

SITE INTRODUCTION

Regal lake town is a residential and commercial project with an area of 2489 sq ft that should finish amassing in one year and is categorized as a medium scale project. The tower consists of 9 floors amounting to 82 units and its possession is expected by Dec,2022. The project is located near Ravet Basket Bridge overlooking the water body.



CLIMATE

-  SUNRISE 6:50 AM
-  WIND SPEED- 3 KM/H
WIND DIRECTION- FROM S-SE
-  AVERAGE PRECIPITATION- 778.2 MM.
AVERAGE DAYS RECEIVING PRECIPITATION- 100.5 Days
-  AVERAGE MINIMUM TEMPERATURE -18.5°C.
AVERAGE MAXIMUM TEMPERATURE -32.1° C
-  SUNSET 17:57 PM

S

- Road connectivity
- Accessibility and transportation linkages
- Medicals and government hospital in vicinity

W

- Pollution due to vehicles
- Unsanitary environment
- Less vegetation cover
- Polluted soil due to improper drainage

O

- Natural air and ventilation
- Educational NGO's nearby
- Increase awareness and socio-cultural belief

T

- Flooding
- Increasing traffic density
- Construction impacts and debris
- Vulnerability to diseases due to mosquitoes and insects

SITE JUSTIFICATION

- The existing 10 rooms of size 8*10 ft are inhabited by 80-90 labourers which are extremely cramped and unhygienic.
- The building under construction is in immediate vicinity of the labour camp and hence puts them at risk of fatal injury.
- It has a substantial workforce out of which 14 families are residing on site.
- A poor drainage and water supply system is observed on site.
- The existing living space provided is in the most meagre conditions and in dire need of amendments.

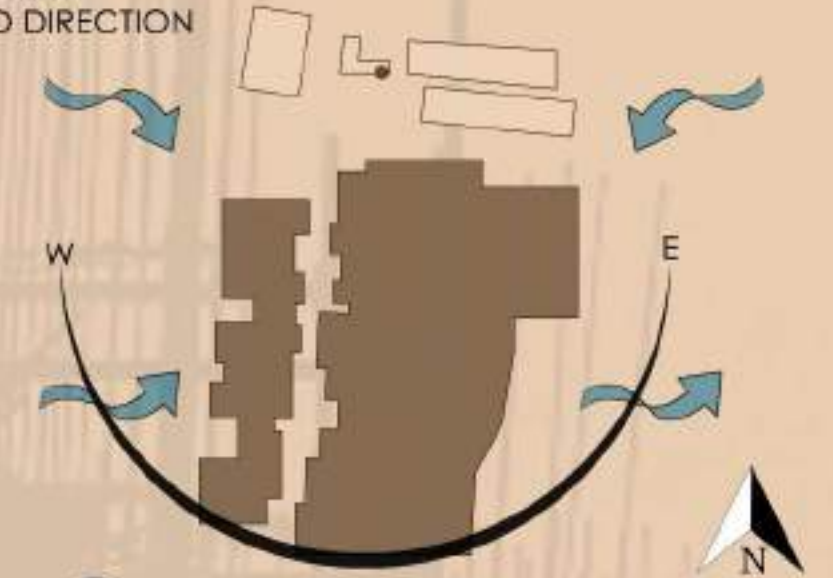
LOCATION

- 1) GANESH SUPER MARKET - 76 M
- 2) PCMC Dawakhana Punawala - 95 M
- 3) LAXMI TEMPLE - 46M
- 4) RAJVIR MEDICAL & GEN STORE - 7 M
- 5) PCMC PRIMARY SCHOOL - 56 M

VEGETATION



SUN PATH WIND DIRECTION



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MATERIALS USED ON SITE



Ceramic tiles
To cover the toilet chambers

Fly ash bricks
To create a stacked bench



Aluminium sheets
To create walls for labour camps

Wooden logs
To create framework for doors



WATER SUPPLY

There are no drainage lines on the site, instead slopes are created to move the standing water.

For water supply, A bore hole is used for water storage

The drinking water is provided with a charge while water for other purposes is provided free of cost.

CONDITIONS

- Ventilation**
The existing structure provided is quite congested and suffocating pertaining to lack of appropriate wind circulation.
- No Privacy and security**
No considerable measures taken to ensure a secure and personalized space.
- Unhygienic Conditions**
Toilets and wash area have very poor hygiene due to lack of proper facilities.
- Incompatible thermal insulation**
The space is not equipped with the required thermal comfort that should be ideally provided.

DEVELOPMENT PLAN



LEGEND

- RESIDENTIAL ZONE
- LOCAL COMMERCIAL ZONE (L1)
- HIGHER ORDER COMMERCIAL ZONE (H1)
- INDUSTRIAL ZONE
- GREEN BELT/HILLSIDE
- RESIDENTIAL WITH HOLD SPACE
- COMMERCIAL HOLD SPACE
- PUBLIC USE/RECREATION (PARKS, SPORTS, CULTURAL, EDUCATIONAL)
- RECREATION (PARKS, SPORTS, CULTURAL, EDUCATIONAL)
- TRANSPORTATION (ROADS, RAILWAYS, AIRPORTS)
- WATERBODIES

DEMOGRAPHIC

Migrant labours Ratio.



Male - Female Ratio



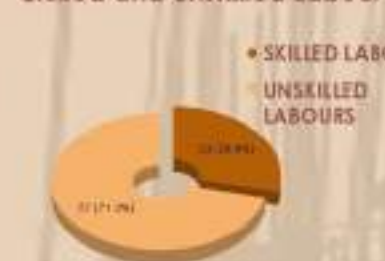
Family-Bachelor Ratio.



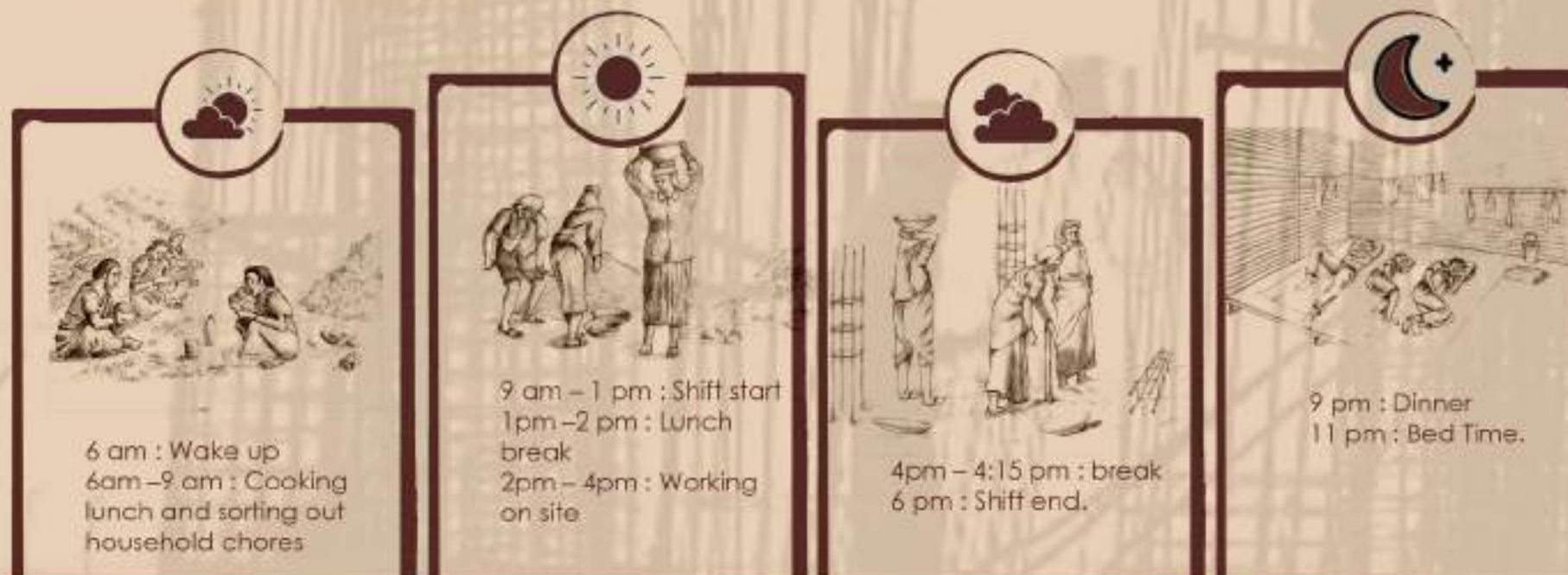
Illiterate and Literate Labour



Skilled and Unskilled Labour



TIME MAPPING



LABOUR CAMP RESIDENTS

Deepak Yedu, Labourer
Skills (plastering/managing)
Age 34

I am concerned about the privacy of spaces. There is no appropriate space delegated for toilets and washing either. The drainage system is extremely dysfunctional causing hygiene issues.



Rupa Pal, Labourer
Skills (house wife/plastering)
Age 31

I have been working on sites for some years now and a point of commonality that is disappointing is the lack of security and unitedness within the workers themselves. In my opinion, a space where everyone can gather could be an excellent factor in establishing this.



Himmat Singh, Labourer
Skills (plastering/managing)
Age 52

There are a lot of problems while living in these spaces but there are a few issues that need to be rectified like the lighting. The ventilation is very poor and sunlight is in sparse too.



