



# SPACES LIVE

FUTURE  
STUDENT HOUSING

FOR  
NIEMI CAMPUS | LAHTI UNIVERSITY OF APPLIED  
SCIENCES







## SPACES LIVE

FUTURE  
STUDENT HOUSING  
FOR  
NIEMI CAMPUS | LAHTI UNIVERSITY OF APPLIED SCIENCES

LAHTI UNIVERSITY OF APPLIED SCIENCES  
DEGREE PROGRAMME IN INTERIOR DESIGN  
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## ABSTRACT

The title “Future Student Housing” is composed of three different words, namely, future, student and housing. Firstly, future is mainly a prospective or expected condition, considering growth, advancement, or development, and based on the importance of sustainability. Recently developments in building designs mostly consider efficiency in terms of energy and space. The second item in the title is student. This defines a special part of society, in terms of their ages, their hopes and their views of the future. Finally housing deals with accommodation, where services are provided to give people comfortable living conditions.

This thesis attempts an approach in a new interior layout which gives flexible space, considering wood as the main material. Flexible space and wood, both, support efficiency in all the stages of design, including production, construction and maintenance, in other words, embodied energy.

This study includes the following two aspects: Firstly, research was done to understand the student accommodation needs for flexible design. Secondly, wood was studied and is presented as the main material.

Student accommodations are one of the most important aspects of learning environments and campuses where the quality of the mentioned space affects the learning process. On the other hand, due to economic issues, student living spaces are normally small and shared, which reduces satisfaction in terms of interior layout. Recently, student housing design has been trying to give diversity in material and colour, to bring a more active and special atmosphere, including modular designs as a method to support student housing. This thesis has approached these issues which support a modular system to give diversity in the design in different ways. It concentrates on a new adaptable modular interior system which could give opportunities



## KEY WORDS

INTERIOR LAYOUT, EFFICIENCY,  
SPACE, ENERGY,  
STUDENT HOUSING, WOOD,  
MODULE

to users to change the interior layout with a certain number of modules that they have or over time could be expanded in any direction they wish.

Students' opinions were studied based on the results of questionnaire which reflects students' evaluation of their current living space. Because wood has a strong background in architecture and interior design, and recently it has attracted more use in sustainable design, the next approach is studying about the possibilities of wood in interior design as the main material to support energy efficiency.

The collected research data of the theoretical part is applied to a student housing design related to the Lahti Innovation Hub project which aims to build up a nationally important innovation hub to the Lahti region. Location of the hub will be in the Niemi area. One of the targets of the project is development of a concept for a modern campus and learning environment for Lahti University of Applied Sciences (LUAS) for the future campus (Campus 2020). This interior layout supports modular wooden student housing and gives diversity to the spaces by taking into account the real wishes and needs of users. It also supports different typologies of accommodation which could be implemented by users.

All in all, the design process has progressed to create an "alive" space--changing and expanding in different directions based on the certain needs at different times, in other words, spaces live with us.

TILAA ELÄÄ

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OHJAAJINA: YRSACRONHJORT | REZA ESHRAGH JAHROMI

## TIIVISTELMA

Otsikkona ” Future Student Housing ” sisältää kolme eri Sanaa, nimittäin, tulevaisuus, opiskelija ja asuntola. Tulevaisuus on pääasiallisesti perspektiivinen tai odotuksia ottaen huomioon kasvu- ja kehitysnäkymät, jotka puolestaan perustuvat tärkeäksi havaitun kestävä kehitykseen.

Viime aikaisissa rakennussuunnitteluissa otettu huomioon vain energiatehokkuutta ja tilan käytettävyyttä. Toinen sana otsikossa on opiskelija. Opiskelijat ovat erityisryhmä yhteiskunnassa ikäänsä, toiveidensa ja näkemyksiensä puolesta. Kolmas sana, asuntola käsittää asumisen mukavuutta, missä palvelut on järjestetty niin, että ihmisillä on mukavaa asua.

Tämä päättötyö lähestyy uudella tavalla rakennuksen sisäpuolista layoutia, joka on joustava käyttäen puuta perusmateriaalina. Joustava sisätila ja puu tukevat tehokkuutta suunnittelussa, tuotannossa, rakentamisessa ja kunnossapidossa, toisin sanoen ” embodied energy”.

Tämä tutkimus käsittää kahta näkökohtaa: ensisiksi, ymmärtää opiskeliasuntojen tilantarve joustavalle suunnittelulle. Toiseseksi puuta perusmateriaalina on tutkittu ja esitetty käytettäväksi .

Opiskelija-asunnot on Yksi tärkeimmistä vaikuttavasta seikoitsa oppimisympäritössä ja mainittu tilan laatu vaikuttaa oppimisprosessiin. Toisaalta taloudellisuussyistä opiskelijasunnot ovat tavallisesti pieniä ja jopa jaettu, vähentäen vähentää tyytyväiosyyttä layoutin suhteen. viime aikoina yritetty suunnitella opiskelijaasunnot aktiivisemmäksi ja luoda erikoisilmapiiriä käyttäen erilaisia materiaalia ja väriä mm. modular designa käyttäen.



## AVAINSANAT

SISÄPUOLISTA LAYOUTIA,

EFFICIENCY, TILA,

ENERGIA, OPISKELIA-ASUNNOT,

PUU, MODULI

Tässä päättötyössä lähestytään niitä seikkoja, jotka tukevat modularisysteemiä, joka puolestaan mahdollistaa suunnitella eri tavalla. Se keskittyy uuden sovitettavan modular interior systeemiin, joka mahdollistaa käyttäjä (opiskelija) voidella layoutia käytettävissä olevilla moduleilla tai aika myöten voisi laajentaa toivonsa mukaiseen suuntaan.

Kyselyn perusteella opiskelijoiden mielipiteet ja arviointi asunnon nyky tilanteesta on käsitelty.

Koska puun käytöllä on pitkät perinteet arkkitehtuurissa sekä sisutuksen suunnittelussa, ja lisäksi viimeaikaiset kiinnostukset kestäväkehityksen suunniteluun antaa mahdollisuuden tutkia puuta sisustuksen perusmateriaalina, mikä puolestaan tukee energiatehokkuutta.

Kerättyä dataa on sovellettu opiskeliasuntolan suunniteluun osana Lahti Innovation Hub projekti, jonka tarkoituksena on rakentaa kansallisesti tärkeä innovation hub Lahden alueella. Hubin paikkana tulee olemaan Niemi alueella. eräs projektin tavoitteena on kehittää ratkaisumalli uuden aikaisen kampuksen ja oppimisympäristön Lahden Ammattikorkeakoulun tulevalle kampukselle (kampus 2020). tämä sisutuksen layout tukee puinen modular opiskeliasuntoa ja antaa mahdollisuuden erilaisille tilaratkaisuille ottaa huomioon käyttäjien toivomukset ja tarpeet. Se myös tukee erilaisia typologisia sovituksia , joita käyttäjä voi toteuttaa.

Kaikki kaikessa, tämä suunnitteluprosessi on edistynyt niin, että voidaan luoda elävä asumistila, joka voidaan muuttaa ja laajentaa tarpeen mukaan, toisin sanoen, asumistila elää meidän kanssamme.



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# INTRODUCTION

METHODOLOGY  
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## INTRODUCTION

Student life is one of the special period which mainly happens in young age. It defines certain and special type of activities.

Schools, universities, libraries and student accommodation are main spaces which students spend time during their studies. Student accommodations are one of the most important places which need to have quality as good as quality of young hood. In term of quality, architecture and interior architecture could be aware to design and define an atmosphere which would be appropriate with student life style.

What is the difference between

student houses and normal living spaces, is a question which its answer could clarify more student living space. Even though the student houses initially were designed as the typical family houses, campus and family houses are not the same (Nurul et al., 2012). However both items have same activities area such as, cooking area (kitchen), washing area (bathroom), private area (bedroom) and public area which are halls in both, but significant item is that there are different type of residence with different type of expectation.

According to research done by

*Amole* (2009) in student housing satisfaction, the expectations of each space were different compared to same spaces in family houses. for example, it is showed the expectation of student's bedroom are studying there, privacy, sleeping, entertaining friends, security of properties, number of persons who live in the same bedroom, and Ventilation.

The purpose of this thesis is reviewing the existing solutions and types of student housings with a view to evaluate which kind of significant design they have for living spaces for an special group of people as stu-

dents.

In this order, firstly, it is necessary to identify the needs of student housing, secondly, in order to the importance of efficiency in term of space and energy wood is chosen as the main material for interior spaces and finally propose and design future student housing.



## METHODOLOGY

The essay is based on an extensive review of literatures on the student housing design following projects that have taken a prototype and modular approach to design.

A list of questions which were asked through a questionnaire to find student's definition of their living space, in addition interview with an investor in student housing field is done to achieve their needs in design as investors who are dealing with the building.

A range of published literature in the field of development studies in wooden building was also consulted to provide an over-

view of the problems, solutions and methods which employed to the woods in building industry.



## STRUCTURE OF THESIS

This thesis is structured into three main chapters.

The importance of satisfaction and definition of student houses are discussed in the first chapter . this study tries to understand definitions of student housing from different points of view.

The method which is chosen in this research was questionnaires where Students opinion was reflected through questions such as, what are the features of student accommodation, or which types of accommodations give more satisfaction? In which size they are more acceptable? When it comes to economic issues, how much is affordable for

students to pay for accommodation?. Next important question do the student accommodations have the identity for living as a house? And finally how they could choose the proper living space in all issues, such as size, rent and comfortable place.

In the other hand I tried to figure out expectations of student housing from investor points of views who are working in special part of real state business. Due to the fact that they are presenting and renting houses for certain part of society who are young with new attitudes toward the life, investors should be aware of client's need to support

their success in their business.

In order to the census which shows the shortage of student houses, building new student houses which are different to the traditional ones, would be smart investments. (Zaransky, 2006).

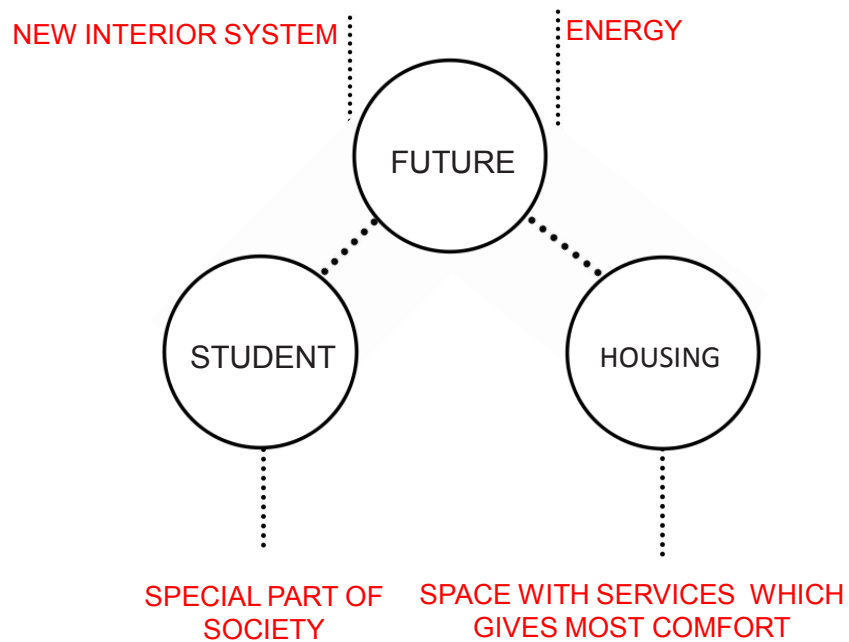
According to the interviews which have been done during this research, affordable student houses which could reflect energy efficiency and ecological design with special identity were mentioned.

Second chapter tries to find ecological material, specifically study about wood and analyses it due to the fact that wood has a strong back ground in Finnish ar-



chitecture and in the other hand it has lowest carbon footprint and embodied energy which are recently, the most controversial issues in ecological design.

Finally design process chapters rely on studied which have done in the previous chapters. Modular a prefabricated units which creates new concept of interior layout which is supported by wood as an ecological material.



## REFERENCES

1. Najib, Nurul'Ulyani Mohd, Nor'Aini Yusof, and Norazmawati Md Sani. "The Effects of Students' Socio-Physical Backgrounds onto Satisfaction with Student Housing Facilities." *Procedia-Social and Behavioral Sciences* 62 (2012): 64-74.
2. Amole, Dolapo. "Residential satisfaction in students' housing." *Journal of Environmental Psychology* 29.1 (2009): 76-85.
3. Zaransky, Michael. *Profit by investing in student housing: Cash in on the campus housing shortage*. Kaplan Publishing, 2006.







# STUDENT HOUSING



<http://www.ucollege.edu/student-life>

STUDENT'S OPINION  
INVESTOR'S OPINION  
BENCHMARKING  
CONCLUSION  
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## STUDENT'S OPINION

According to considering user-centred as a main factor in the future student housing design, also based on the fact that students are the residences of this type of housing, their points of view should be seen to be understood, Which spaces with which quality and features would give them more services. Practically, questionnaire is a method to reflect student's idea about their favourite student housing. Questions were asked in different categories in term of, type and size, identity, energy, furniture.

such as, what are the features of student accommodation, Or

which types of accommodations gives more satisfaction? Which size are more acceptable? The next important question asked about the identity for living as a house? A series of questions were chosen in furnishing issues.

The results and analysis which are based on 56 responder would be essential in design process and concept to improve this special type of accommodation toward giving more efficiency spatially and ecologically.

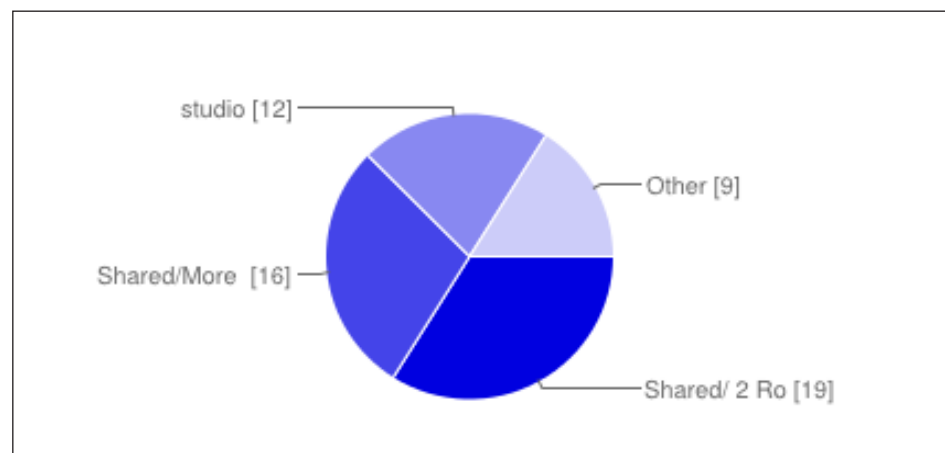


Based on different type of accommodation such as, studio, family type, shared rooms and other different typology, 34% of participants are lived in two shared room and 29% stayed in more than two-shared apartment, studios in 21% recorded as place where applicant were living there and rest of the group chose other type of accommodation (16%). (Figure1)

Interestingly, when favourite type of accommodation which gives more satisfaction, were asked, studios got the biggest amount of attentions (38%), two-shared room apartments are recorded

as second popular type of student housing, whereas family type and more than two-shared apartment have a same chance to be chosen(15%).(Figure. 2)

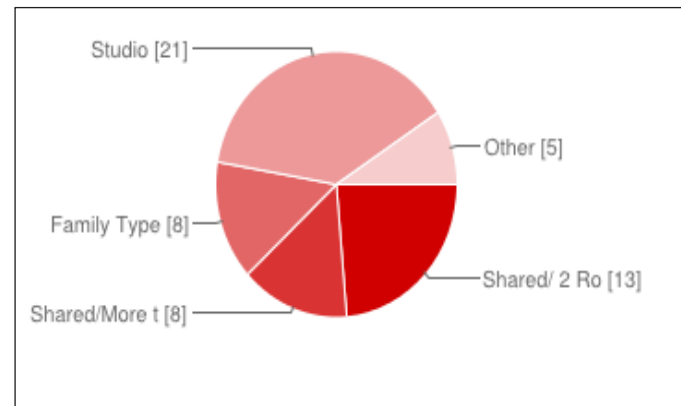
(Figure1). student houses typology



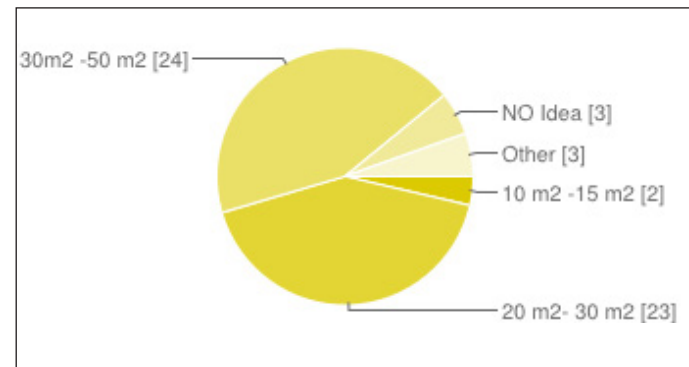
Results of Figure. 2 were approved when sizes of accommodation were asked(Figure. 3), 30 m2 to 50 m2 and 20 m2 to 30 m2 were accepted closely( respectively, 44% and 42%) which are approximately sizes of studios and two shared rooms in this chart also showed that just 4% of people liked to live in small apartments (20 m2 -30 m2).

Figure. 4 shows that amount of rents is challenging items of size and type which were discussed in the previous charts. Significant part of participants believes that rent is the main factor when they choose the accommoda-

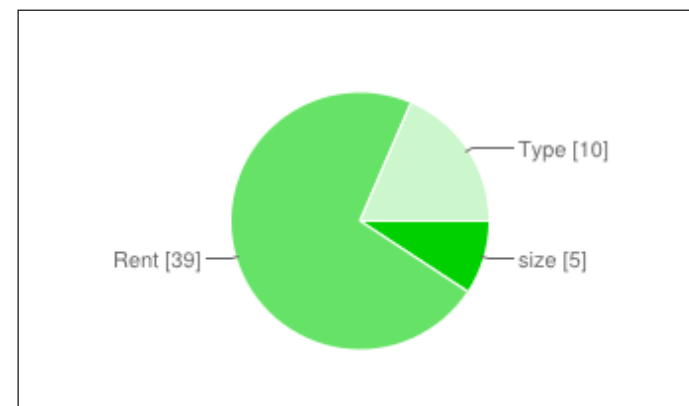
(Figure2). Satisfaction of different accommodations.



(Figure3).size



(Figure4).main factor for choosing student houses.



tion; comparing, type and size were mentioned much more less (19% and 9%).

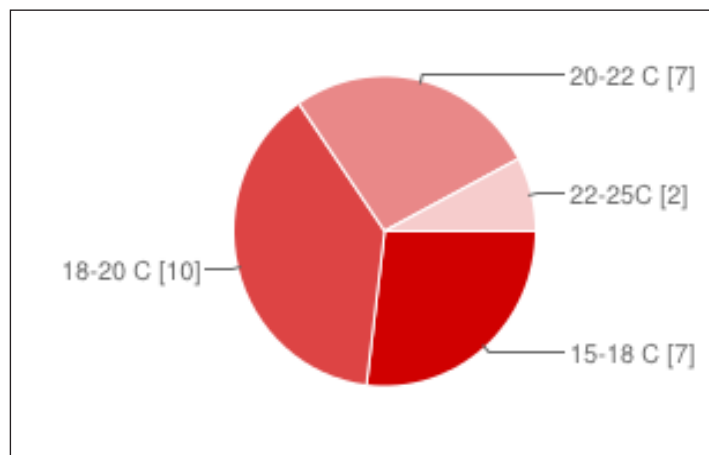
#### STUDENT'S IDEAS: EFFICIENCY (ENERGY AND SPACE)

Therefore, efficiency in term of energy and space are supporting each other closely, it means efficient space relatively could need and save less energy and provide energy efficiency, question this categories of questions were asked relatively.

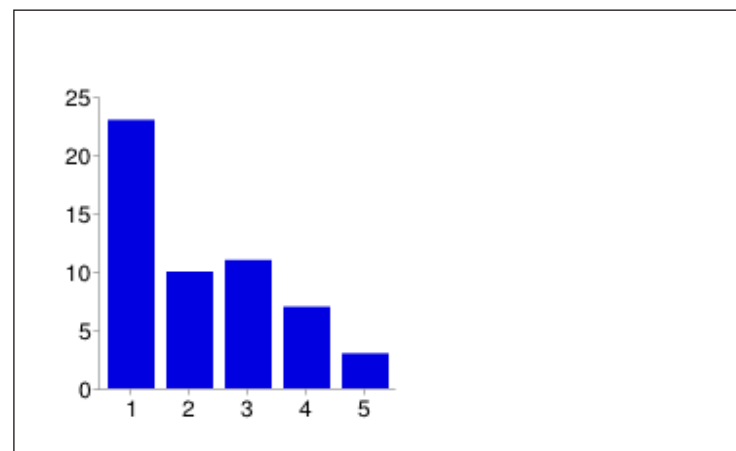
In term of energy, respondent answered questions such as, which temperature is comfortable inside places in winter and summer (Figure. 5 and 6), following, Figure. 7 which represent the importance of energy efficient living space and it has scaled from 1 to 5, describ-

ing necessary to not important. When the survey wanted to analyse how much embodied energy is noticeable for participants, importance of dividing waste from home were asked, widely recognised it as a necessary issue.( Figure. 8)

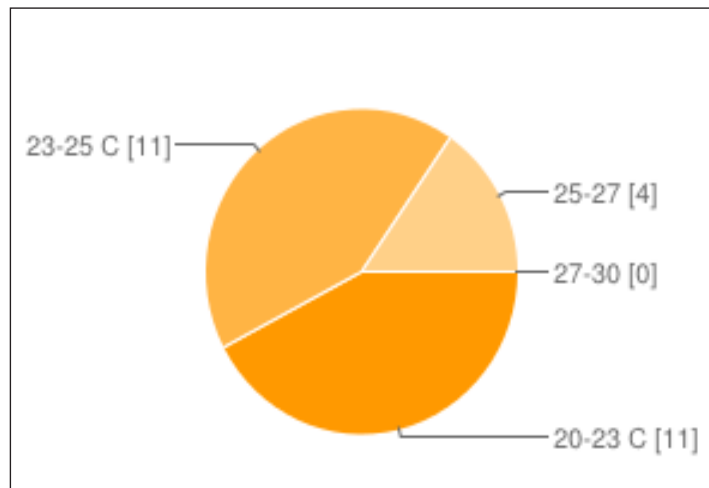
(Figure6). Type of accommodation that gives more satisfaction



(Figure7). Importance of energy efficiency



(Figure5). comfortable temperature



(Figure8). Dividing waste from home.

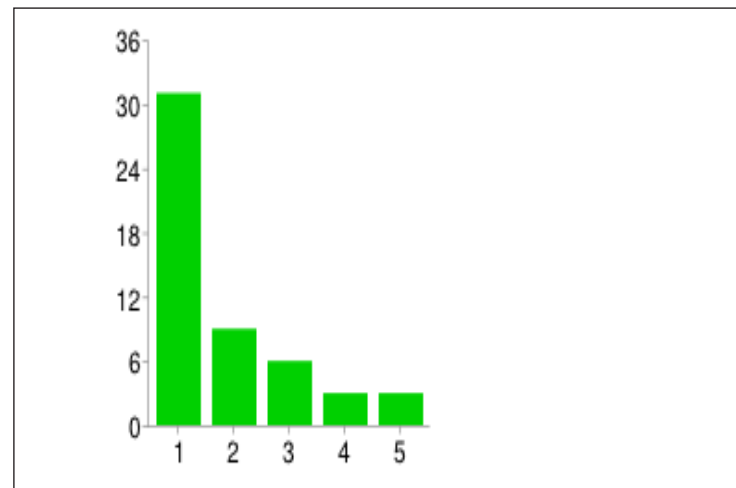
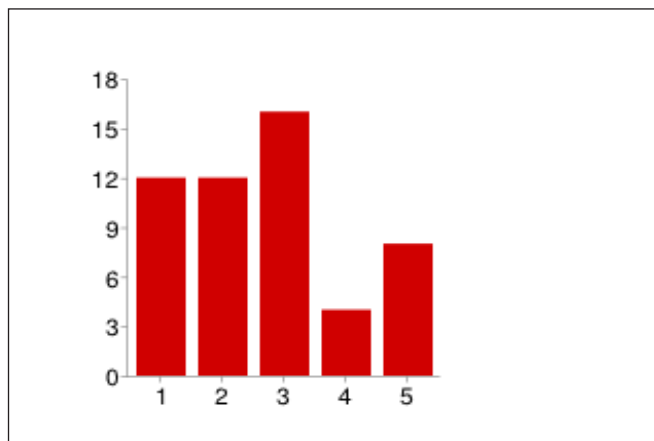




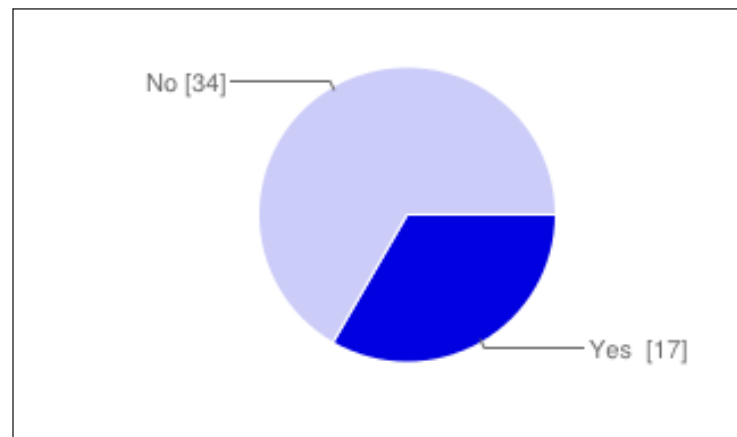
Figure. 9 shows that in which extend their apartments are well-furnished, in this respect Bar-chart number 10, they significantly mentioned, they prefer furnished apartment.

Next category of questions is devoted to flexible and multifunctional furniture, although Figure. 11, the majority had not bought a multifunctional piece of furniture, Figure. 12 demonstrates in an acceptable range, 38% gave number 1 for being handy a piece of multifunctional furniture.

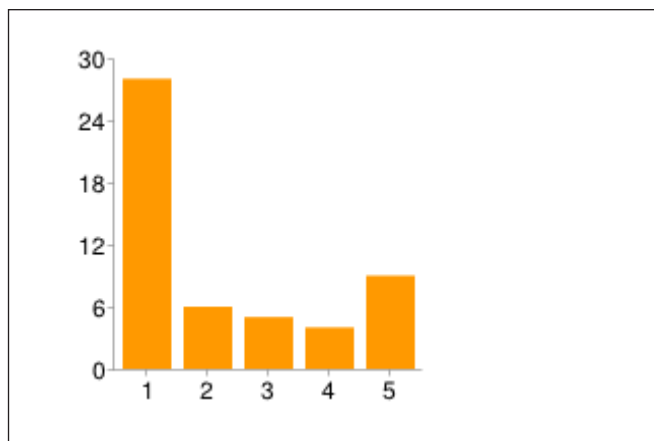
(Figure9). Well furnishing student apartments



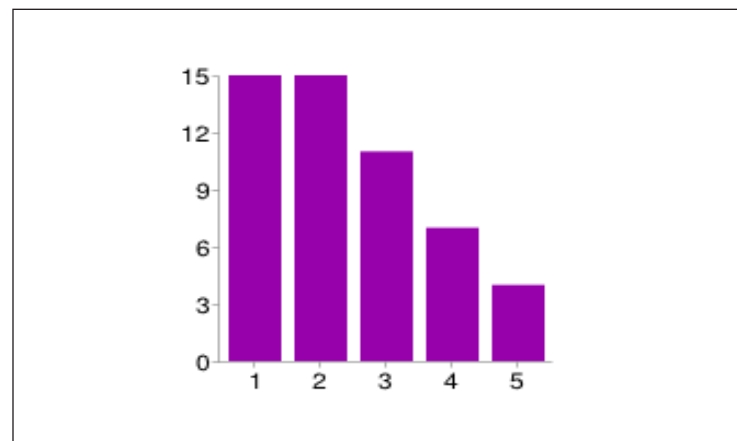
(Figure11). Multifunctional furniture



(Figure10). Full furnished apartments



(Figure12). Using multifunctional furniture



Different materials namely, concrete, brick and wood were the main materials which are presented in Figure. 13 ,in order to shows which one is more suitable for interior spaces. Mostly chose wood (53%), concrete and brick were chosen closely (17% and 15%) also other 15% did not have any idea for the interior material.

In conclusion, critics which were given by student's, about their living spaces shows problems mainly about material, furniture and lay out and rent.

In term of material, metal walls were mentioned as problem also plastic for the floor was be

mentioned as a negative item, cardboard as a divider wall let to hear all sounds pollution from other rooms.

Lay out and space organizing were the other issues which got critics, they expect lay outs which could give them privacy , also lights and widows placements in order to make more bright spaces.

### INVESTOR'S OPINION

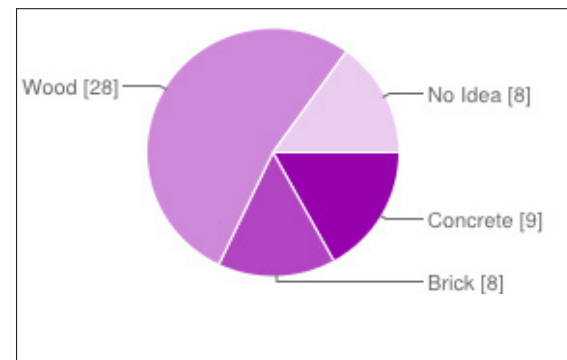
In the other hand ,Interview with investors shows that the importance of special identity of design which supports efficient and compact spaces.

Compact spaces also respect to economical issues and reduce

the rents relatively.

Surprisingly, in term of material, wood was the first choice from investors, eventhought fire legislation were mentioned as an important .

(Figure12). Preferred Material



# BENCH MARKING 01

## SCAPE

LONDON | AB ROGERS DESIGN GROUP | 2013

Photo1. <http://www.dezeen.com>



Ab Rogers who is a Designer from London believes that Scape which is the name of student housing project located in London, could bring different point of view to Small and compact spaces.

600 Students are living in Scape which includes bedrooms which are more than 12.5 m<sup>2</sup>. Designer tried to use the space as efficient as it could be , for example cupboards that double up as desks and seating in the win-

Photo2. <http://www.dezeen.com>







Photo3. <http://www.dezeen.com>

dows. Common areas also are a big part of this project where it has challenges to integrate 600 students while the individual spaces give calm and comfort. Two restaurants; a cafe named The Kitchen and a Pan-Asian restaurant entitled Box Noodle are the common areas.

Ab Rogers mentioned the main concept which was creating a new thinking in design language for small spaces such as student houses where the young people are the main target.

Color is one of the most distinctive design elements in this pro-

ject which mainly Bright colours are used. Red staircase which is near the reception is a good example for colour concept.

Photo4. <http://www.dezeen.comdesign/>



## BENCH MARKING 02

### SANT CUGAT'S STUDENT HOUSING

BARCELONA | H ARQUITECTES AND DATAAE'S STUDIOS | 2013

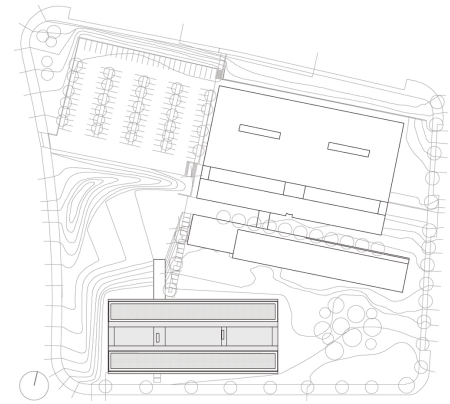


Photo5. <http://www.dezeen.com>

Photo6. <http://www.dezeen.com>



The Polytechnic University of Catalonia will be accommodated in modular student housing which is designed by Spanish studios H Arquitectes and dataAE, the housing would not accommodate exclusively students in Architecture, but its location is beside the Vallès Architecture School in Barcelona. Central terrace is between pair of parallel two-story blocks which gives to the Architect to design Bridges in the first-floor to connect them.

The typology of housing is defined to support each room has kitchen and bathroom while

Photo7. <http://www.dezeen.com>

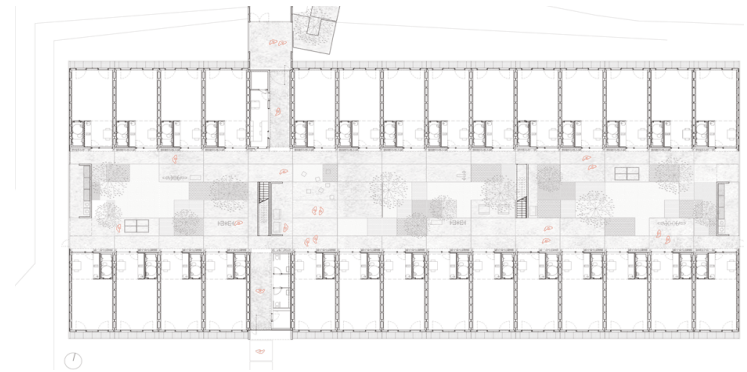
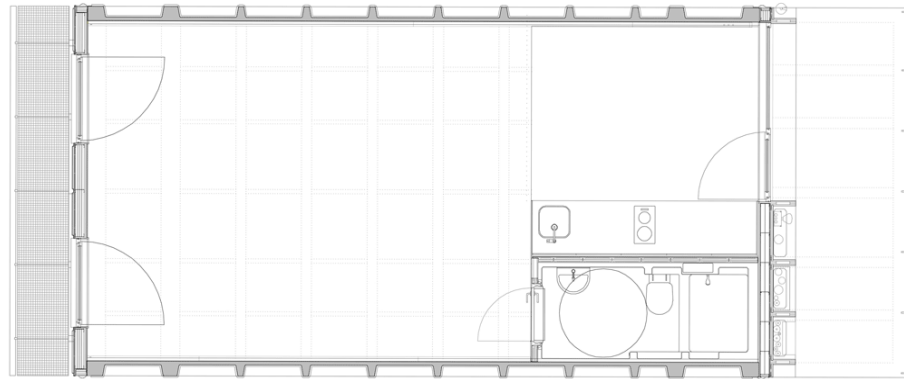


Photo8. <http://www.dezeen.com>





Photo9. <http://static.dezeen.com>



the interiors are unpainted walls which are exposed concrete and also in the ceiling which has visible beams.

Photo10. <http://www.dezeen.com>

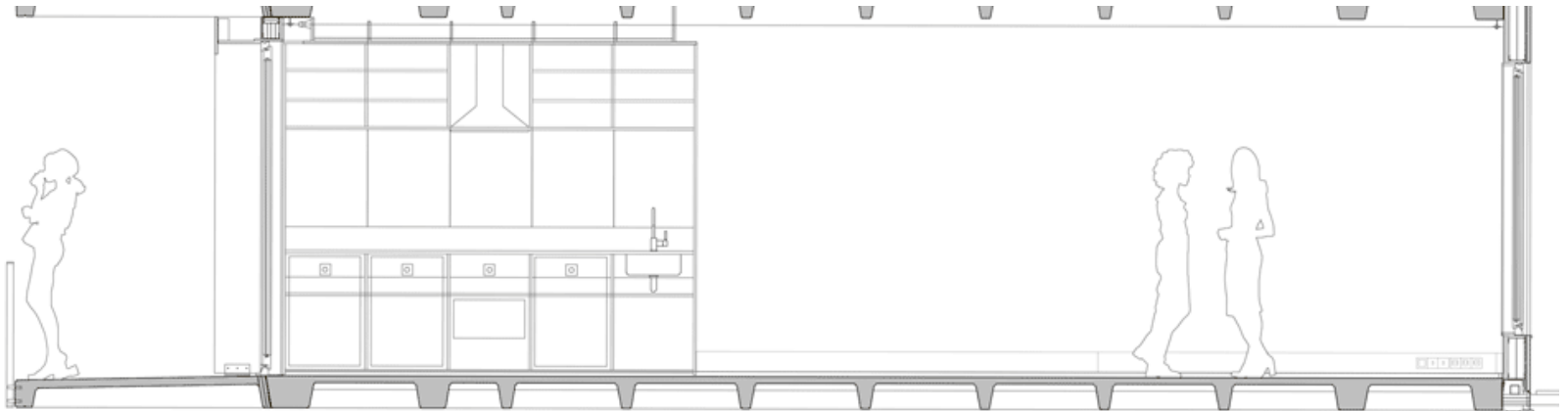


The main concept was giving the students an empty home, maybe in this way the architectural student could have the opportunity to design their interior space.

Photo11. <http://www.dezeen.com>



Photo12. <http://static.dezeen.com>



# BENCH MARKING 03

## STUDENT UNITS

SWEDEN | LINDA CAMARA & PONTUS ÅQVIST, TENGBOM | 2013

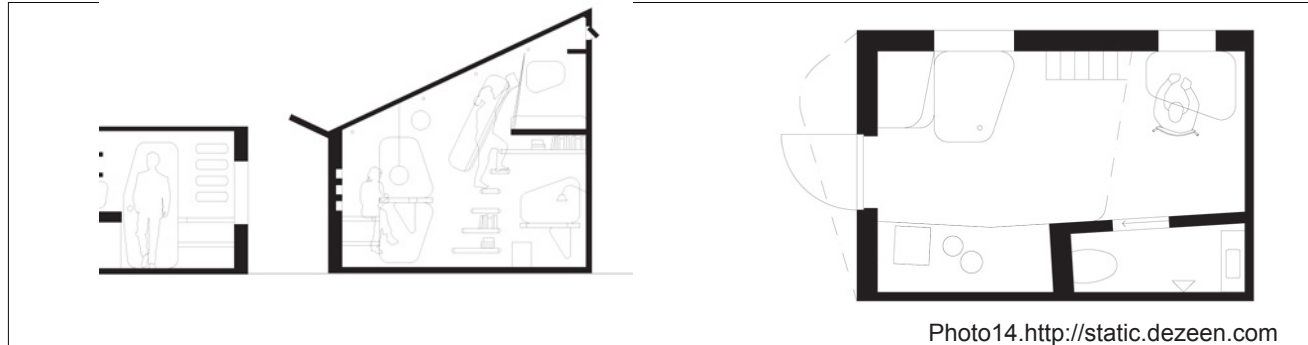


Photo14. <http://static.dezeen.com>



Photo13. <http://www.dezeen.com>



Photo15. <http://www.dezeen.com>Photo16. <http://www.dezeen.com>Photo17. <http://www.dezeen.com>

Tengbom Architects has designed a student flat for students which has main features such as affordable, environmental-friendly and smart design and materials due to use of manufactured wood.

The university of Lund was asked for student flat 's Design which would be 10 M2,tengbom Architectural group tried to design Affordable, sustainable way .the result displayed in Virserum Art Museum.

Main spaces f this compact student houses are comfortable

sleeping-loft, kitchen, bathroom and a small garden with a patio.

This application is concentrates on small and modular spaces while the choice of material is mainly wood.



# BENCH MARKING 04

## KEETWONEN- RECYCLED CONTAINER STUDENT HOUSING

AMSTERDAM | TEMPO HOUSING | 2006

Photo19. <http://www.revedecor.com>



Photo20. <http://www.revedecor.com>



Photo 18. <http://www.tempohousing.com>

Photo21-23.<http://design.spotcoolstuff.com>

Photo23

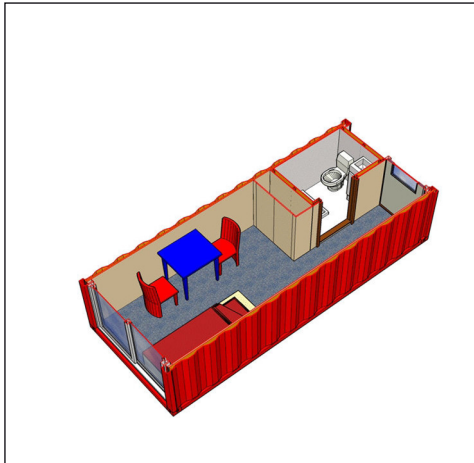


Photo22

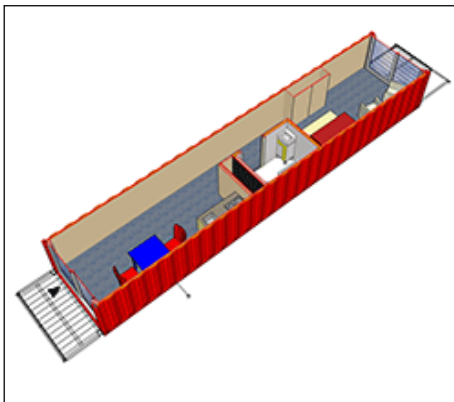
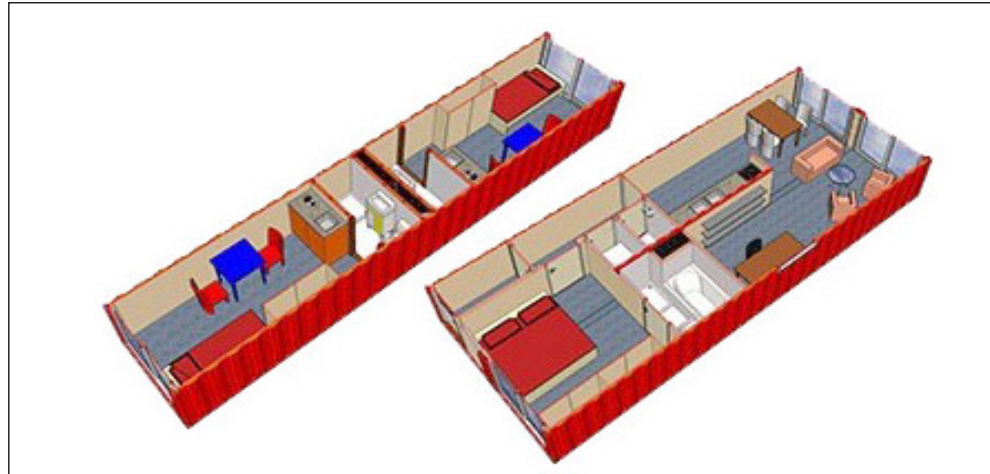


Photo21

*Keetwonen* is student housing project in Amsterdam, designed by TempoHousing. 1000 unit of containers changed to be student houses this special type of student housing not only gives different feeling of dwelling but also create comfortable and private space to each student with their own kitchen, bathroom balcony, separate study and bedroom , also it has social areas

such as such as office spaces, a supermarket and even a sports area.

Day lights which comes trough large windows ,automatic ventilation system with variable speeds and The heating which it is from a central natural gas boiler system, also the hot water which is supplied by one 50 litre tank per home support the main design.

## CONCLUSION

Benchmarking of student houses shows that , recently student housing design have been trying to give diversity in term of material and colour in order to bring more active and special atmosphere, also modular designs as a method tried to support student houses in term small spaces design. In some extent the idea of giving chances to users to change colours or some interior elements were recognised limitedly.









