering 10 mm	0,81	0,81	m³
Sand for plastering 10 mm	4,06	4,06	m³
Studs M8 120 mm	8	8	pcs
Nuts M8	16	16	pcs
Fixed frame: steel strip 100 x 20 mm	90	90	m
Beams: gumpoles ø 80 x 1000 mm (c.t.c. 153 mm)	426	426	pcs
Wood screws M5 100 mm	1020	1020	pcs

20. RAIN WATER COLLECTION TANK

1 segment

Material	Quantity per object	Quantity total	Unit
Cement for concrete	61,54	61,54	bags
Gravel for concrete	185	185	m³
Steel U strips for assambling columns 300 x 100 x 50 x 1.5 mm	4	4	pcs
Column: gumpoles ø 80 x 2600 mm	4	4	pcs
Beam: wooden planks 25 x 175 x 1500 mm (1 beam = 2 planks)	8	8	pcs
Batterns: gumpoles ø 50 x 3000 mm (c.t.c. 600 mm)	6	6	pcs
Corrugated sheets ‘Big Six’ 920 x 1400 mm	6	6	pcs
Sink plate for rainwater cutter 400 x 3000 x 2 mm	1	1	pcs
Concrete anchor M8 x 50 mm	4	4	pcs
Studs M8 x 200 mm	16	16	pcs
Nuts M8	36	36	pcs
Steel assemble strip for rafters on beams 20 x 150 x 1,5 mm	12	12	pcs
Steel splitting prevention ring ø 50 x 20 x 2 mm	12	12	pcs
Leg bolts M5 10 mm	48	48	pcs
Wood screws M8 50 mm	60	60	pcs
HDPE Water tank 5000 liters	1	1	pcs
Additional water tap with padlock	1	1	pcs
Rainwater downpipes: PVC ø 150 mm	4,50	4,50	m³
Rainwater downpipes: PVC 45º corner ø 150 mm	2	2	pcs
Assembling rubber sink rain gutter to PVC down pipe ø 150 mm	3	3	pcs
Sand filter	1	1	pcs



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