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 पतन्त्यर्थे
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 अहिसाप्रतष्ठिठायं
 तत्संनधि वैरत्यागः ॥
 आ नो भद्राः कर्तवो
 यन्तु विश्वतः ॥
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BRIEF INTERPRETATION

Construction work from the primeval of the times has been a social activity. Metaphorically the very roots of this colossal activity are inside the ground.

The workers live, eat, survive in dejected conditions. The basic fundamental rights guaranteed by our constitution are being contravened by people who are the stake holders in the main frame work by the people at the top of the construction chain. The very creators of the building blocks required for any structure are being jilted.

They are in a desperate need of a symbol.

The design of a temporary and mobile settlement to house these construction labourers is to be executed. The design must be collapsible and easily employed over a variety of terrain, stages of construction and its iterations as well as weather conditions. The design, most importantly, must address the core problems of privacy, security and their right to dignified lives.

AIM

- Provision for communal Recreational spaces.
- Providing cost effective, reformed, minimalistic, collapsible mobile design.
- Equipping the design with basic facilities required by the labourers.
- Providing a long lasting and durable design.
- Symbolism in design.

OBJECTIVE

- To bridge the lifestyle gap between construction labourers and their employers.
- Child sensitive design.
- Sustainable and adaptable to site condition and orientations.
- Use of low cost and durable material.
- Use of forms, engravings, imagery or composition.

SCOPE



- Child sensitive design



- Ensuring Privacy, Security



- Interactive And Communal Spaces.



- Thermal insulation.



- Collapsible structure



- Economical and sustainable



- Long lasting & Durable.



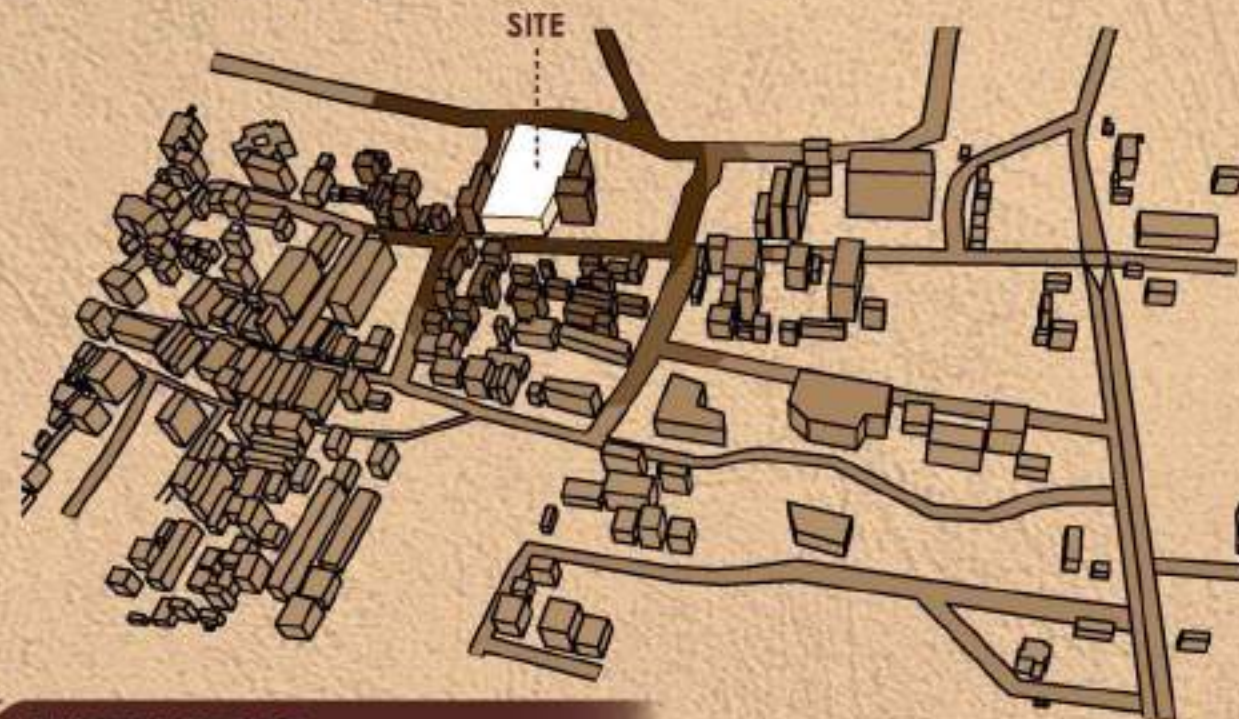
- Minimalistic



- Unifying Workers



- Flexibility in design



INTERVIEWS



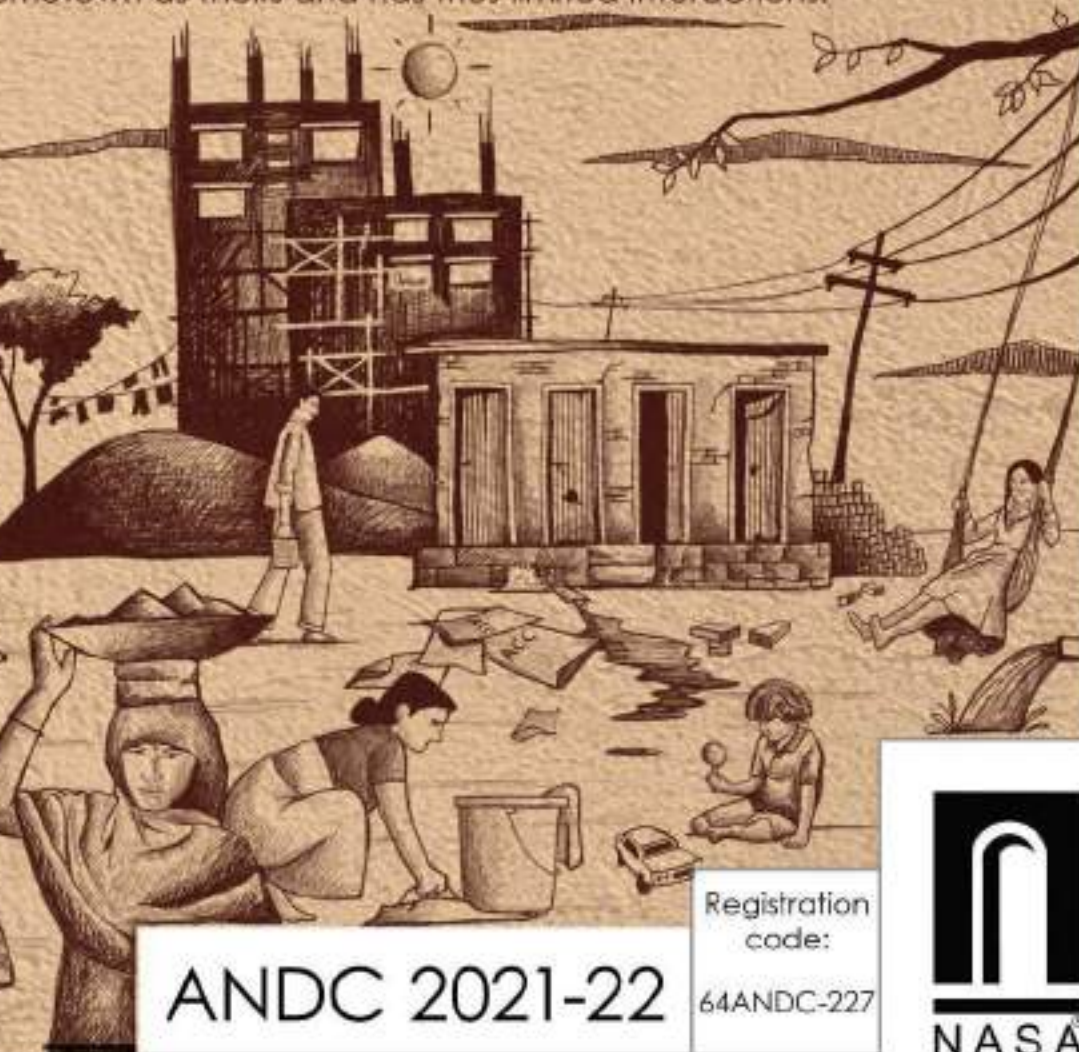
Chanda Yadav
34 (Chattisgarh)

I have been working on this site for 6 months and staying here with my family of 4 in the provided space. My prime concern is my children's safety and education. I would be much more relaxed if proper security measurements were undertaken in the concerned spaces



Ram Charan Chauhan
38 (Bihar)

I have been working on this site for 3 months as a mason, however I don't reside in the spaces provided. I don't prefer staying on site considering the highly dysfunctional state of the spaces and the poor facilities. The untimely water supply and heated up roofs cause discomfort.



QUESTIONNAIRE

1. What is the size of your living space?
It is about 8ft by 10ft.

2. What are the prominent problems faced by you while living here?
There are several problems including shortage of drinking water, hygiene, space, drainage but we are used to it.

3. What are your daily wages?
On an average men earn about 400 and women earn 200.

4. Who takes care of your children?
While us parents work the children are left on their own in their respective living spaces whereas parents take their toddlers and infants along with them to the site.

5. What are your daily working hours?
They range from 9-10 hours.

6. Through what sources are you employed in these sites?
Some of us are employed through a contractor who connects us with the builder and some come looking for sites on their own.