# WOOD



WOOD, TIME AND ARCHITECTURE  
WOOD AND CLIMATIC CHANGES  
FEATURES OF WOOD  
REFERENCES

Photo : Zahra Rasti

## WOOD TIME AND ARCHITECTURE

Wood as a building material is considered in different eras, especially in traditions(Photo 24). As the documents is shown that the oldest known timber building are log houses found in Poland ,dating 700 BC[1]

Is Timber a traditional material?(Photo.25) If Timber as a material be compared in different eras in architecture, it is a basic material for human from the beginning shelter till now in scale of family houses But when it comes to other scales it is stopped strongly[1].

The heroic age of industrial revolution was a certain period

Photo25 <http://upload.wikimedia.org>



photo24. Photo: <http://en.wikipedia.org>



Fig.13 Done by Zahra Rasti  
Wood and building in different scales.



of time which was considering the how large structure could be made. Cast iron and after that Steel was the main issues to make the huge structure and following, reinforced concrete developed huge structures as well.[1]

Obviously, wood stayed in the small houses and footbridges

and watching huge structures to the skyscrapers and long bridges which were built by new materials which is shown in Fig. 3. Recently two strong reasons bring wood out to be acceptable as a modern and new material, Environmental Movement and new interests of tradition methods in building industry.



and new material, Environmental Movement and new interests of tradition methods in building industry.(Fig.13)

One of the earliest uses of developed wood was in United Kingdom ,in the Waterloo entrances arches which was built for the festival of Britain in 1951[1]. (Photo26)

Photo26.<http://fabricomagazine.com>



Photo27. <http://www.rpbw.com/project/41/jean-marie-tjibaou-cultural-center/#>





*Renzo Piano* is one of the architects who designed wooden structures to create new building with considering local architecture methods where as he designed Tjibaou cultural centre. (photo27)

Wood in building could be developed constantly due to the fact that, architecture, as a creation of a human work which is a long time produced by user, same as all product should be developed over time and based on user's needs. Architecture is always answering to tradition and culture of its time Society, environment action,

life style of inhabitants and their aesthetic value are reflected as well [1].

In conclusion wood stayed with builders, architects and Designers, when they wanted to make first shelters till nowadays when human s concerning about environment and they are recalling wood which was behind for decades and it is accepted that Wood is proper option and new material for Sustainable architecture .

## WOOD AND CLIMATE CHANGES

Regarding to importance of Global warming and climate changes, controlling of harmful material became as a main issue, all industries are scanned to find the issues which are affect climate changes. In this regard architecture and building industry emerge as one of the large industry to be considered enhance that it is one of the basic needs of human in term of housing issues. Considering sustainable solutions, in this manner, energy efficient building is one of the conventional issues which is considering sustainability and low energy building represents one of the most well-known ide-

as in sustainable building. In sustainable building, thermal comfort is defined based on low energy process [4].

Wood is absorbing carbon dioxide during all its life and also in term of embodied energy it has a good records . the amount of energy which is needed to produce a unit of timber is much more less compare to other materials, for example, it takes 750 MJ of energy to create a cubic meter of rough –swan timber, compared to 266000MJ for a cubic meter of aluminium [1].

Life cycle assessment is an universally accepted, a method based on science which is quan-

tifying a product's ecological input and output from beginning to end. It reveals a scientific scale of environmental impact in side of resource extraction and also processes of row materials during the manufacture, spreading, ,even the reusing and recycling process and finally disposal[5]. based on the chart in Figure.14. Life cycle assessment researches present a lighter environmental footprint from wood compared with other materials such as steel, concrete and etc, in addition clear environmental advantages at each Stage is another positive point of wood(5) . Also regarded to Gabaza et al[6]

reviewed the literature on low carbon and embodied energy material in building.

They studied the implementation of the energy building performance directive (EBPD) in Europe as example. The studies is showing difficulties which exist about measuring embodied energy and also they mentioned new methodology which was founded in the literatures. Additionally they showed the relationship between embodied energy and embodied co2 in different material. new materials with low embodied energy is the issues that they highlighted

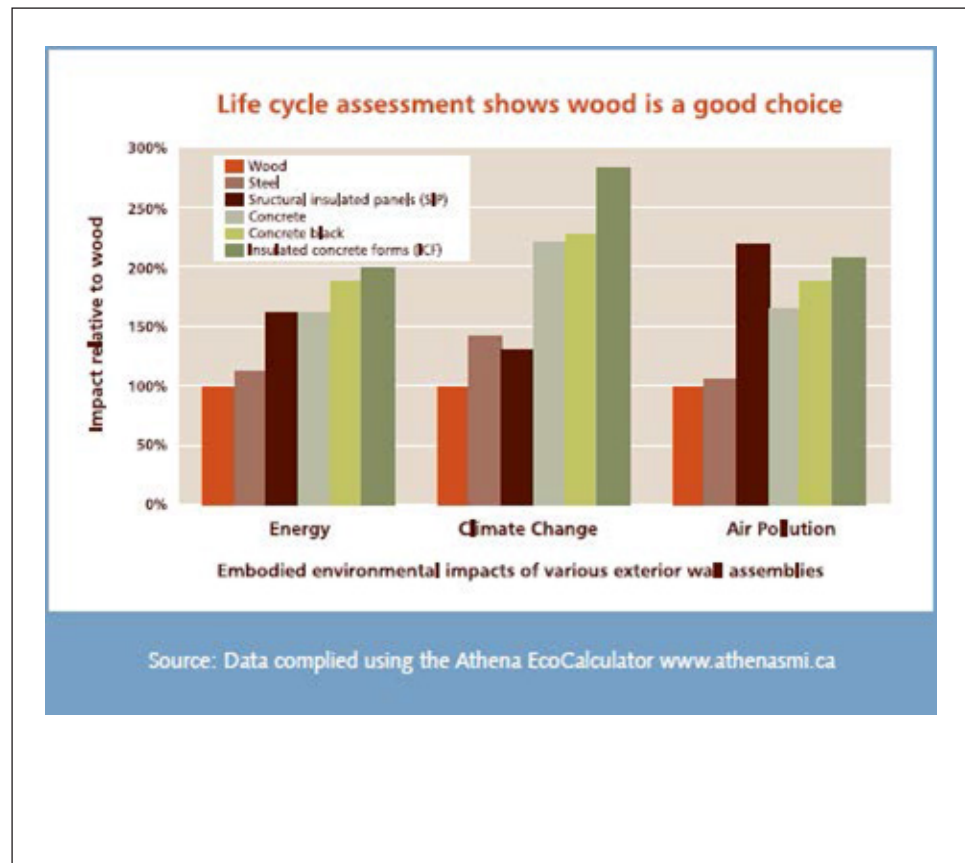


Fig 14. Life Cycle assessment

.in the article many references is founded which shows that wood is required much lower process energy and results in lower carbon emissions than other building material [6].

At the same time wood industry tried to develop wood as a modern and renew material. Development of glue laminated material, the understanding of using every part of tree in wood industry, also emphasizing on wood an environmental friendly material regarding to its low carbon dioxide features.

Based on ,Steffen Lehman who [7] studied low-carbon prefabricated modular construction

systems which used prefabricated engineered solid wood construction panel system .such as :load bearing cross laminated timber panels and also due to the reducing greenhouse gas emissions and waste avoidance he discussed about disassembly.

The article is trying to introduce the CLT panels as an alternative to build with low carbon construction and lightweight prefabricated material [7].





## DENSITY OF WOOD

Wood density is defined as mass of wood per unit volume [2] good strength and hardness properties are features which comes by High density of wood I ,also there is a fact that high density gives higher weight of a wooden product.

The density of wood depends on the species of wood which usually varies between individual trees and also in different parts of a tree trunk.

thickness of its cell walls and the size of its cells define the density of a wood species.as the following table shows, 120 kg/m<sup>3</sup> is recorded for Balsa ,which is a low density , compare to other

species of wood have a density around 1000 kg/m<sup>3</sup> ,whereas Birch, Oak and Beech have averagely same density which is recorded around 600 kg/m<sup>3</sup> [3].

Species of	Density
Balsa	120
Spruce	430
Pine	490
Birch	600
Oak	650
Beech	680
Jarrah	800
Muhuhu	900
Ekki	1100
Indian Eboni	1200

Fig.15 Density comparison



Photo28. Balsa  
<http://www.wood-database.com>



Photo29. Birch  
<http://www.aversis.be>



Photo30. Spruce  
<http://saydina.com>



Photo31. Pine  
<http://en.wikipedia.org>

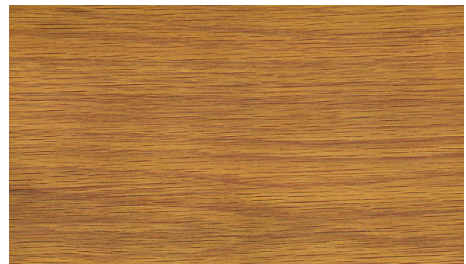


Photo32. Oak  
<http://www.browardcustomwoodwork.com>



Photo33. Beech  
<http://www.justwood.co.uk>

The average density decreases from the top of the trunk to the root; however some exceptions are recorded also.

In general trees which have grown fast has a lower density than the same species of tree that has grown slowly.

Knots and trunks have same density in many cases. Additionally high-density knots in some species of trees cause crack through drying and later on in processing also based on some records knots frequently contain compression or tension wood [3].

## MOISTURE CONTENT OF WOOD

The most distinctive significance of the wood is its moisture content additionally moisture make wood heavier as far as dry wood has almost half weight of wet wood which is an important item in transportation of the wood, also dry wood is considered to bear heavier load compare to wet ones .painting and gluing is other two items which are much more easier to do on dry wood [3].

Swelling or shrinking, and harmful twisting, warping, splitting, convexity are caused when the moisture content of wood is

changed .

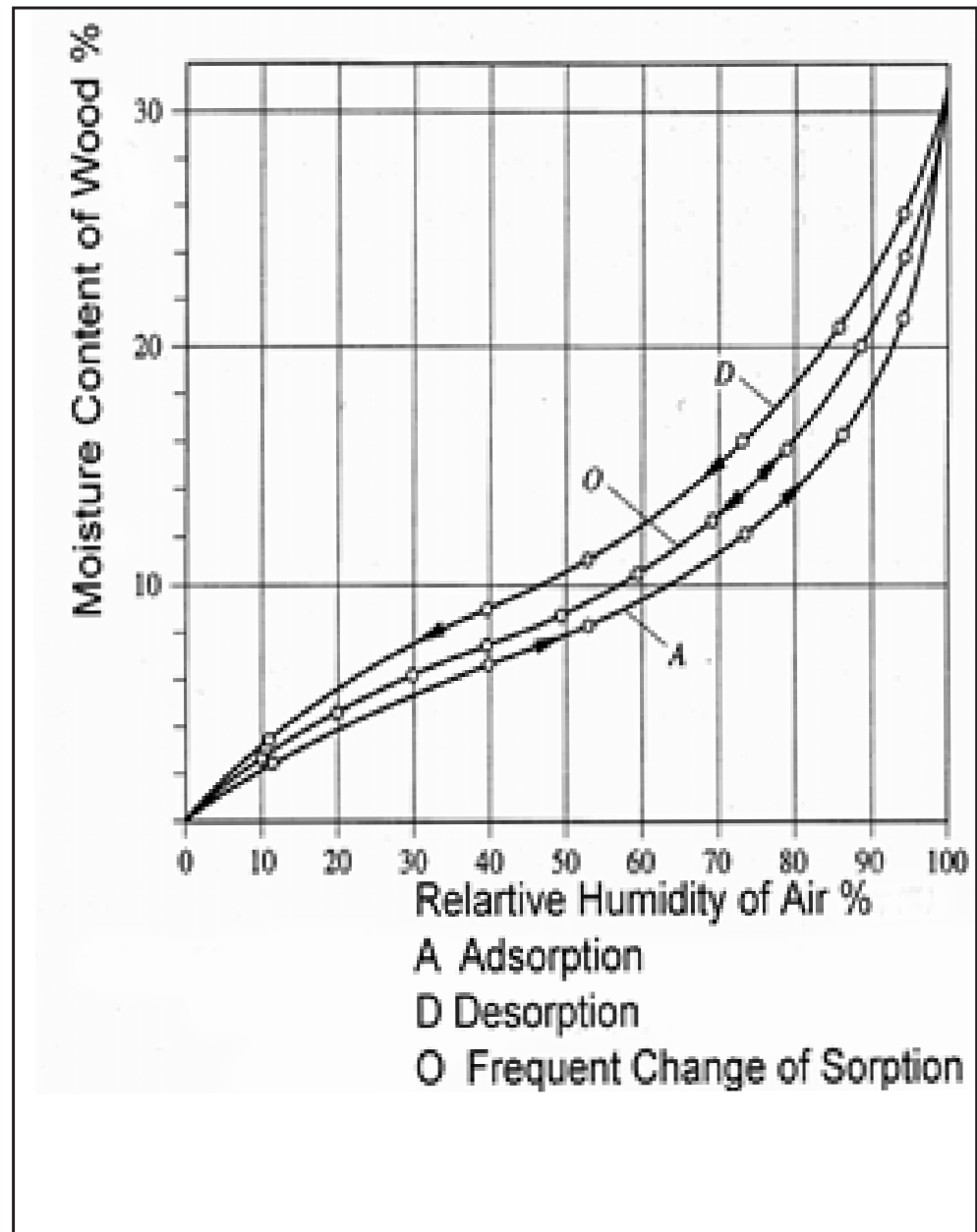
other affects such as cracks or damages could appear in the Joints or finished surfaces .

Adsorption is named of process when moisture increases and desorption when it decreases. As in the Figure (16) is presented, Usually, these two mentioned process make consequently Adsorption and Desorption alternate [3].

Since the stated changes have minimum importance, basically it is passed over. Changes of moisture content normally decrease whenever would have painted or added layer. Also moisture changes have different

fluctuation based on seasons. Swelling and shrinking in wood is caused by moisture changes [3].

Fig16. Moisture and humidity content  
WWW.Lamk.fi



## STRENGTH OF WOOD

The ability of a piece of wood to bear load is defined for strength of the wood. The breaking force divided by the area, i.e. N/mm<sup>2</sup> or MPa (million N/m<sup>2</sup> or mega Pascal) is another expression for strength which is general for all materials.

The direction of loading in relation to the grain direction of wood are affecting on strength properties. Two main direction which are observed to analyses the strength of the wood are Parallel and perpendicular to the grain of wood which are respectively marked( //) and ( $\perp$ ).

Wood is accounted as an strong material when its weight is con-

siders. It should be remarked the fact that the the circumstances of usage is defining the strength of wood as well [3].

elasticity is the main factor which describes how much wood is strong to resist against change of shape such as bending, tensile or compression deflection, in other expression, higher the modulus of elasticity causes the less deflection[3].

In practical terms, how wood is used in construction is based on deflection feature of wood and it bring this fact out that hard loading does not damage timber but, bending is certain effect of deflection which it is completely

rejected. In the other hand elastic is also the deflection of wood which is zero when timber does not bear anymore loads however, when wood has loaded for a long time, mainly plastic deflation take place which in some extend it reverse and in some would remain as a permanent affect [3].

The variation of the properties is an important factor which is essential to be considered when the strength properties of different species of wood would be compared such as large knots or irregularities.

Different strength is catego-



rized in the wood such as, Tensile strength which is high in the grain's direction, [Fig.17] is showing it, secondly , compression strength which is shown in figure.18 explains that wood in the compression behave as a ductile material .

Bending strength is one of important features of wood . therefore bended timber has compression on the top and tension in the lower side , the factors which were mentioned first and second categories of strength could apply in bended strength also, refers to figure 19.

The last category is shear strength which appears when

the tall timbers in different layers have a tendency to move and slide against its direction, in the Figure.21 is presented visually the mentioned condition. Hence this strength of wood is weak, in constructional items should be avoided of shearing forces.

Fig.18 wood in compression  
WWW.Lamk.fi

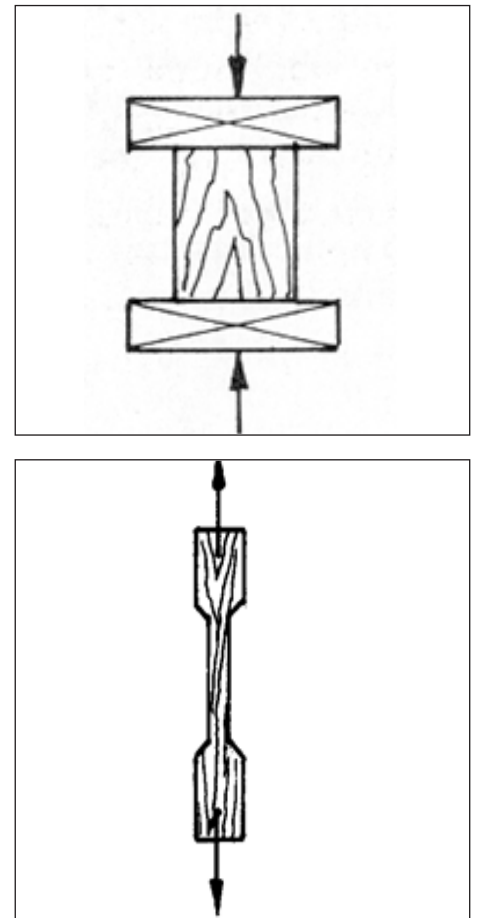


Fig17. Strength in grain direction  
www.Lamk.fi

## HARDNESS

Hardness is very important to define the durability of the wood which is important in building industry, especially when it comes in term of using wood in the surfaces as floors.

Pressing a metal ball into the wooden material is used to test the hardness of wood which basically in two different way could be applied, called Janka test and Brinell test. in the first test, the ball is pressed to a constant depth and the required force is measured and in the second way, the ball is pressed with a constant force and the size of the imprint is measured for the calculation of the hardness .

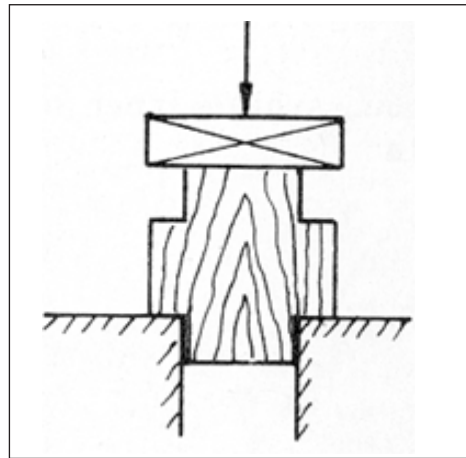


Fig.10 Sliding different layers of wood  
www.lamk.fi

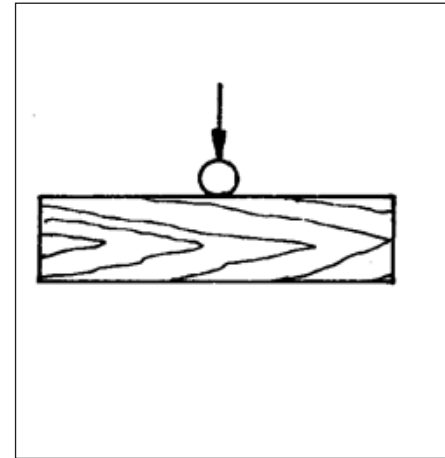


Fig.20 Hardness test  
www.lamk.fi

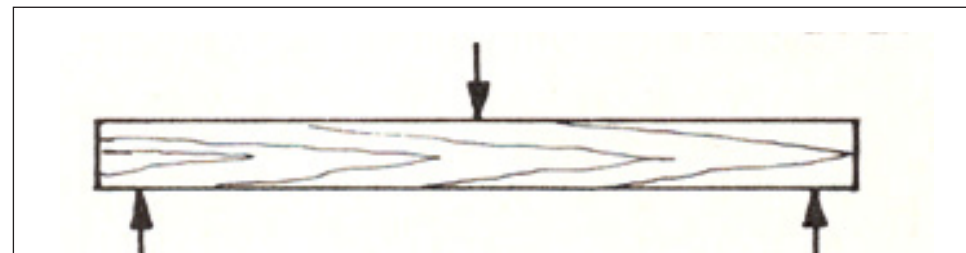


Fig.19 wood and bending

WWW.Lamk.fi

Figure.20 refers to Hardness test [3].

## REFERENCES

- [1] Slavid, Ruth. wood architecture. Laurence King, 2005.
- [2] [Online] // prometheuswiki - 07 08, 2013. - 12 02, 2014. <http://prometheuswiki.publish.csiro.au/tiki-index.php?page=Wood+density+protocol>
- [3] Mikko Salmi, LAMK
- [4] Almusaed, Amjad. Biophilic and bioclimatic architecture: analytical therapy for the next generation of passive sustainable architecture. Springer, 2011.
- [5] Surprenant, David. The National Building Code of Canada: A Tool for Recovery in the Forest Industry?. Library of Parliament, 2010.
- [6] Cabeza, Luisa F., et al. "Low carbon and low embodied energy materials in buildings: A review." *Renewable and Sustainable Energy Reviews* 23 (2013): 536-542.
- [7] Lehmann, Steffen. "Low carbon construction systems using prefabricated engineered solid wood panels for urban infill to significantly reduce greenhouse gas emissions." *Sustainable Cities and Society* (2012).
- [8] Watson, Donald. "Climatic design: energy-efficient building principles and practices." (1983).





# DESIGN PROCESS

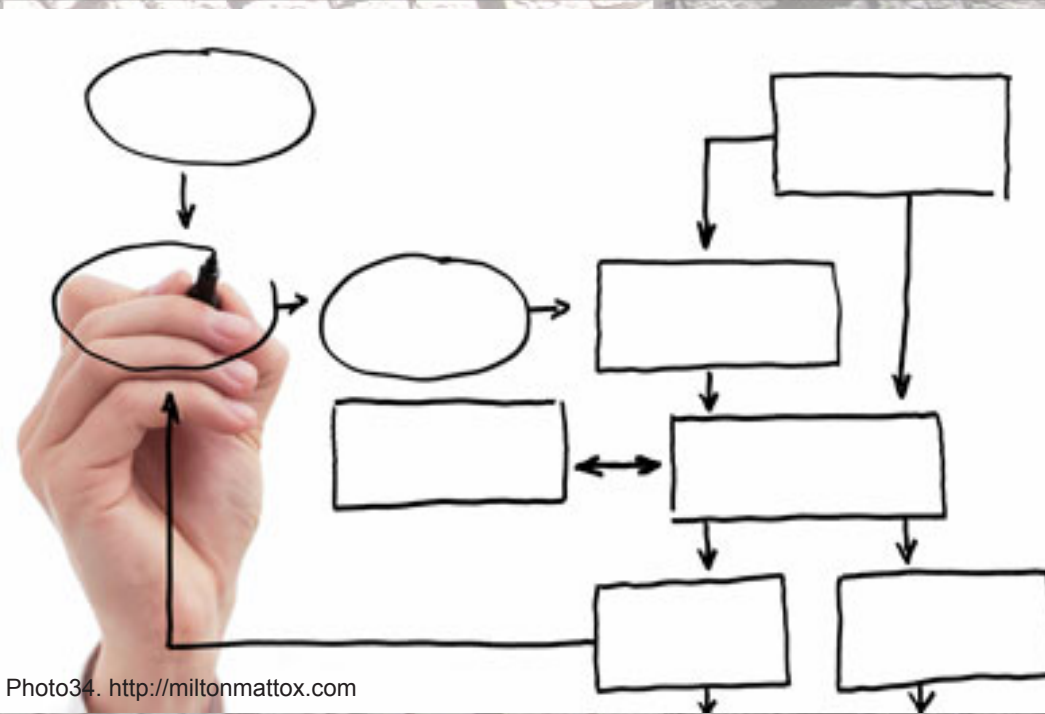


Photo34. <http://miltonmattox.com>

DESIGN PROCESS

SITE ANALYSIS

CONCEPT

MODULES

LAY OUT OF THE MODULES

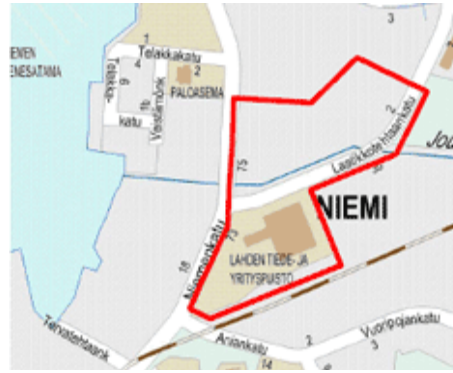
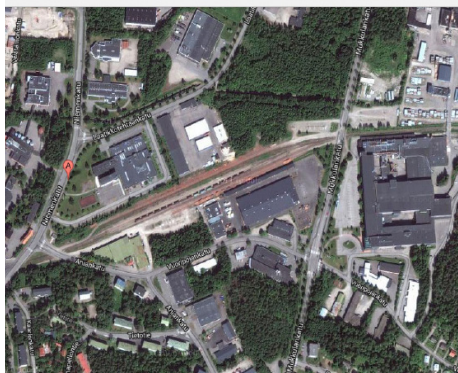
TYOLOGIES

COMBINATION



Photo35.Niemi Campus's area

<http://www.lahti.fi>



Lahti Innovation Hub project which, aims to build up a nationally important innovation hub to Lahti region. the strategies of Lahti region and the focus on developing a model area for practise ,are defined the activities of the project .

location of the hub will be in the Niemi area. One of the target of the project is development of a concept for a modern campus and learning environment for Lahti University of Applied Sciences (LUAS) and other actors of the future campus (Campus 2020) .A multi-actor, multi-disciplinary , diverse community and shared resources are the

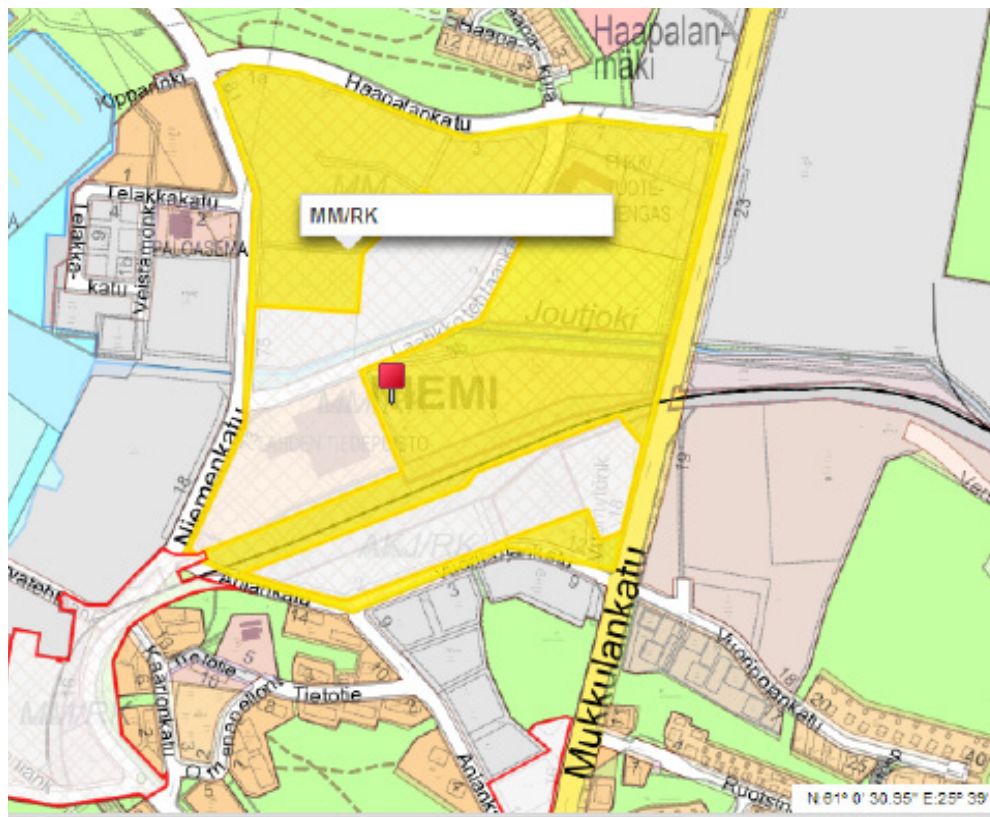


Photo36. Niemi Campus's area

<http://www.lahti.fi>

factors to support new campus in term of modernity, in addition user centred idea is a strong approach which involves whole development's stages.

Campus will be developed based on beliefs in open future learning environment, human-centric, multi-scale and multi-functional campus as a

part of everyday life.

Reducing campus physically is a purpose for future campus instead of the fragmented campus. Multi-purpose and adaptable spaces simultaneously with the operational and pedagogical solutions are required to make the mentioned purpose real.

Photo37. <http://www.studyinlahti.fi>



If we highlight list of aims for the new campus namely modern campus, multidisciplinary, diverse community and shared resources, user centered, multi-scale and multi-functional campus. in the other hand, considering the result of the second chapter which mentioned prefabricated potential of wood and also other results from all chapters ,drives concept to a new layout of interior which would be created in modular and prefabricated system .



Photo 38.basic idea of home

<http://photo.elseoar.com>

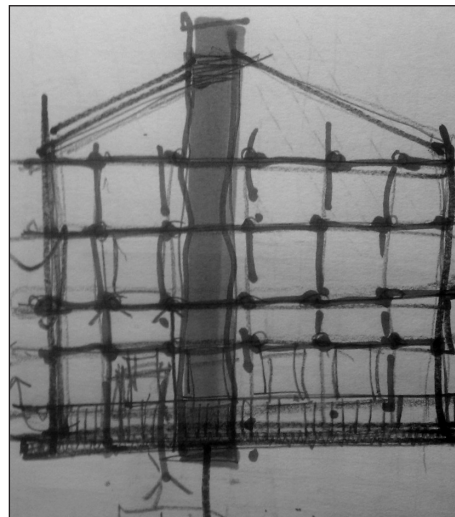


Photo39. Sketch  
Zahra Rasti

Photo40.  
edited by Zahra Rasti



Photo41  
edited by Zahra Rasti

Photo40 is presenting prefabricated units which are built in factories and transformed to the site.

Photo41 is presenting the idea of self-design and self-build of houses, which gives the opportunity to students to design and think about their accommodation



Photo42  
edited by zahra rasti

Photo 42, represent the idea of houses which has special features based on individuals, also each student could be interacted by their place.

Photo 43, demonstrates the placement of each unit in a space .

1



Photo43  
done by Zahra Rasti

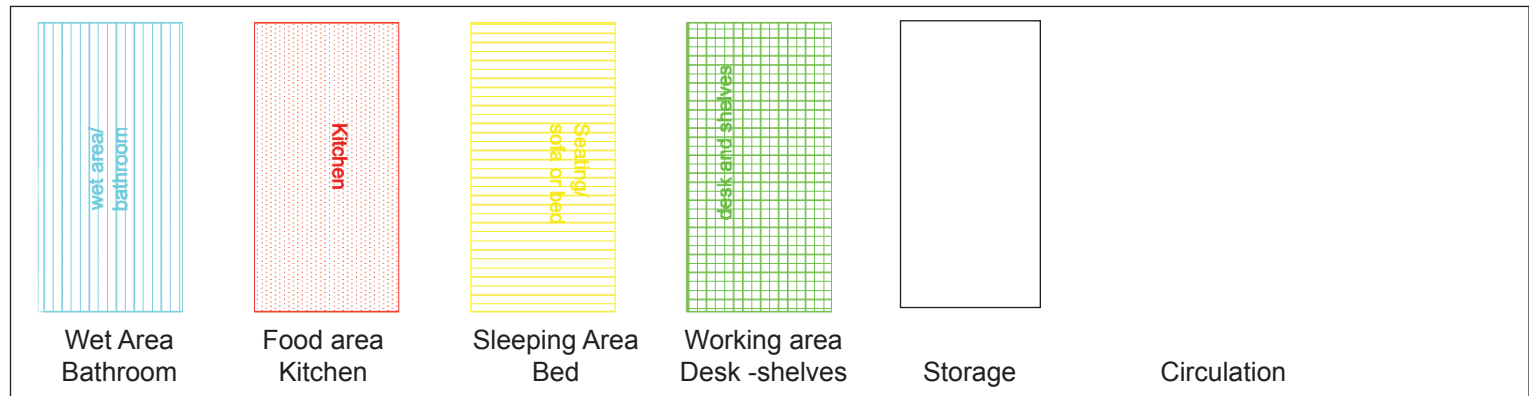
INTERIOR LAYOUT  
CONCEPT



ACTIVITY IN A STUDENT HOUSE



## 2



Activities which take place in the certain area, defines the different spaces in a building, In term of student accommodation, main activities are divided under the categories of wet area such as bathroom and toilet, cooking area as the kitchen, working area, resting area, storage and finally circulation spaces which is included different type of possibilities to move horizontally and vertically.

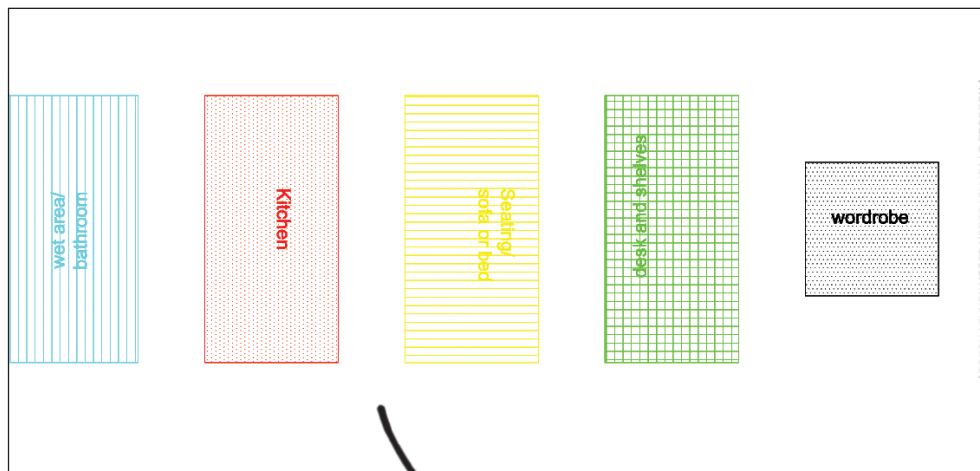


Photo 44-46 are sketches to analyse minimum space which could wrap the basic functional units.

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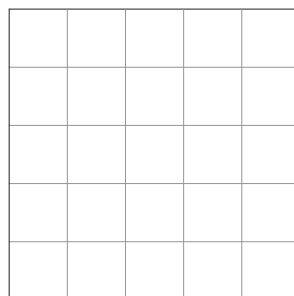


Photo44

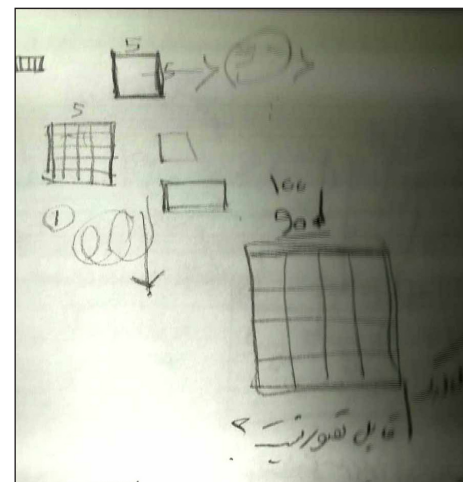
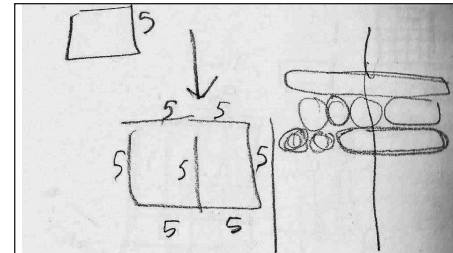


Photo45

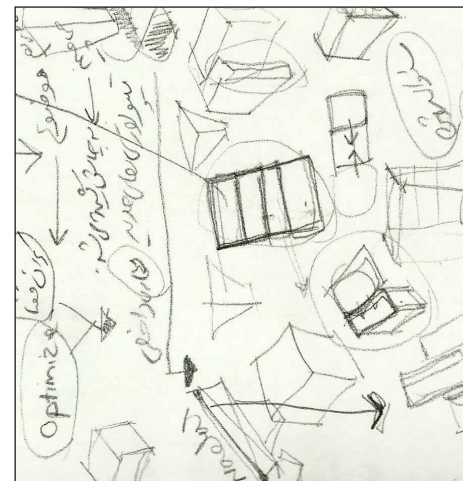
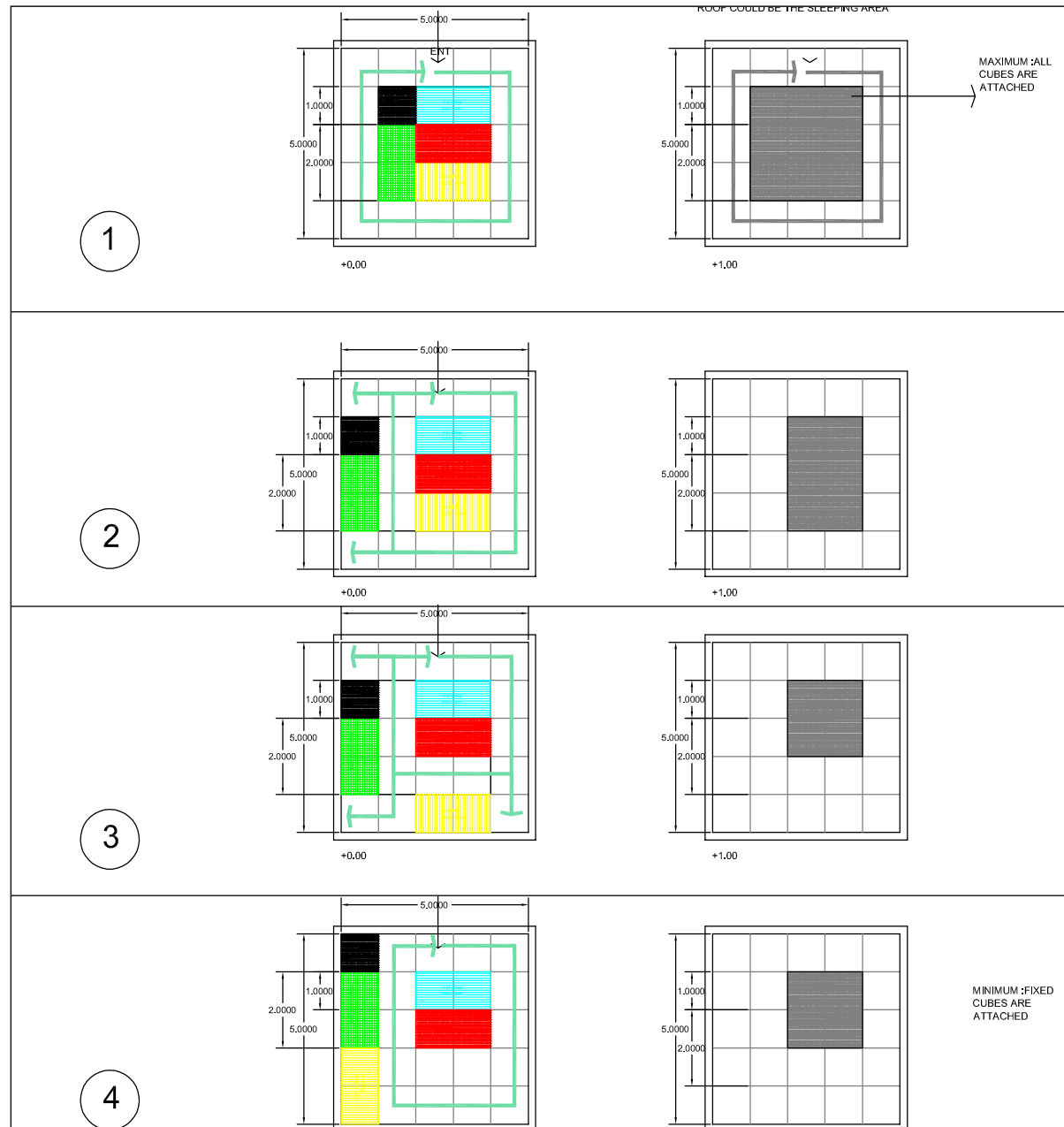


Photo46

3

Certain number of modules could create different layout.



# 4

In the previous proposal all the verities of lay out is limited just inside of one units and in two dimension, one step further could create interior lay out system in 3 dimensional space which give the possibility to each functional unit To move in different direction and create each student houses in different sizes. Based on their needs during they live there.

It means each units which are

named, Sleeping area, Kitchen area, working area ,washing area and finally space which supports circulation system such as corridors and stairs.

It means each units which are named, Sleeping area, Kitchen area, working area ,washing area and finally space which supports circulation system such as corridors and stairs.

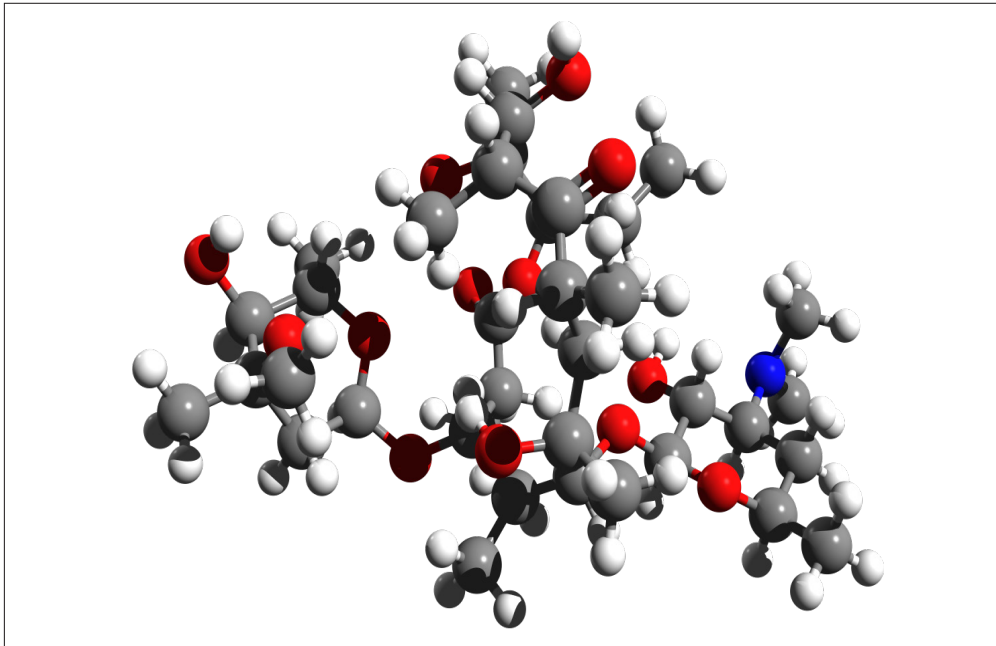


Photo47  
<http://www.theweedstreetjournal.com>

Photo 47-48 represent the ideas of connected elements which could grow in different direction.