7. What cooking facilities are available to you?
Gas and stoves are acquired by the us with own funds and some is case with our ration which we buy on weekly basis.

8. How interactive is the atmosphere amongst the labourers during their leisure time?
Everyone interacts only with people belonging to the same hometown as theirs and has thus limited interactions.

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आलस्यं हि मनुष्याणां शरीरस्थो महान् रपिः । नास्त्युद्यमसमो बन्धुः कृत्वा यं नावसीदति । अर्थात् : मनुष्यो के शरीर में रहने वाला आलस्य ही (उनका) सबसे बड़ा शत्रु होता है । परशिरम जैसा दूसरा (हमारा) कोई अन्य मतिर नहीं होता, क्योंकि परशिरम करने वाला कभी दुखी नहीं होता ।

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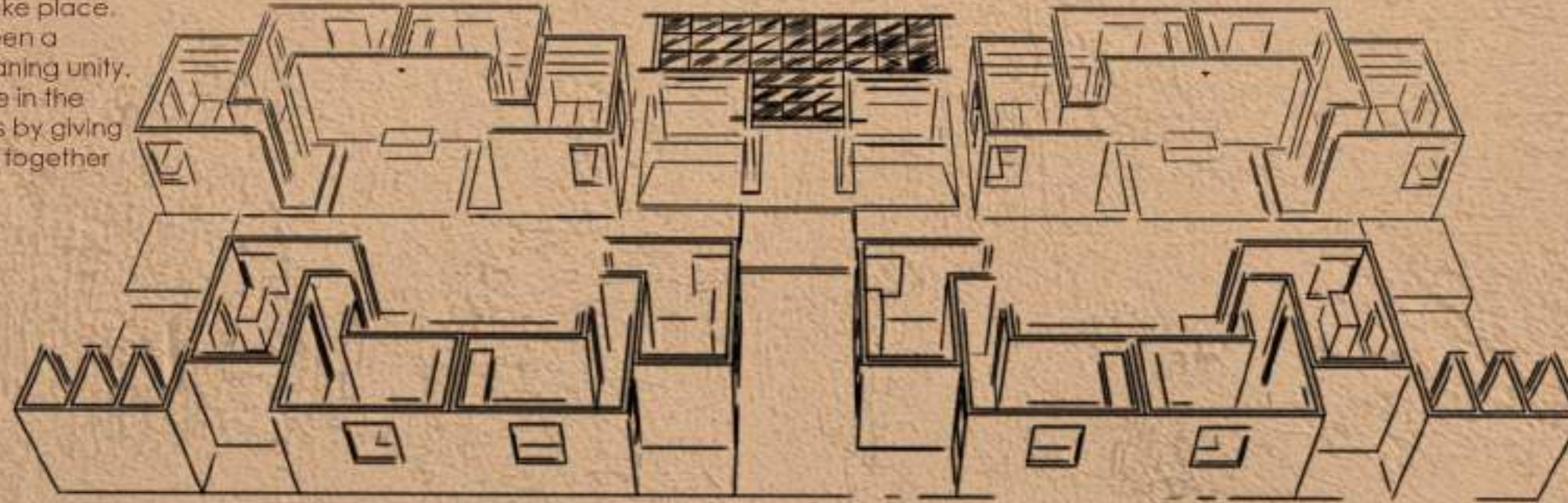
CONCEPT

Courtyard, since ancient times, has been a space prominent in influencing the environment and lives of people residing in these courtyard ridden structures. The essence of a courtyard is the physical expression of concept of connectivity. They controlled the character and atmosphere within the house. In ancient times, whole towns were planned around a central courtyard open space where gatherings, marriages, and social events would take place.



CONCEPTUAL 3D VIEW

They are interactive spaces where congregations could take place. The courtyards have been a symbol of 'EKANK', meaning unity. Courtyards unite people in the most fundamental ways by giving them a space to come together and associate.



The storyline depicts the journey of labourers' lives in which single sketches will be portrayed on the facades of each cluster creating a storyline around the walkway. It portrays how the labourers set out from their respective hometown towards their sites. Their life struggles and hard work are illustrated where we can see their daily routine and activities. Children are also seen alongside their parents on site and playing around. It clearly depicts the harsh reality of their existence.



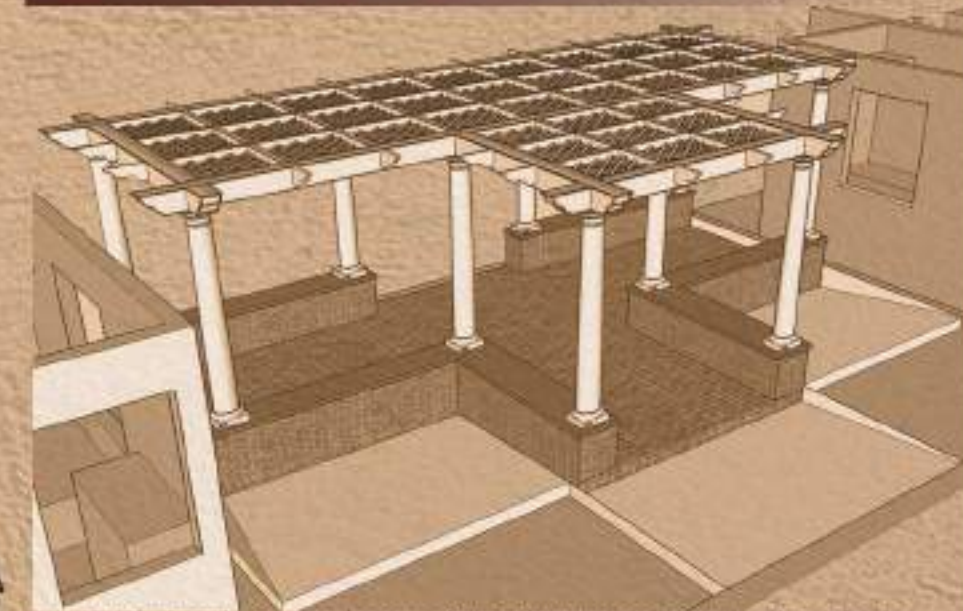
EVOLUTION

The initially existing dispersed rooms of the labourers were not an ideal choice therefore the courtyard was introduced in the design. This introduction of courtyard led to the creation of a central interactive space encouraging unity. Courtyards thus decided the layout of the design. Inspired by a working tool that workers use - a Pick Axe, the form was decided. After some reformation, the design was finalized.



"The essence of the beautiful is unity in variety."

COMMUNITY SPACE



A communal space is an obligatory addition in the design. The labourers need a congregating space and this space will act as that - A symbol of 'Ekank'-unity. Educational sessions by this NGO for the kids can be arranged in this communal space. The communal space acts as the central point of commonality in the whole cluster. The workers need a space where they can celebrate festivals and the communal space will function as that space. The communal space is placed in such a way that the kids are not prone to any impact or damage from the construction site.

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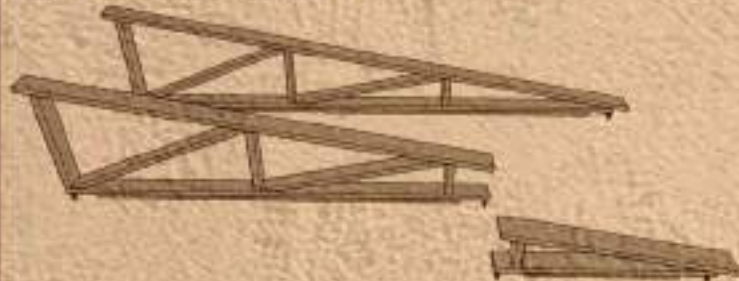
DESIGN INTERVENTIONS

1) FLEXIBLE PLINTH FOOTING



THE PLINTH FOOTING AND FRAME ARE CONNECTED BY WELDED BOLTS AND NUTS WHICH ULTIMATELY WORKS AS A FLEXIBLE AND FIRM FOUNDATION WHICH MAKES THE STRUCTURE ABOVE INSTALLABLE ON A VARIETY OF TERRAIN.

2) MONO TRUSS



THE TRUSS IS CUSTOMIZED BY CUTTING IT INTO THREE PARTS TO MAKE IT MORE EFFICIENT, FLEXIBLE AND DESIGN FRIENDLY.

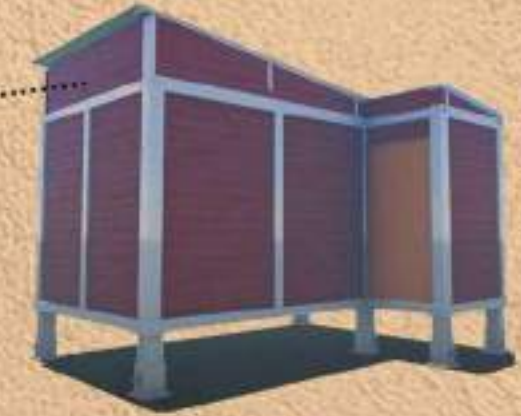
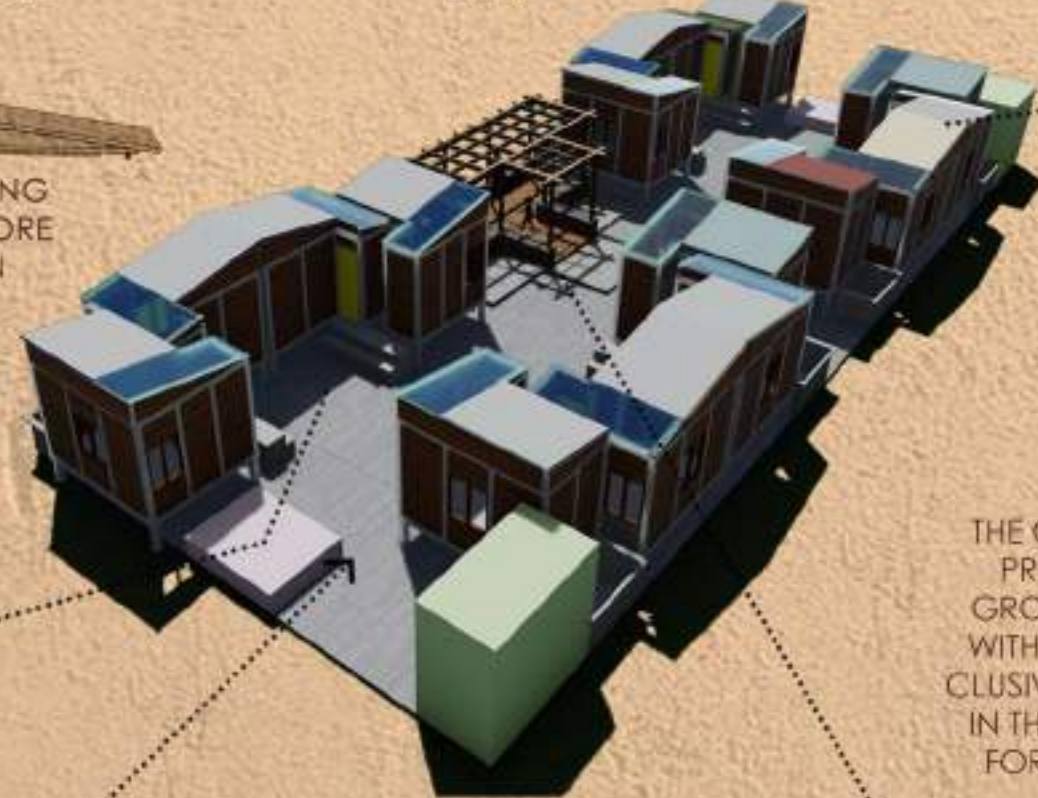


STAIRS AS SITTING AREA



COMMUNITY PATHWAY

DESIGN MODEL



MODULE 3D VIEW

THE COURTYARD AND COMMON PATHWAY PROVIDES MANY OPPORTUNITIES TO THE GROUP TO COME TOGETHER AND ENGAGE WITH THE COMMUNITY. IT IS HOPED TO BE INCLUSIVE OF THE DIVERSITY OF GROUPS PRESENT IN THE CAMP AND CREATE A SOCIAL SPACE FOR EVERYONE IN PLACE TO PARTICIPATE.

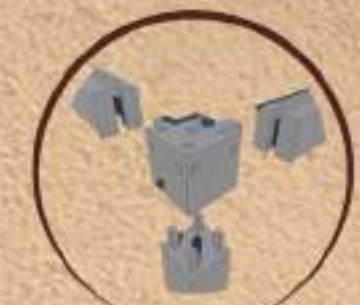


AERIAL VIEW



COMMUNITY SPACE

DETAILS



TWO WAY CORNER JOINERY
IT CONNECTS THE WHOLE FRAMEWORK TOGETHER.



C-SHAPED EXTENSION
IT CONNECTS THE BASIC FRAMEWORK BENEATH THE TRUSSES AND THEN THE U CLIP SLIDES INTO IT TO SOLIDIFY THE JOINERY.



I SECTION
IT ACTS AS A VERTICAL SUPPORT BETWEEN TWO CONSECUTIVE ALUMINIUM FRAMES THAT ACT AS BEAMS.



FLEXIBLE FOOTING
IT CAN CHANGE LEVELS OF THE PLINTH AS REQUIRED.

MATERIALS USED



Plywood
Rate :- 95 Rs/sqft.



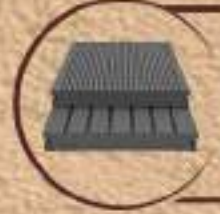
Aluminium Frame
Rate :- 53 Rs/sqft.



Cement-fibre sheet
Rate :- 20Rs/sqft.



Steel bars(140mm)
Rate :- 75 Rs/sqft.



WPC Panels(120mm thick)
Rate :- 20 Rs/sqft.



BASE FRAME
IT FIXES THE FLEXIBLE FOOTING TO THE PLINTH USING WELDED BOLTS AND NUTS.

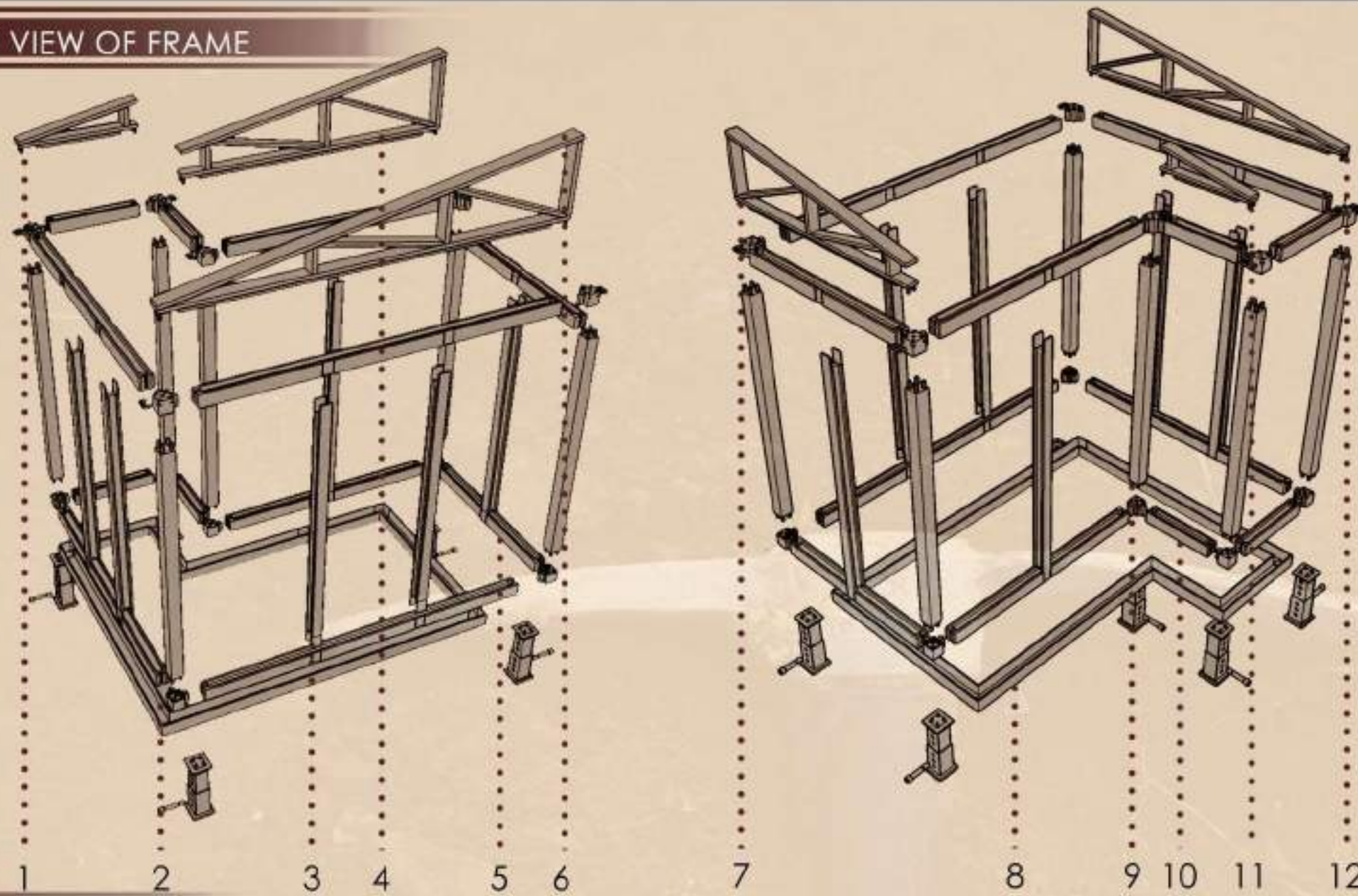
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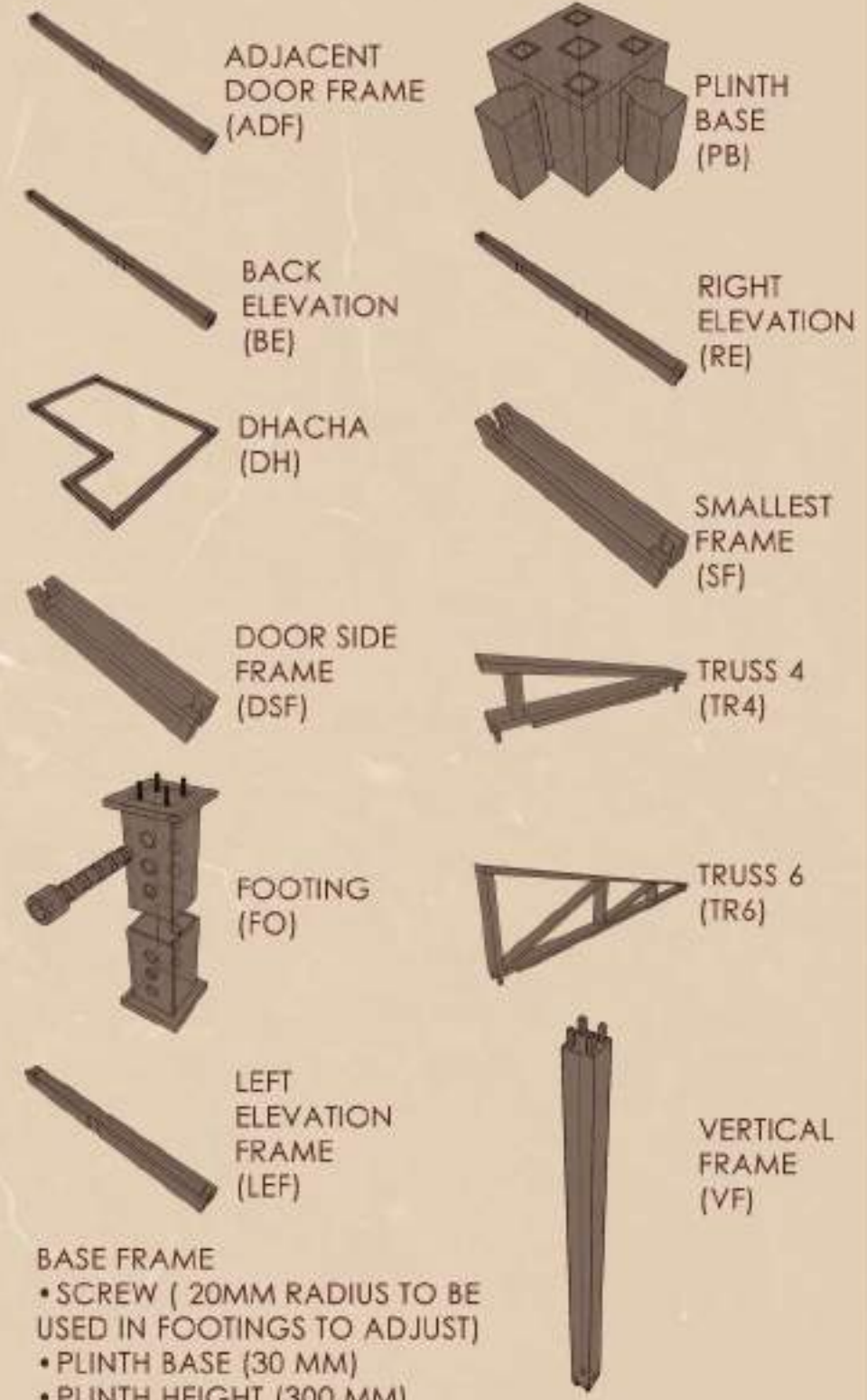