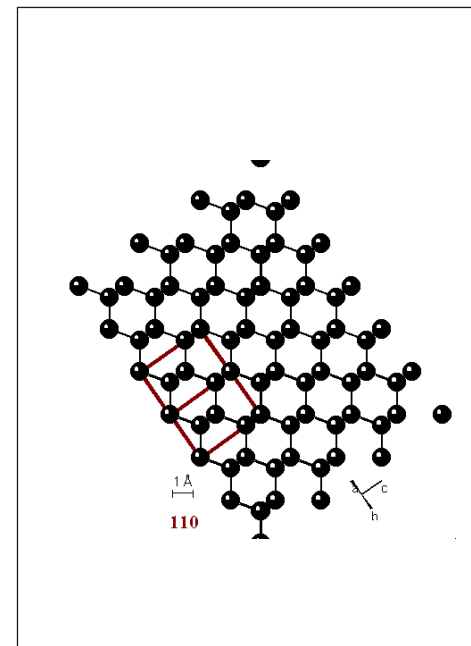


Photo48  
<http://www.theweedstreetjournal.com>

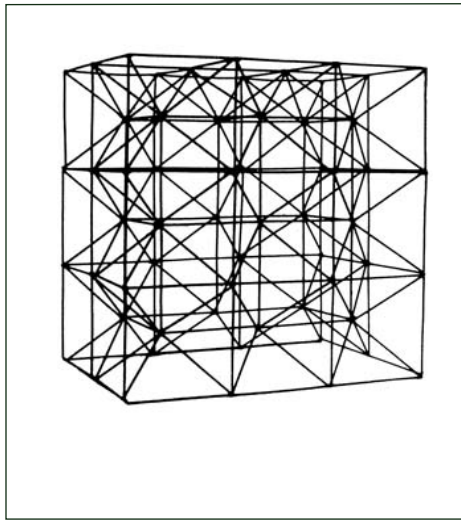
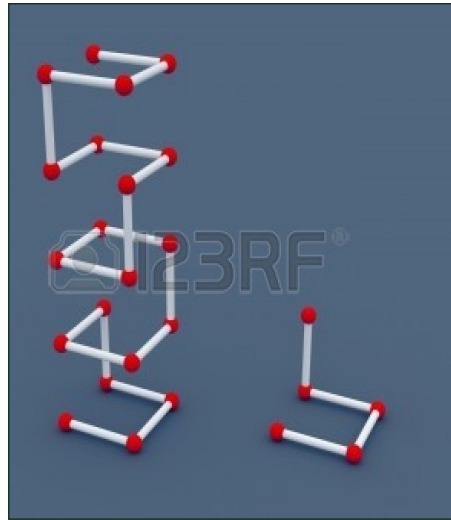
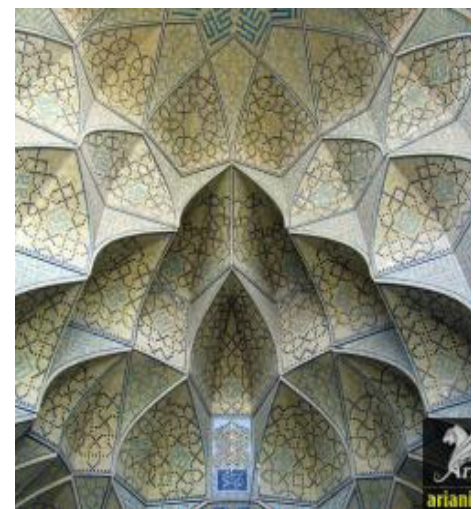
Photo49. <http://www.123rf.com>Photo50. <http://www.123rf.com>

Photo49 and 50, shows the idea of magnetic extension, horizontally and vertically.

Photo 51 and 52 representing the repetition a module in architecture which could create an active shape, form and space.

Photo 51. <https://www.flickr.com>Photo 52. <https://www.flickr.com>



Photoes 53-56, demonstrate the fact of cubic volume which could creates spaces widely. it could happen with lego bricks or even with tetris game .

Photo54 <http://erikjohanssonphoto.com>

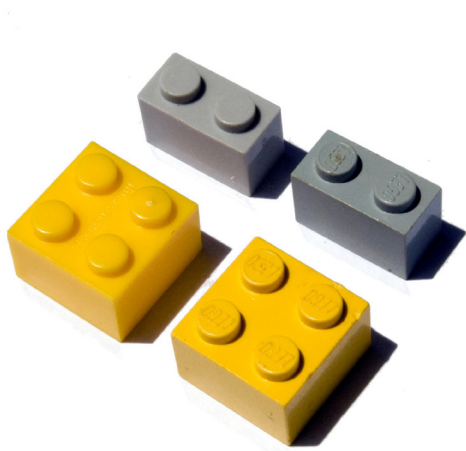


Photo53 <http://erikjohanssonphoto.com>

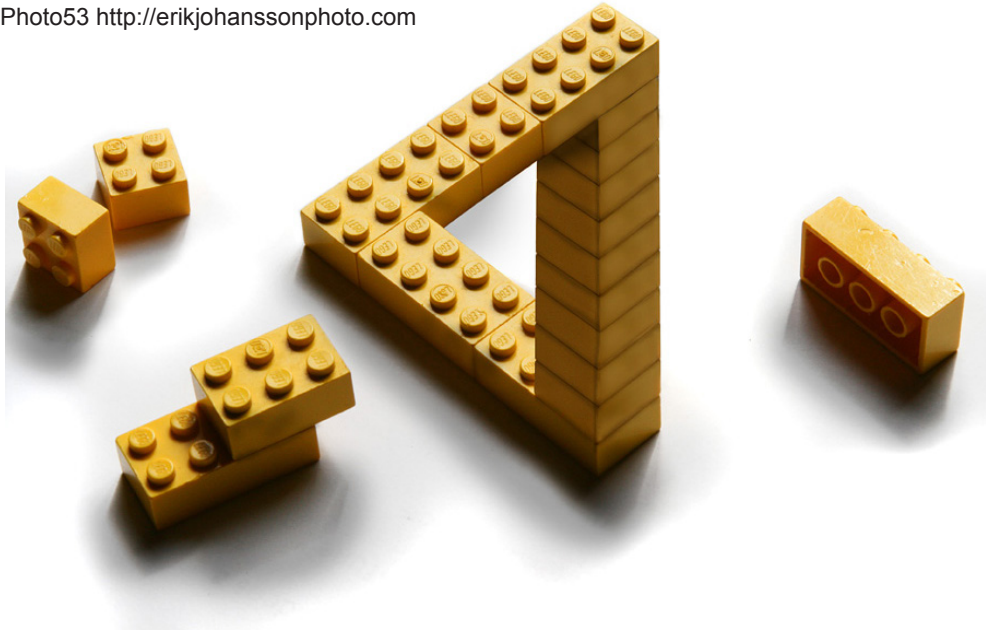
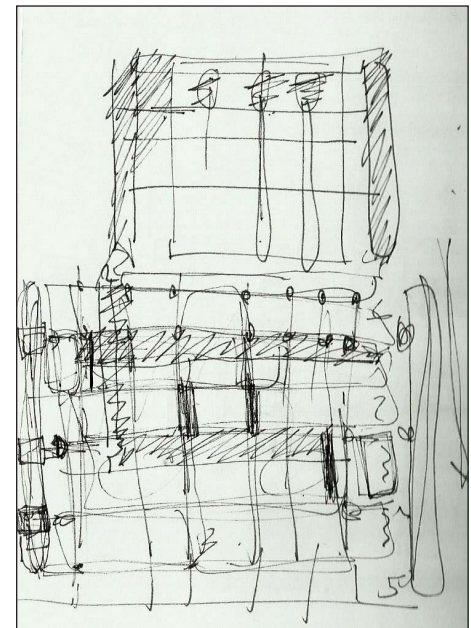
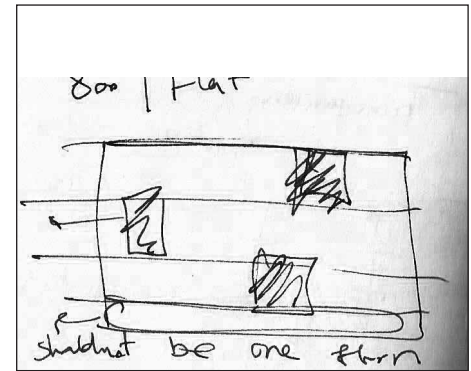
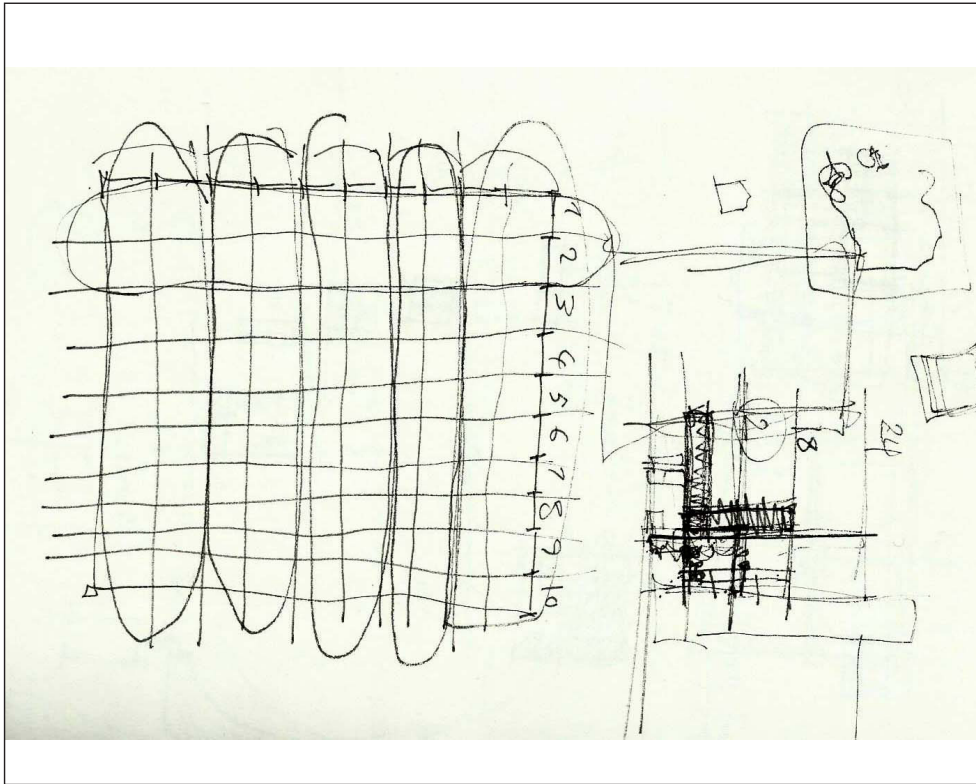


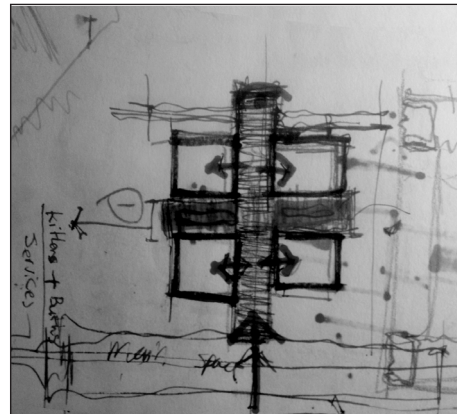
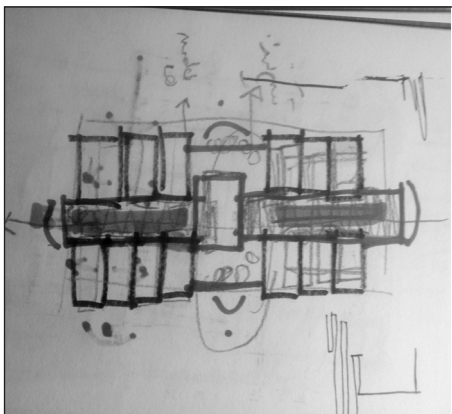
Photo55.QR- CODE  
<http://en.wikipedia.org>



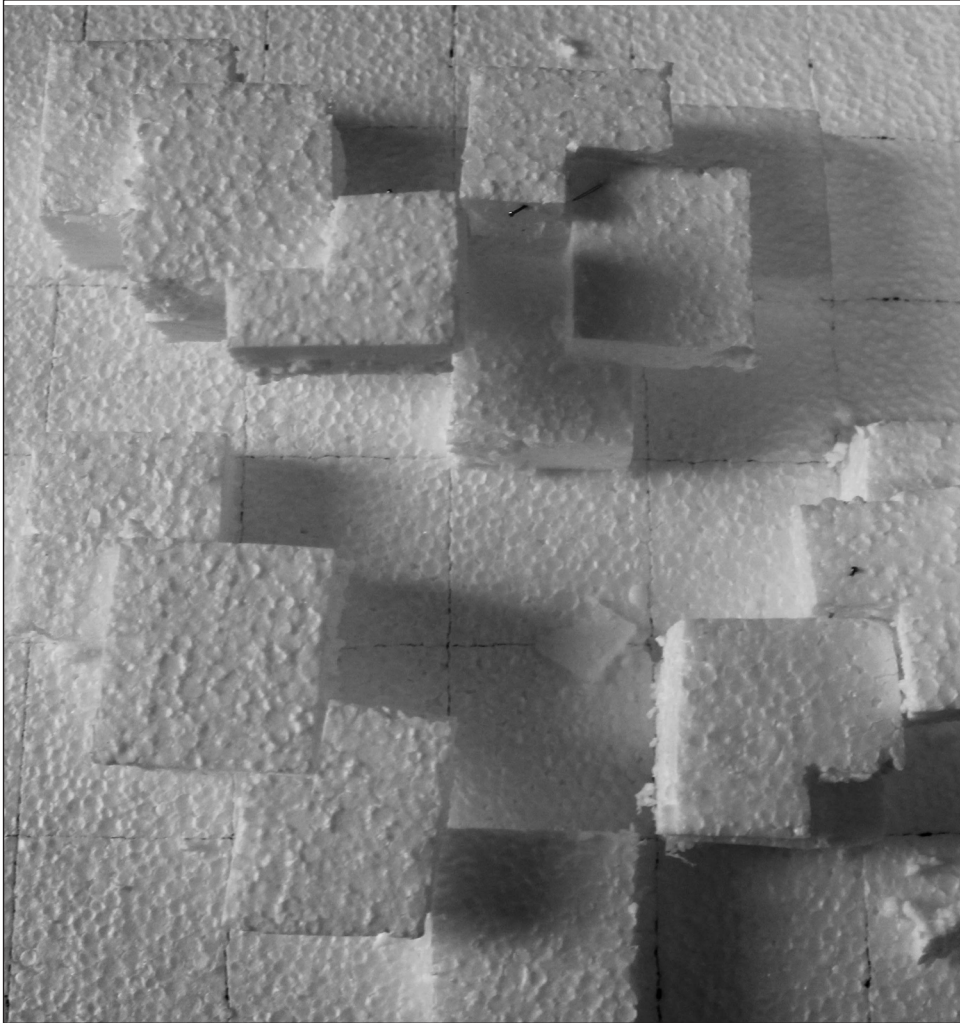
Photo 56. <http://shkspr.mobi>  
QR tetries game



5



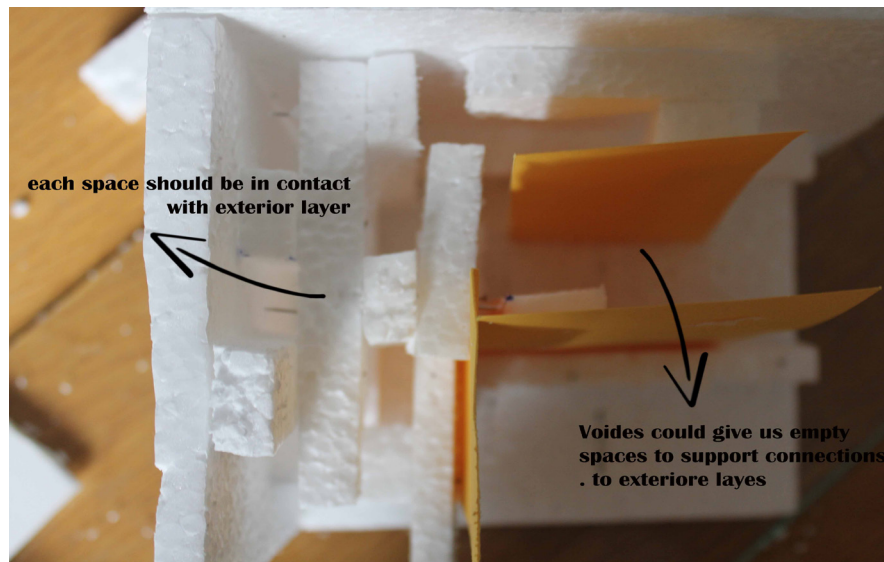
Combination of the modules were sketched to approach different typology of houses without understanding of the connections to the main structure and main circulation.

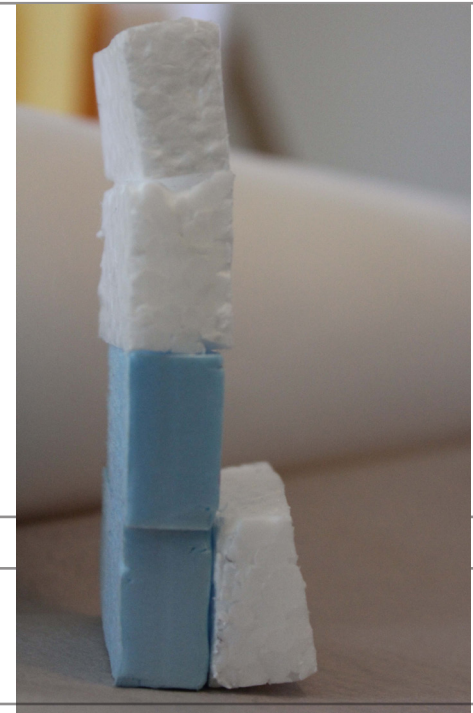
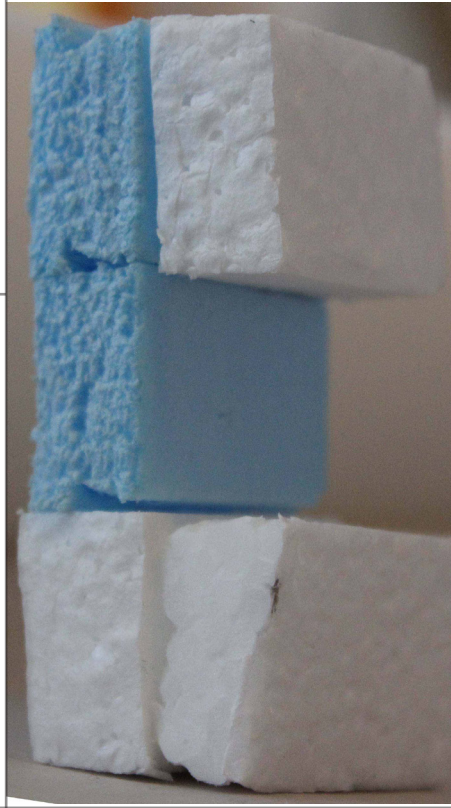
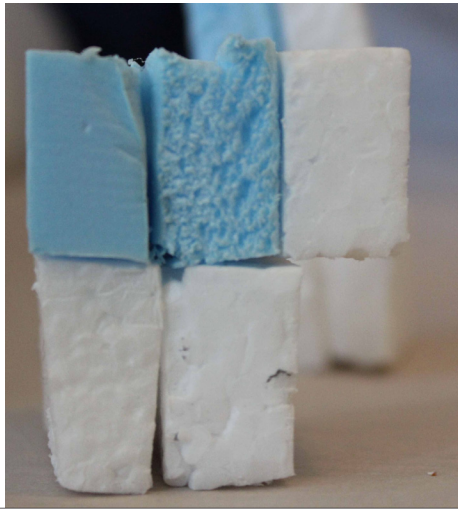


Understanding of combination of the modules and expansion of the modules by physical model.



Understanding of a grid system to organise  
combined the modules a



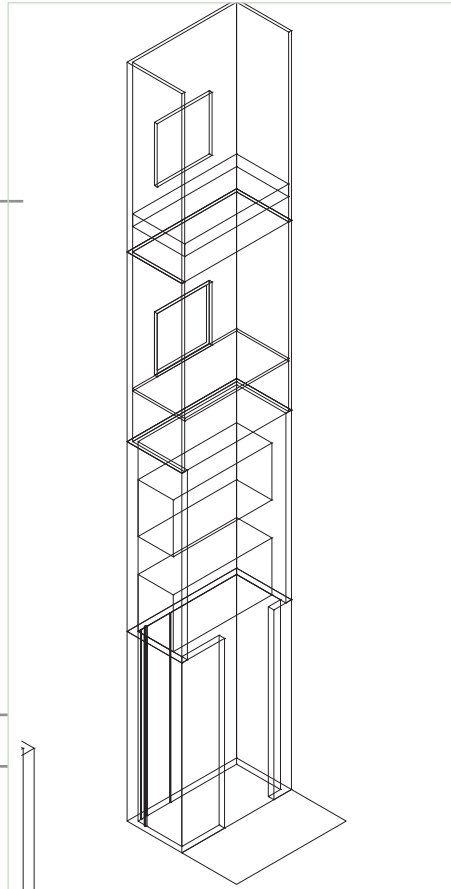


Combination of five basic modules were studied by physical modules to achieve different typology of hosing.

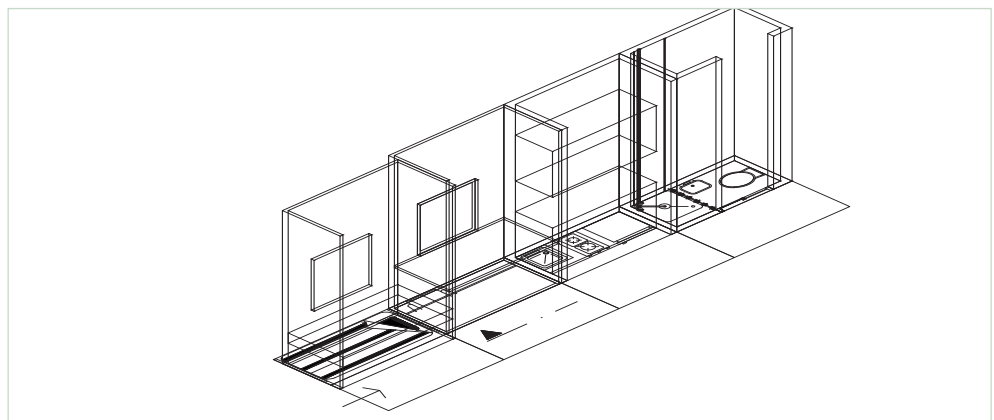
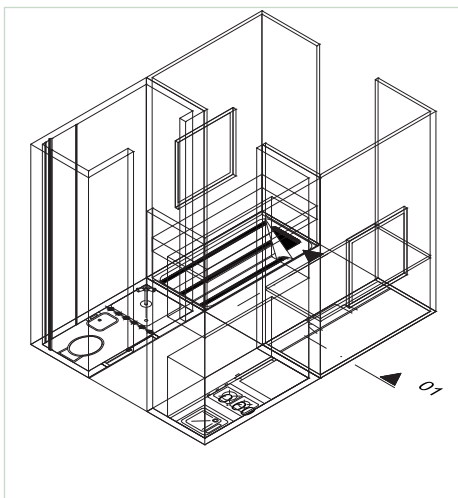
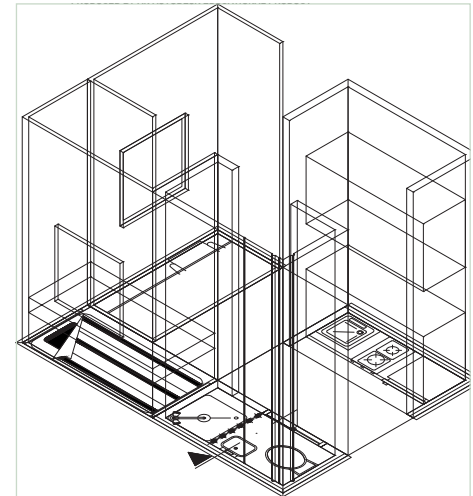
Blue is wet area and white is the non-wet area.



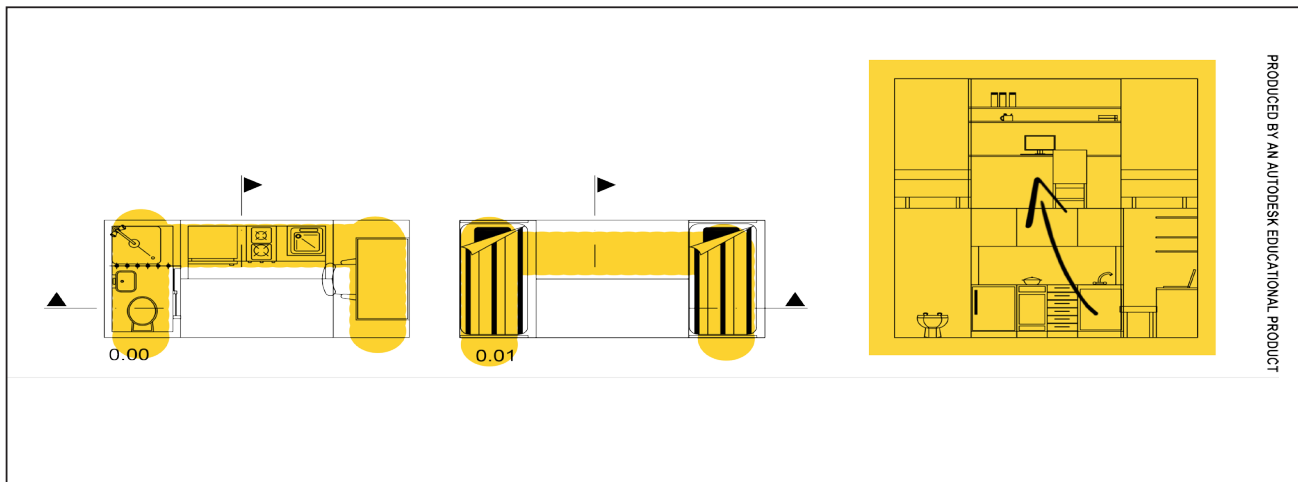
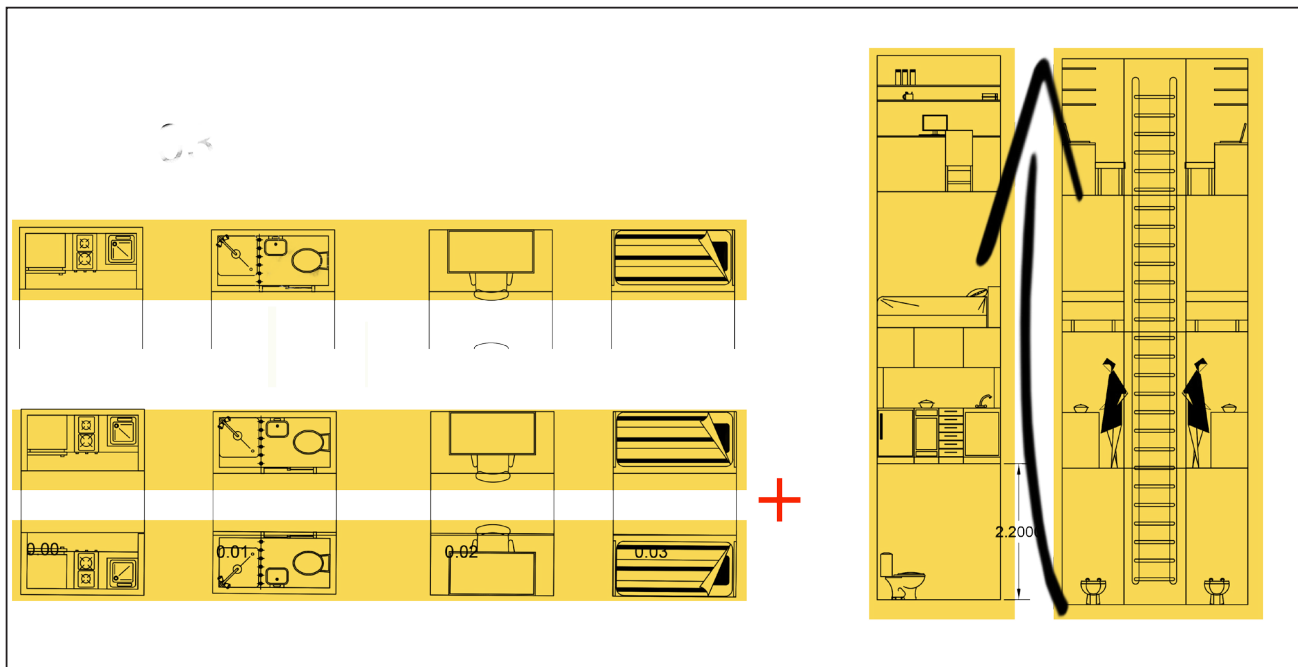


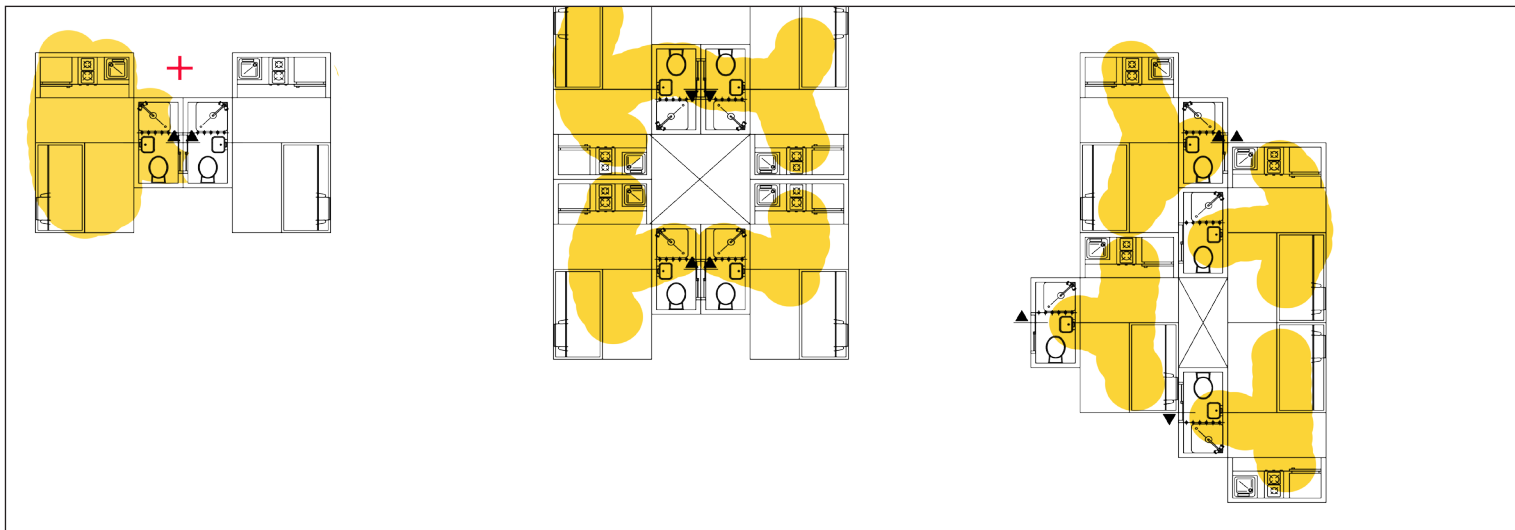


Combination of five basic modules were studied and examined by 3dimentional drawings.

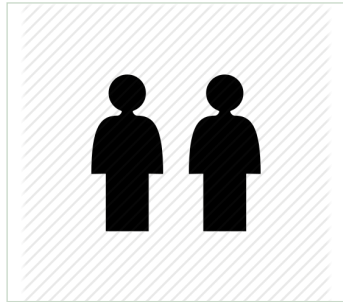


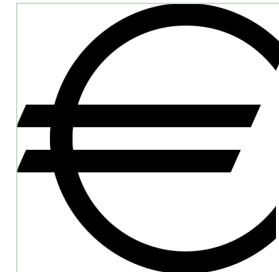
Line shape combination, vertically and horizontally were sketched to understand the layout and create different typologies, aslo sketching the neighbour units how they could be connected.





These sketches tried to one combined unit could be repeated .

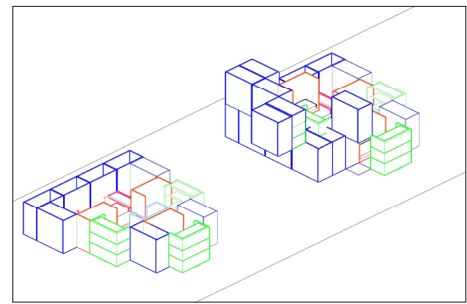
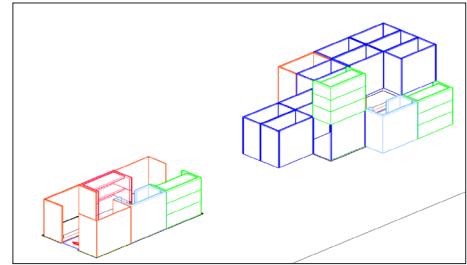
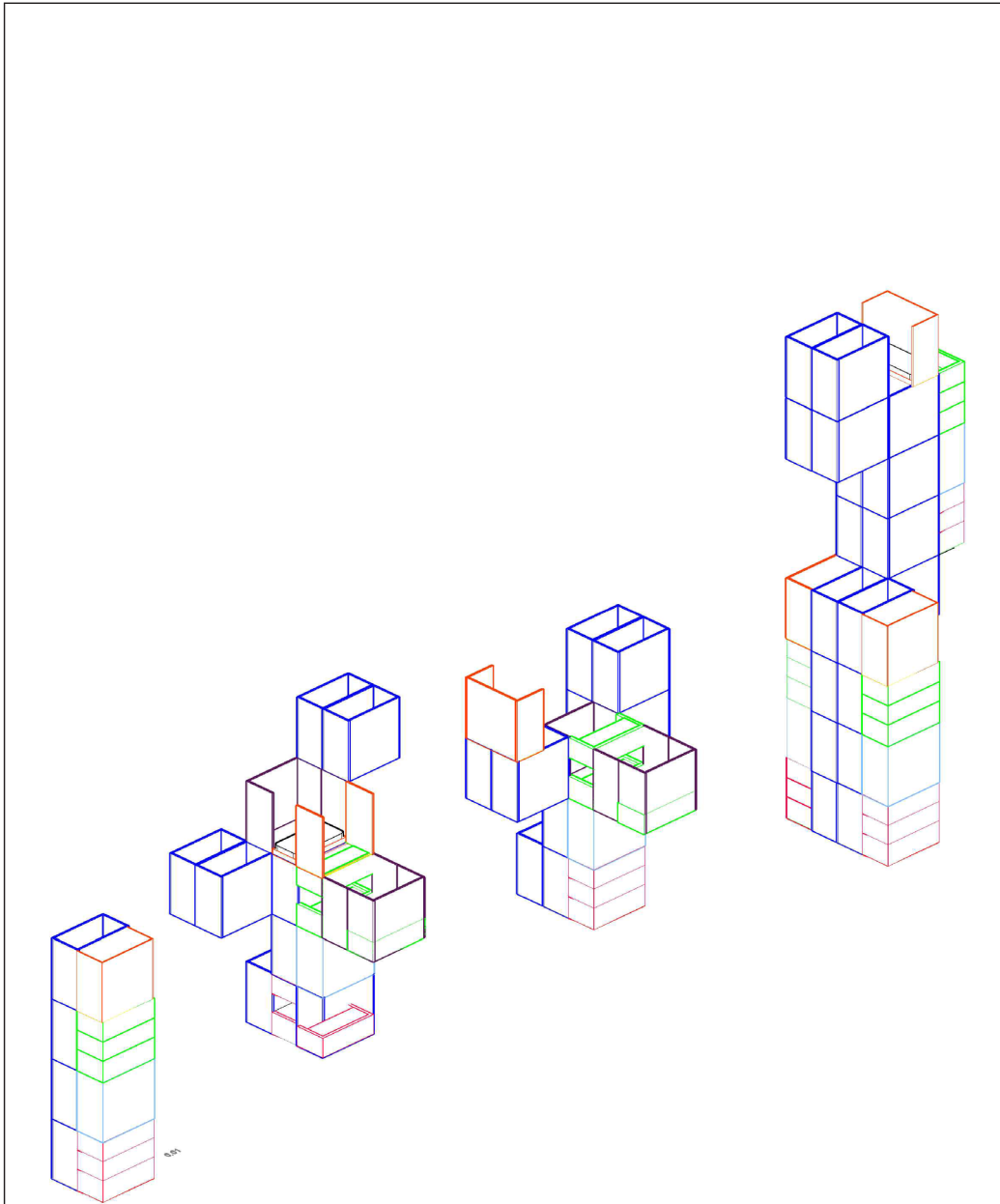




A house could be expand for any reason which user need to change the size and type of the house.

6





From left to right, expansion of the first layout produces diversity of forms and space and function



This section demonstrate a possibility of combination of different apartment which basically are made by same modules,

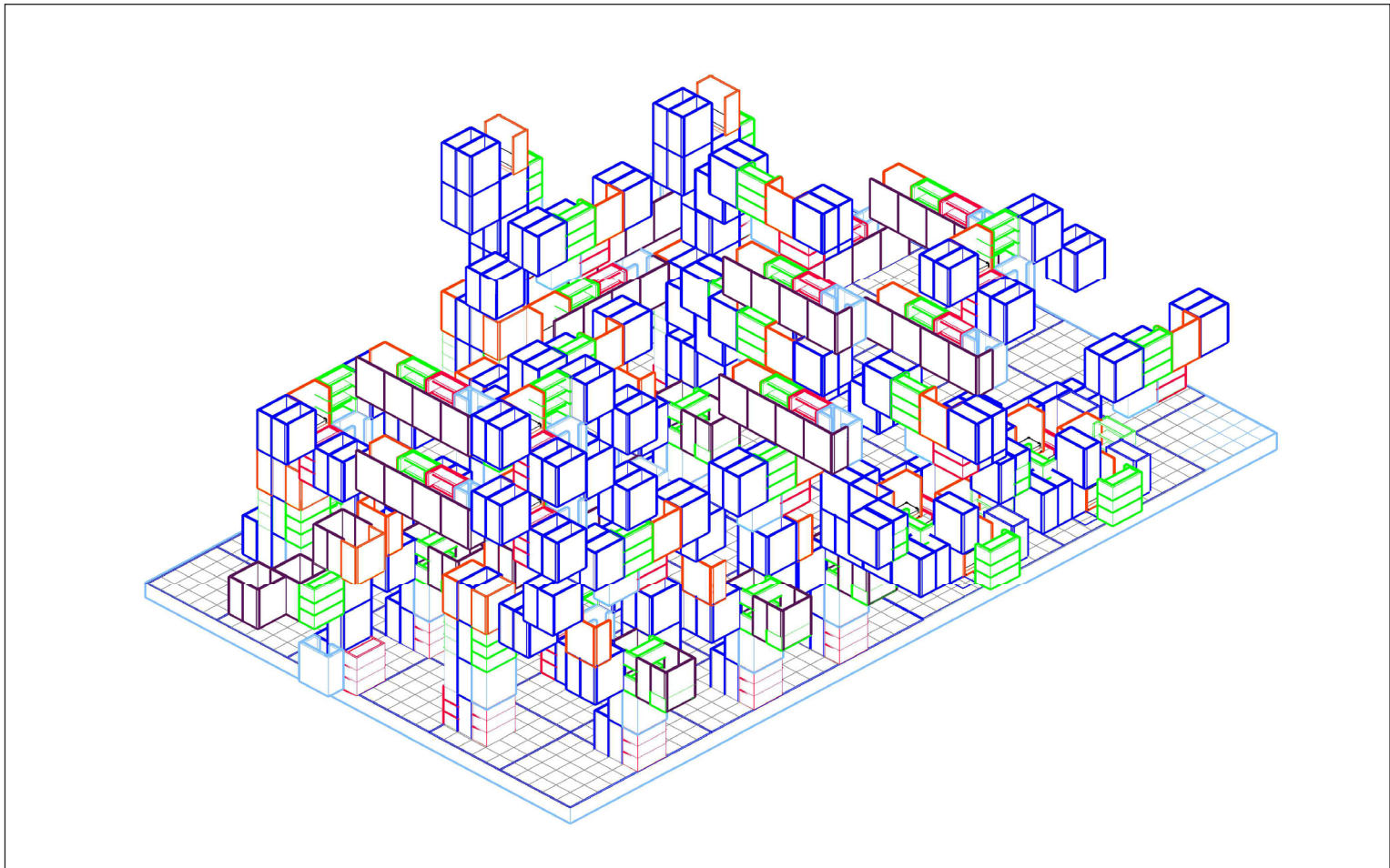
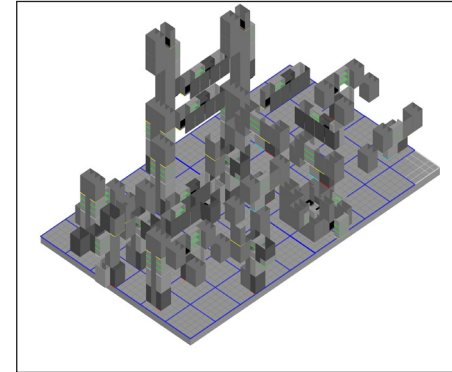
it should be mentioned that by changing each apartment the form and space would be changed, in this order, active

and alive space would be possible to be created.

7



3dimensional drawings show the a possibility of unit's combination which already created by basic modules. Additionally it should be mentioned this system is a changable sytem, It means when the layout of one apartment would be changed it would affect these lay out of aprtemnts in this scale.







RESULTS



Photo57 <http://www.dreamstime.com>

This chapter presents drawing in small modules, categorized, firstly, wet areas such as kitchen, bathroom and toilet. Secondly, sleeping and working module included bed and desk as the main furniture. Next category is named circulation modules which support moving and circulating horizontally and vertically in the space, Included, stairs and free floors which are designed in different type to support different typology of apartments.

In the following, documents show numbers of possible typologies of the student apartments which are designed by the mod-

ules to represent the main idea of this thesis, Spaces could be changed in certain amount of area or it could be expand in different directions, to have more spaces, even it could be reduced and compressed, based on different needs of student. Limitless possibilities of the layouts are summarized by certain classifications, based on the system of layout of the modules, named, Line, Adventure and Island. In each classification, changes of the layout with certain modules and also one or two possibilities of expansion are presented.

Mentioned possibilities could be

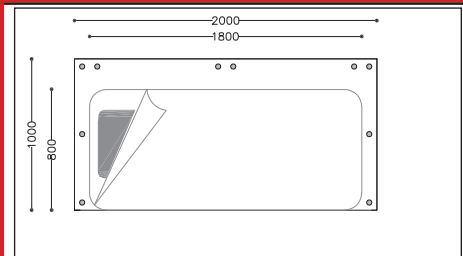
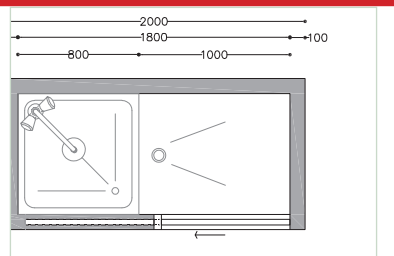
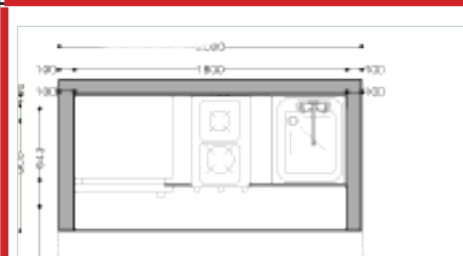
applied with pulling and pushing the modules in a framing system which define the main structure of building, the frame consist of wooden slabs which support not only a part of structure but also, It provides spaces for technical issues such as electricity, water sources, sewage system and air ventilation. Beside that vertical waterproofed wooden structure are supporting the frame which also provides main circulation of the apartments.

could affect the exterior of apartments.