3D VIEW OF FRAME

ISOMETRIC VIEWS OF MODULES, GIVEN TO SHOW THE DIFFERENCE OF TRUSSES ON BOTH OF THE MODULES AS THE SLOPES ARE GIVEN TO COLLECT RAIN WATER HARVESTING. SHOWING "EKANK" OR UNITY IN OUR DESIGN THE MANUAL IS MADE SPECIFIC TO THE LABOURER'S EASE. USING FRAMES AND TRUSSES TO MAKE IT DURABLE, WEATHER RESISTANT AND AFFORDABLE. THE USE OF TRUSSES HAVE BEEN GIVEN TO INCORPORATE THE USE OF SLOPED ROOF INTO THE MODULE TO CONNECT THE LABOURERS TO THEIR ORIGIN, INCLUDING MODERNISM INTO THEIR DESIGN IN AN EFFECTIVE AND PRODUCTIVE WAY.



JOINERIES DETAILS



NOMENCLATURE OF FRAMES

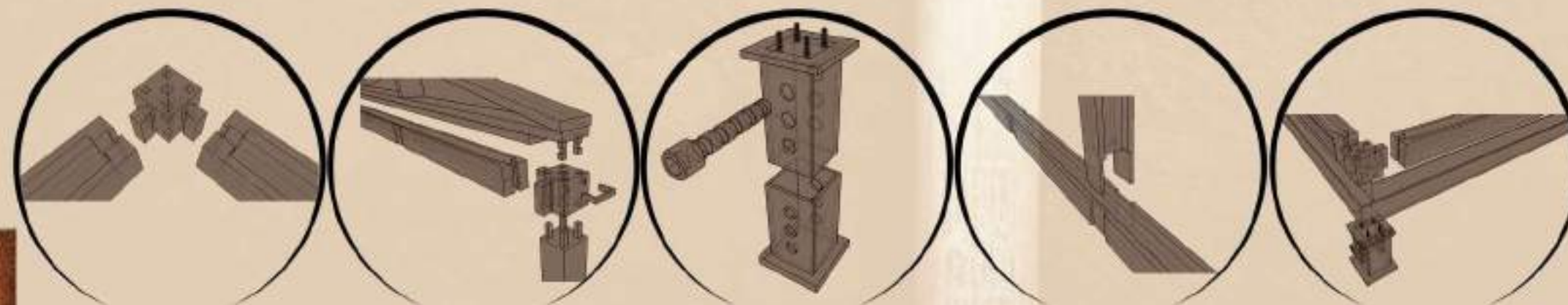
- 4 WHOLE OF 18MM.
- MIDDLE WHOLE OF 24 MM.
- CUBE OF 120 MM.
- EXTENSION OF 13.2 MM AND WIDTH 24 MM.
- 6 MM EXTENDED ON BOTHE SIDES.
- SQUARE BOX OF 36 MM.

CORNER JOINT: CONNECTING THE SIDE FRAME WITH ALUMINIUM SIDE JOINT TO KEEP THE BASE FRAME INTACT. THE CORNER JOINT IS DESIGNED TO FIT IN THE ADJOINING ALUMINIUM FRAMES EASILY AND RIDGES ARE ALSO PROVIDED TO SLIDE IN THE PANELS FITTING IT EFFORTLESSLY.

I-SECTION: USED TO CONNECT PANELS TO THE VERTICAL FRAMES.
 • HEIGHT 2500 MM.
 • 120 MM INSIDE WITH 10 MM EXTENSIONS LEFT.
 • TOP PLAN (100 BY 120 MM)

FOOTING: KEEPING ITERATIONS AND ARRANGEMENTS INTO CONSIDERATION THE FOOTING IS DESIGNED AS SUCH TO HANDLE CONTOURS ON SITE AND FLAT LANDS. IT IS CONNECTED TO THE BASE FRAME.

BASE FRAME
 • SCREW (20MM RADIUS TO BE USED IN FOOTINGS TO ADJUST)
 • PLINTH BASE (30 MM)
 • PLINTH HEIGHT (300 MM)
 • EXTENDED PLATE (200 MM)
 • WELDED SCREW ON TOP (5MM RADIUS) (4 IN EACH)
 • HEIGHT (130 MM)
 • WIDTH (140 MM)
 • HOLLOW AREA (6.58 M²)
 • OUTER AREA (8.32 M²)



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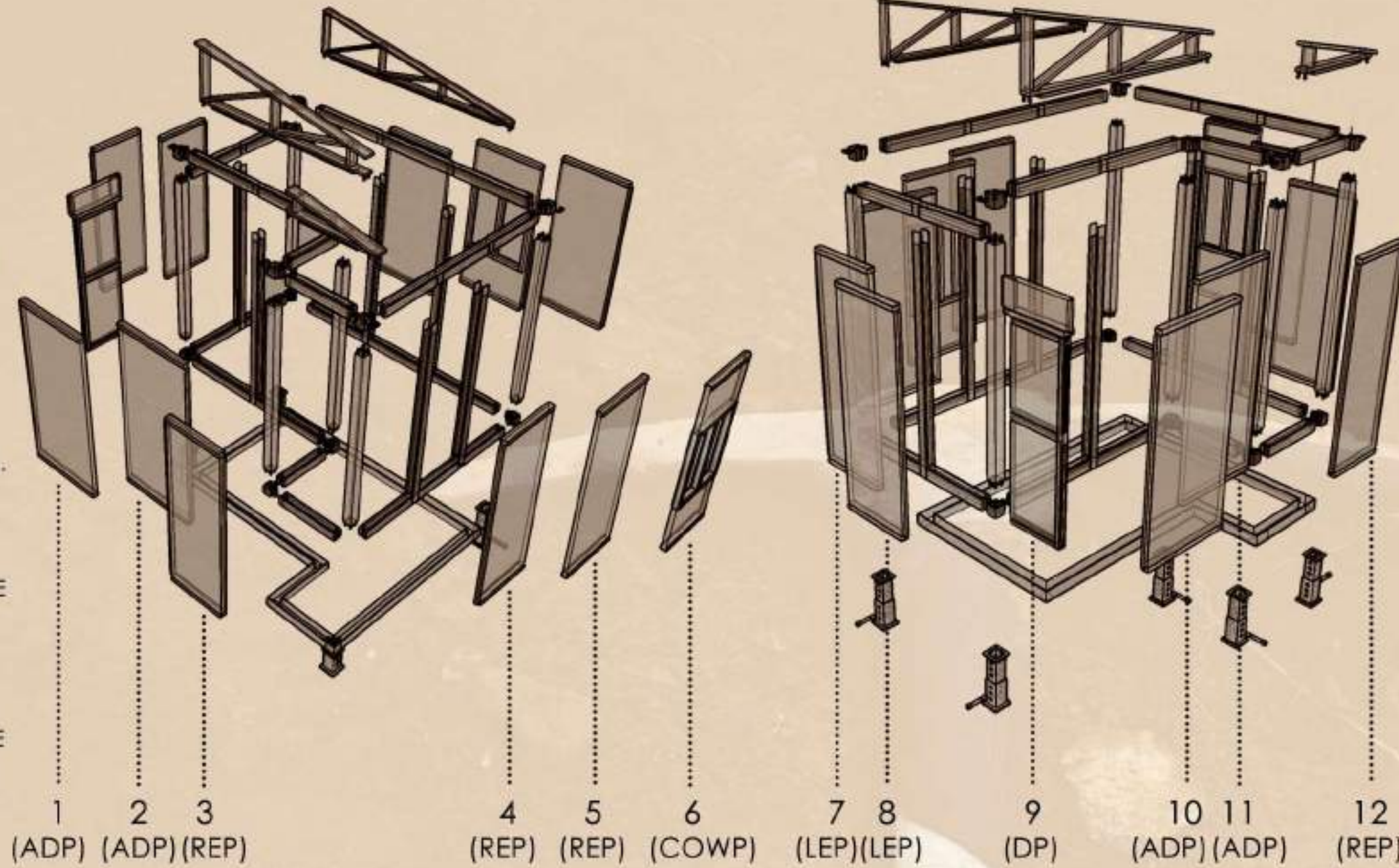
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3D VIEW OF FRAME

DETAILS OF PANELS

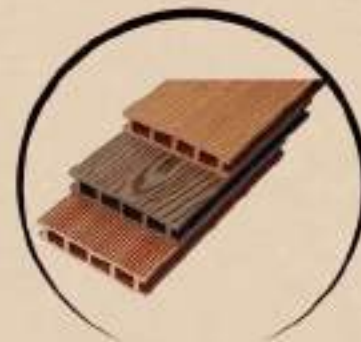
ISOMETRIC OF THE MODULES GIVEN TO HIGHLIGHT THE PANELS THAT ARE BEING CONNECTED TO THE BASIC FRAMEWORK OF THE MODULAR STRUCTURE. THE PANELS OF THIS MODULE ARE OF WPC BOARDS (WOOD PLASTIC COMPOSITE) OF A THICKNESS OF 60 MM. THE PANELS IN THE MODULE ARE USED TO SLIDE THROUGH THE ALUMINIUM FRAMES ON BOTH THE TOP AND BOTTOM SIDES OF THE STRUCTURE. A "U" FRAME OF ALUMINIUM IS FITTED AND RUN ALONG THE SIDES OF THE FRAME TO EASE IT'S SLIDING THROUGH THE FRAMES.



- ADJACENT DOOR PANEL (ADP)**
 - WIDTH 1116.8 MM
 - LENGTH 2340 MM
- CENTRAL WINDOW PANEL (CWP)**
 - WIDTH 866.8 MM
 - LENGTH 2340 MM
- CORNER WINDOW PANEL (COWP)**
 - WIDTH 1064.53 MM
 - LENGTH 2340 MM
- DOOR PANEL (DP)**
 - WIDTH 750 MM
 - LENGTH 2100 MM
- LEFT ELEVATION PANEL (LEP)**
 - WIDTH 866.8 MM
 - LENGTH 2340 MM
- RIGHT ELEVATION PANEL (REP)**
 - WIDTH 854.53 MM
 - LENGTH 2340 MM



ACRYLIC SHEETS



WOOD PLASTIC COMPOSITE BOARDS



PLYWOOD



ALUMINIUM FRAMES

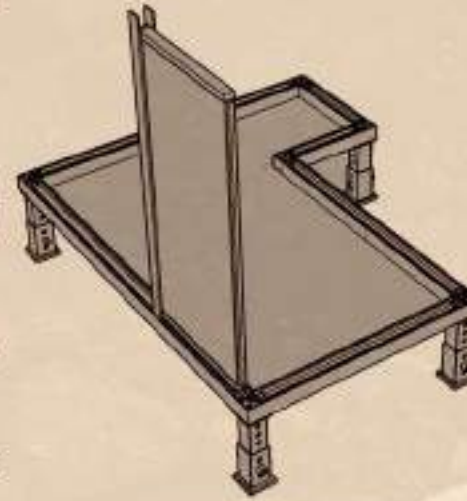


CONCRETE BOARDS

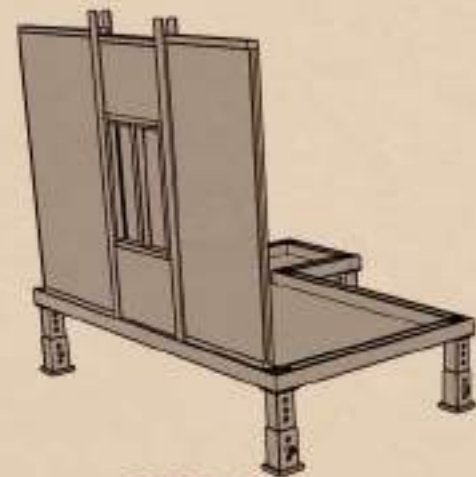
REAR ELEVATION ASSEMBLY

THE BASIC LAYOUT OF THE PLINTH AND ITS FOOTING HAS ALREADY BEEN LAID OUT INCLUDING THE CORNER JOINERIES AS WELL AS THE BASE FRAMEWORK ON WHICH THE WPC PANELS WILL SLIDE.

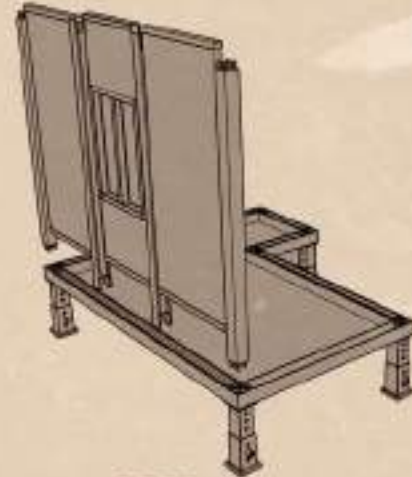
- STEP 1** FIRSTLY, ONE PANEL WILL BE SLID ON THE BASE FRAMES.
- STEP 2** THEN THE I SECTION WHICH WILL ACT AS A VERTICAL SUPPORT WILL BE PLACED ON THE GROOVES FIRMLY ON THE BASE FRAME.
- STEP 3** SIMILARLY, THE WINDOW FRAME (WHICH IS ALREADY JOINED TO THE WPC PANEL) WILL BE PLACED.
- STEP 4** AFTER THAT, ONE MORE I SECTION AND A SIMILAR WPC PANEL WOULD BE PLACED ON THE BASE FRAME WORK.



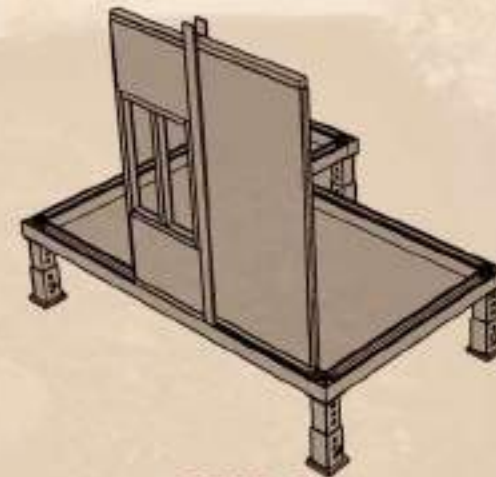
STEP 1



STEP 4



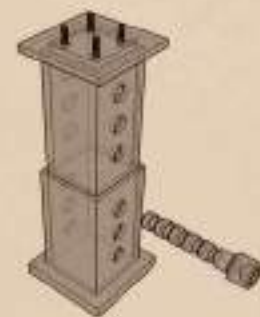
STEP 3



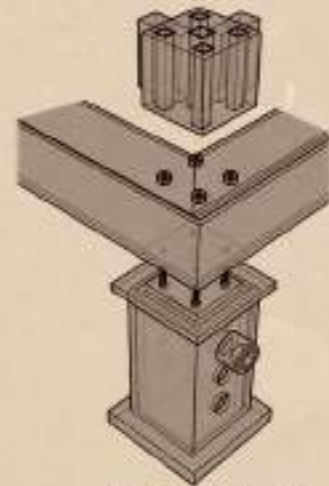
STEP 2

PLINTH WORKING TO THE GROUND

STEP 1: A BASIC FRAMEWORK OF THE PLINTH FOOTING IS TO BE PLACED IN THE GROUND WHICH IS ADJUSTABLE TO ITERATIONS AND ARRANGEMENTS.