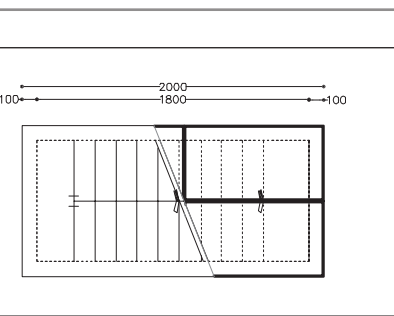
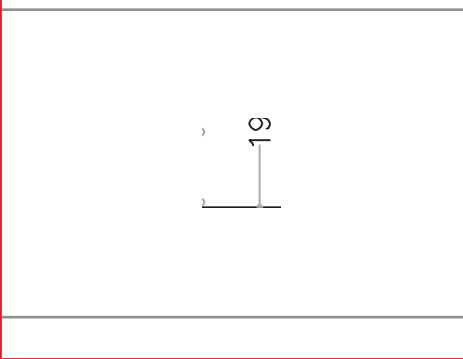
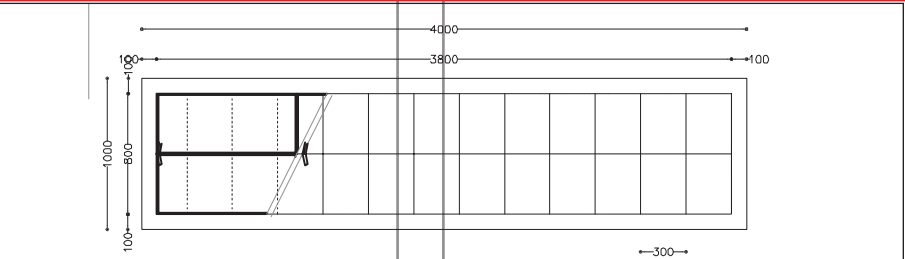
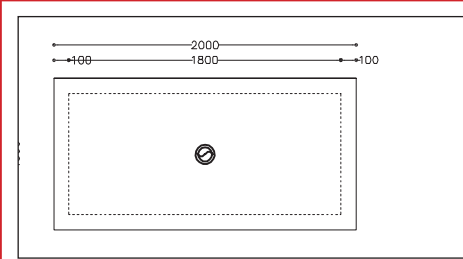
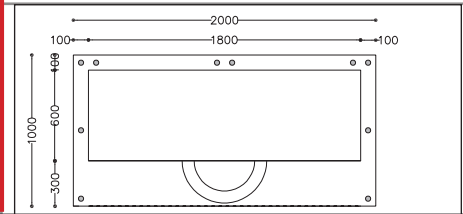
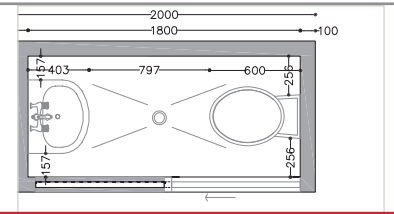
Mentioned drawing shows the option of an active and alive system of Interior elements which It



SLEEPING  
&  
WORKING  
BED | DESK



WET AREAS  
KITCHEN | BATHROOM | TOILET

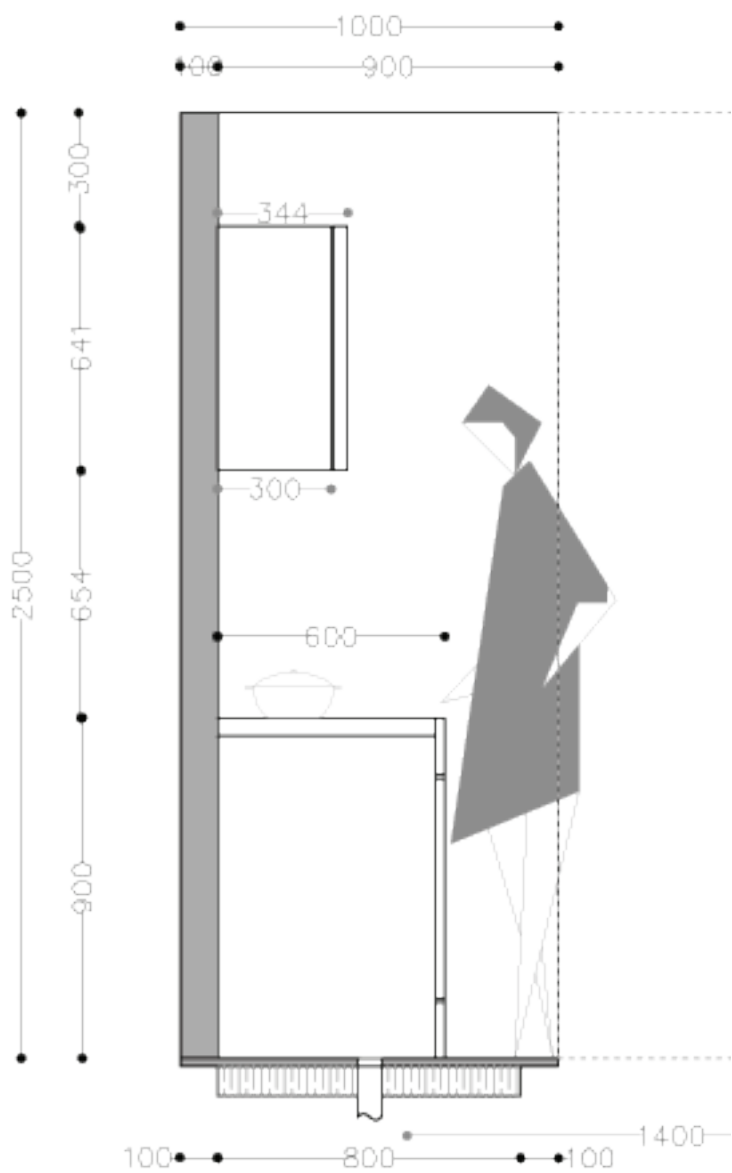
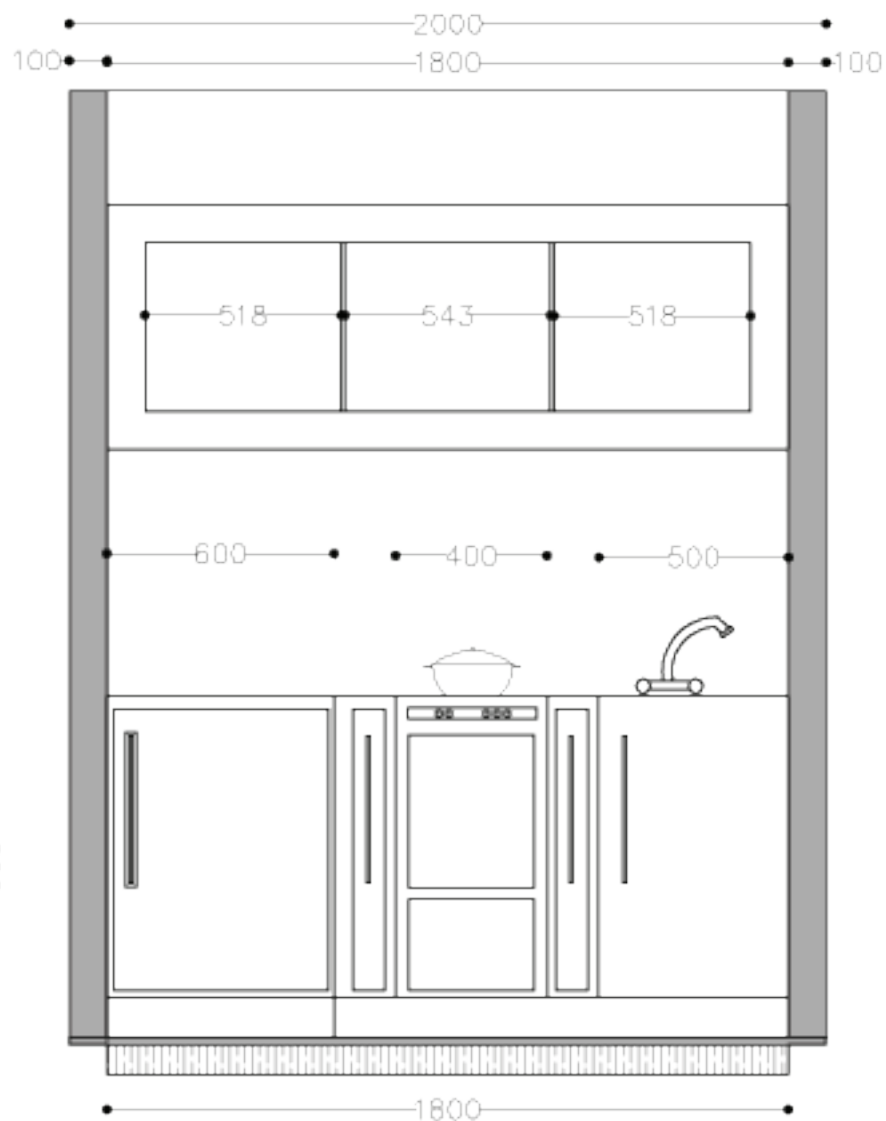
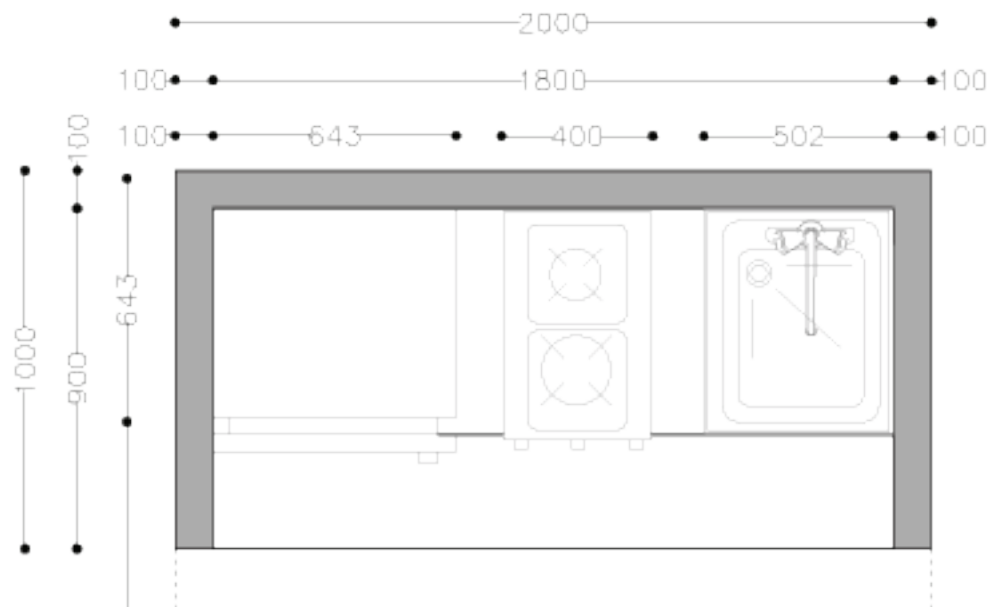


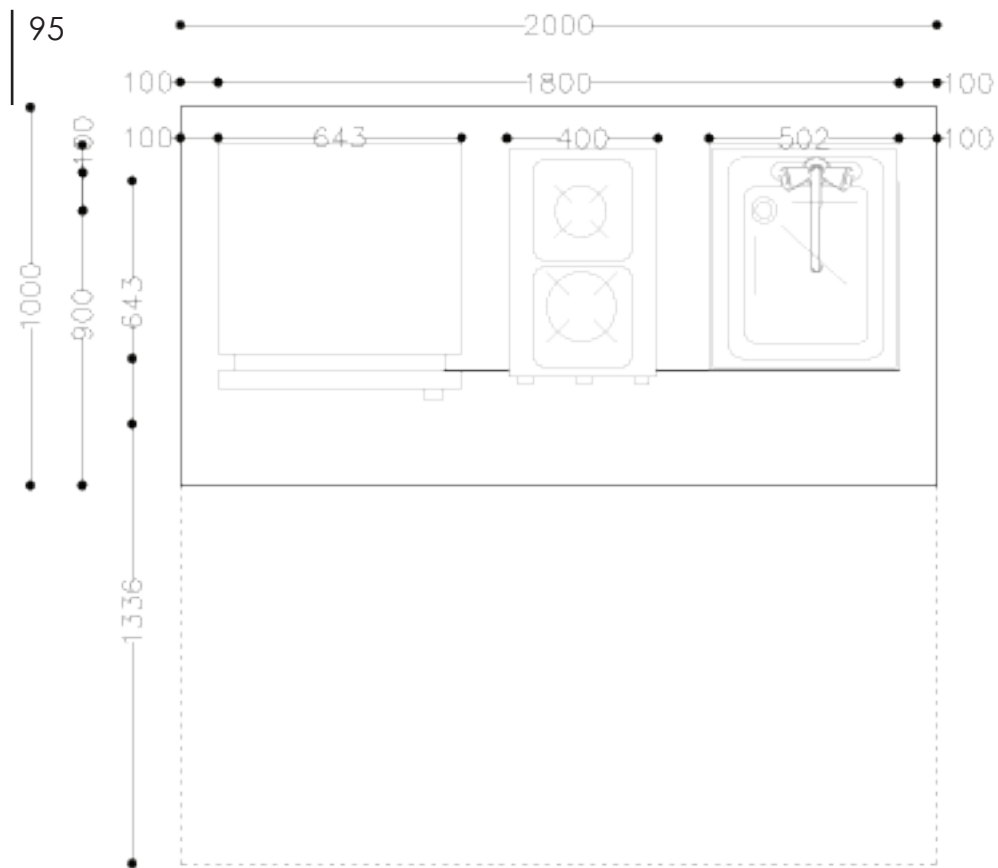
CIRCULATION  
STAIRS AND FLOOR



WET AREA  
 KITCHEN  
 CUBIC VERSION

SC: 1/20

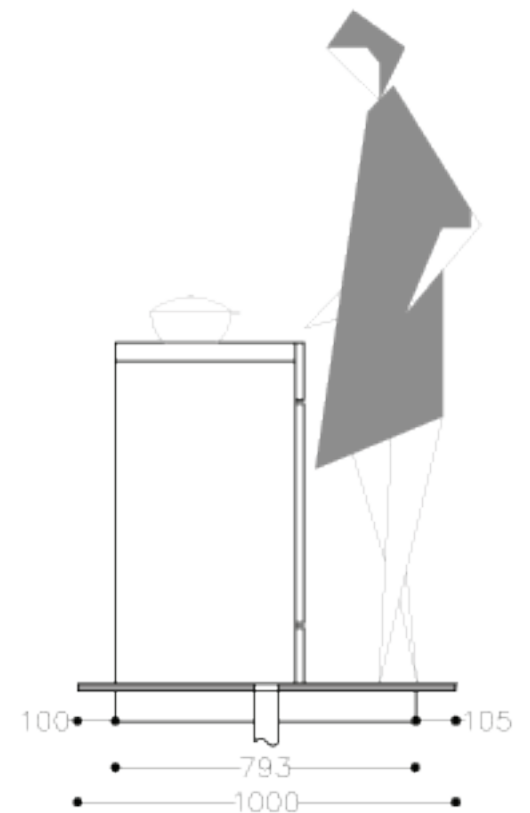
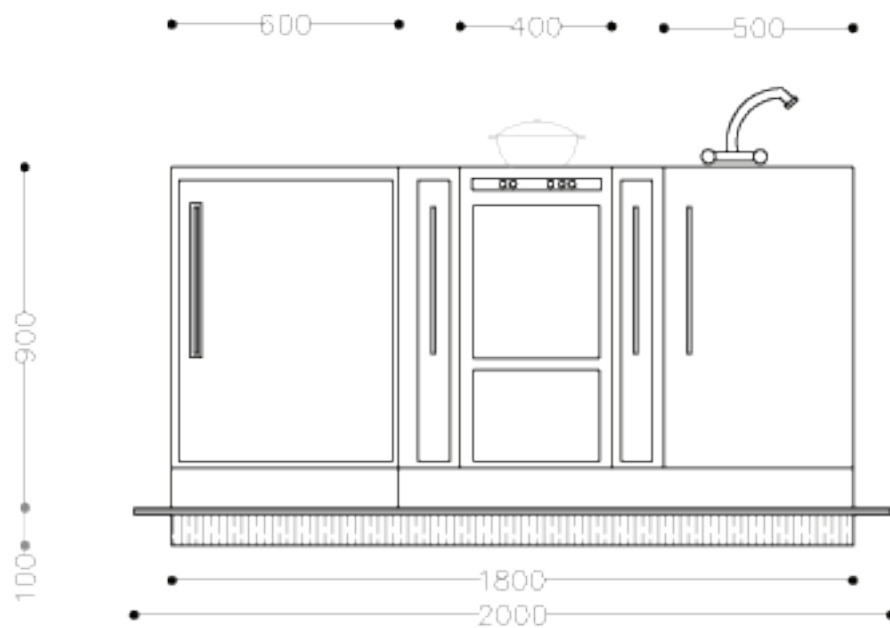




KITCHEN  
ISLAND VERSION

SC: 1/20

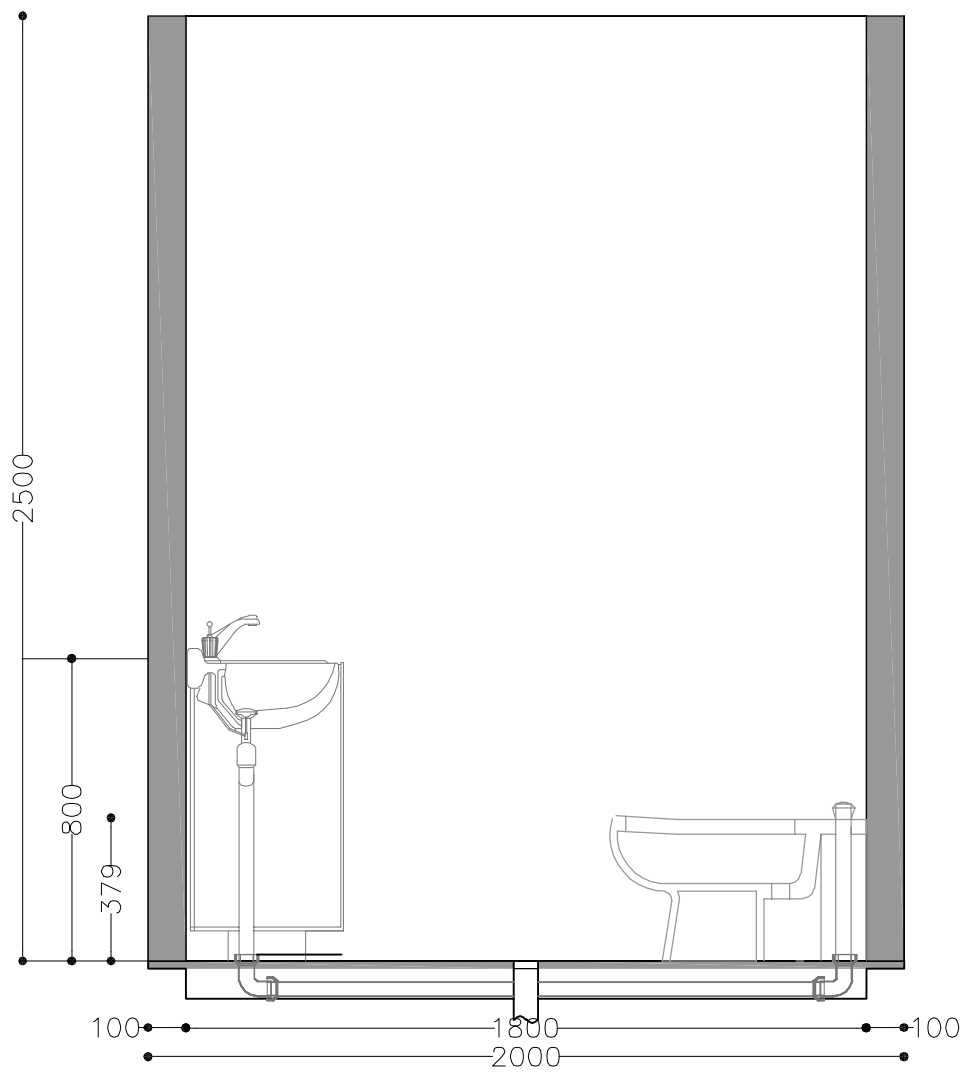
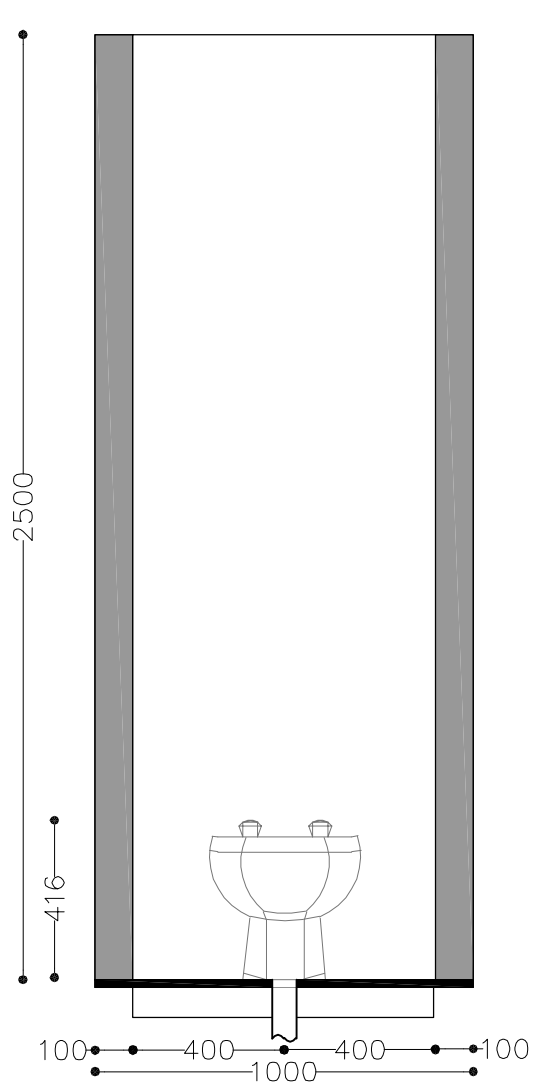
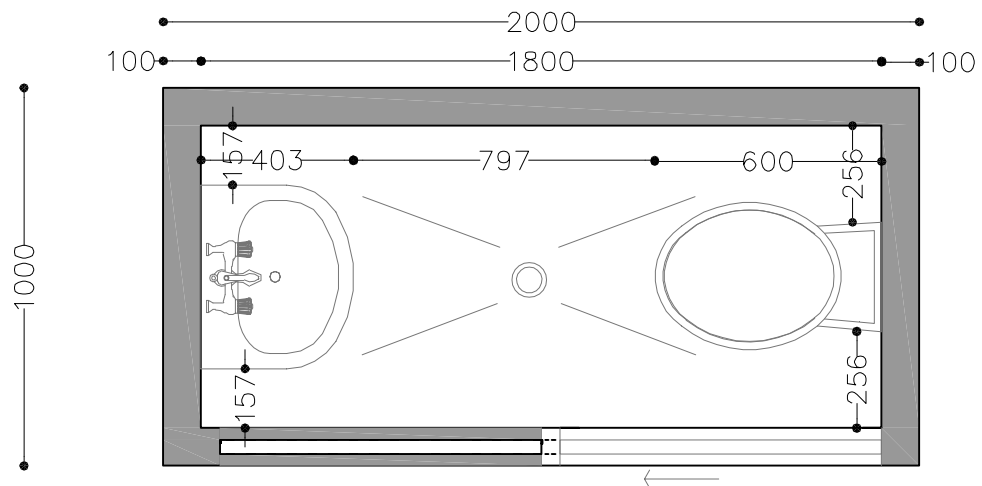
This plan shows the kitchen module which always should be beside the space module to provide standard space in front of oven.



WET AREA

TOILET

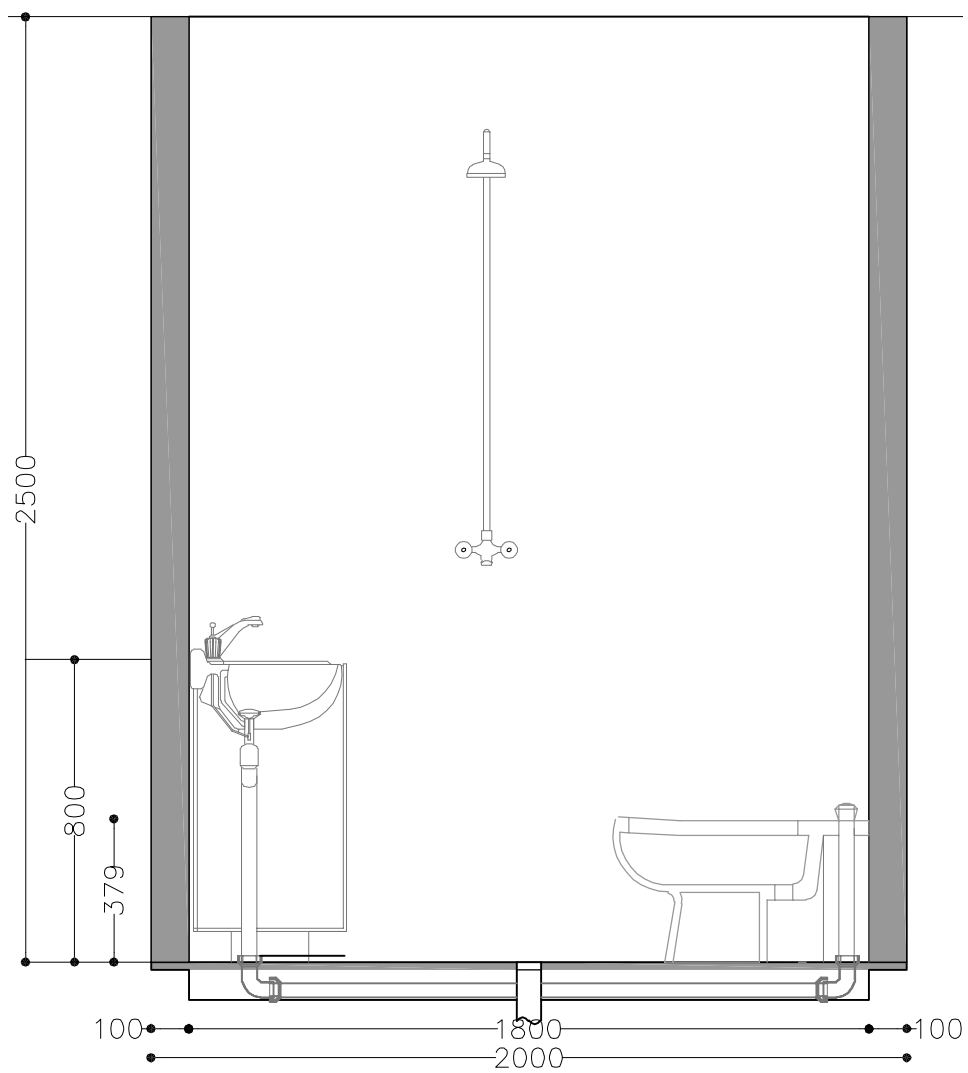
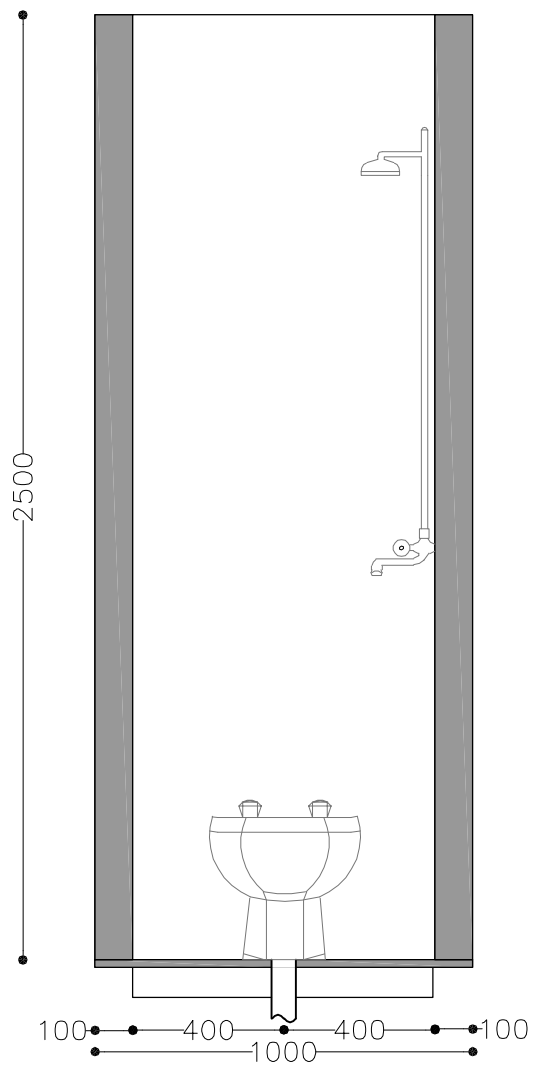
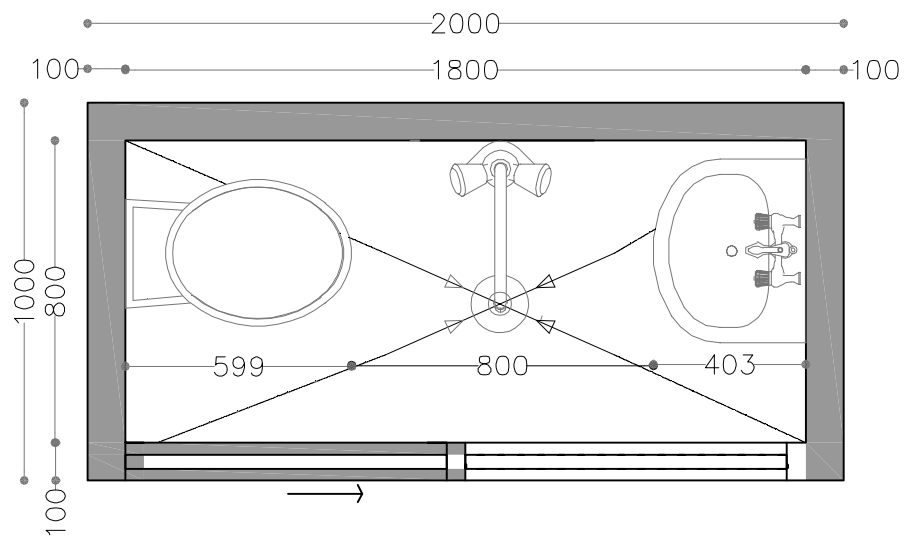
SC: 1/20





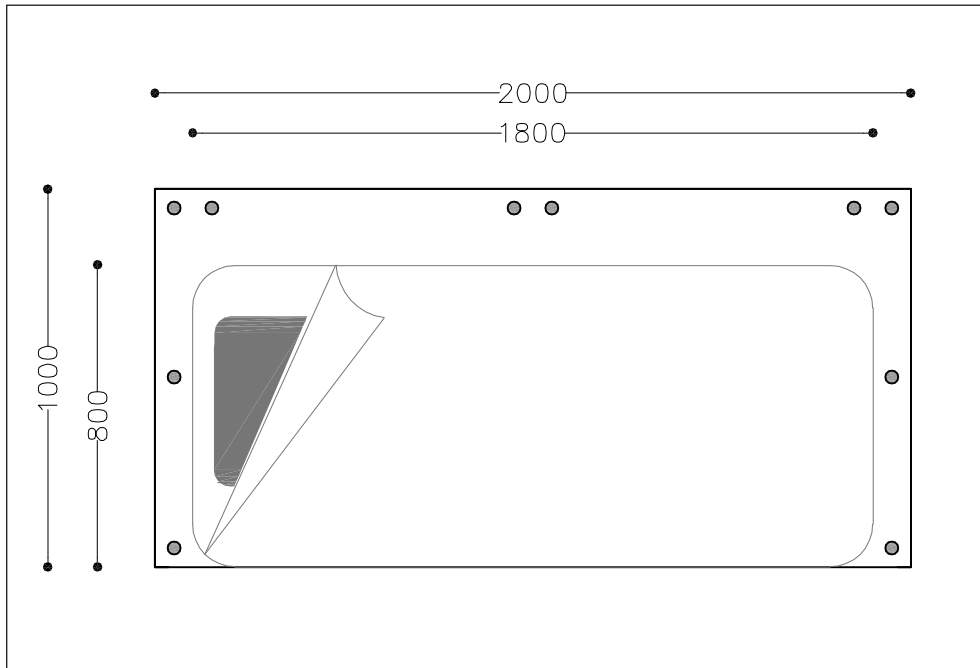
WET AREA  
TOILET AND SHOWER

SC: 1/20





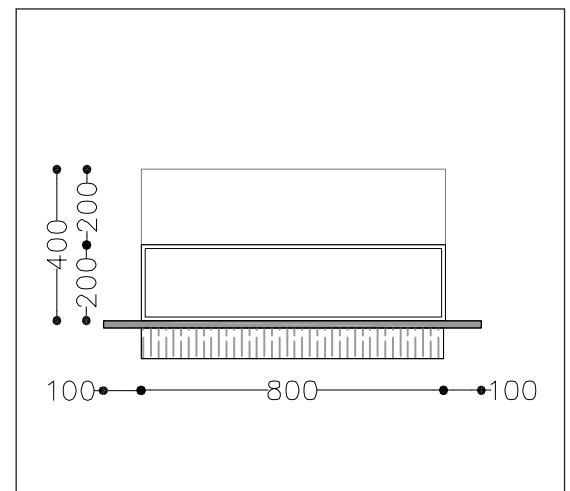
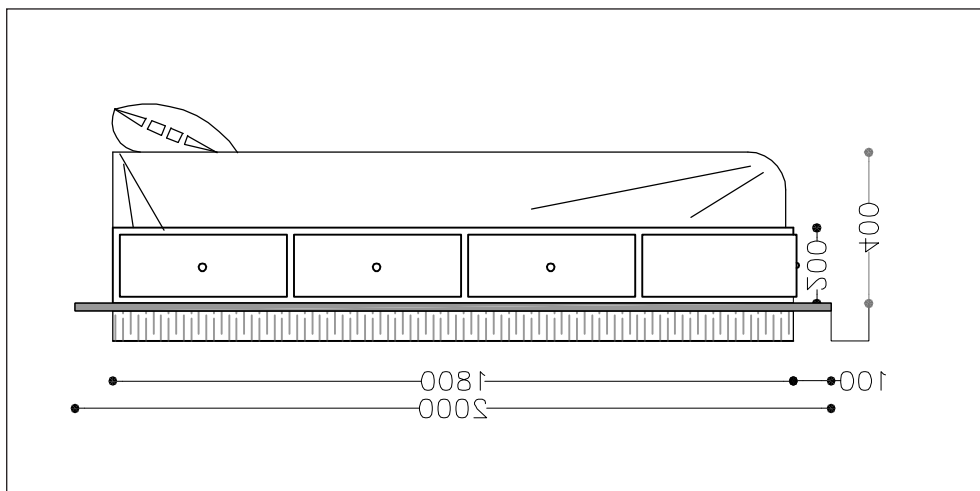


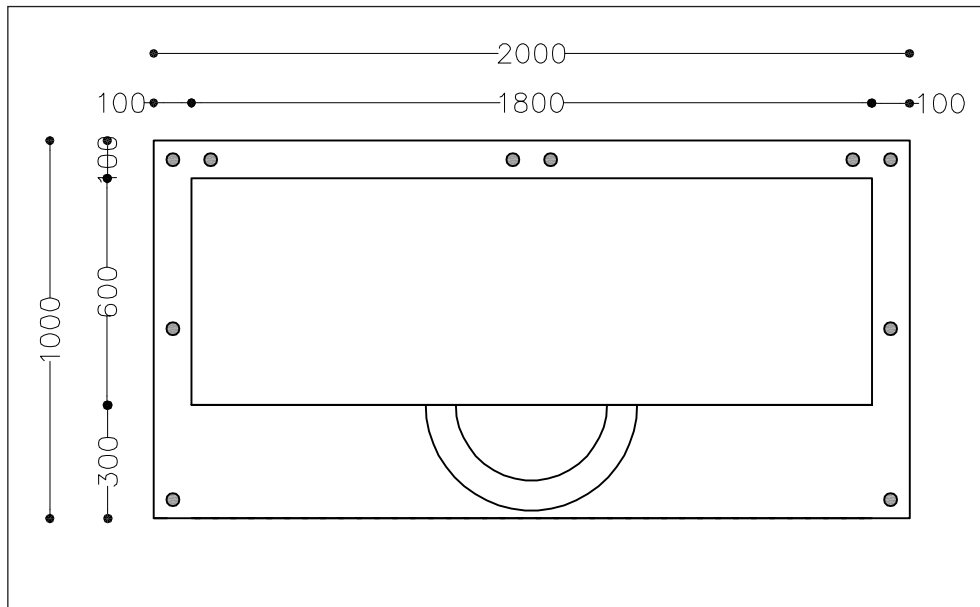


SLEEPING AREA

BED

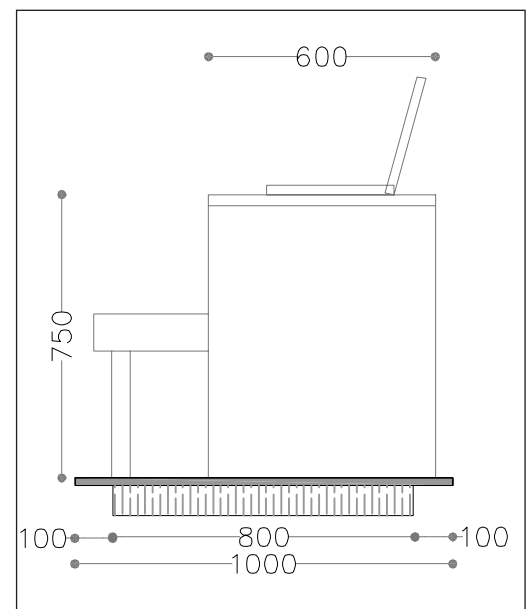
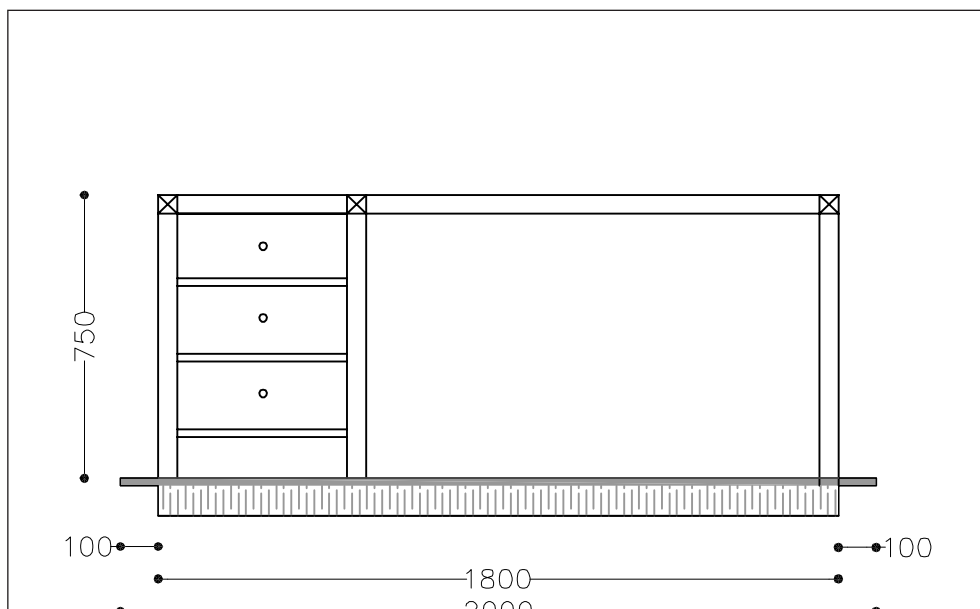
SC: 1/20





WORKING AREA  
DESK

SC: 1/20



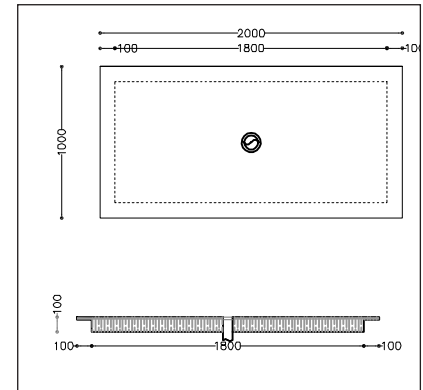
CIRCULATION

FLOOR

STAIRS

SC: 1/50

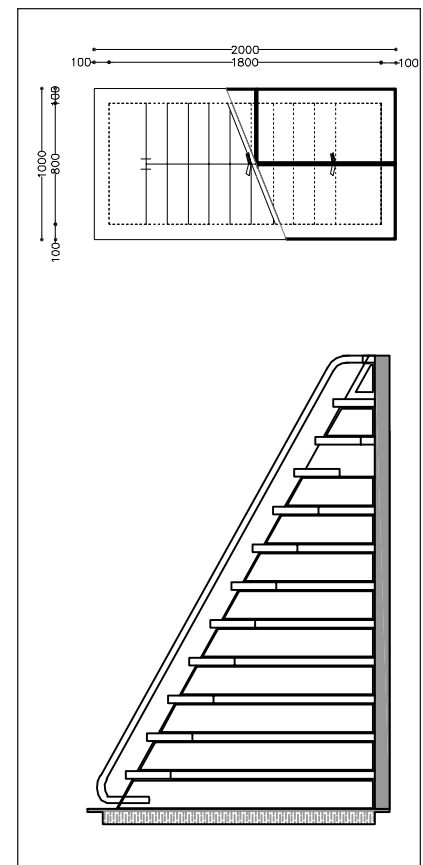
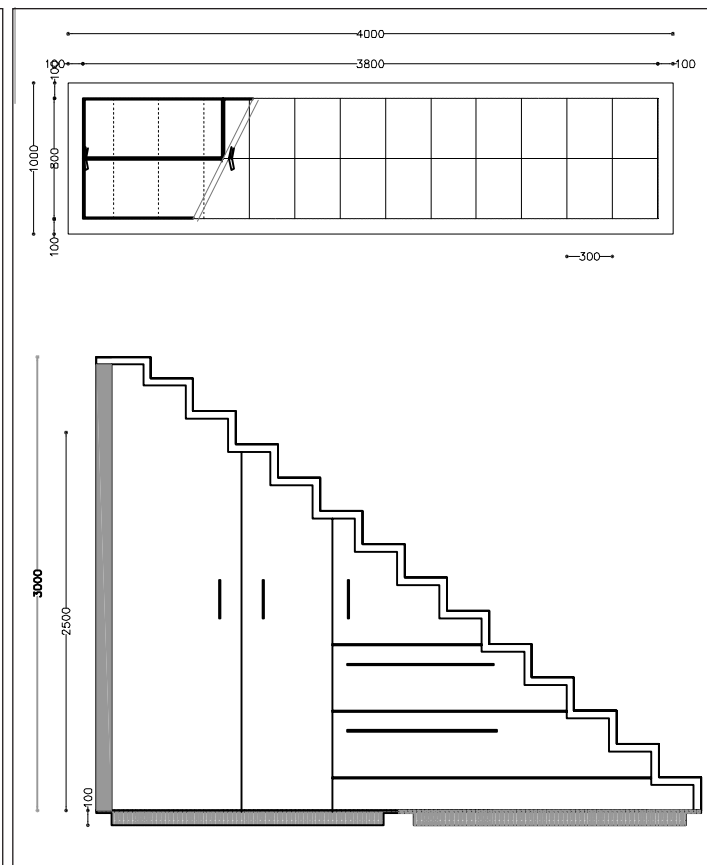
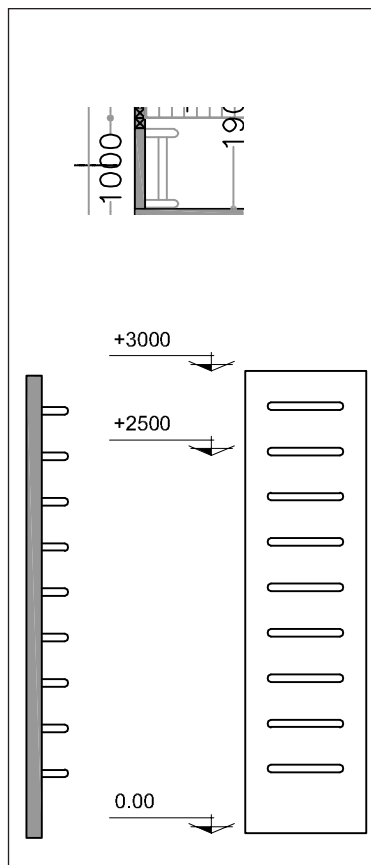
Floor- Free spaces