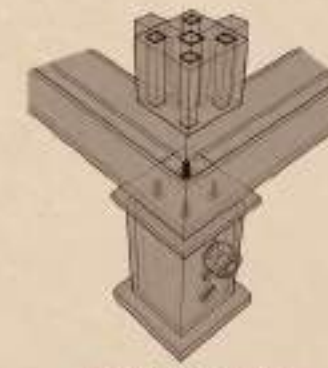
FLEXIBLE PLINTH FOOTING



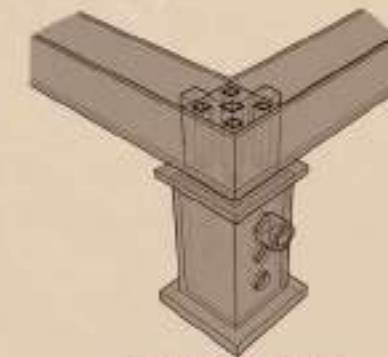
ADDITION OF BASE FRAME

STEP 2: THE BASE FRAME IS TO BE ADDED TO THE PLINTH FOOTING AND FITTED WITH BOLTS.

STEP 3: THE CORNER JOINT IS TO BE PLACED ALONG WITH THE ALUMINIUM FRAMES ON THE BASE FRAME.



ADDITION OF CORNER JOINT



FINAL PLINTH FRAME WORK

STEP 4: THE FINAL PLINTH FRAMEWORK INSTALLATION IS COMPLETED.

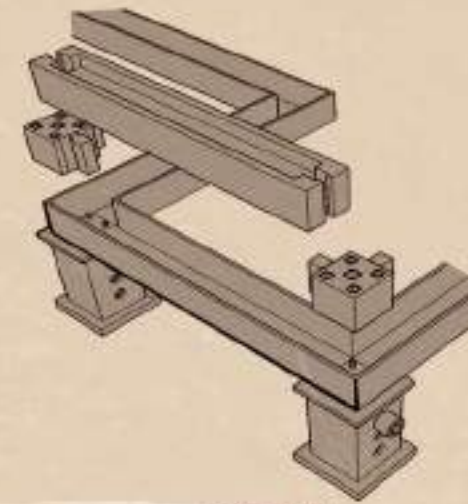
PANEL ASSEMBLY WITH TWO VERTICAL JOINTS

STEP 1: AFTER THE BASE FRAME HAS BEEN SET THE ALUMINIUM FRAME IS TO BE PLACED ON THE CORNER JOINT.

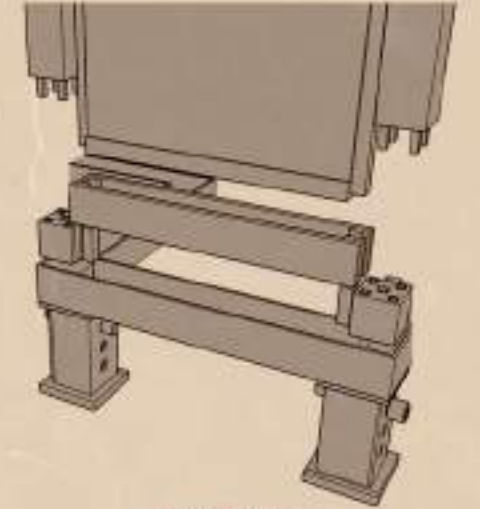
STEP 2: ON PLACING THE ALUMINIUM FRAME, THE PANELS ARE TO BE SLIDED ONTO FRAME.

STEP 3: AFTER THE PANELS ARE FITTED, THE VERTICAL FRAMES ARE TO BE PLACED ON THE CORNER JOINT BY PUSHING IT DOWNWARDS.

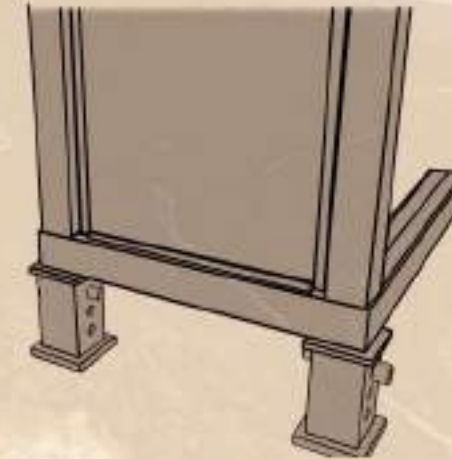
STEP 4: THE JOINTS ARE FITTED AND ASSEMBLY IS COMPLETED.



STEP 1



STEP 2



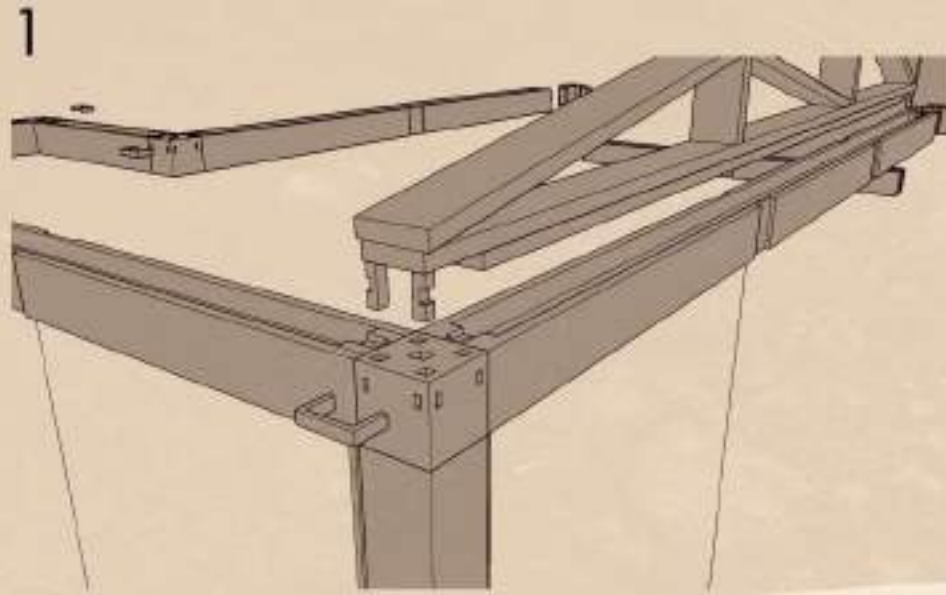
STEP 4



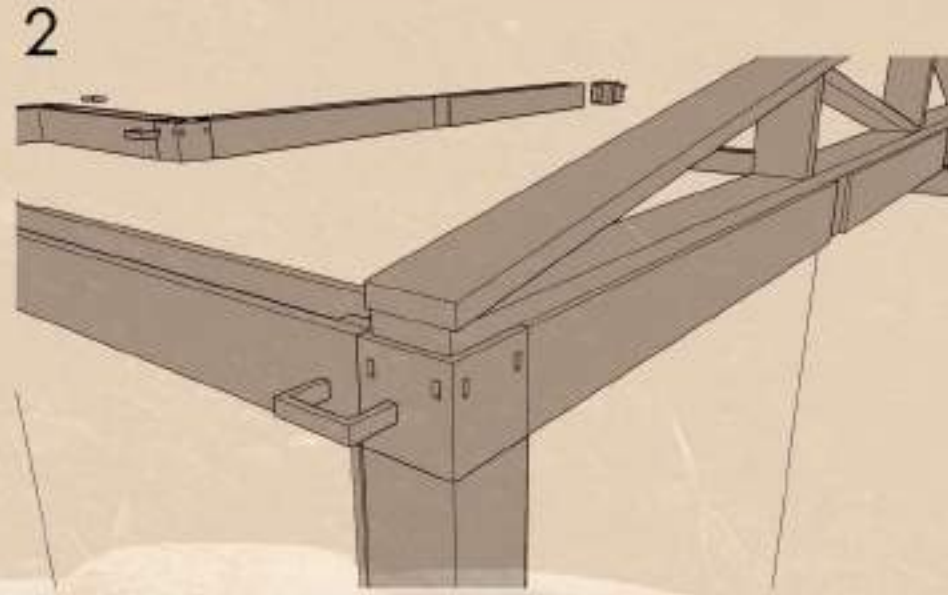
STEP 3

TRUSS FRAME WORKING

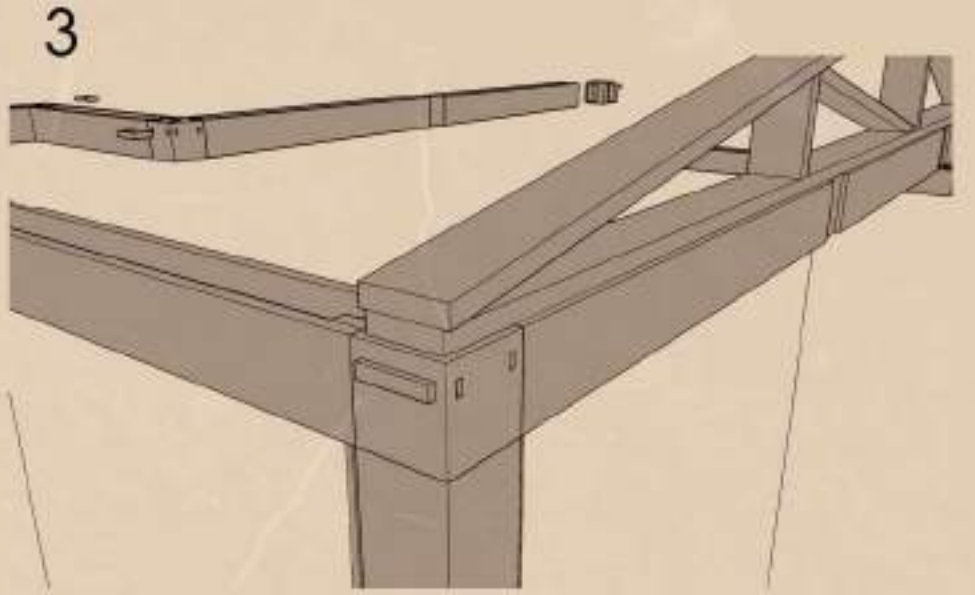
STEP 1: INSERT THE TRUSS FRAMEWORK INTO THE CORNER FLEXIBLE JOINT THAT CONNECTS WITH THE MAINE FRAME WORK OF THE STRUCTURE.