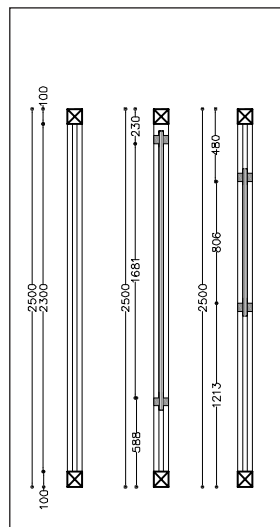
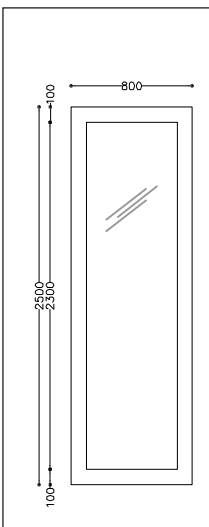
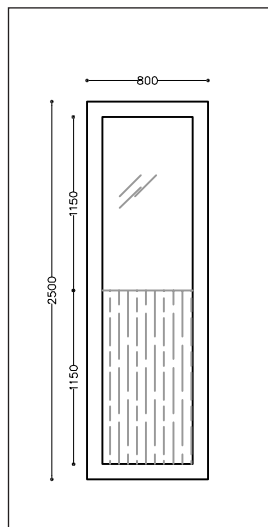
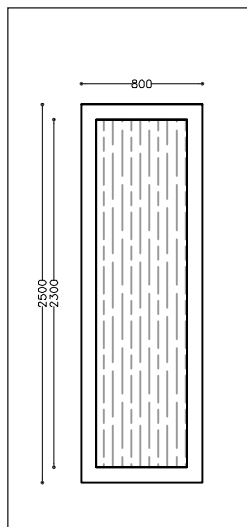
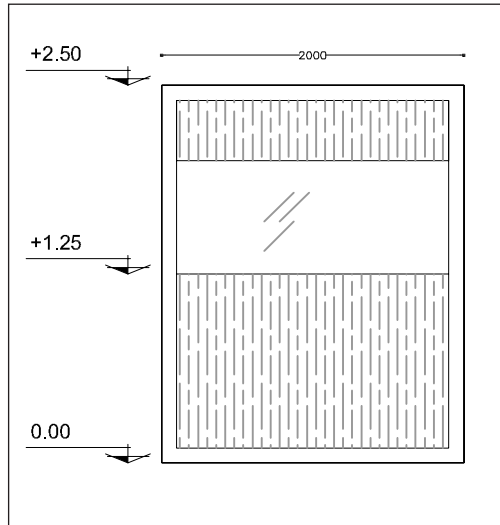
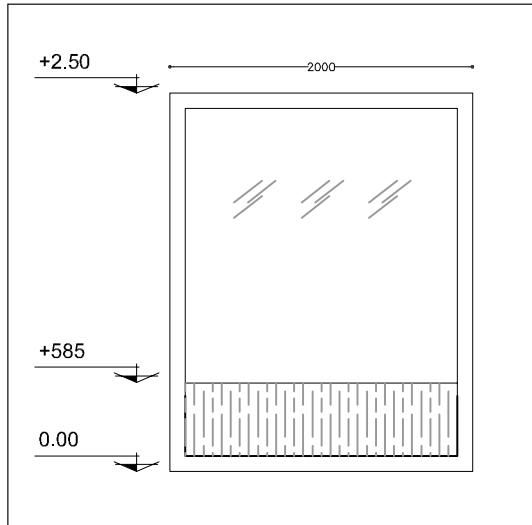
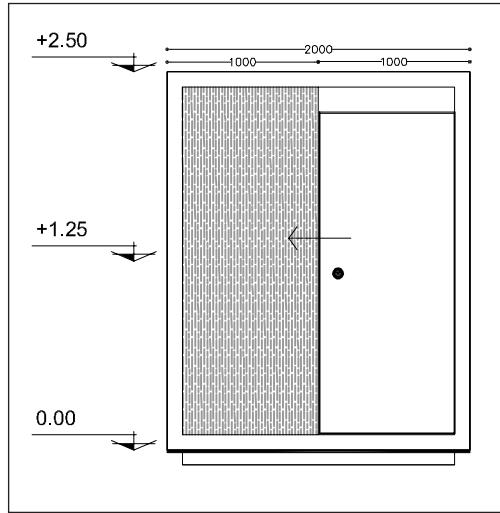
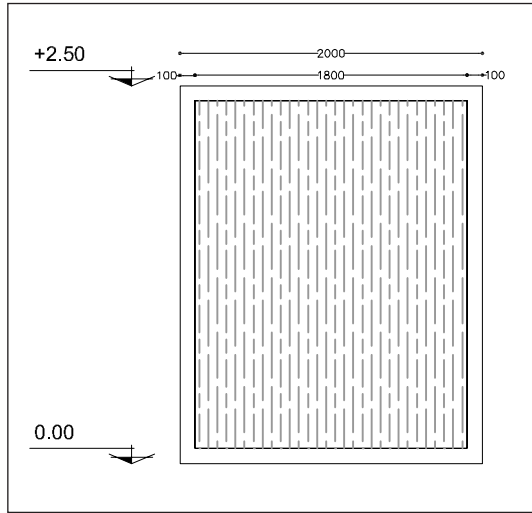


Stair-Adventure style

Stair-Normal

Stair-Ship style





WALLS

SC: 1/50



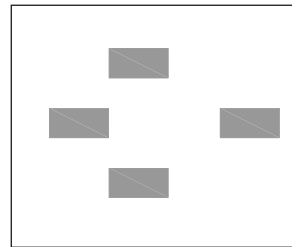


# TYOLOGIES

LINE



ISLAND

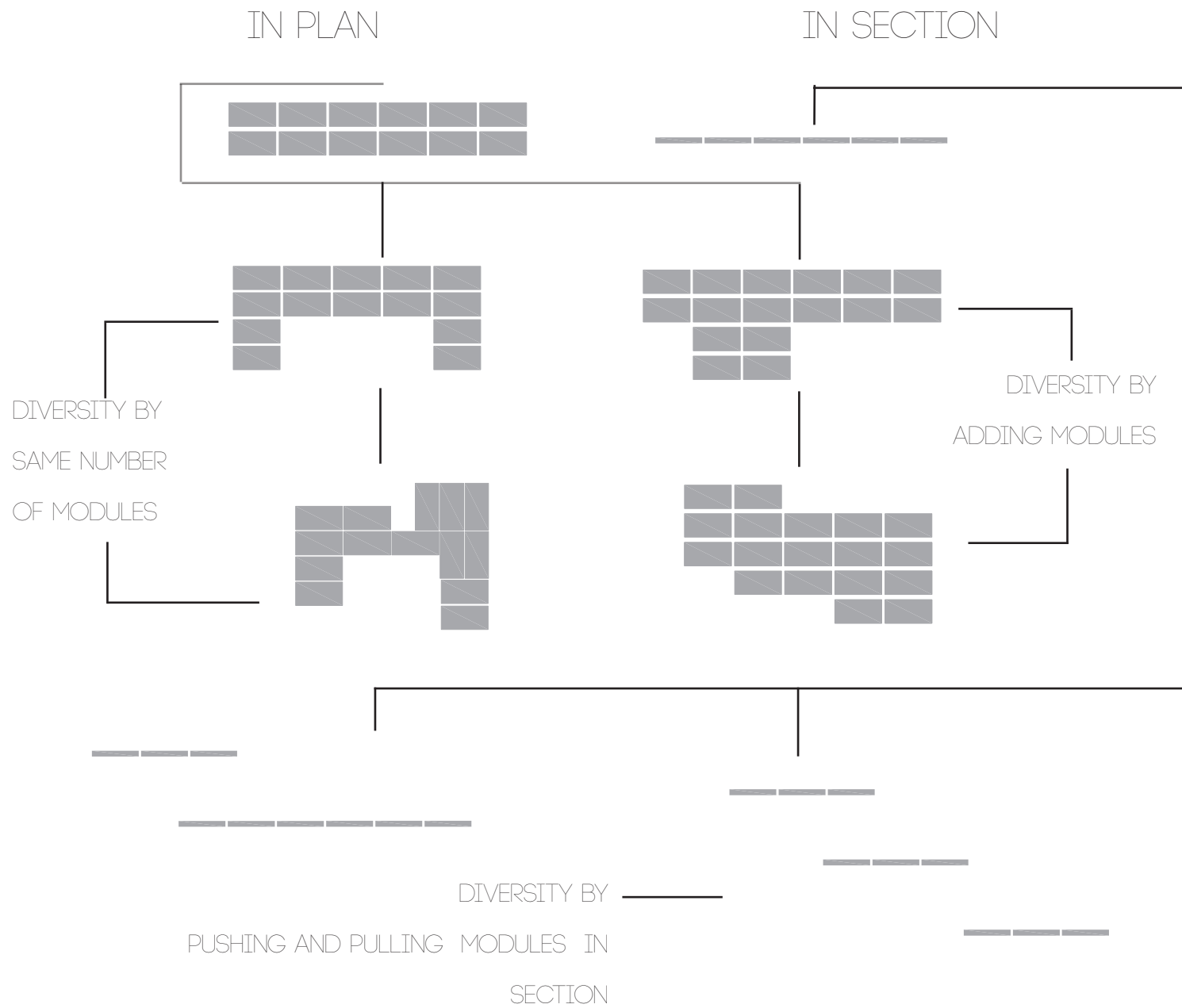


ADVANTURE





# LINE TYPOLOGY

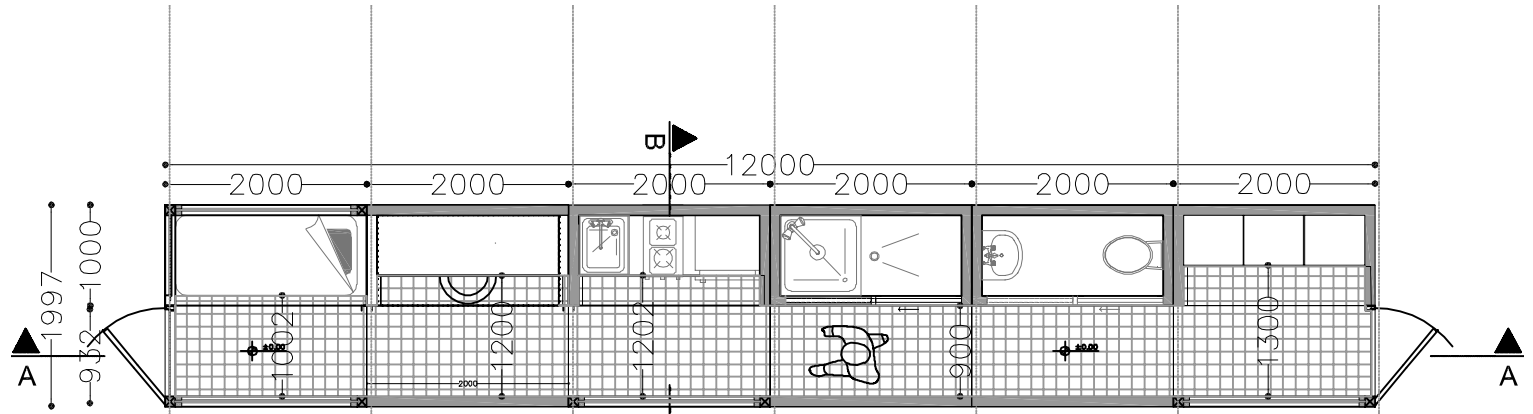






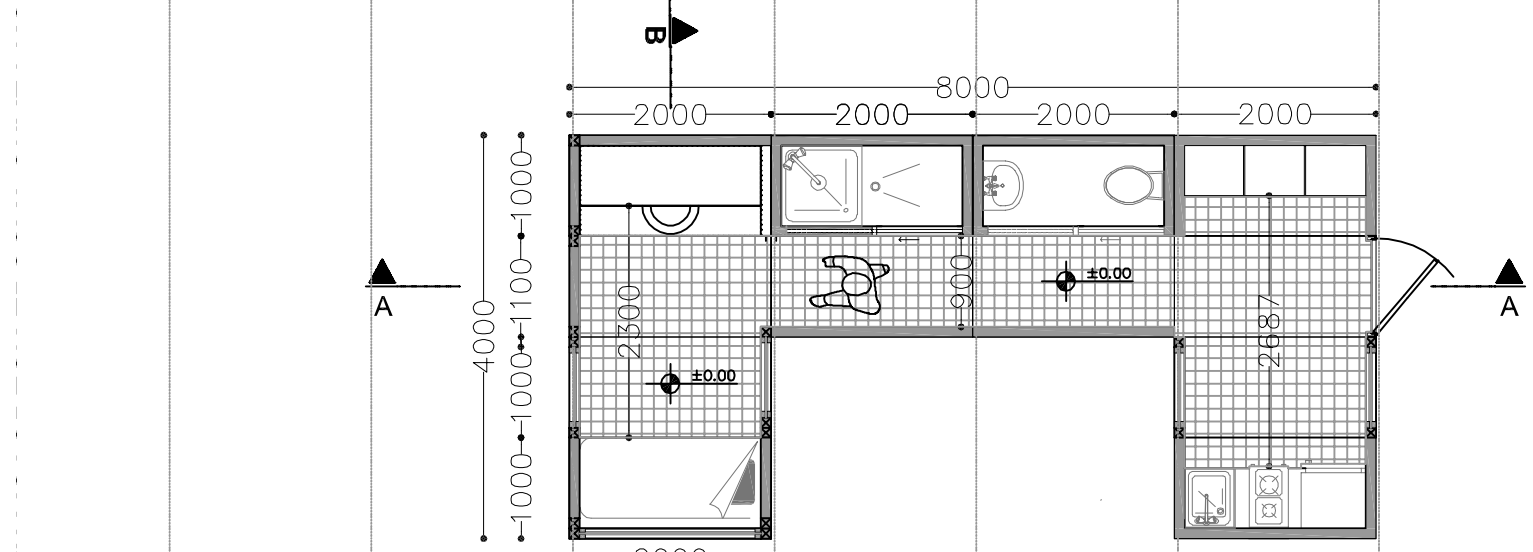
109

SC: 1/75



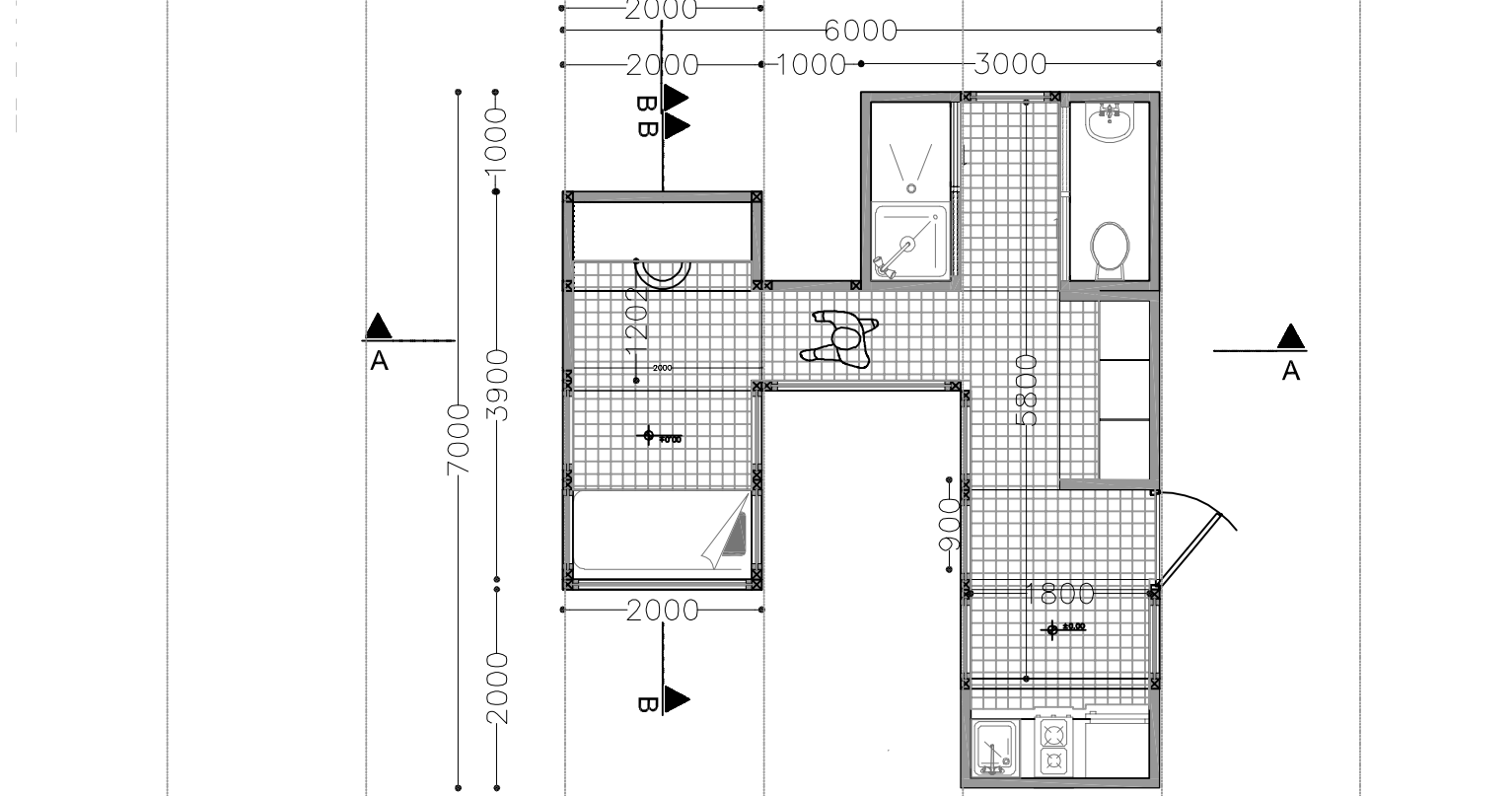
LINE

Plan



LINE|A| 01

Plan



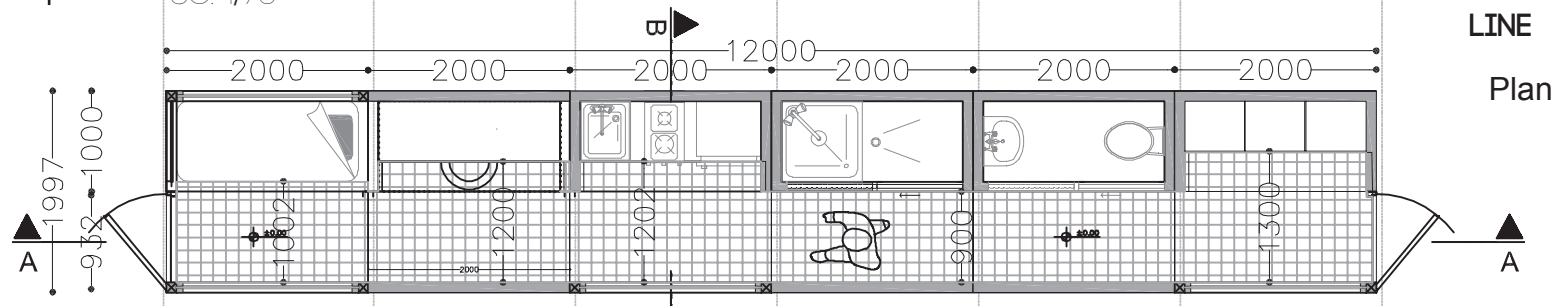
LINE|A| 02

Plan

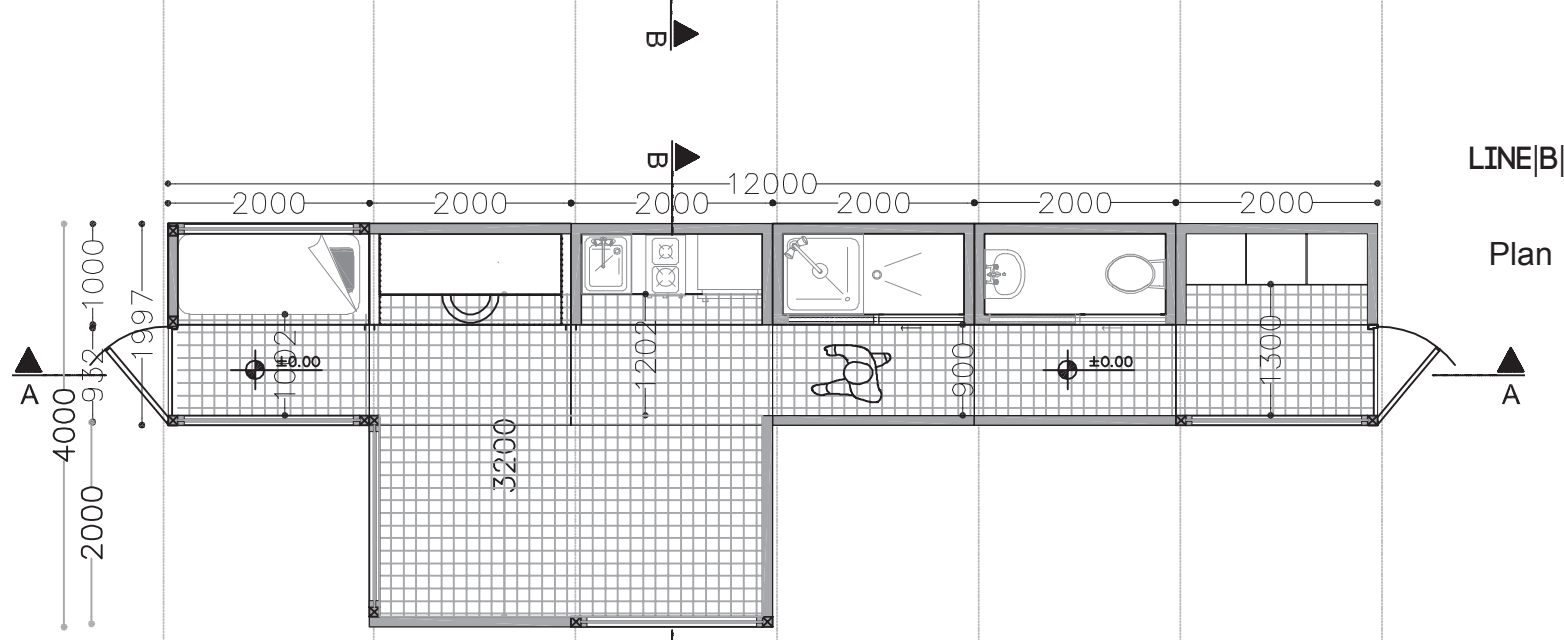


111

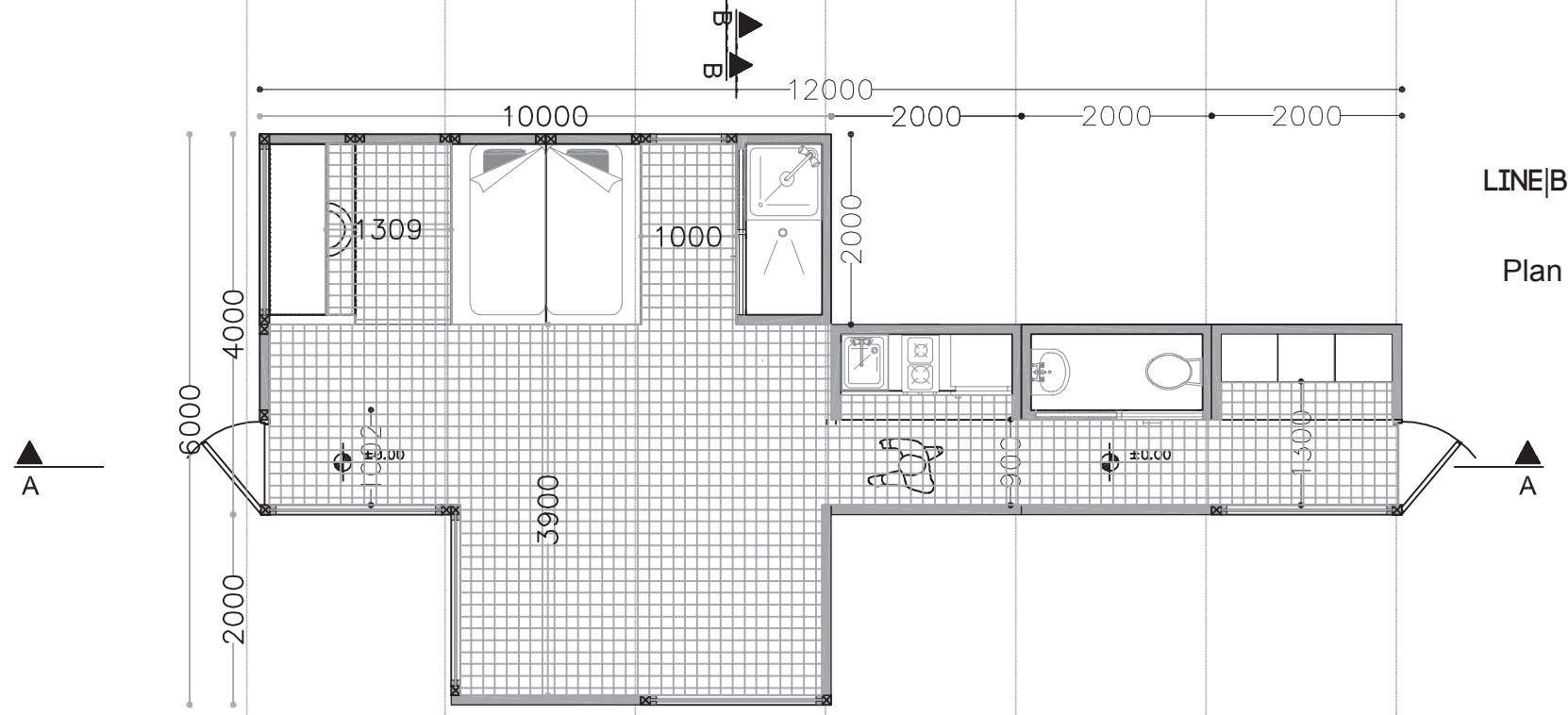
SC: 1/75



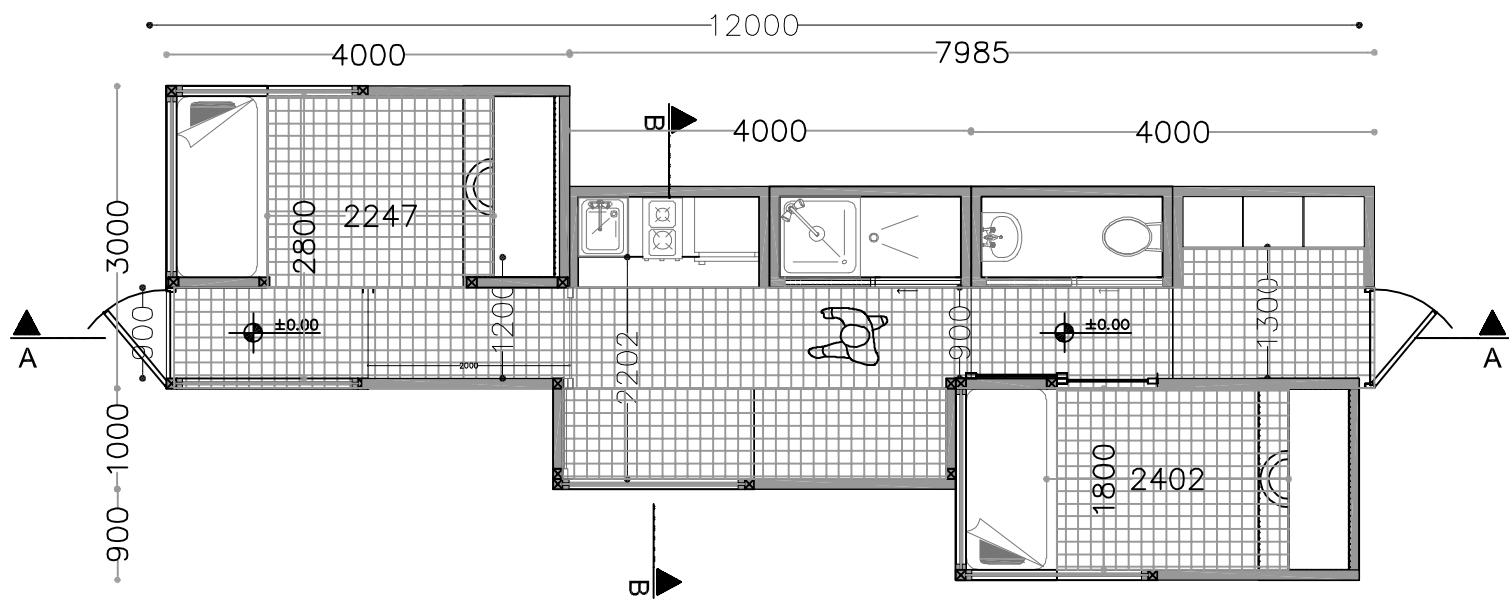
LINE  
Plan



LINE|B| 01  
Plan

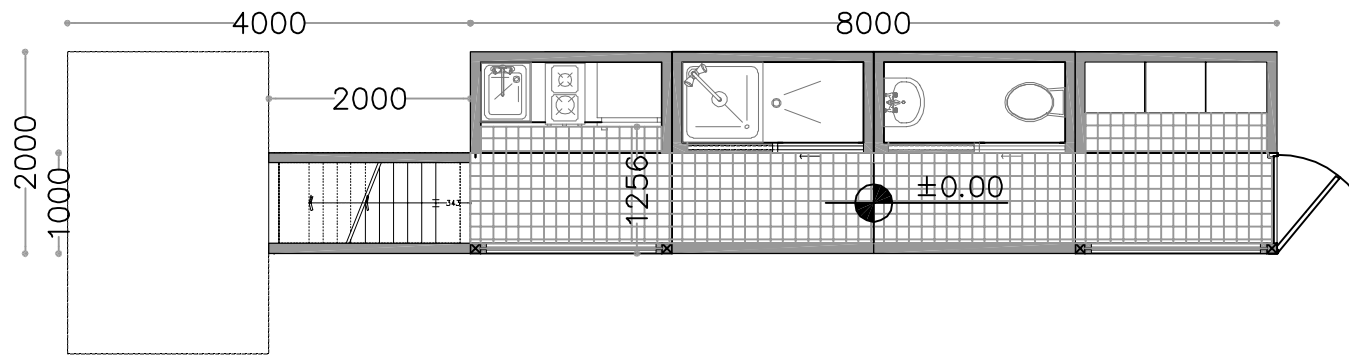


LINE|B| 02  
Plan



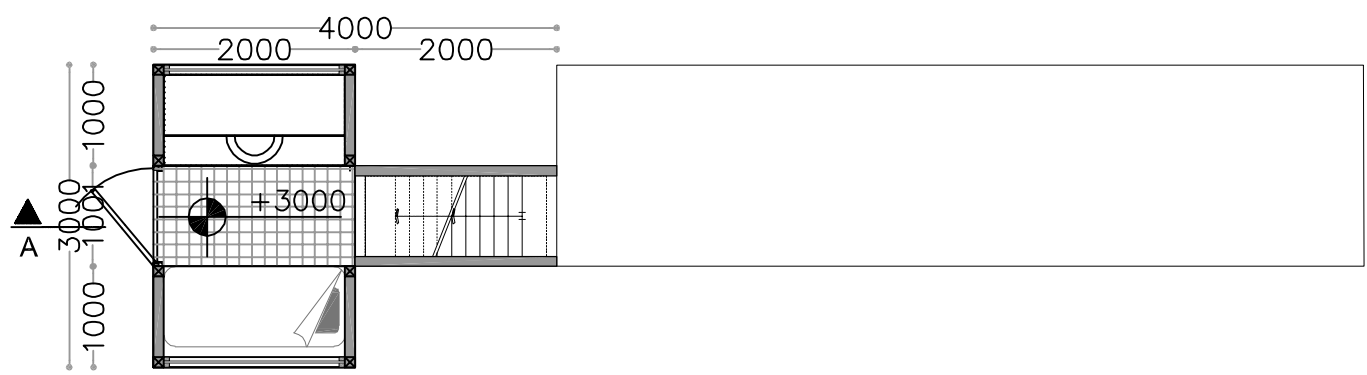
LINE|B| 03

Plan



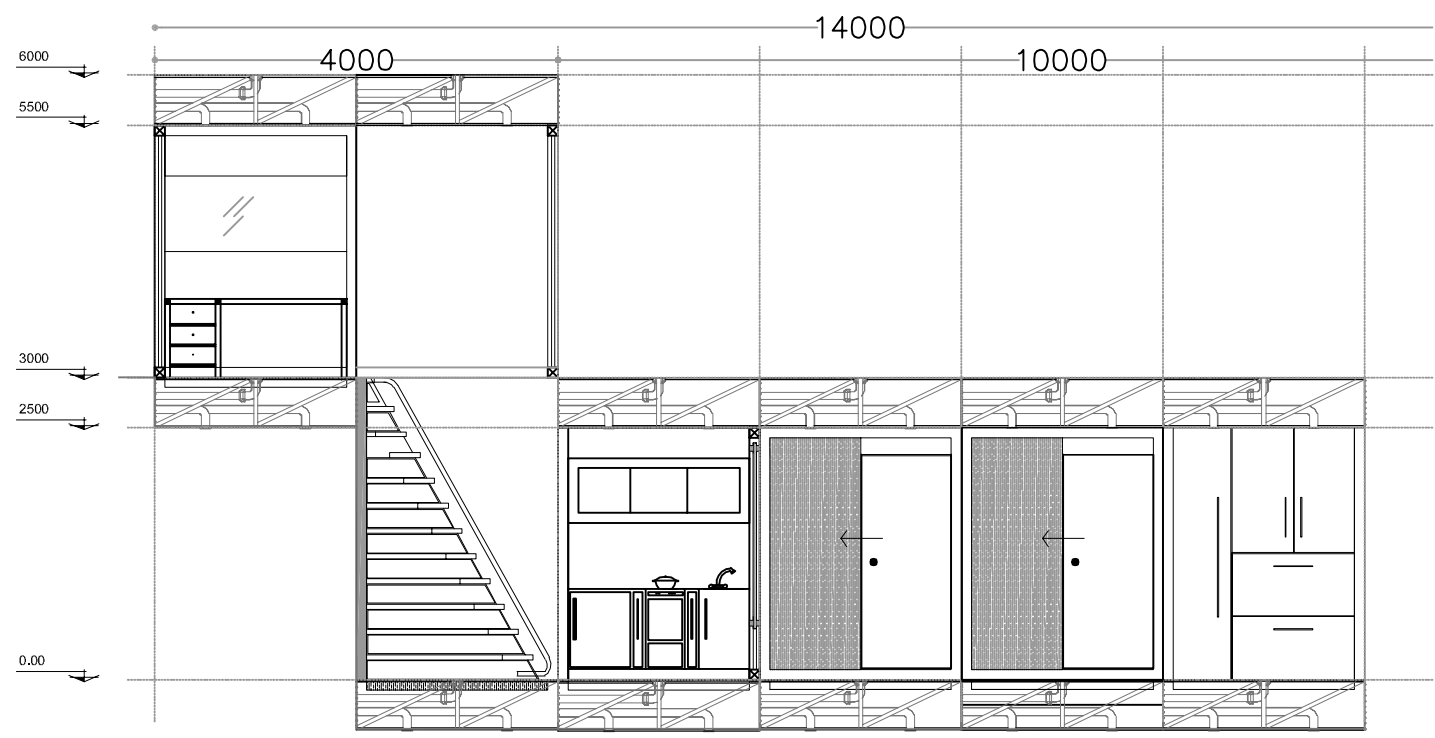
LINE|C| 01

Plan



LINE|C| 02

Plan

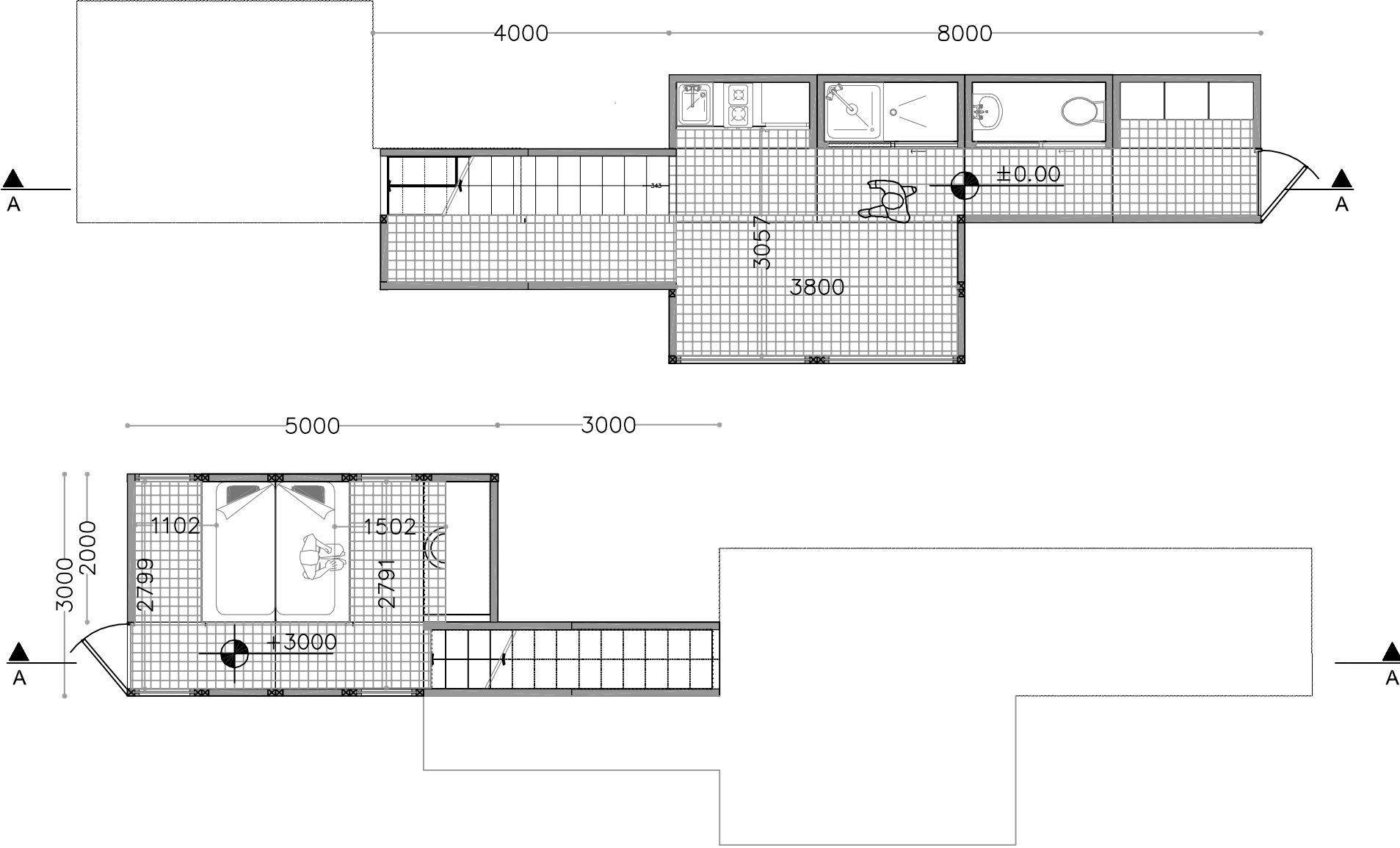


LINE|C| 02

Section

LINE|C| 03

Plan

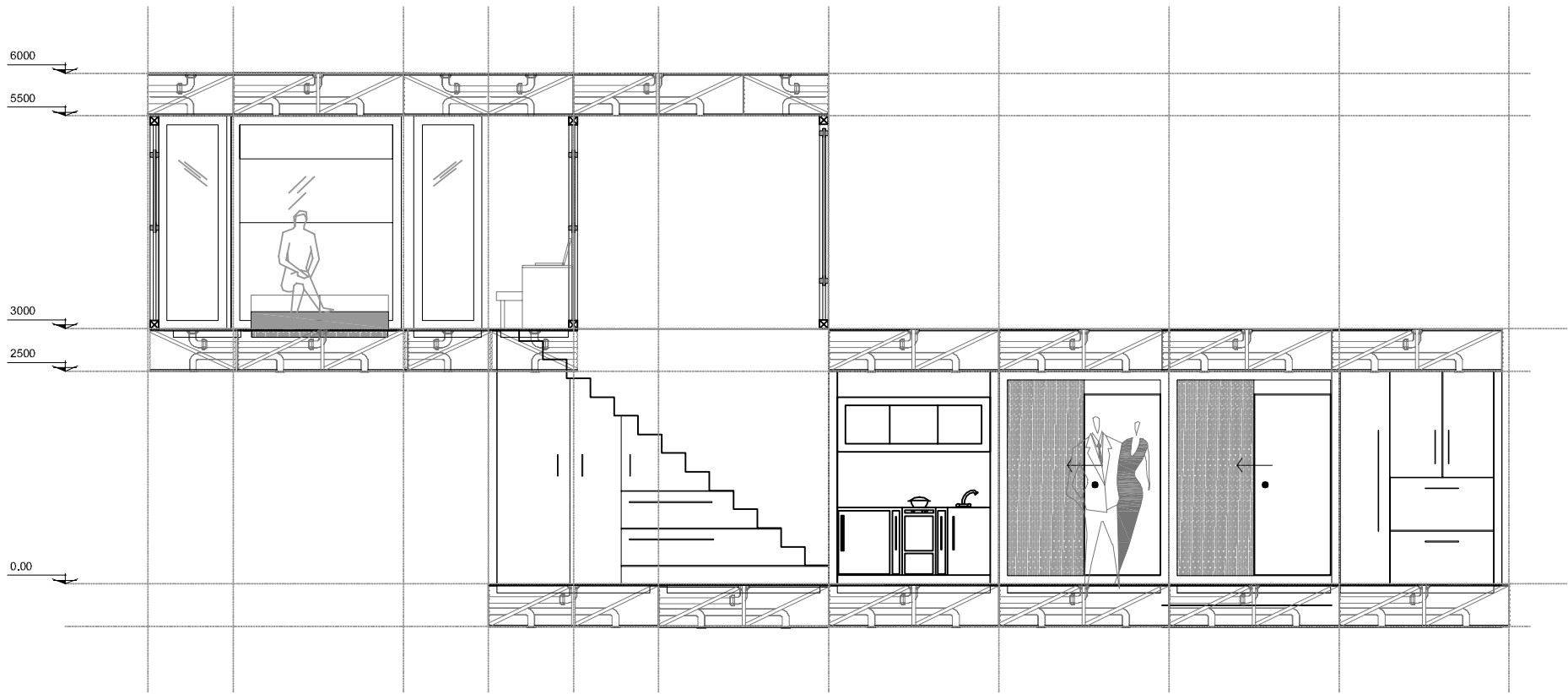




LINE|C| 03

Section

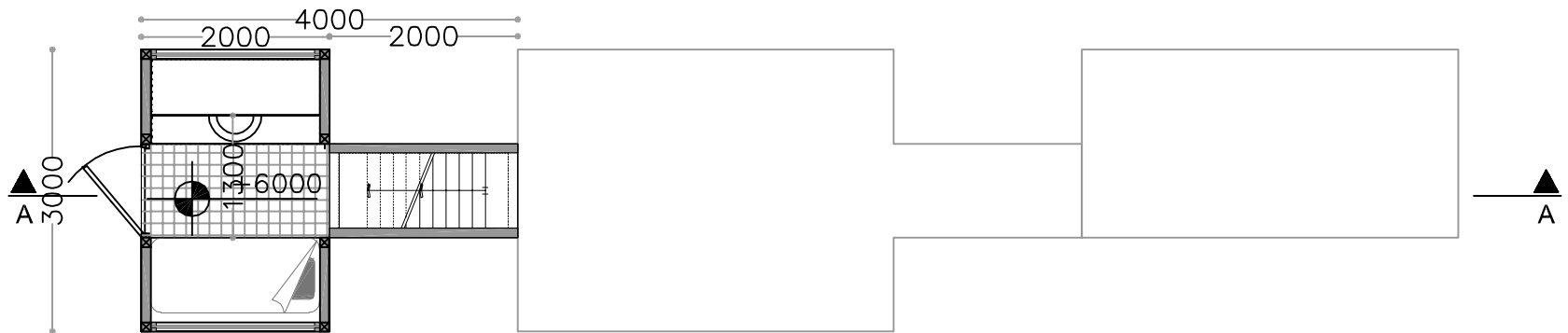
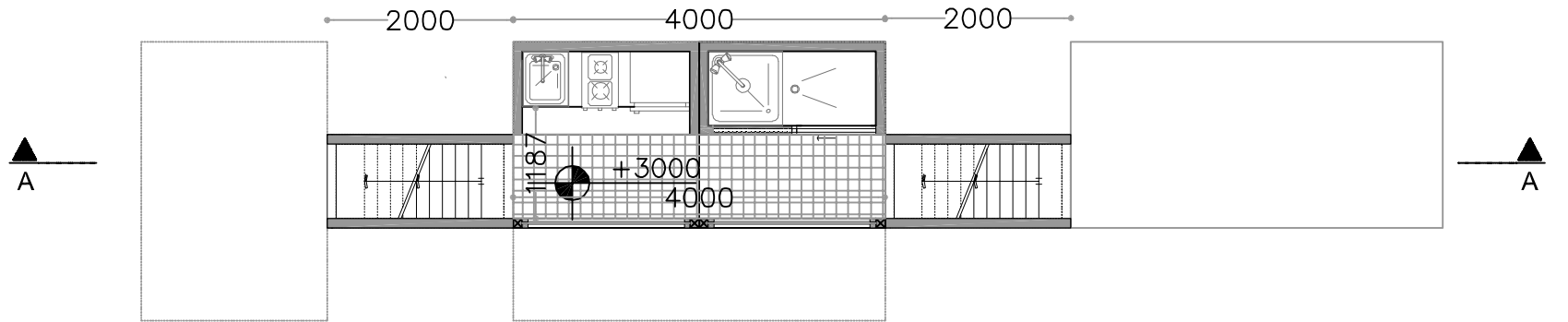
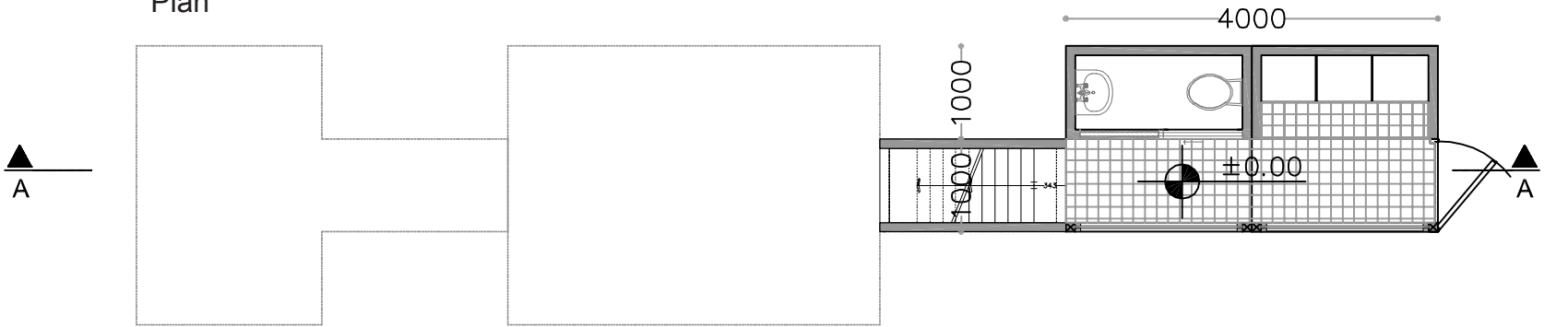
SC: 1/75



LINE|C| 04

Plan

Plan

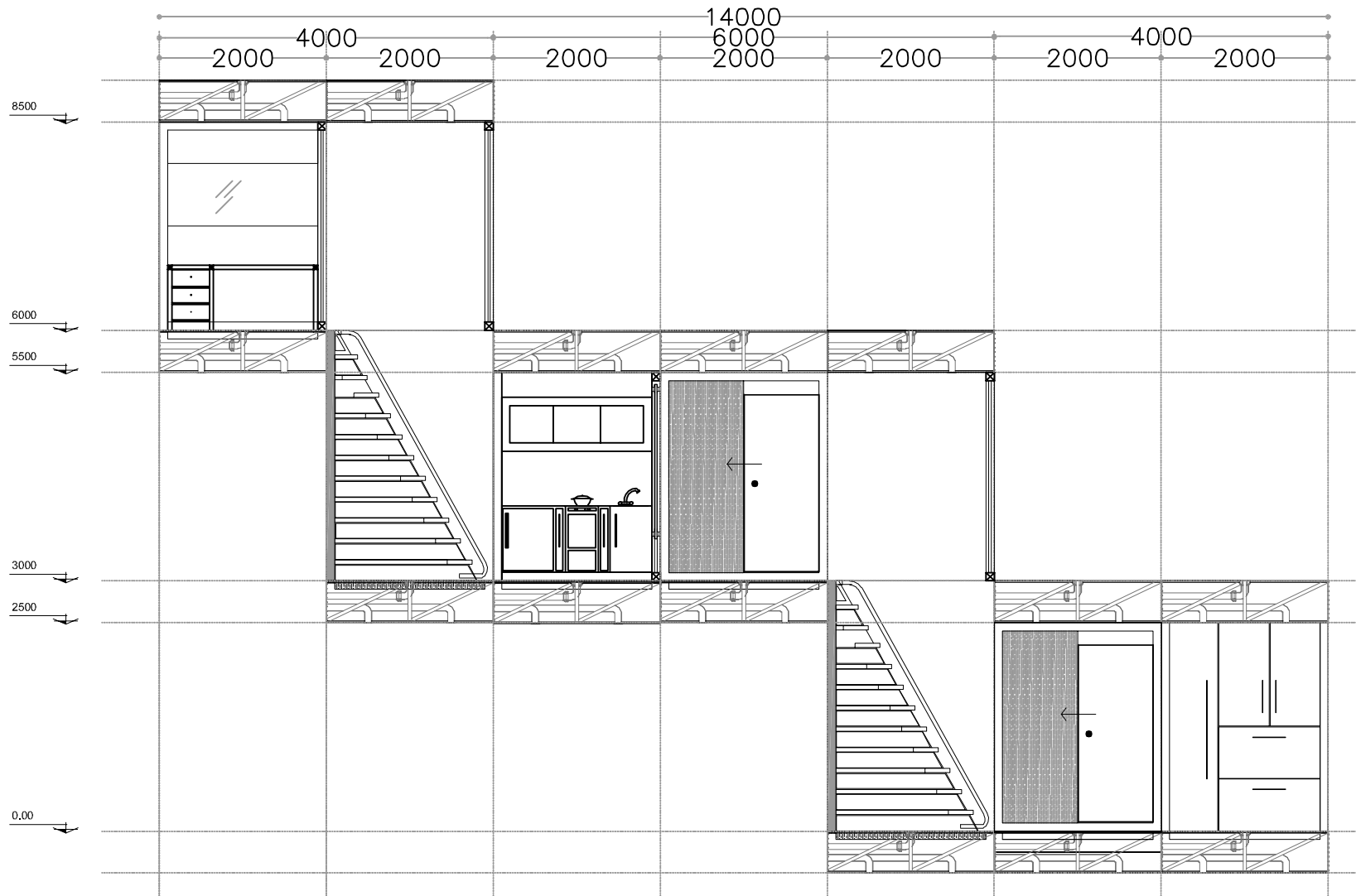


117

LINE|C| 04

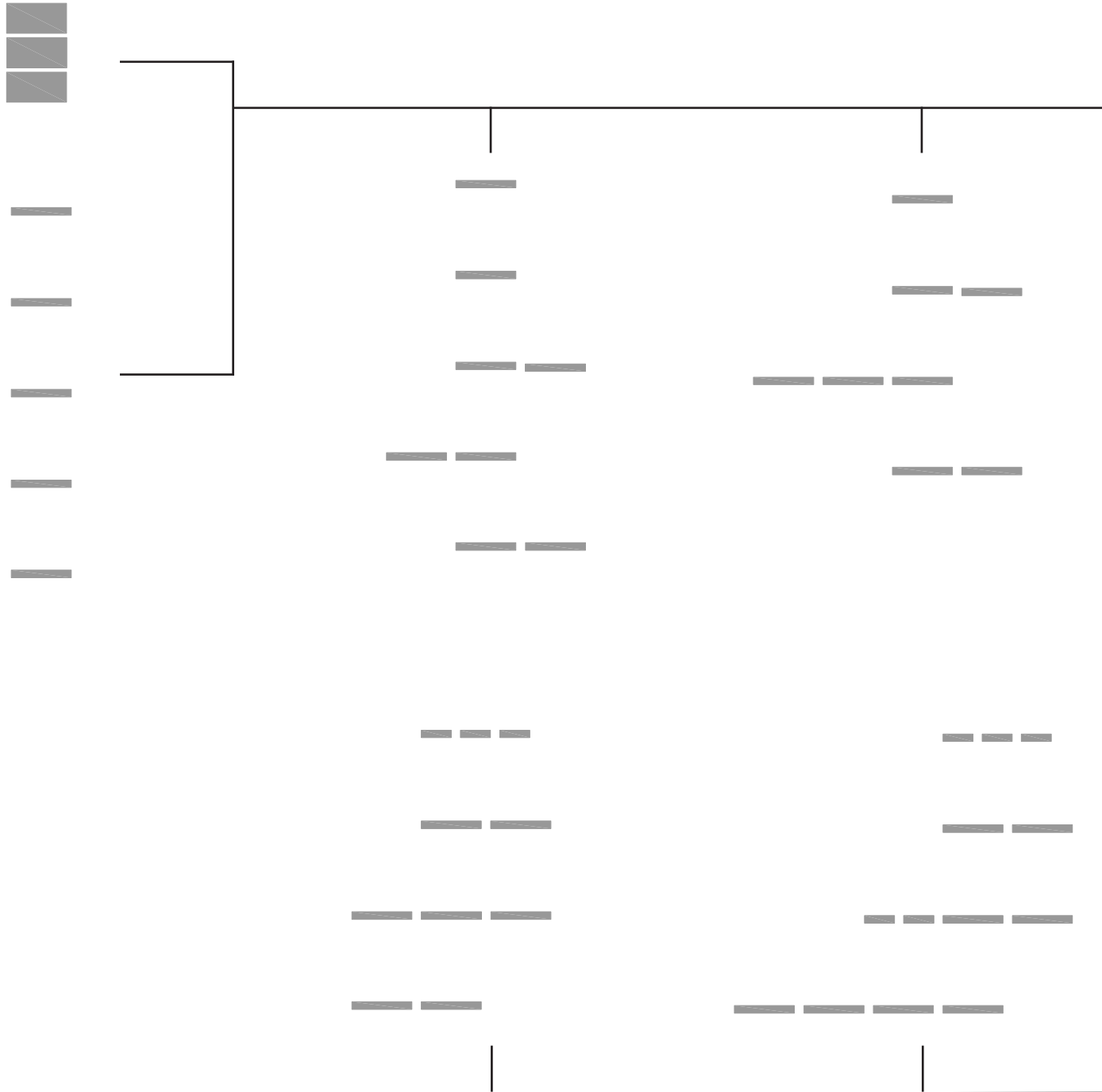
Section

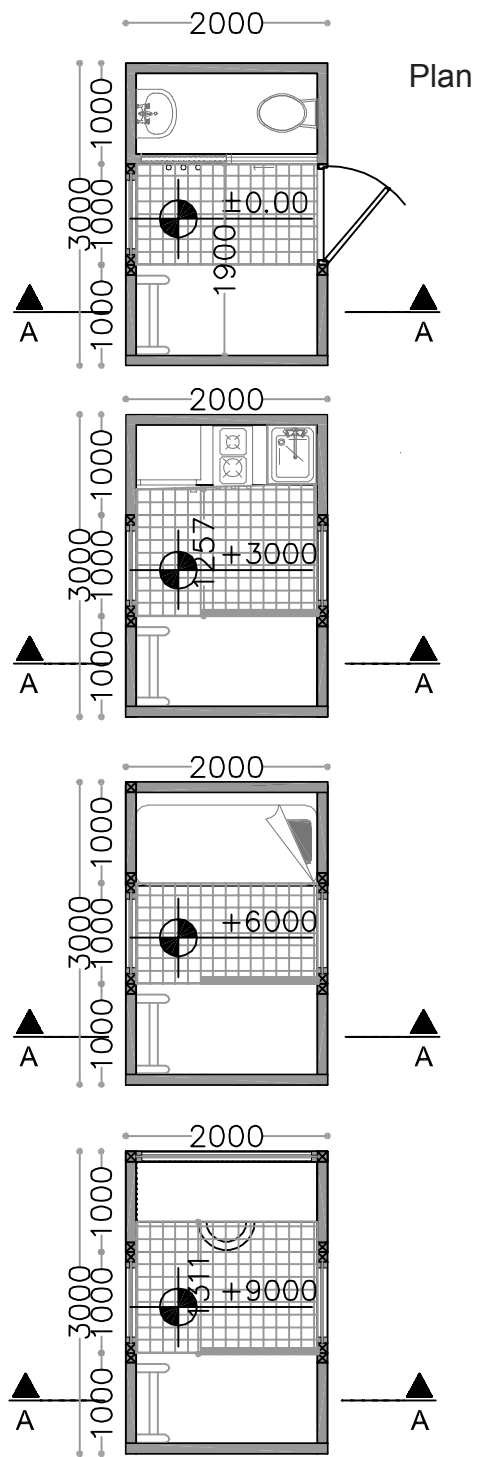
SC: 1/75





## ADVENTURE TYPOLOGY

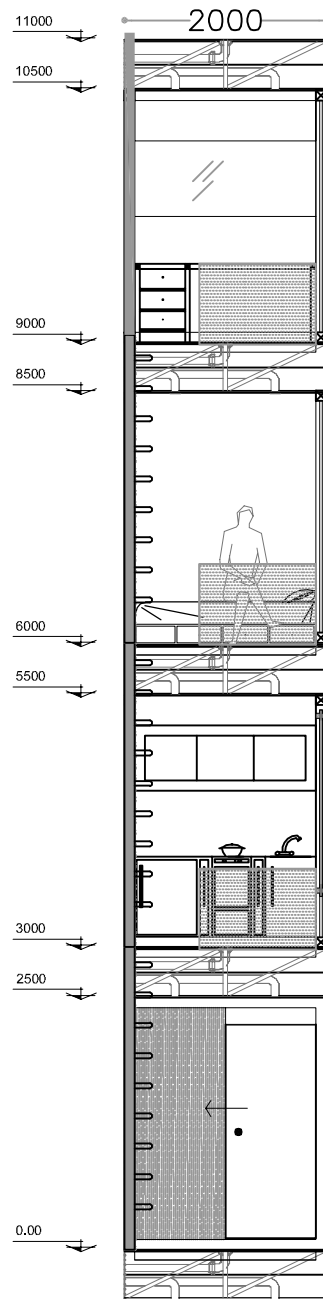




ADVANTURE

Section

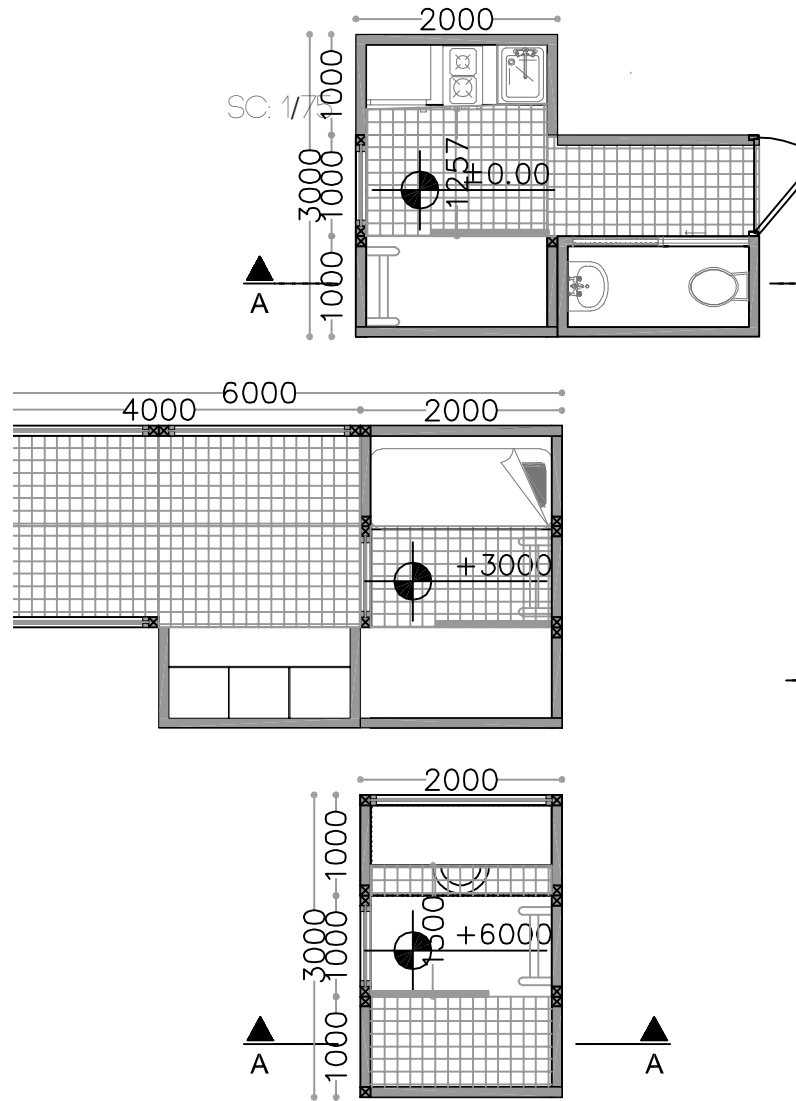
SC: 1/75





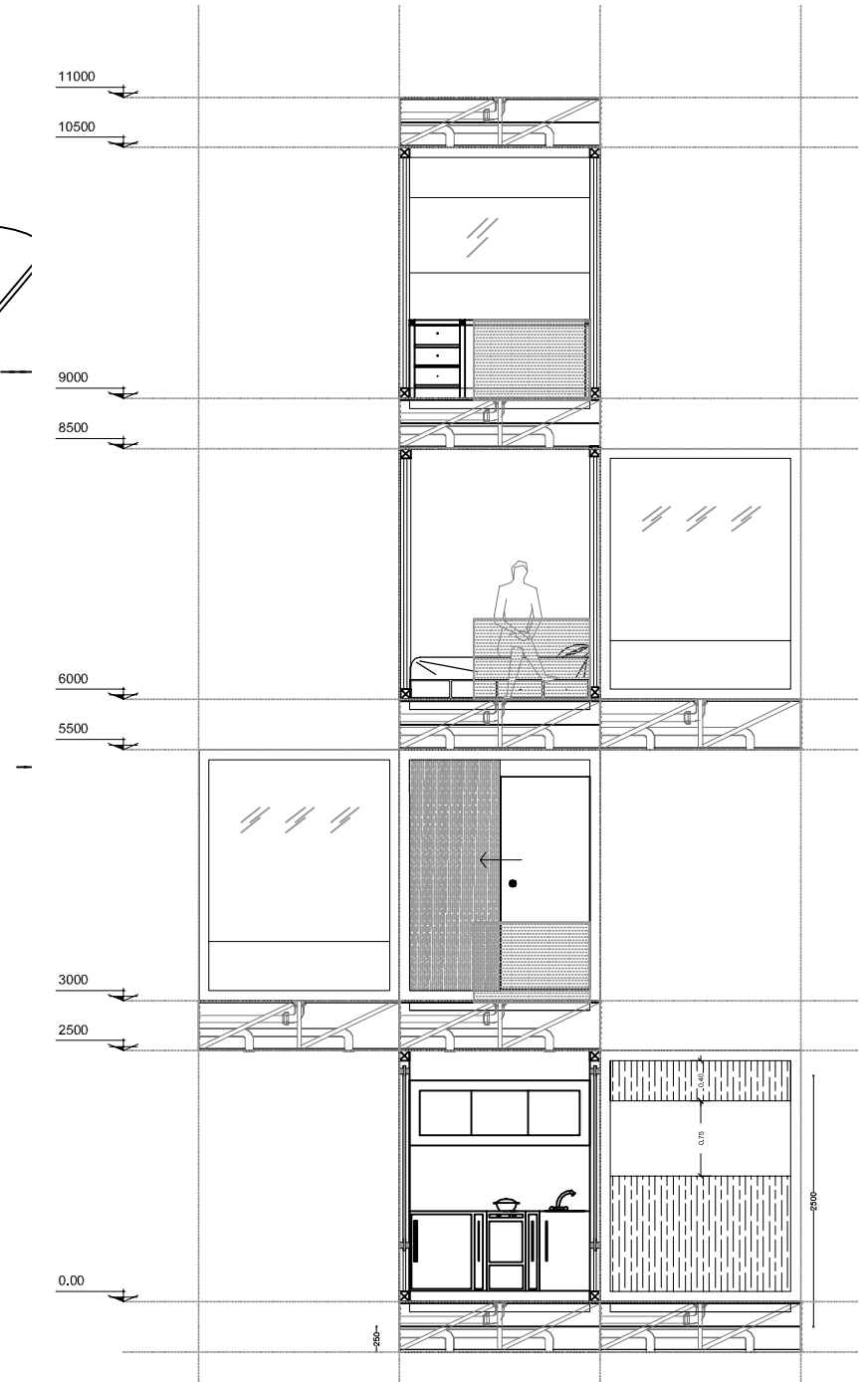
ADVANTURE|A|01

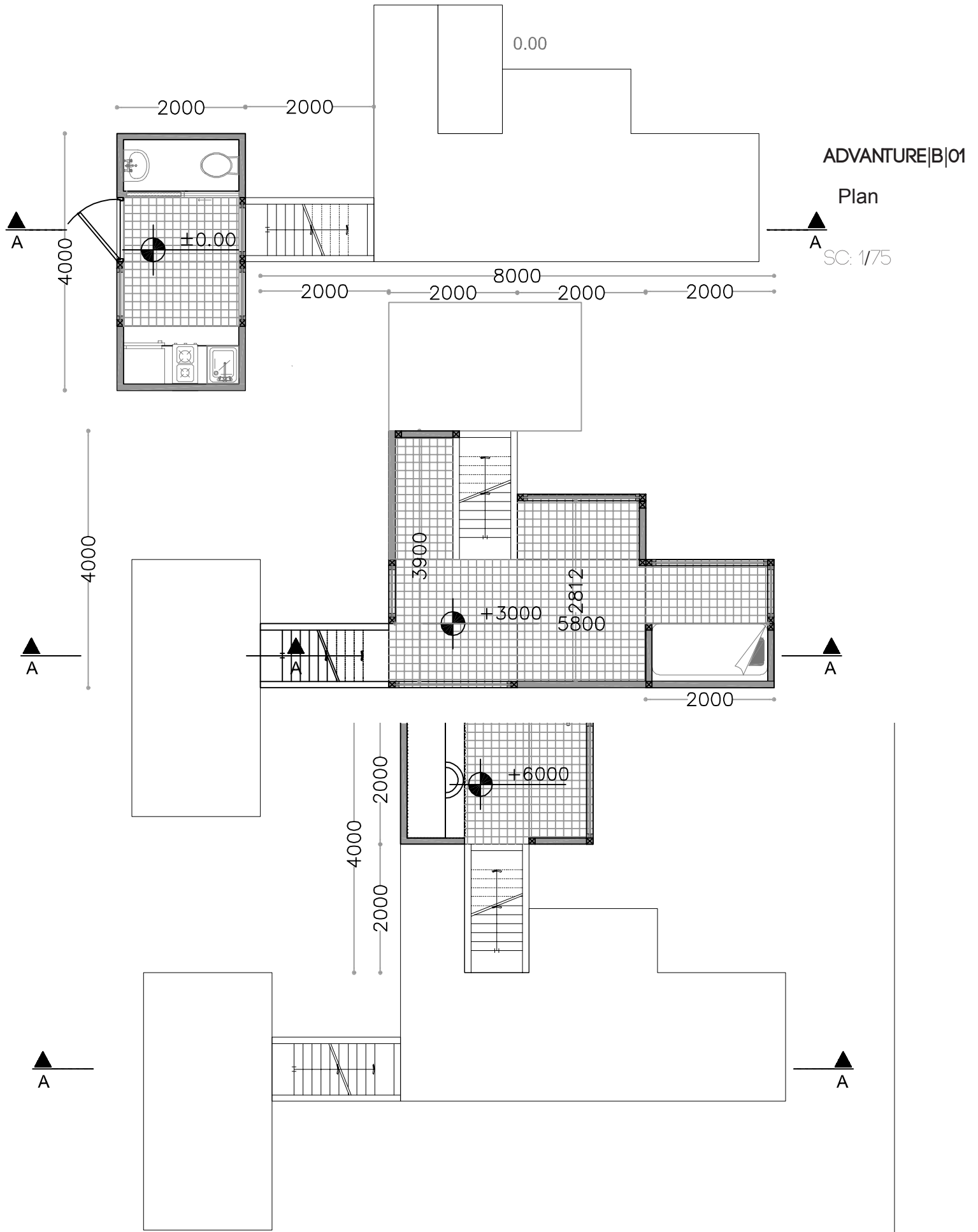
Plan



Section

SC: 1/75

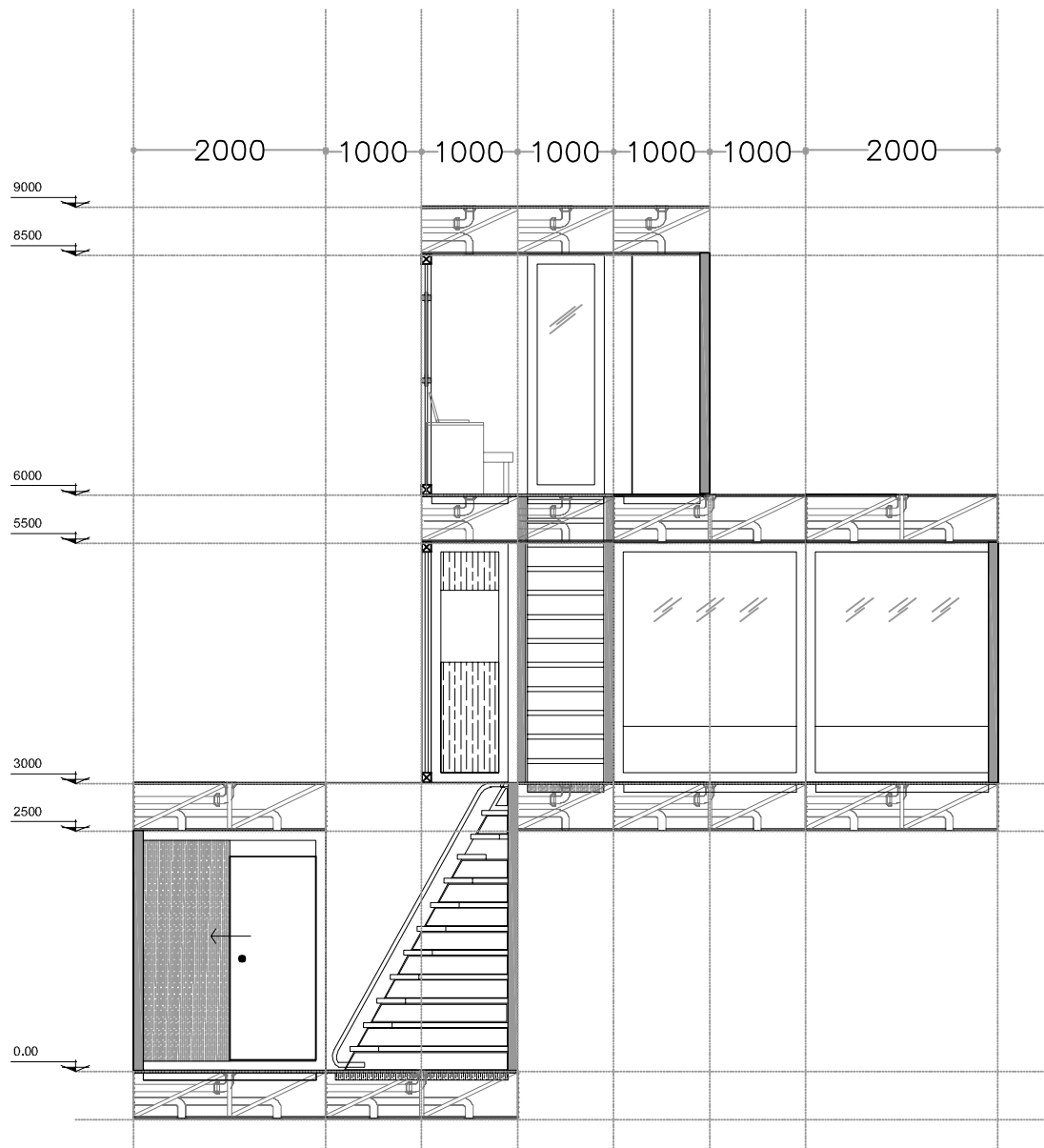




ADVENTURE|B|01

Section

SC: 1/75

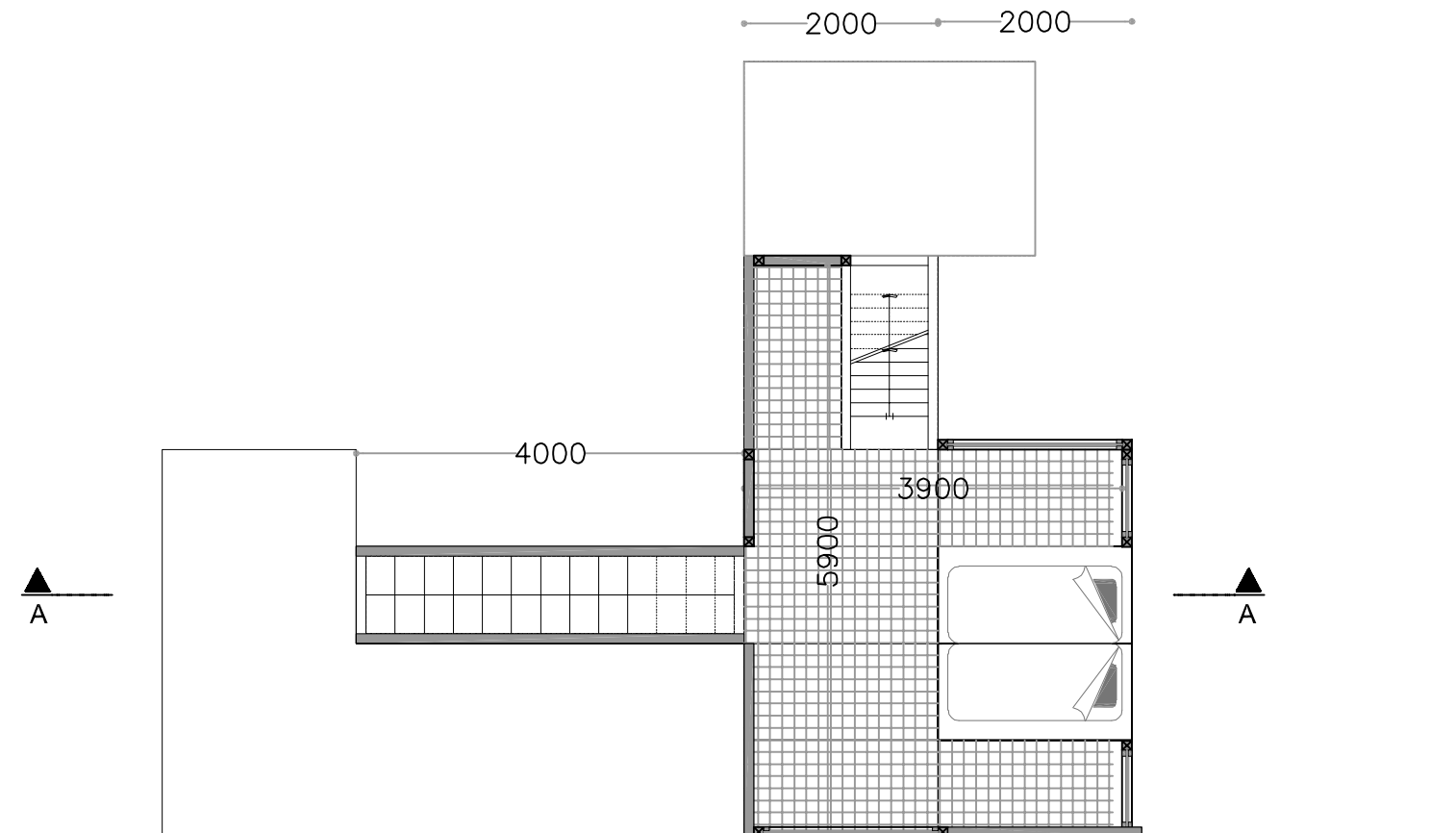
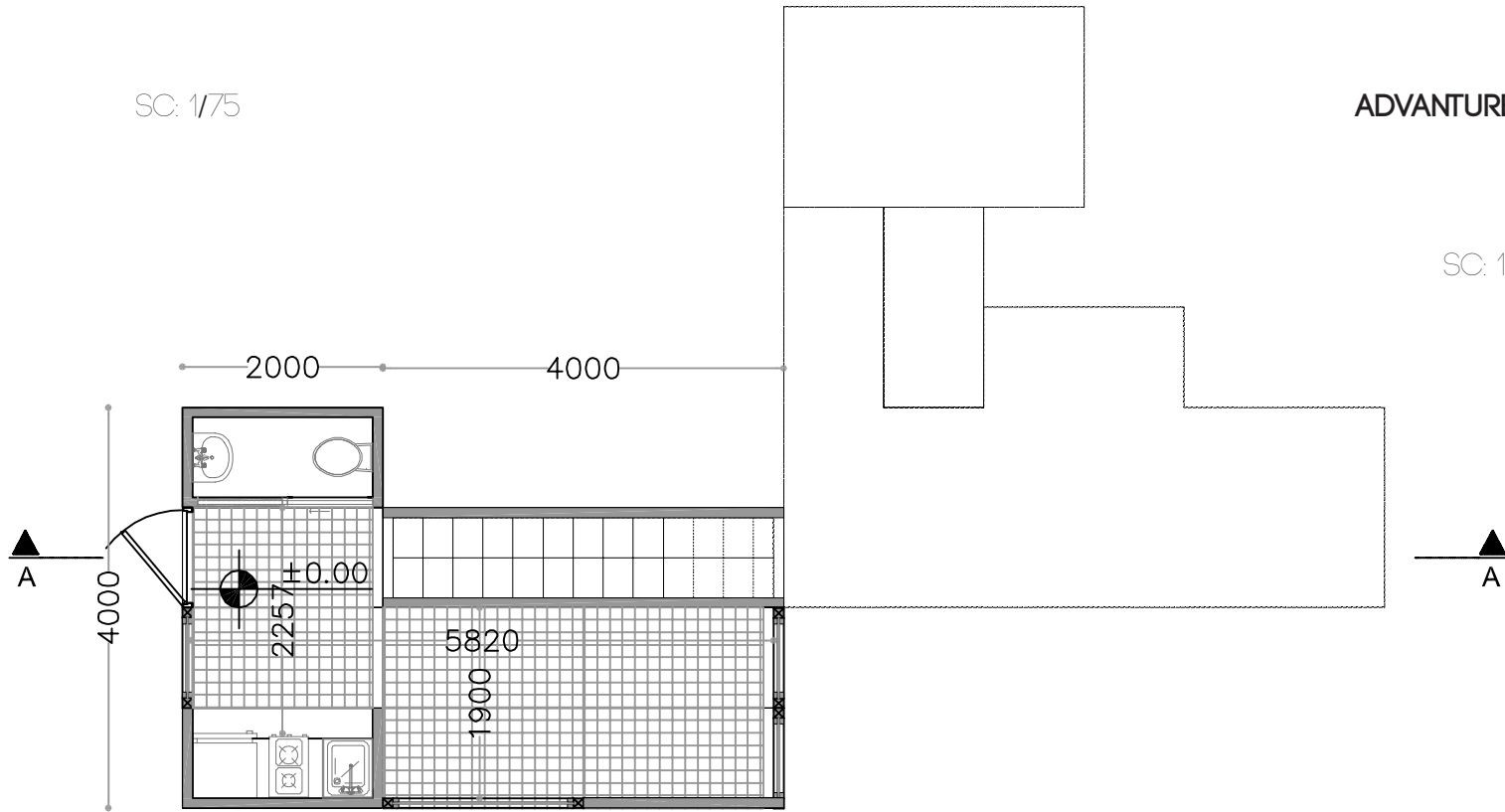


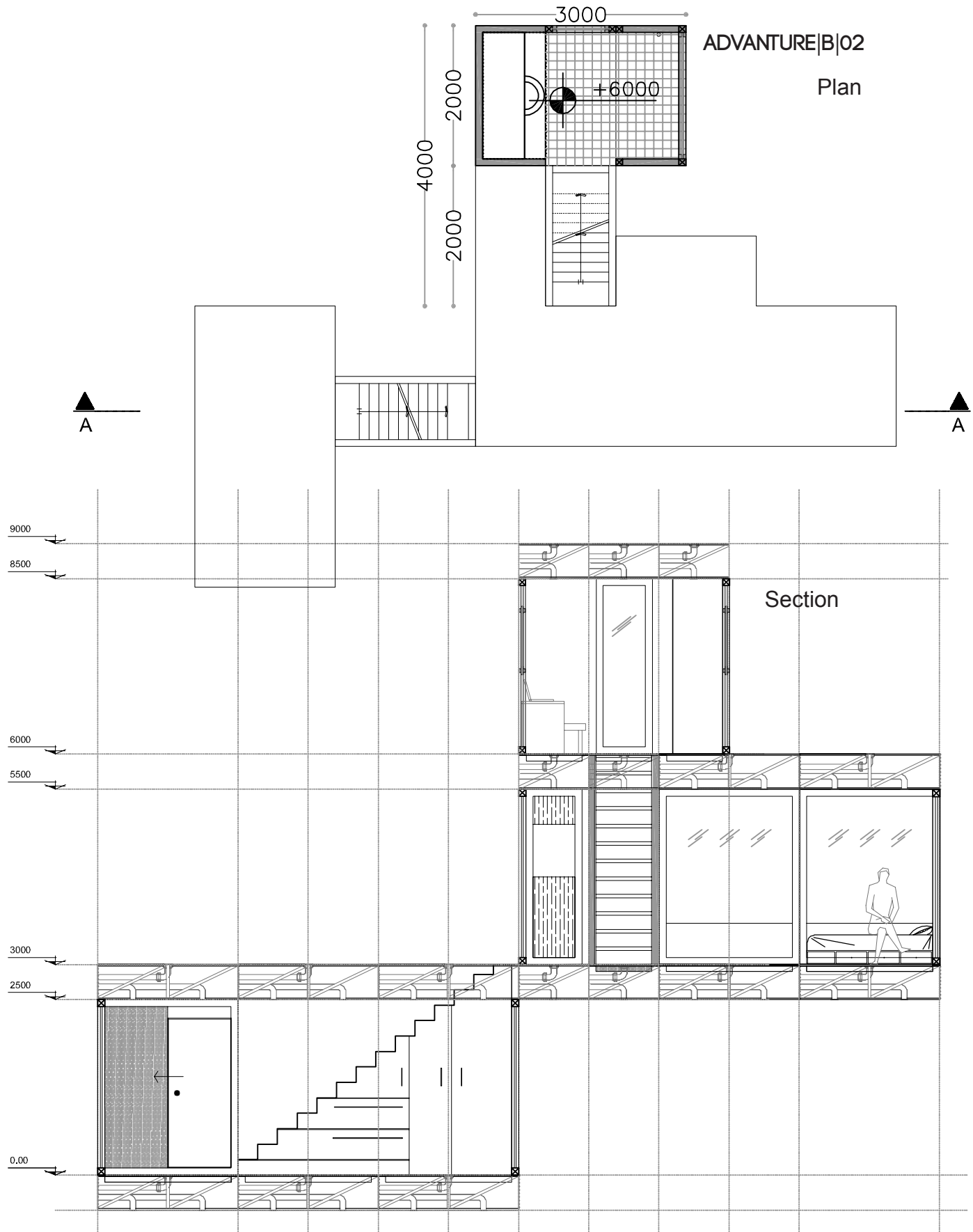
SC: 1/75

ADVENTURE|B|02

Plan

SC: 1/75

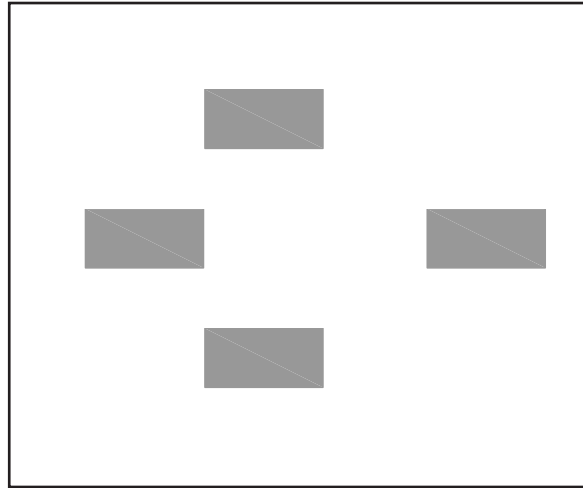




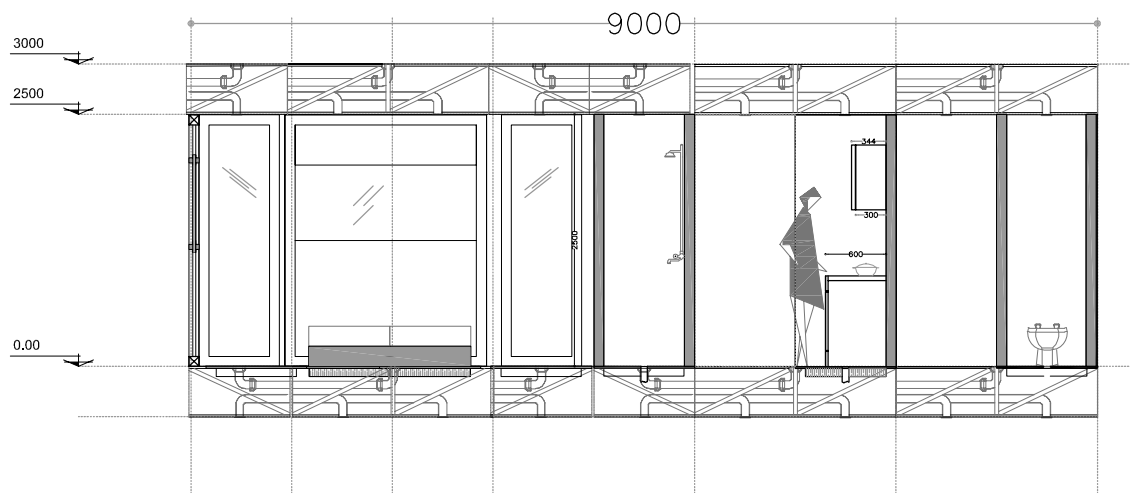
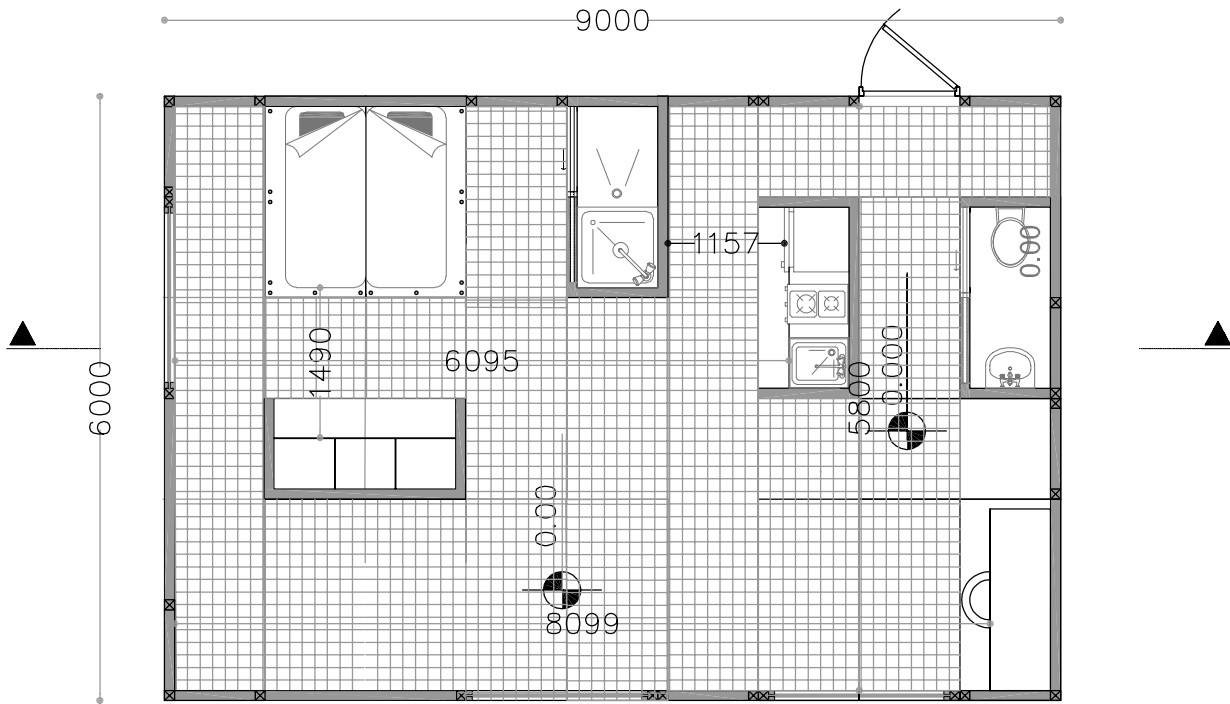




## ISLAND

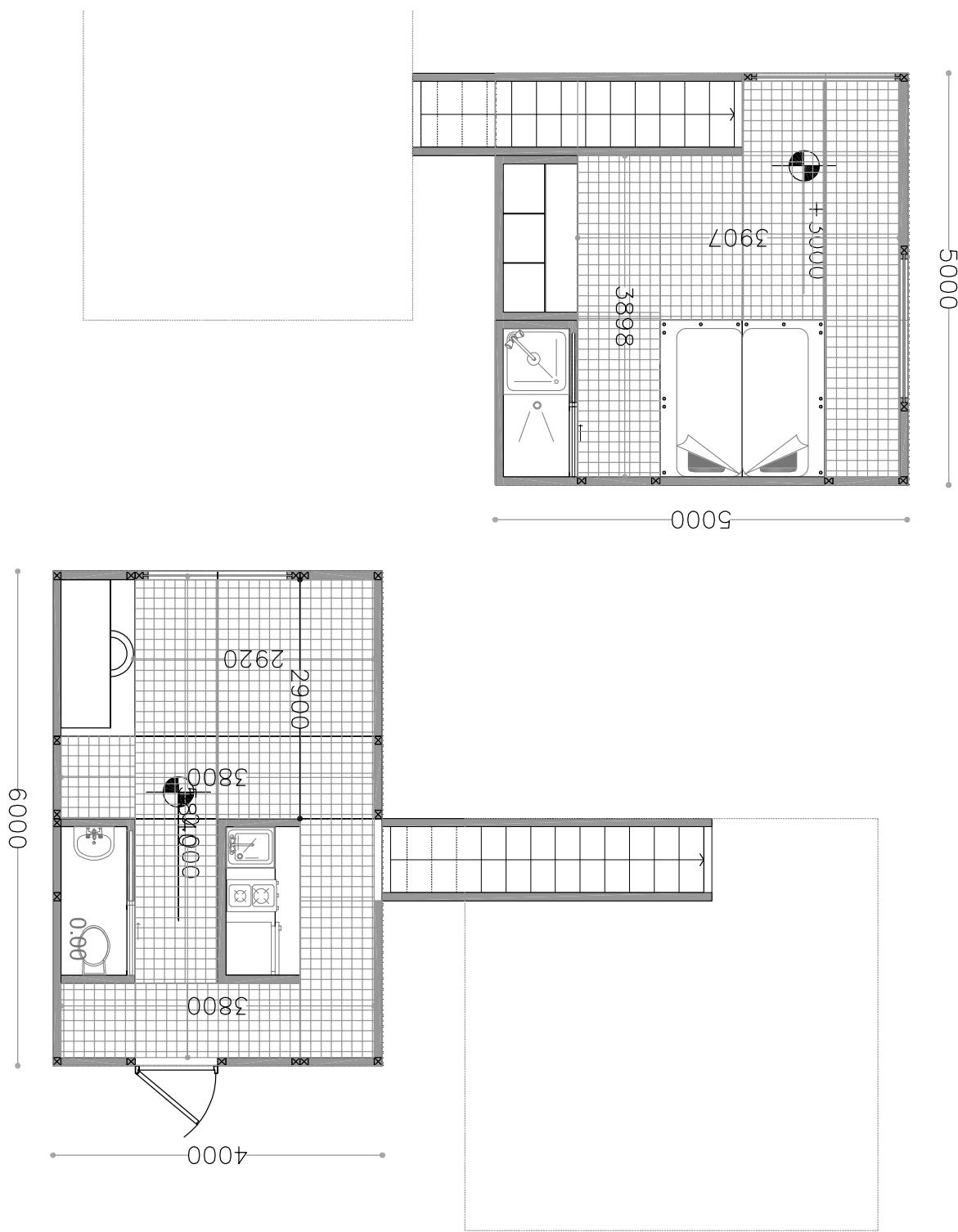




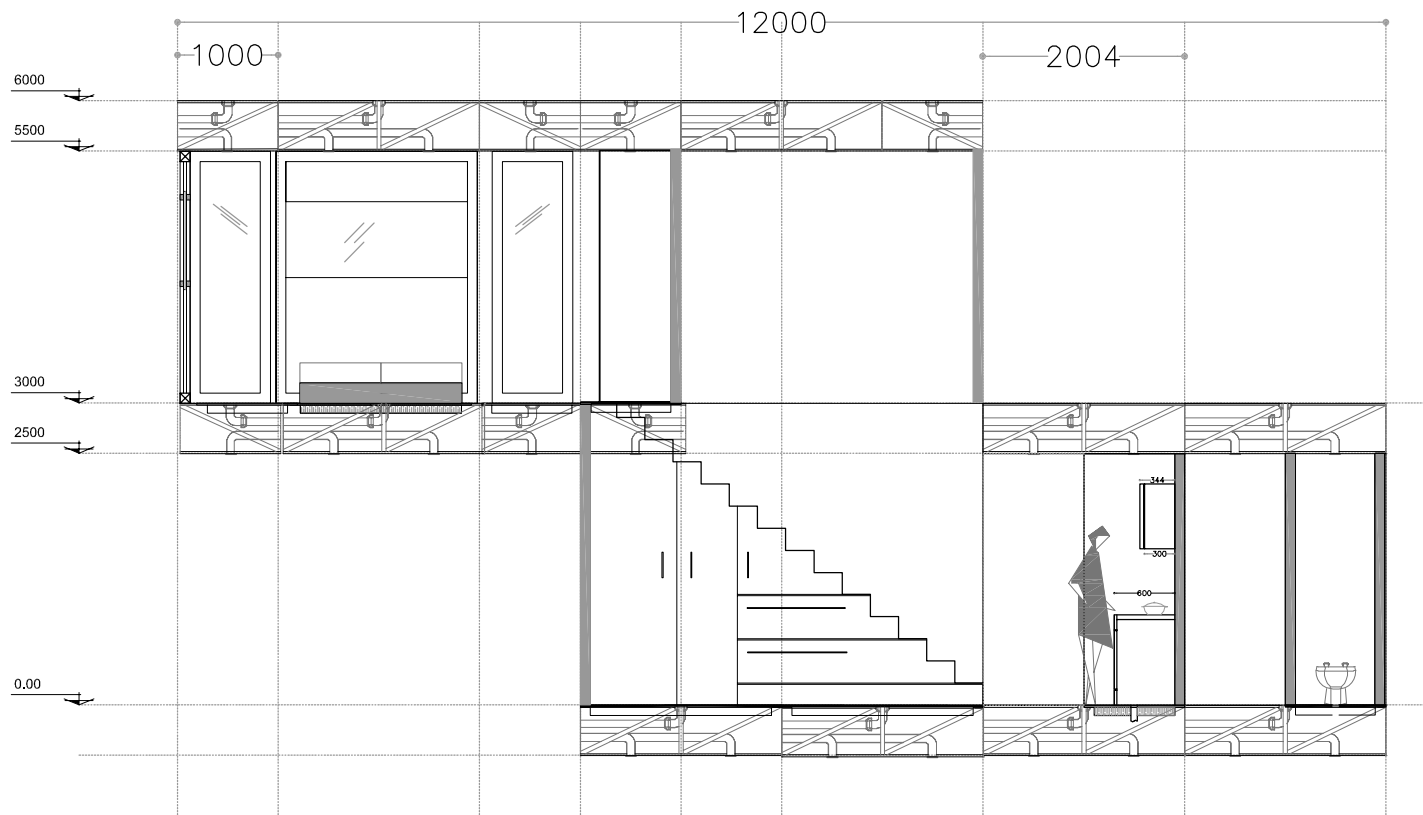


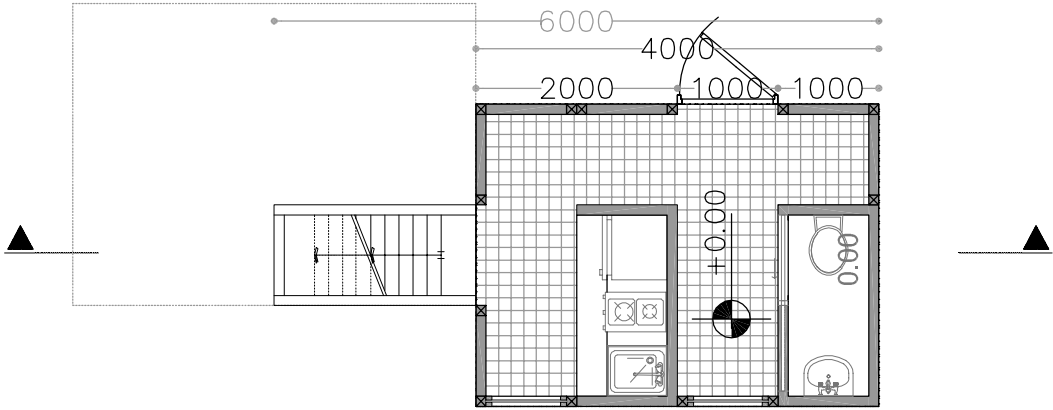
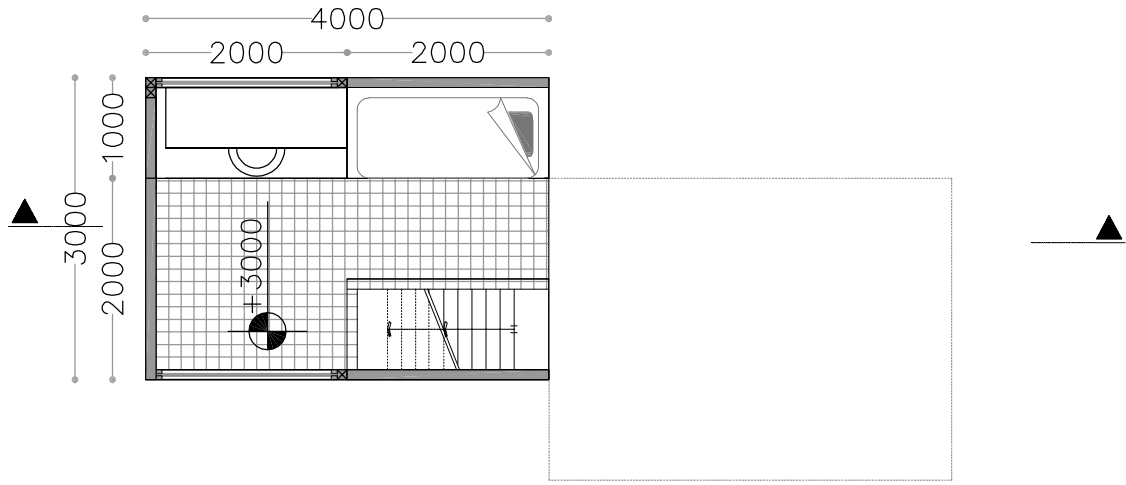
ISLAND | 02

SC: 1/75



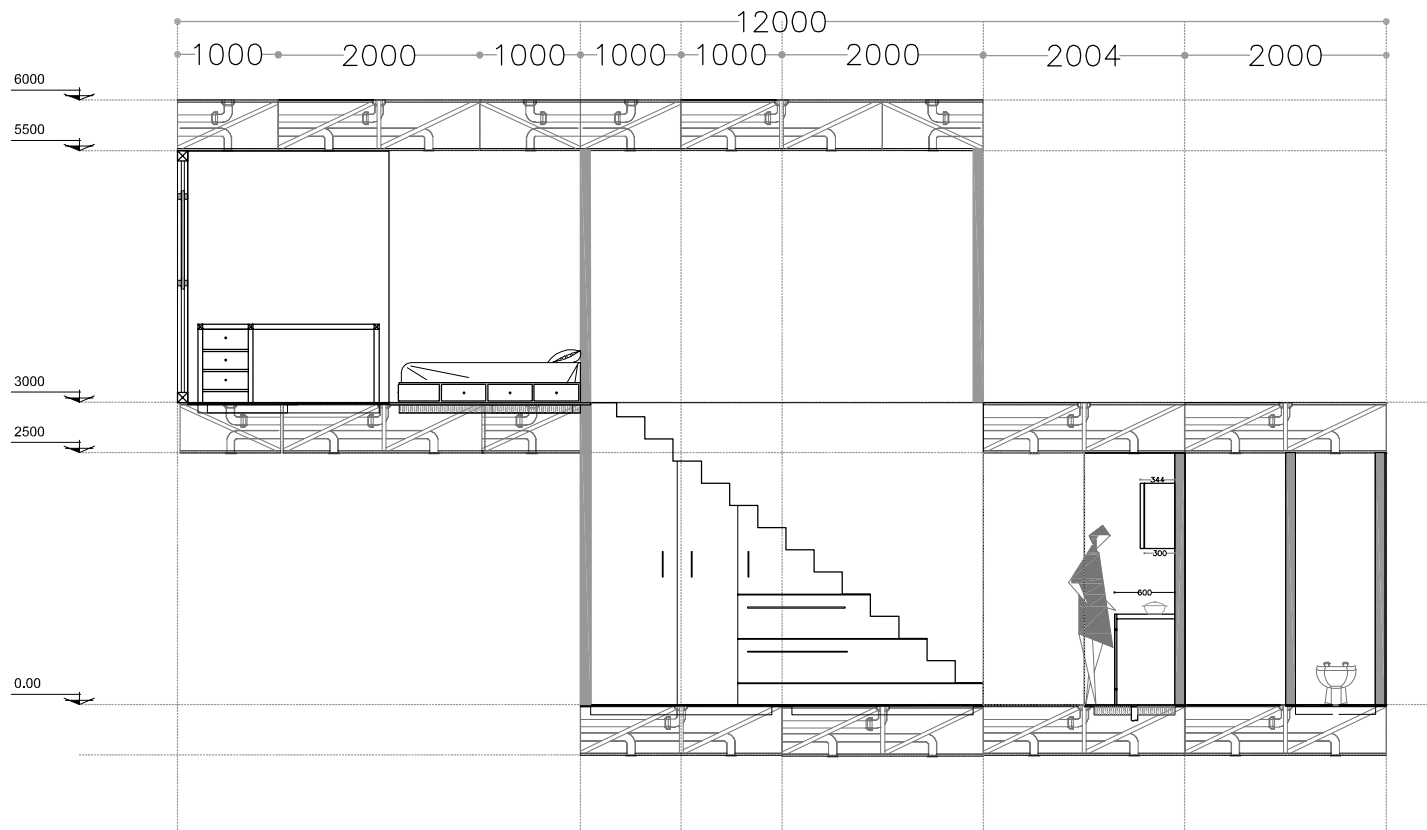
## ISLAND | 02

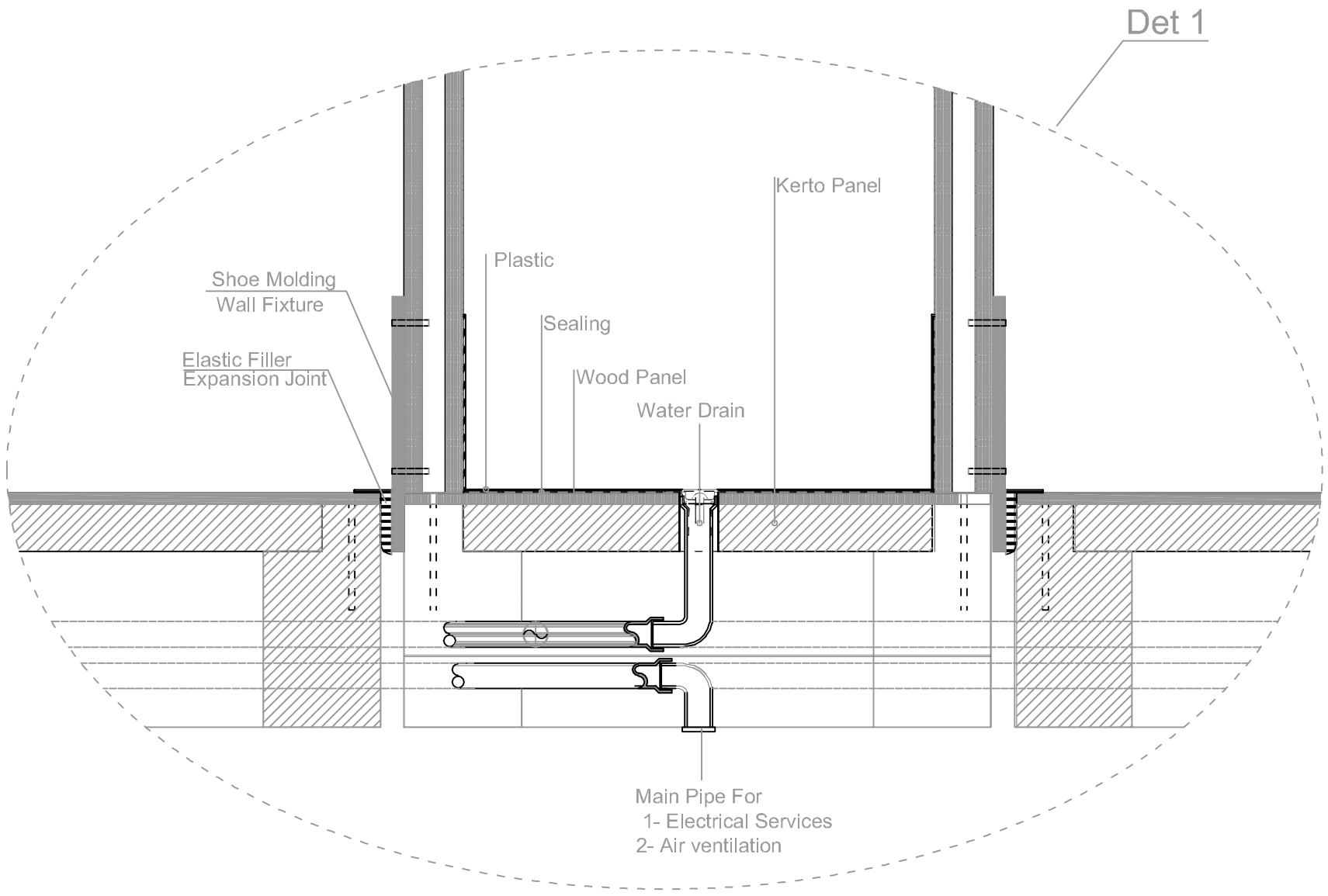




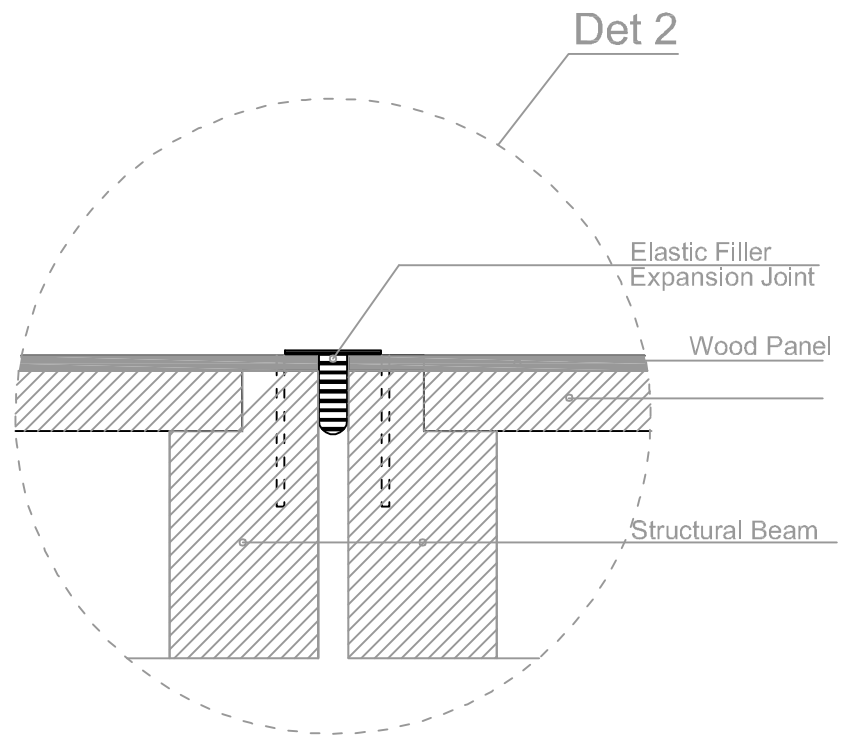


SC: 1/75





Detail1: Floor Section



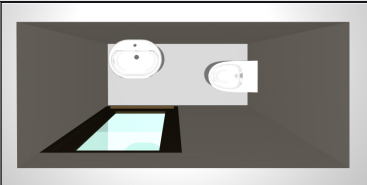
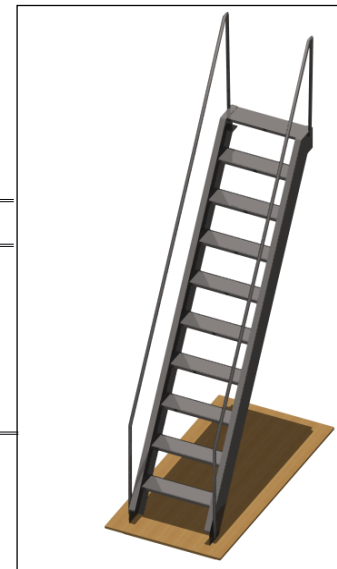
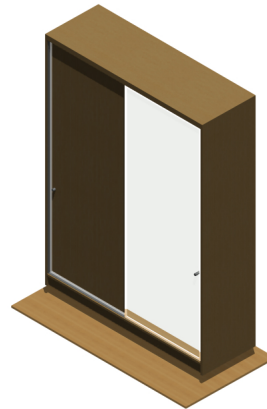
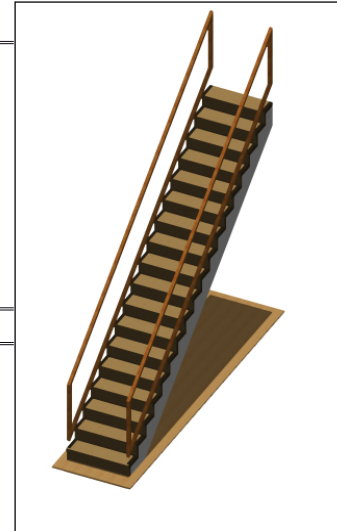
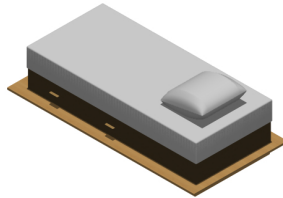
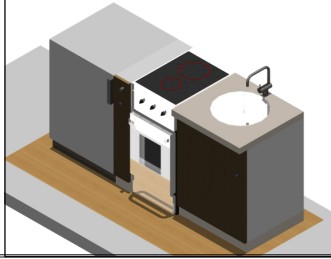
Detail2:Expansion Joint

LOAD BEARING STRUCTURE













# MATERIAL

Metsä wood

Q-kerto panel (CLT) + Gypsum

Slabs: kerto-Qpanel



Metsä wood

Q-kerto panel (CLT)



Photo58. <http://www.metsawood.com>

Photo59. <http://www.metsawood.com>



photo60.https://members.nationalgeographic.com

Slabs: kerto-Qpanel

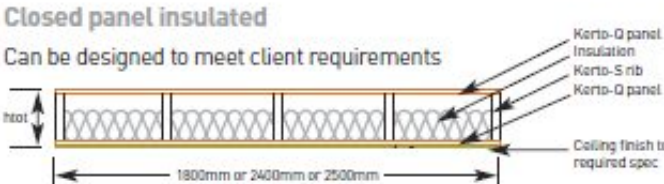
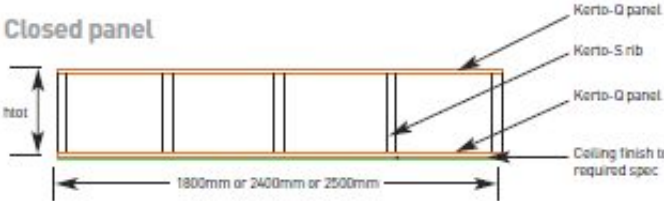
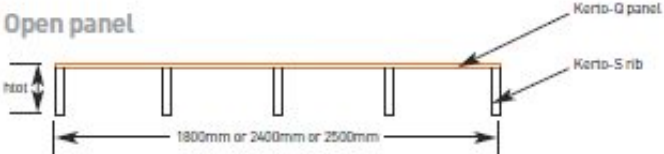




photo61.<https://members.nationalgeographic.com>



photo62.<https://members.nationalgeographic.com>



## Application of Wood - Fiber-Reinforced Gypsum Board

- Ceiling (6mm & 8mm thick)
- Partition Panel: (10mm 12mm 15mm thick)
- Pipe cover, wall cabinet & window shutter cover slab
- Windowsill baffle, internal warming plate of exterior wall or clap board
- Light compound roofing and siding board
- Anti -static insulating floor



A Layer of gypsum on the Kerto-Qpanels, make the main corridors fire proof, it should be mentioned that a layer of fire proof colour in the yellow code, on the gypsum, remark corridors as safe place.

Photo63.<http://hengshenglong.en.ec21.com>

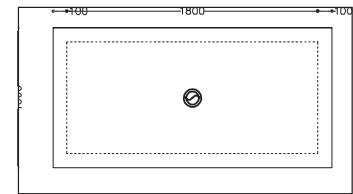
Photo 64.

<http://www.metsawood.com>



Photo 65.

<http://www.metsawood.com>

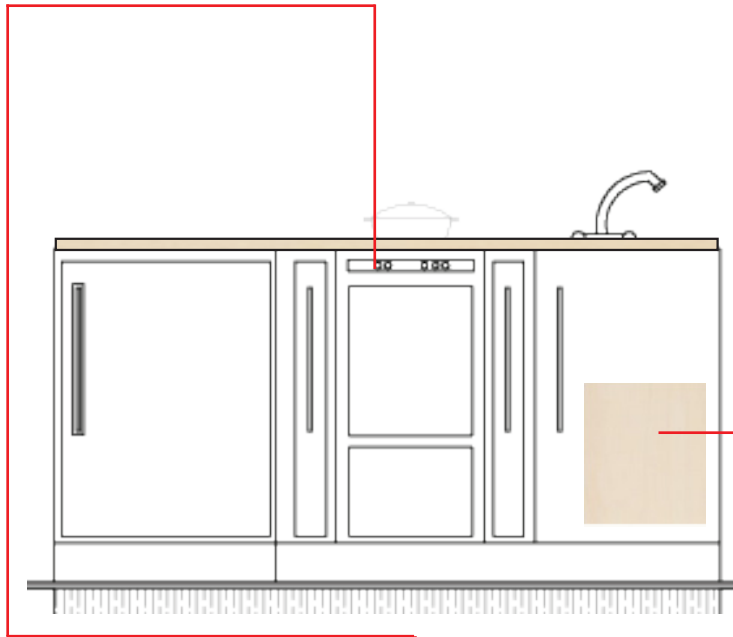




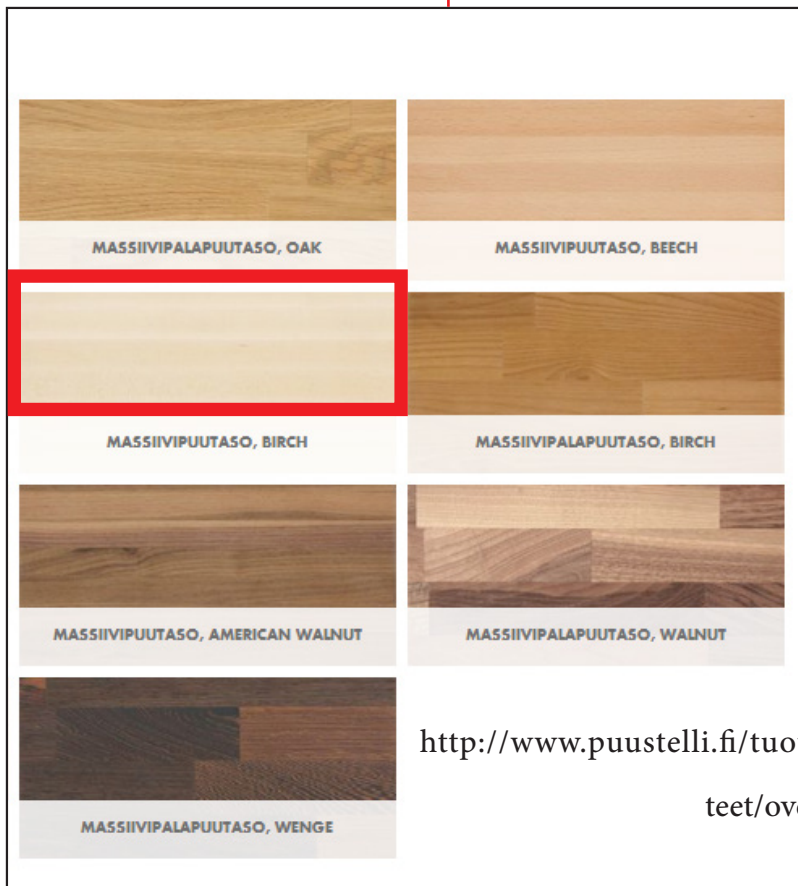
# KITCHEN



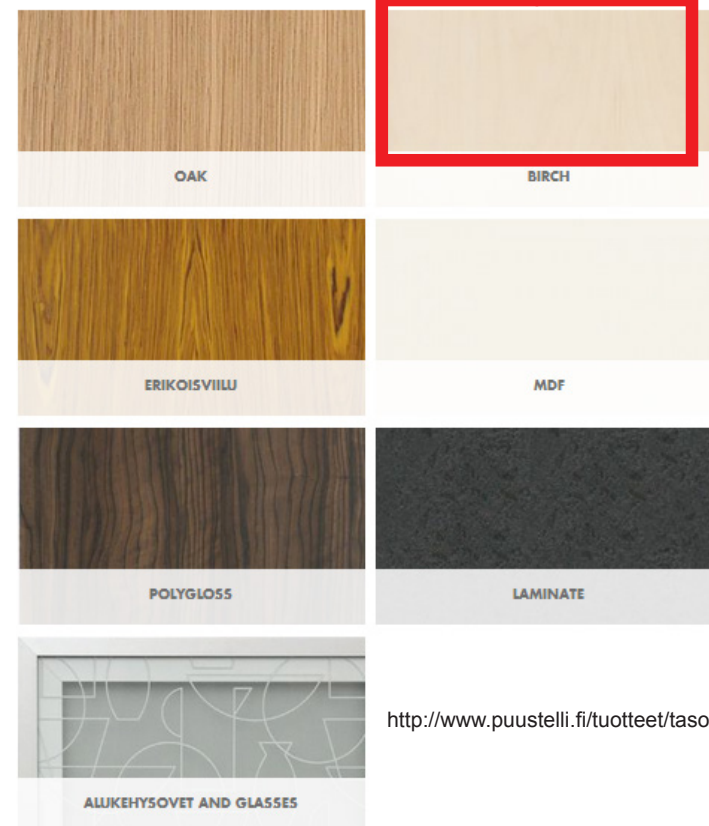
Photo66.<http://www.puustelli.fi>



DOORS: TP65 Birch veneer, lacquered



<http://www.puustelli.fi/tuotteet/ovet>



<http://www.puustelli.fi/tuotteet/tasot/massiivipuu>

## LIGHTING

According to the electrical services which comes through slabs to the unit from ceiling side, ceiling type of Lights mainly is chosen .

Photo67. <http://www.architonic.com>



Ledona

Manufacturer RZB - Leuchten

Launched in 2013

Architonic id 1219601

Mondana

Manufacturer RZB - Leuchten

Designer Hartmut S. Engel

Launched in 2008

Architonic id 1219662



Photo68 <http://www.architonic.com>

Photo69.<http://www.architonic.com>



Arkki

Manufacturer Blond Belysning

Designer Johan Kauppi

Launched in 2014

Architonic id 1246707



PLAY Pendant

Steel Rod (red / dark grey /  
black / white) with Solid Oak  
wood

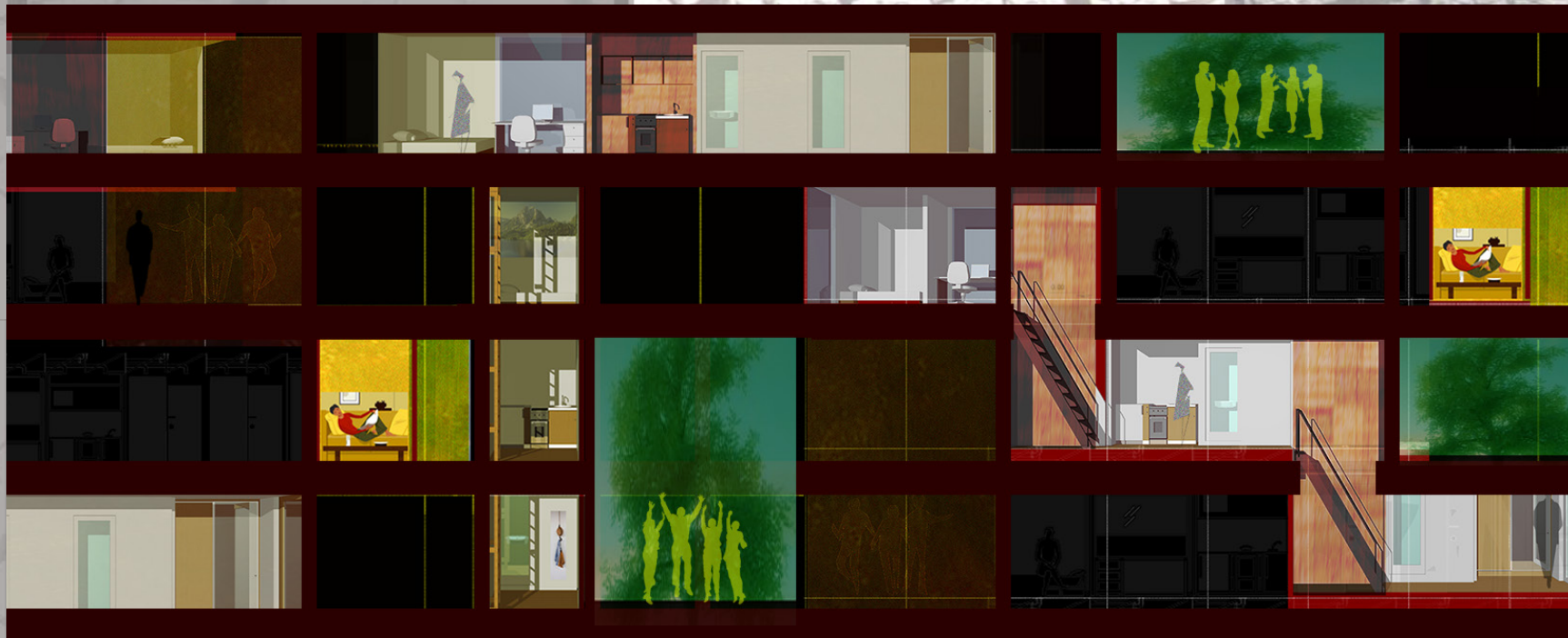
W16,5xD16,5xH22,5 cm

Photo70.<http://www.architonic.com>

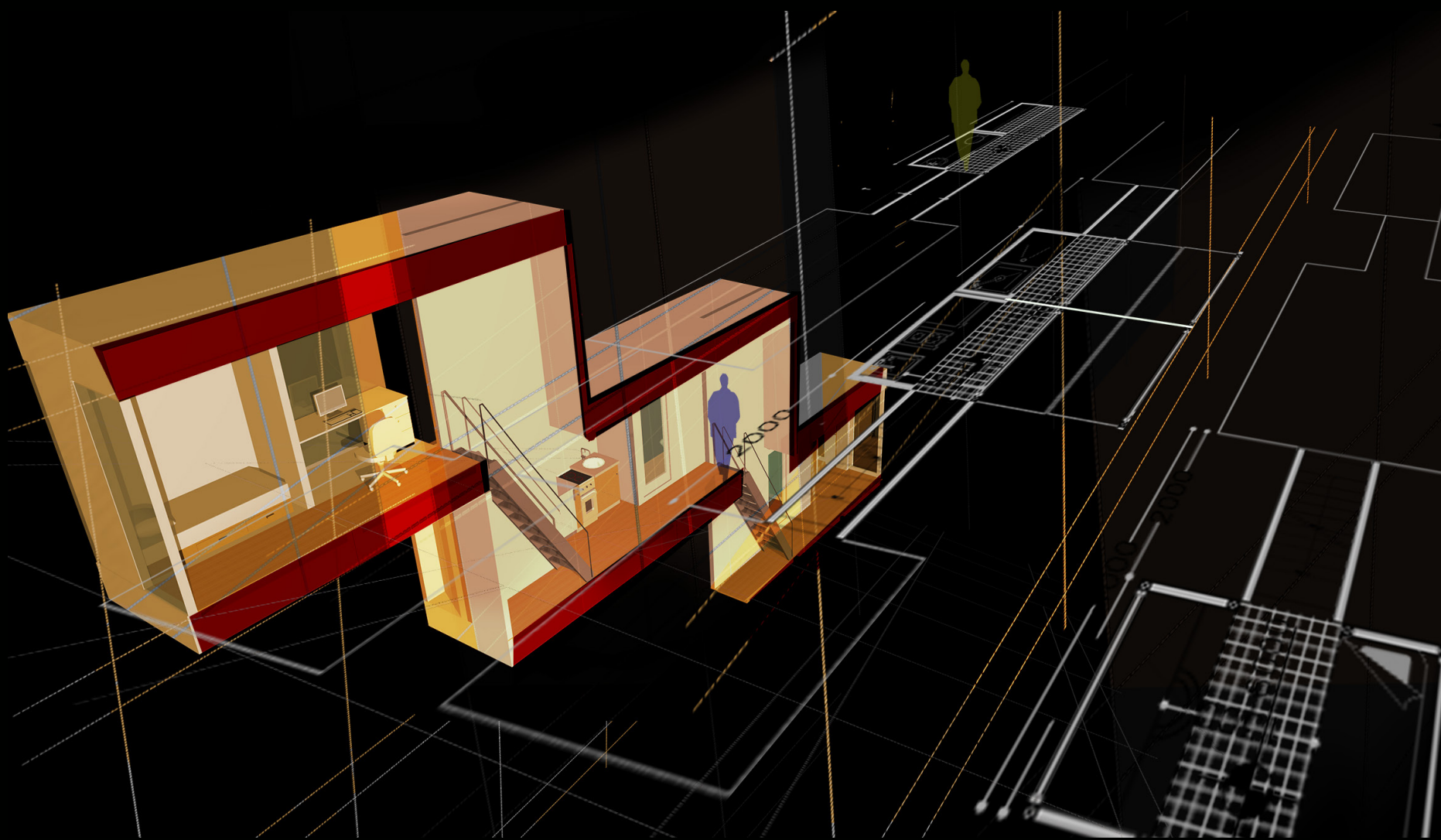




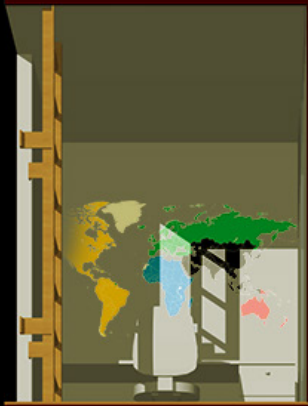
# VISUALISATION





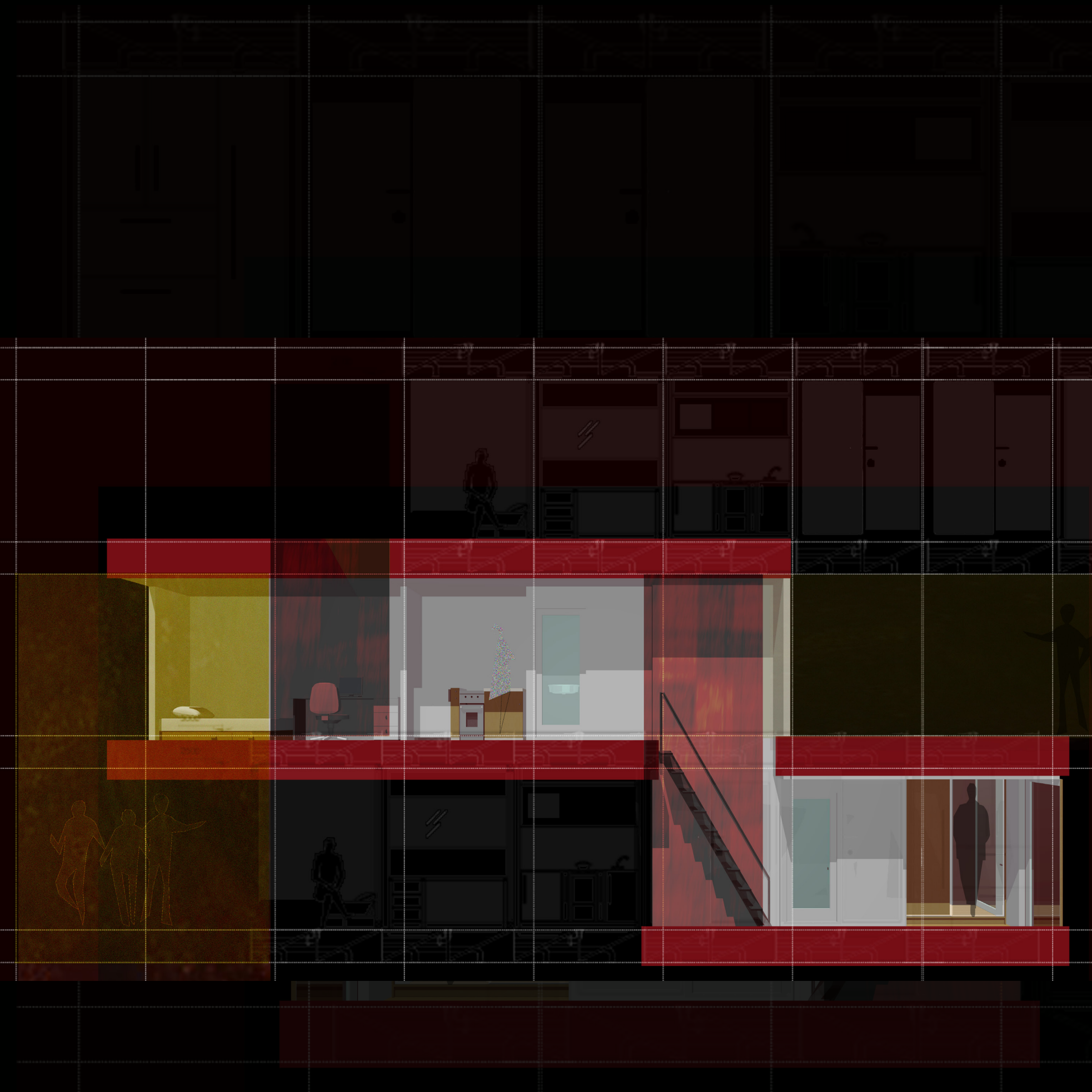










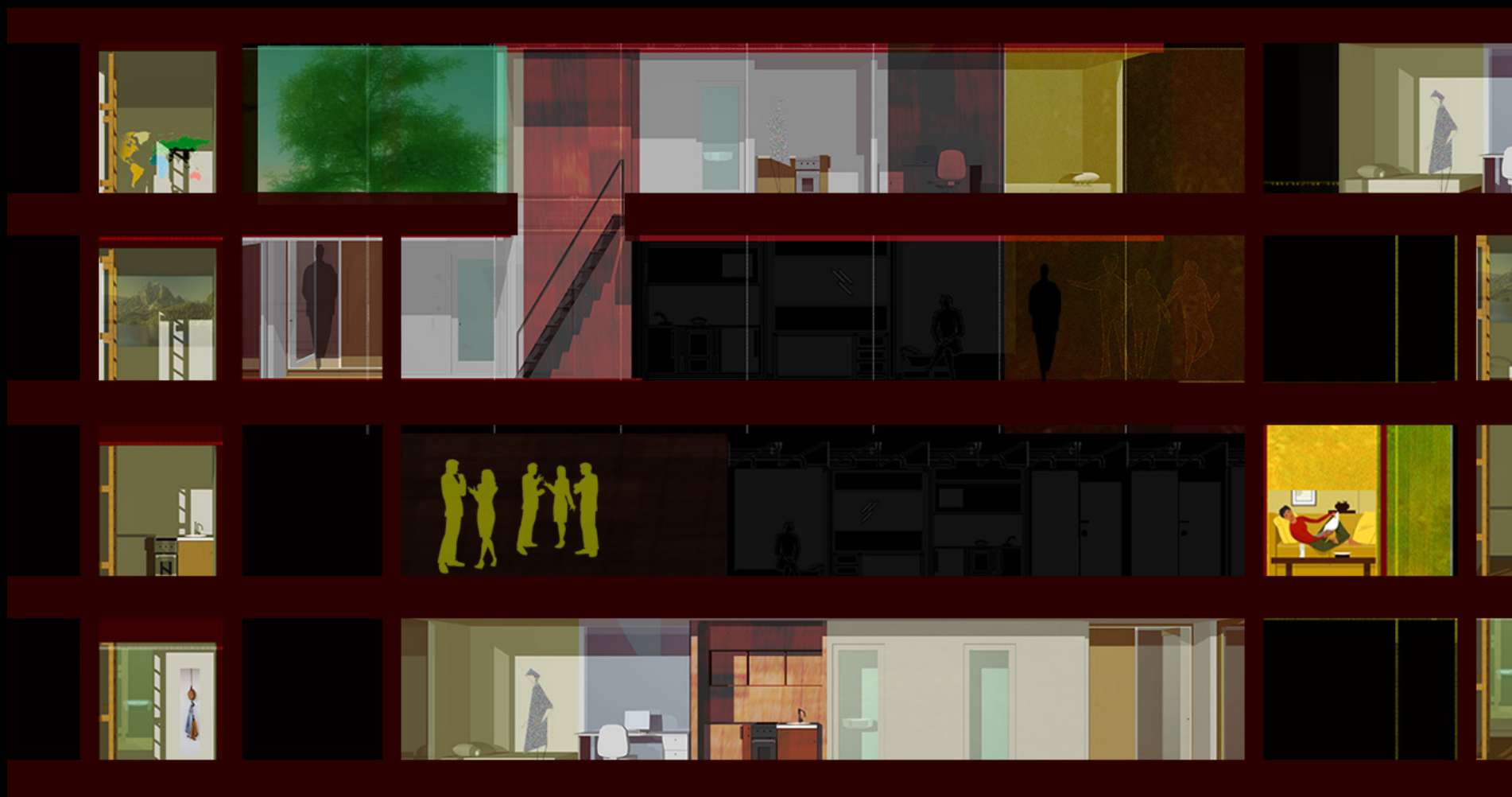


















# EVALUATION

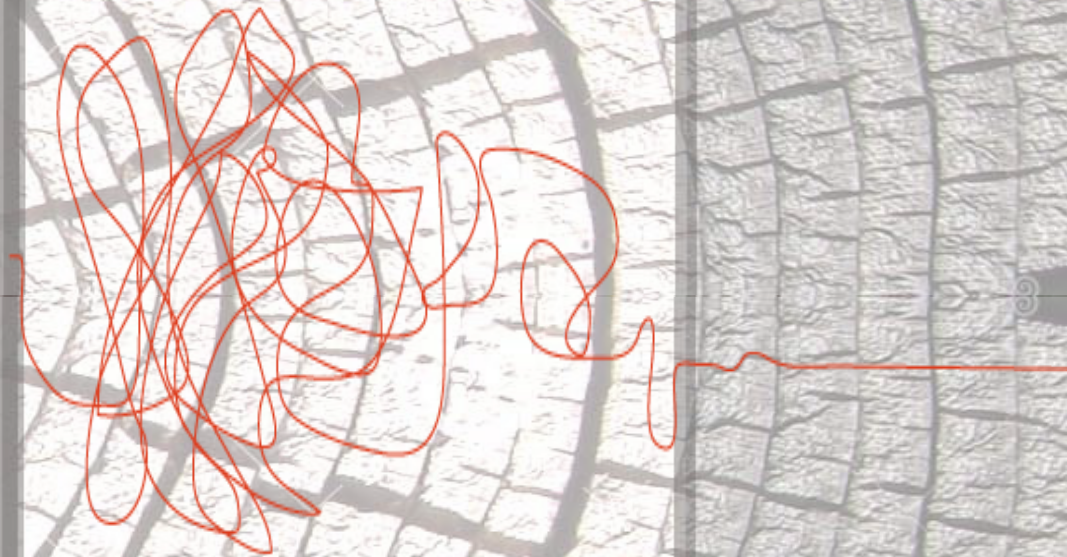


photo71 <http://www.santafe-nm-webdesign.com>

PROCESSE, PORPUSES AND  
DESIGN

DEVELOPMENT



# PROCESSE, PORPUSES AND DESIGN

My thesis process started in autumn 2013 when I had an opportunity to have a topic which was related to future student housing in new campus for Lahti University of applied sciences. Therefore, the topic has capacity of thinking widely toward the future. I was satisfied to start and work on my thesis related to new campus. After first discussions about the wishes and possibilities of sustainable material as wood, I started to research about this specific material and how it could be effective in term of ecological and sustainable design. In this path, I connected my thesis with wood life project in Aalto University who were researching

about, how wood could be energy efficient as an interior architecture element.

Starting to research and think about the structure of research was an important and difficult point to clarify the task. I tried to analyze and understand the title "future student housing". In this order I divided the title in three different word "future", "student" and "housing". I continued to connect each word in the design field, for example, innovative design and concerning sustainability were the main connection of the future and design in my point of view. It remarked efficiency in term of

energy and space in future design. Reminding, design for a special group was another connection to design based on second word. Finally housing as the third word of the title, mentioned a functional space where should service people in order to make people comfortable in their living space, beside that the meaning of home has a special and sensitive identity.

Based on title analysis I tried to research about each connection's point, for example, researching about energy efficiency clarified the fact that reducing energy in whole process

is very important . The needed energy to produce each material which is used in the building industry, how much constructing process needs energy and even how much it could have less energy for maintenance. Comparing to the other way of thinking about energy efficiency which considered design a space which consume less energy consumption in term of electricity, gas and etcetera it gave me different point of view to the energy efficiency concept. Innovative design which support efficiency in term of energy and space were showed up as a chain to define a relative con-

cept of " future student housing". I was deepening my researches by Studding wood as a specific material in order to understand how it could support energy efficiency need to research and review the articles, essays and searching about back ground of wooden building. The first results of studies showed me a concept of embodied energy and how the design should be concern about whole energy in the all processes, and it were clarified that wood is the lowest embodied energy material. Here the challenge were started to think how a design could consider embodied energy in stu-

dent housing application.

Next step which needed to be clarified was student housing and considering student as a special part of society to review their needs in their places to be able to design their future accommodation, because needs in present could give us a picture of future. I tried to use user data bases through questionnaire, results based on analyses of the questionnaire, was a convenient documents to study student's opinion as the main users.

The most difficult part of my thesis was starting point of design, due to the fact that new

Niemi campus did not have architectural design except rough sketched that which possibilities could have this area to develop, general idea of thinking different to future new spaces were mentioned in the sketches as well.

It means the thesis did not have a certain building as a reference in order to start the interior architecture design process and it showed if this project was facing to a large range of design issues. Concentrating to define a certain part of task for the thesis was a big challenge; there were a warning to avoid large scale design, in order to do the task in limited time.

Surprisingly this difficulties, clarified the fact that, new view of the interior layout could also defines the exterior layout.

In this step, based on all researches in the starting point of design, concept of creating a new system of interior layout by choosing modular and prefabricated as the method, helped to make the scale of design more understandable. In this way, I started to design by small modules to create each student houses as the average scale and continued to combine them and create large scale of whole connected student housing.

Defining basic functional area

in the student houses, such as, kitchen, toilet, bathroom, sleeping room, working area and circulation area or free spaces as the main modules, working with combination with certain number of modules and creating other combination by expanding the space in different axis and direction, based on the users 'need over the time. Increasing and reducing the number of cubic modules or pulling and pushing them, to change the interior layout and change the spaces, creates a live and active living spaces which it does not have rigid exterior form. In the other word, these basic modules

which defined based on activities in the living places, affect exterior architecture. In this concept interior architecture elements are not the spaces which all the time are wrapped in the rigid exterior surface.

The purpose of the my work was to design an flexible, alive new system of interior layout, which achieved in different typology of student housing based on the character and needs of each student. Different typologies were categorized as: Line, adventure and island, were some examples of the limitless of different possibilities of combina-

tion system.

When the wood was chosen as the material for the modules, it considered a light and recyclable material which has lowest embodied energy. Also it considered as a proper material for prefabricated system to insist on reducing embodied energy by reducing the amount of construction work on the site.

The adjustable spaces which could be applied by users based on their way of understanding that, how big or how small would be an efficient space according to their situation in life, support the idea of reducing embodied energy. It would be more clear, if

we try to imagine how much energy and time is needed, when people have to find and move from one place to other one to achieve their needs during the time, even in this application which is student housing. In this way, the possibility of pulling and pushing space to expanding or adjusting living area, based on the current needs of users, also reduces the energy consumption of transforming because of dwelling reasons.

According to current phase of

## DEVELOPMENT

Niemi campus, there were no need to think about more details but as a development plan, If I want to develop this project more, there is need to thinks more about how active and alive living complex could affect the exterior layer.





## REFERENCES

Najib, Nurul'Ulyani Mohd, Nor'Aini Yusof, and Norazmawati Md Sani. "The Effects of Students' Socio-Physical Backgrounds onto Satisfaction with Student Housing Facilities." *Procedia-Social and Behavioral Sciences* 62 (2012): 64-74.

Amole, Dolapo. "Residential satisfaction in students' housing." *Journal of Environmental Psychology* 29.1 (2009): 76-85.

Zaransky, Michael. *Profit by investing in student housing: Cash in on the campus housing shortage*. Kaplan Publishing, 2006.

Slavid, Ruth. *wood architecture*. Laurence King, 2005.

[Online] // prometheuswiki - 07 08, 2013. - 12 02, 2014. <http://prometheuswiki.publish.csiro.au/tiki-index.php?page=Wood+density+protocol>

Mikko Salmi, LAMK

Almusaed, Amjad. *Biophilic and bioclimatic architecture: analytical therapy for the next generation of passive sustainable architecture*. Springer, 2011.

Surprenant, David. *The National Building Code of Canada: A Tool for Recovery in the Forest Industry?*. Library of Parliament,

2010.

Cabeza, Luisa F., et al. "Low carbon and low embodied energy materials in buildings: A review." *Renewable and Sustainable Energy Reviews* 23 (2013): 536-542.

Lehmann, Steffen. "Low carbon construction systems using prefabricated engineered solid wood panels for urban infill to significantly reduce greenhouse gas emissions." *Sustainable Cities and Society* (2012).

Watson, Donald. "Climatic design: energy-efficient building principles and practices." (1983).



## PHOTO REFERENCES

Photo1. <http://www.dezeen.com/2013/01/14/scape-student-housing-by-ab-rogers-design/>

Photo2. <http://www.dezeen.com/2013/01/14/scape-student-housing-by-ab-rogers-design/>

Photo3. <http://www.dezeen.com/2013/01/14/scape-student-housing-by-ab-rogers-design/>

Photo4. <http://www.dezeen.com/2013/01/14/scape-student-housing-by-ab-rogers-design/>

Photo5. [http://static.dezeen.com/uploads/2013/02/dezeen\\_Student-Housing-by-H-Arquitectes-and-data-AE\\_10\\_1000.gif](http://static.dezeen.com/uploads/2013/02/dezeen_Student-Housing-by-H-Arquitectes-and-data-AE_10_1000.gif)

Photo6. <http://www.dezeen.com/2013/02/05/student-housing-in-st-cugat-by-h-arquitectes-and-dataae/>

Photo7. <http://www.dezeen.com/2013/02/05/student-housing-in-st-cugat-by-h-arquitectes-and-dataae/>

Photo8. <http://www.dezeen.com/2013/02/05/student-housing-in-st-cugat-by-h-arquitectes-and-dataae/>

Photo9. [http://static.dezeen.com/uploads/2013/02/dezeen\\_Student-Housing-by-H-Arquitectes-and-data-AE\\_12\\_1000.gif](http://static.dezeen.com/uploads/2013/02/dezeen_Student-Housing-by-H-Arquitectes-and-data-AE_12_1000.gif)

Photo10. <http://www.dezeen.com/2013/02/05/student-housing-in-st-cugat-by-h-arquitectes-and-dataae/>

Photo11. <http://www.dezeen.com/2013/02/05/student-housing-in-st-cugat-by-h-arquitectes-and-dataae/>

Photo12. [http://static.dezeen.com/uploads/2013/02/dezeen\\_Student-Housing-by-H-Arquitectes-and-data-AE\\_13\\_1000.gif](http://static.dezeen.com/uploads/2013/02/dezeen_Student-Housing-by-H-Arquitectes-and-data-AE_13_1000.gif)

Photo13. <http://www.dezeen.com/2013/09/29/smart-student-units-by-tengbom/>

Photo14. [http://static.dezeen.com/uploads/2013/09/dezeen\\_Smart\\_Student\\_Unit\\_by\\_Tengbom\\_plan\\_1000.jpg](http://static.dezeen.com/uploads/2013/09/dezeen_Smart_Student_Unit_by_Tengbom_plan_1000.jpg)

Photo15. <http://www.dezeen.com/2013/09/29/smart-student-units-by-tengbom/>

Photo 16. <http://www.dezeen.com/2013/09/29/smart-student-units-by-tengbom/>

Photo 17. <http://www.dezeen.com/2013/09/29/smart-student-units-by-tengbom/>

Photo 18. <http://www.tempohousing.com/projects/keetwonen.html>

Photo19. <http://www.revedecor.com/2012/12/04/keetwonen-recycled-container-student-housing>

Photo19. <http://www.revedecor.com/2012/12/04/keetwonen-recycled-container-student-housing/>

Photo 20. <http://www.revedecor.com/2012/12/04/keetwonen-recycled-container-student-housing/>

Photo21-23. <http://design.spotcoolstuff.com/unusual-architecture/shipping-container-buildings>

photo24. Photo: [http://en.wikipedia.org/wiki/File:Norskfolkemuseum\\_1.jpg](http://en.wikipedia.org/wiki/File:Norskfolkemuseum_1.jpg)

Photo25. [http://upload.wikimedia.org/wikipedia/commons/5/5c/Oseloftet\\_%C3%B8rnehode.jpg](http://upload.wikimedia.org/wikipedia/commons/5/5c/Oseloftet_%C3%B8rnehode.jpg)

Photo26. <http://fabricomagazine.com/architecture/the-best-buildings-in-sheffield-england-3/>

Photo27. <http://www.rpbw.com/project/41/jean-marie-tjibaou-cultural-center/#>

Photo28. <http://www.wood-database.com/lumber-identification/hardwoods/balsa/>

Photo29. <http://www.aversis.be/textures/wood-ikea-birch-texture.htm>

Photo30. <http://saydina.com/canadian-spruce/>

Photo31. [http://en.wikipedia.org/wiki/Scots\\_pine](http://en.wikipedia.org/wiki/Scots_pine)

Photo32 <http://www.browardcustomwoodwork.com/woods/whiteoak.html>

Photo33. [http://www.justwood.co.uk/types\\_of\\_wood/product/beechn\\_bornholm\\_country](http://www.justwood.co.uk/types_of_wood/product/beechn_bornholm_country)

Photo34. <http://miltonmattox.com/blog/?p=120>

Photo35. <http://www.lahti.fi/www/cms.nsf/pages/CEEDD4AB40FF7BD8C2257B6B003D6BA5>

Photo36. <http://www.lahti.fi>

Photo37. <http://www.studyinlahti.fi/en/home/news/?a=viewItem&itemid=156>

Photo 38. <http://photo.elsear.com/children-drawing-in-pictures.html>

Photo39. Zahra Rasti

Photo 39-43: Zahra Rasti

Photo 44-46 : Zahra Rasti

Photo 47- 48 <http://www.theweedstreetjournal.com/thc-react-brain/>

Photo 49-50. [http://www.google.com/imgres?imgurl=http%3A%2F%2Fus.123rf.com%2F400wm%2F400%2F400%2Fadistock%2Fadistock0803%2Fadistock080300010%2F2651890-3d-structure-rendered-image.jpg&imgrefurl=http%3A%2F%2Fwww.123rf.com%2Fphoto\\_9518846\\_abstract-3d-illustration-of-network-or-molecular-structure.html&h=900&w=1200&tbnid=NY\\_MEuirnbaNgM%3A&zoom=1&docid=Mik1YOWH4KsDZM&ei=K-xeU9LSG-4KmO7r8gNgl&tbm=isch&ved=0CL0BEDMoWjBa&iact=rc&uact=3&dur=258&page=5&start=77&ndsp=23](http://www.google.com/imgres?imgurl=http%3A%2F%2Fus.123rf.com%2F400wm%2F400%2F400%2Fadistock%2Fadistock0803%2Fadistock080300010%2F2651890-3d-structure-rendered-image.jpg&imgrefurl=http%3A%2F%2Fwww.123rf.com%2Fphoto_9518846_abstract-3d-illustration-of-network-or-molecular-structure.html&h=900&w=1200&tbnid=NY_MEuirnbaNgM%3A&zoom=1&docid=Mik1YOWH4KsDZM&ei=K-xeU9LSG-4KmO7r8gNgl&tbm=isch&ved=0CL0BEDMoWjBa&iact=rc&uact=3&dur=258&page=5&start=77&ndsp=23)

com%2F400wm%2F400%2F400%2Fadistock%2Fadistock0803%2Fadis-

tock080300010%2F2651890-3d-structure-rendered-image.jpg&imgrefurl=http%3A%2F%2Fww-

w.123rf.com%2Fphoto\_9518846\_abstract-3d-illustration-of-network-or-molecular-structure.htm-

l&h=900&w=1200&tbnid=NY\_MEuirnbaNgM%3A&zoom=1&docid=Mik1YOWH4KsDZM&ei=K-xeU9LSG-

4KmO7r8gNgl&tbm=isch&ved=0CL0BEDMoWjBa&iact=rc&uact=3&dur=258&page=5&start=77&ndsp=23

Photo 51- 52. <https://www.flickr.com/photos/footprint/468165913/>

Photo53- 54. <http://erikjohanssonphoto.com/work/pen>

Photo55. [http://en.wikipedia.org/wiki/QR\\_code](http://en.wikipedia.org/wiki/QR_code)

Photo 56. <http://shkspr.mobi/blog/2010/11/qr-tetris/>

Photo 57 <http://www.dreamstime.com/stock-photos-effort-results-graph-hand-sketching-black-marker-minimum-maximum-image38763333>

Photo58. <http://www.metsawood.com/products/kerto/Pages/Kerto-Q.aspx>

Photo59. <http://www.metsawood.com/products/kerto/Pages/Kerto-Q.aspx>

photo60 [https://members.nationalgeographic.com/?utm\\_source=NatGeocom&utm\\_medium=Email&utm\\_content=welcomeseries\\_2\\_membercenter2&utm\\_campaign=Membership](https://members.nationalgeographic.com/?utm_source=NatGeocom&utm_medium=Email&utm_content=welcomeseries_2_membercenter2&utm_campaign=Membership)

photo61 [.https://members.nationalgeographic.com/?utm\\_source=NatGeocom&utm\\_medium=Email&utm\\_content=welcomeseries\\_2\\_membercenter2&utm\\_campaign=Membership](https://members.nationalgeographic.com/?utm_source=NatGeocom&utm_medium=Email&utm_content=welcomeseries_2_membercenter2&utm_campaign=Membership)

photo62 [https://members.nationalgeographic.com/?utm\\_source=NatGeocom&utm\\_medium=Email&utm\\_content=welcomeseries\\_2\\_membercenter2&utm\\_campaign=Membership](https://members.nationalgeographic.com/?utm_source=NatGeocom&utm_medium=Email&utm_content=welcomeseries_2_membercenter2&utm_campaign=Membership)

Photo63. [http://hengshenglong.en.ec21.com/Sound\\_Insulation\\_Wood\\_Fibre\\_Reinforced--6984850\\_6985369.html](http://hengshenglong.en.ec21.com/Sound_Insulation_Wood_Fibre_Reinforced--6984850_6985369.html)

Photo 64. <http://www.metsawood.com/products/plywood/birch/Pages/Default.aspx>

Photo66. <http://www.puustelli.fi/mallisto/keittio/woodline/vaalean-puun-kutsu>

Photo67. <http://www.architonic.com/pmsht/ledona-rzb-leuchten/1219601>

Photo68 [http://www.architonic.com/pmsht/mondana-rzb-leuchten\\_proref/1219662](http://www.architonic.com/pmsht/mondana-rzb-leuchten_proref/1219662)

Photo69. <http://www.architonic.com/pmsht/lab-marset/1168723>

Photo 70 <http://www.architonic.com/pmsht/play-pendant-takehomedesign/1228008>

photo 71 <http://www.santafe-nm-webdesign.com/blog/article/web-design-process-part-two>



## APENDIXES

Questionary: your opinion is important: Attachment 1/3

Questionary -Results: Attachment 2/3

Time table: Attachment 3/3



YOUR OPINION IS IMPORTANT TO  
IMPROVE  
FUTURE STUDENT HOUSING

4/11/2014 form - Google Drive

### Your Opinion Is Important To Improve Future student housing.

This questionnaire is part of a master thesis in interior architecture and related to Lahti innovation hub project and design and development of Niemi Campus. We appreciate your opinion related to the student housing and by participating you can be a lucky one to win a Finnkino movie ticket (two tickets are given out). Last day of active link for questionnaire is on 10.04.2014

1. **What Kind of Student housing you are using?**  
*Mark only one oval.*

Shared/ 2 Room  
 Shared/More than 2 rooms  
 studio  
 Other

2. **Are the student accommodations have the identity for living space as a house?**  
*Mark only one oval.*

1 2 3 4 5  
Yes      No

3. **Which types of accommodations gives more satisfaction?**  
*Mark only one oval.*

Shared/ 2 Room  
 Shared/More than 2 rooms  
 Family Type  
 Studio  
 Other: \_\_\_\_\_

4. **In which size student house is more acceptable?**  
*Mark only one oval.*

10 m2 -15 m2  
 20 m2- 30 m2  
 30m2 -50 m2  
 NO Idea  
 Other: \_\_\_\_\_

4/11/2014 form - Google Drive

5. **What is the most Important Item to choose student house?**  
*Mark only one oval.*

size  
 Rent  
 Type

6. **Which kind of material you prefer to be used in interior spaces?**  
*Mark only one oval.*

Concrete  
 Brick  
 Wood  
 No Idea

7. **How much is Important to live in energy efficient houses?**  
*Mark only one oval.*

1 2 3 4 5  
Yes      No

8. **In which temperature you are comfortable in houses In winter?**  
*Mark only one oval.*

20-23 C  
 23-25 C  
 25-27  
 27-30

9. **In which temperature you are comfortable in houses in summer?**  
*Mark only one oval.*

15-18 C  
 18-20 C  
 20-22 C  
 22-25C

4/11/2014

form - Google Drive

10. **Do you agree to use multifunctional furniture in everyday life?**

Multifunctional Furniture:example: Table could be changed to sofa or sofa to bed such a way to support small living spaces.

Mark *only one oval*.

1 2 3 4 5  
Yes      No

11. **How much is Important to divide waste from home,such as paper, metal, glass and Bios?**

Mark *only one oval*.

1 2 3 4 5  
necessary      Not Important

12. **Which options could help student housing to make it more cozy?**

.....

13. **Do you think a piece of furniture which could be changeable for different use, is handy for every day life?**

Mark *only one oval*.

1 2 3 4 5  
Yes      NO

14. **Have you ever bought a multifunctional furniture?**

multifunctional Furniture:a piece of furniture which could be changeable for different use

Mark *only one oval*.

Yes  
 No

15. **Do You prefer Full Furnished Student Houses?**

Furnished : Bed, tables, lamps, Kitchen facilities.

Mark *only one oval*.

1 2 3 4 5  
Yes      No

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16. **Do you think your student apartment is well furnished?**

Mark *only one oval*.

1 2 3 4 5  
Yes      No

17. **Could you please write the best point of your current student house ?**

.....

18. **Could you please write the worst part of your Student House ?**

.....

19. **Please write you contact information if you are intrested to take part of Cinema ticket lottery**

.....

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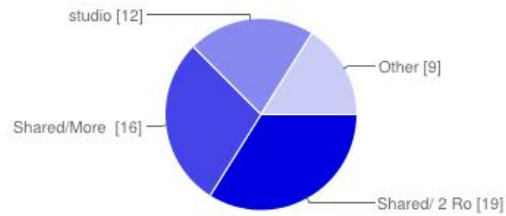
Zahra Bisti  
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# 56 responses

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## Summary

### What Kind of Student housing you are using?



Shared/ 2 Room	19	34%
Shared/More than 2 rooms	16	29%
studio	12	21%
Other	9	16%

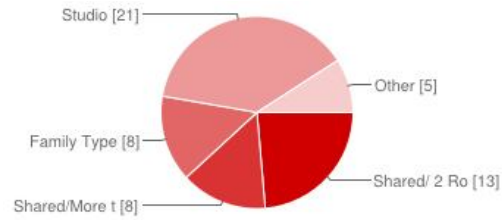
### Are the student accommodations have the identity for living space as a house?



### Which types of accommodations gives more satisfaction?

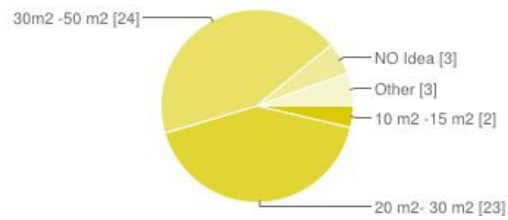
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Shared/ 2 Room	13	24%
Shared/More than 2 rooms	8	15%
Family Type	8	15%
Studio	21	38%
Other	5	9%

#### In which size student house is more acceptable?



10 m2 -15 m2	2	4%
20 m2- 30 m2	23	42%
30m2 -50 m2	24	44%
NO Idea	3	5%
Other	3	5%

#### What is the most important item to choose student house?



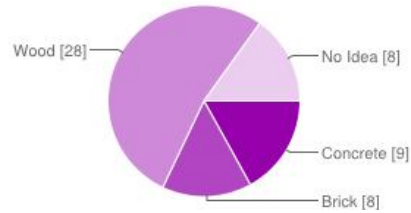
size	5	9%
Rent	39	72%
Type	10	19%

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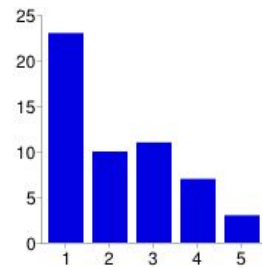


### Which kind of material you prefer to be used in interior spaces?



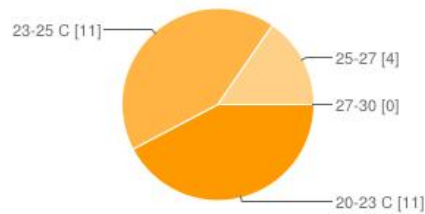
Concrete	9	17%
Brick	8	15%
Wood	28	53%
No Idea	8	15%

### How much is Important to live in energy efficient houses?



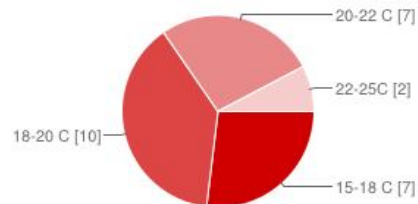
1	23	43%
2	10	19%
3	11	20%
4	7	13%
5	3	6%

### In which temperature you are comfortable in houses in winter?

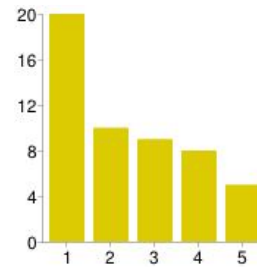


20-23 C	11	42%
23-25 C	11	42%
25-27 C	4	15%
27-30 C	0	0%

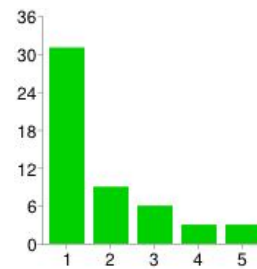
### In which temperature you are comfortable in houses in summer?



15-18 C	7	27%
18-20 C	10	38%
20-22 C	7	27%
22-25 C	2	8%

**Do you agree to use multifunctional furniture in everyday life?**

1	20	38%
2	10	19%
3	9	17%
4	8	15%
5	5	10%

**How much is Important to divide waste from home, such as paper, metal, glass and Bios?**

1	31	60%
2	9	17%
3	6	12%
4	3	6%
5	3	6%

**Which options could help student housing to make it more cozy?**

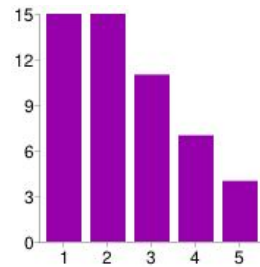
Lower rent bigger storage, both in the kitchen/room and basement a room that is somewhat furnished would make me happy and feel like home more interesting interior Sofas in kitchens/living rooms shared living room/living kitchen - Sofa Possibility to hang stuff on walls (e.g. wooden board on top of wall to use nails/screws on) nice furniture and floor sauna inside Big kitchen with big fridge. If there is a common space, that should be big with lots of chairs. dish washer good furniture, having a good air condition system for both summer and winter, having enough drawers and cupboards. enough light, more equipments, spacious cabinets common area in the basement where all the students from one building may hang out , watch tv, play games etc Wallpapers on the wall Better equipment, such as the lights, windows, stoves etc. size, color, furniture proper furniture furniture Asking about feedback no idea Not white walls, mirrors, some shelves in bathroom tidiness barbicue noise insulation Heaters and lamps I think it's cozy enough in Finland. Other facilities (gym, swimming/sports hall are nearby) couch Using other colors than gray Plants

**Do you think a piece of furniture which could be changeable for different use,**

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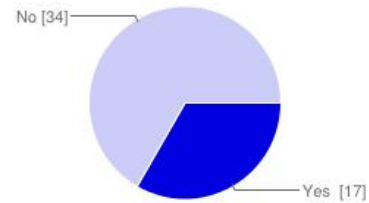
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### is handy for everyday life?



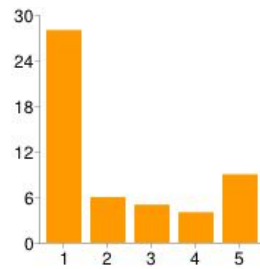
1	15	29%
2	15	29%
3	11	21%
4	7	13%
5	4	8%

### Have you ever bought a multifunctional furniture?



Yes	17	33%
No	34	67%

### Do You prefer Full Furnished Student Houses?

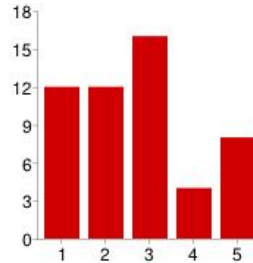


1	28	54%
2	6	12%
3	5	10%
4	4	8%
5	9	17%

### Do you think your student apartment is well furnished?

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1	12	23%
2	12	23%
3	16	31%
4	4	8%
5	8	15%

### Could you please write the best point of your current student house ?

we are living in affordable housing by sharing international culture. Size, water, electricity  
Nice neighborhood close to the university and low rent I live alone Size and rent brand  
new furnished Close to the center The huge freezer! (I don't mean the balcony in winter!)  
renovated, location & rent It's not shared, just a single room. Also big windows spacy  
Affordable and a nice location rent city center and we have a huge living room kitchen  
space The location is nice toilet and bathroom are separate, my room has two big windows  
facing (south)west . lots of sunlight!, big room, high walls, wooden floor (NICE), Peaceful  
place type New tables + fridge the kitchen is really big, with an oven and four cooking  
places The kitchen has a big fridge sauna Lighting size Near prisma enough light,  
spacious cabinets, having1 bathroom and one toilet separate the best point is that it is in the  
first floor and it is close to the laundry, and also the room has 2 windows in different parts of the  
room which make the ventilation much more better than rooms with only one window Plenty of  
room Laundry New house, energy efficient, high house, great view from window free  
electricity, free repair availability Well behaved student neighbors It is well designed,  
architechurely Location Outside looks old but inside is totally renovated recently. so my  
bathroom + toilet is new and clean. the kitchen devices are also new and never break down. the  
radiator is actually adjustable. some student house doesnt let you adjust the radiators. btw, you  
should add also "location" to the categories when we choose housing. i actually think twice for  
the "location" criteria when i decide to move elsewhere close to universit good light, access  
to back yard, wooden floor size, sauna cozy flat with new furniture and floor close to  
uni

### Could you please write the worst part of your Student House ?

we have to use gas heating in a very old house - not ecological. ground plan ist not that smart.  
(long ways, too long hall way) Matress missing smallest room ever, cannot fit everything  
in dark (not enough sunlight) Very small studio for 2 small kitchen Far from uni  
small, its door open to garage, price Not all parts have been renovated Old and bad-  
quality small No possibility to choose or change flatmates narrow beds, cardboard  
partition wall doesn't prevent noise from neighbour's room Sometimes the neighbours hold

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parties loud neighbors Rent, Sharing toilet with others. Old, no storage place, dirty Do not like shower place thin walls between Rooms, small Rooms, Old house and equipment, very windy and cold Site view laundry has to be booked 2 weeks beforehand!! Rent high cost Rooms are nit isolated enough in terms of sounds It's a big house but I dont know any of my neighbors which can sometimes feel a bit lonely. the toilets and shower in the same roome Being locked out with no house elder, LOAS closed, and need to call and wait for turvatiimi The wall division material is not so good sound from one room to another passes quite easily The smoke area is just outside my window. So every time someone goes to smoke, I get the horrible smell inside my apartment. the room is to big since i stay only for 1 year. kitchen is too small to receive friends. location is to far away from uni Bathroom arrangement is quite bad I think due to being in the first floor the water sewage is so smelly, also there is not enough cupboards in the kitchen for three persons Horrible plastic matt covering the whole foor (gray too) the walls from Metal , too much heat in Summer neighbours no natural light (we are in the basement and the light can't light efficiently the flat) everyone pass by can look through my window The flooring is very prone to scuff marks, not great quality. need rent to lower to about 170 - 200 euros noise the windows are the only things that are old in my flat. so the cold air can leak inside and make my room quite cold.



### Number of daily responses



Monthes	October	November	Desember	January	Feberuary	March	April	May	May
Semeniars	31	4.11	25.11	20.1		3.3	31.3	1.5	14.5

**Research**

Project Title

Wood In Different climate /Spaces

Case studies/Different spaces in different situations

**Design process**

**Site Studies**

Phisical proram

Concept

Structure concept

Energy suppeliment concept

Furniture Concept

Lighting Concept

**Documents**

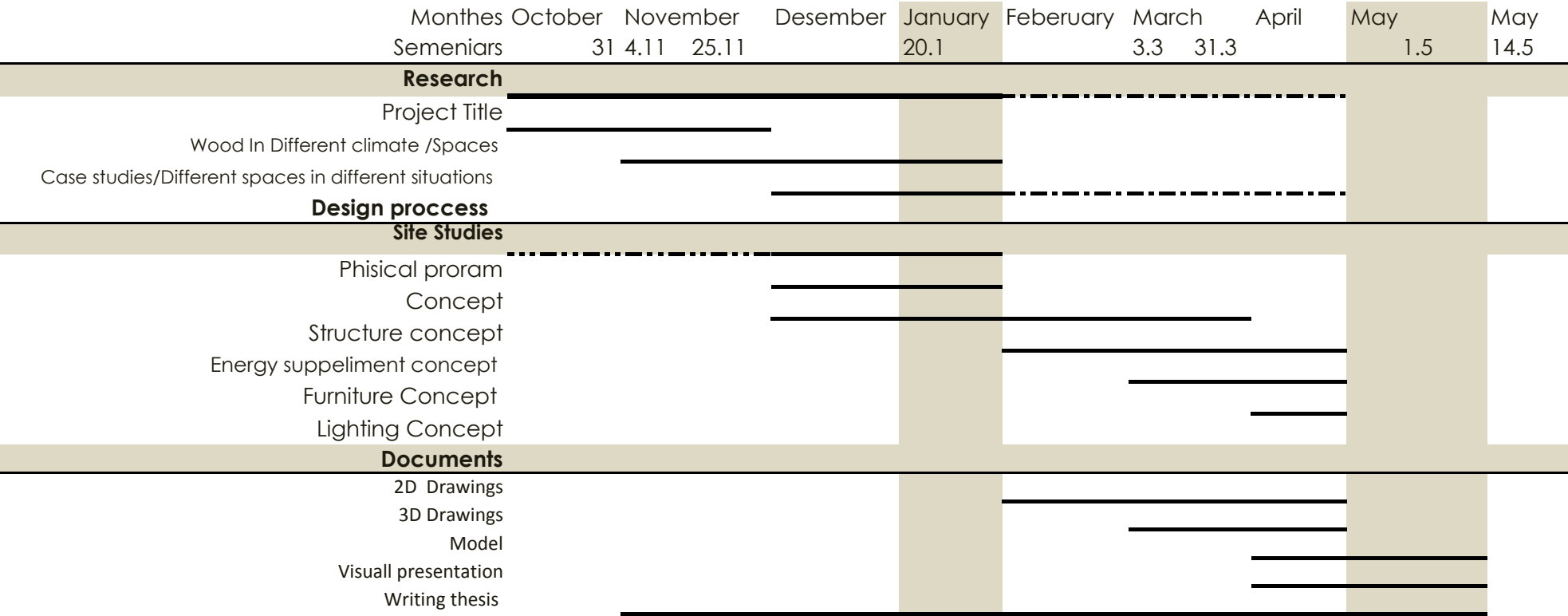
2D Drawings

3D Drawings

Model

Visuall presentation

Writing thesis





## THANKS TO

---

My dear instructors and consultants who supported me,  
even from far distances.

## THANKS TO

---

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And

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Julia Schweighart

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Kati Karjalainen

Arash Hajikhani

and

all nice friends who helped me.

## SPECIAL THANKS TO

---

My Dear friend and husband, Behnam Ghalamchi,  
who supported me constantly and patiently, during  
this study.

A handwritten signature in black ink, consisting of several overlapping, stylized lines that form a unique, cursive-like mark.

Zahra Rasti  
30.04.2014