STEP 2: AS THE TRUSS FRAMEWORK INSERTS IN THE FLEXIBLE CORNER JOINT THE "C" FRAME SHOULD BE INSERTED INTO THE TRUSS TO AVOID ANY HORIZONTAL MOVEMENTS.

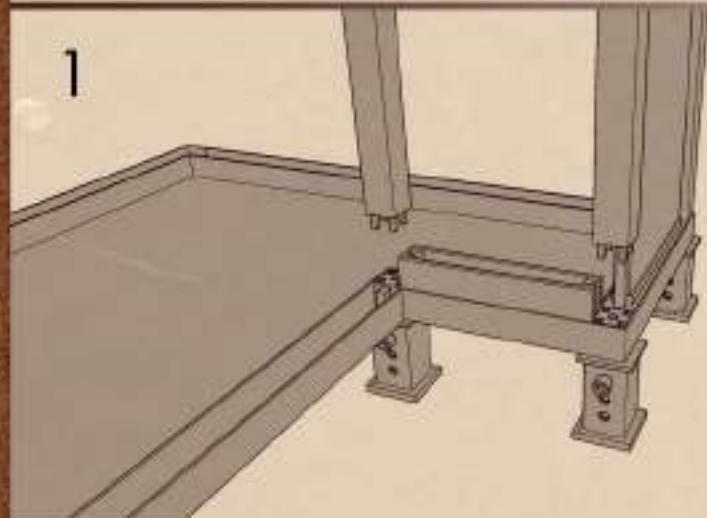


STEP 3: THE TRUSS FRAMEWORK IS FINISHED AND READY TO BE USED.

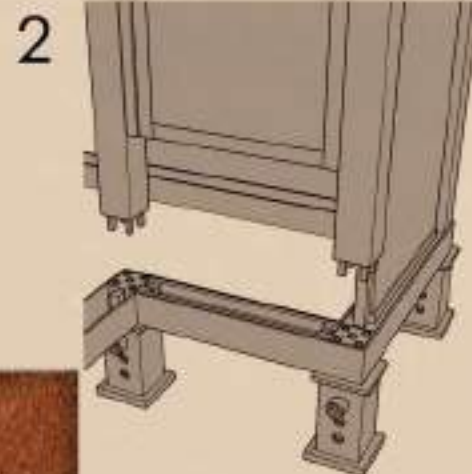


DOOR FRAME INSERTION

STEP 1: THE DOOR FRAME IS TO BE INSRTED WITH THE ALUMINIUM FRAMEWORK OF THE STRUCTURE BY PUSHING IT SIDWAYS.



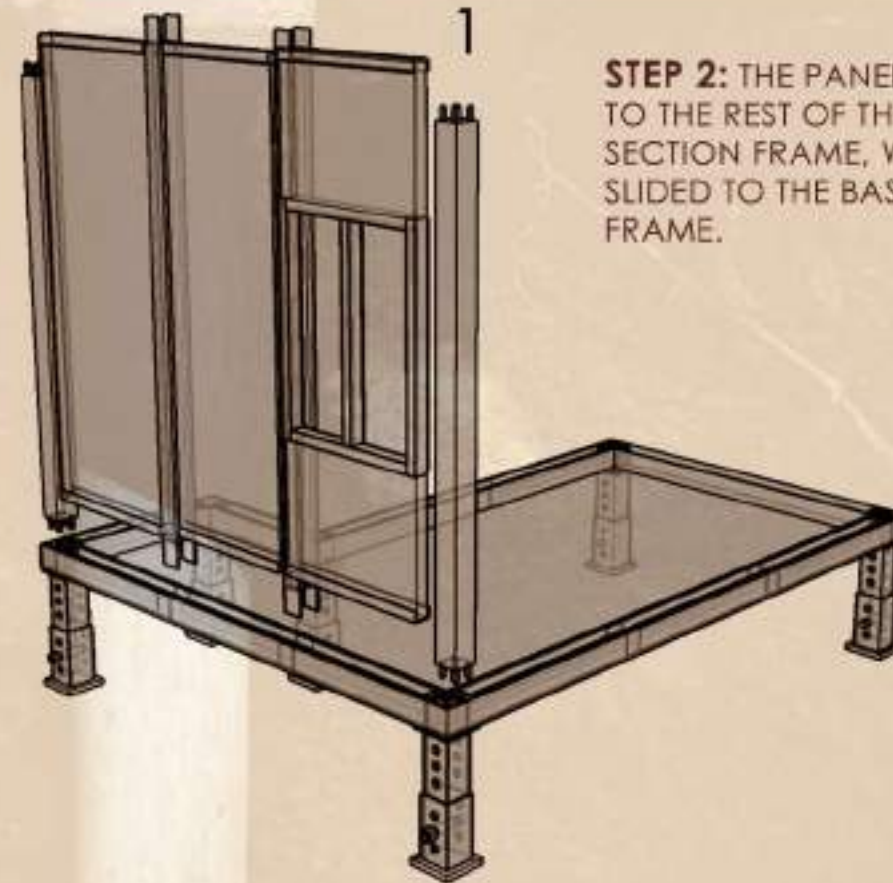
STEP 3: THE DOOR FRAME INSERTION IS DONE.



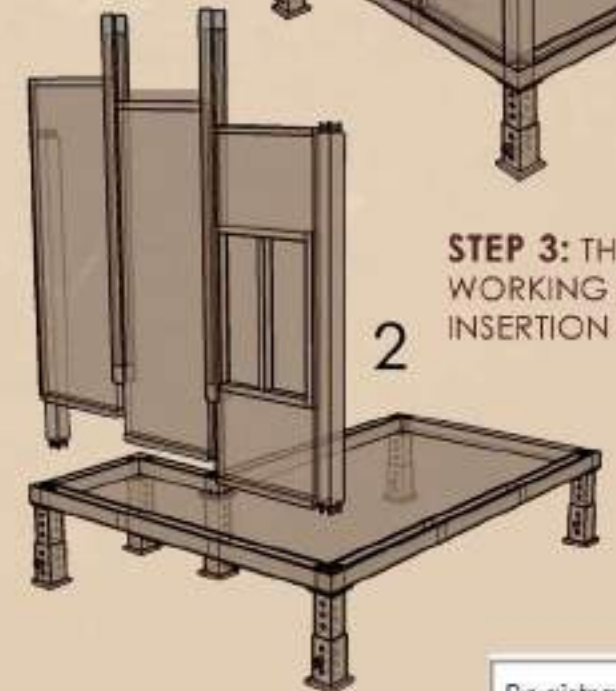
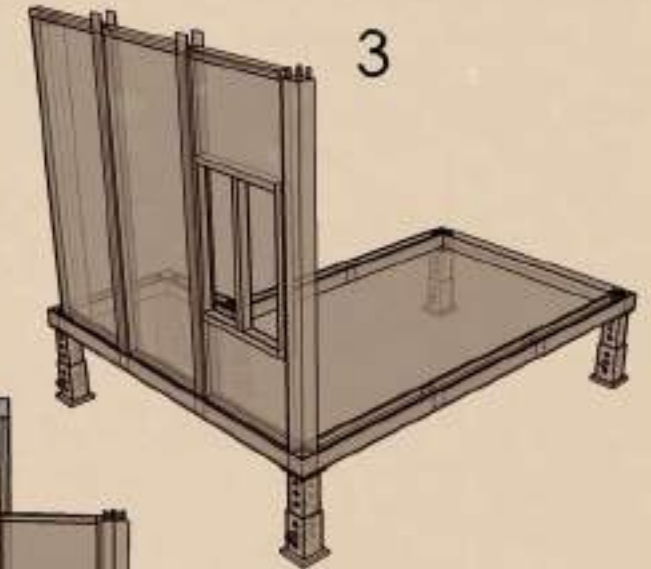
STEP 2: THE DOOR FRAME IS READY AND THEN, THE VERTICAL FRAME IS TO BE INSERTED TO THE BASE OF THE ALUMINIUM FRAME, BY PUSHING IT DOWNARDS THE DOOR FRAME AND PANEL IS READY.

PANEL FRAME INSERTION

STEP 2: THE PANELS ARE CONNECTED TO THE REST OF THE JOINTS VIA AN "I" SECTION FRAME, WHILE FIRST, BEING SLIDED TO THE BASE AND THE CEILING FRAME.

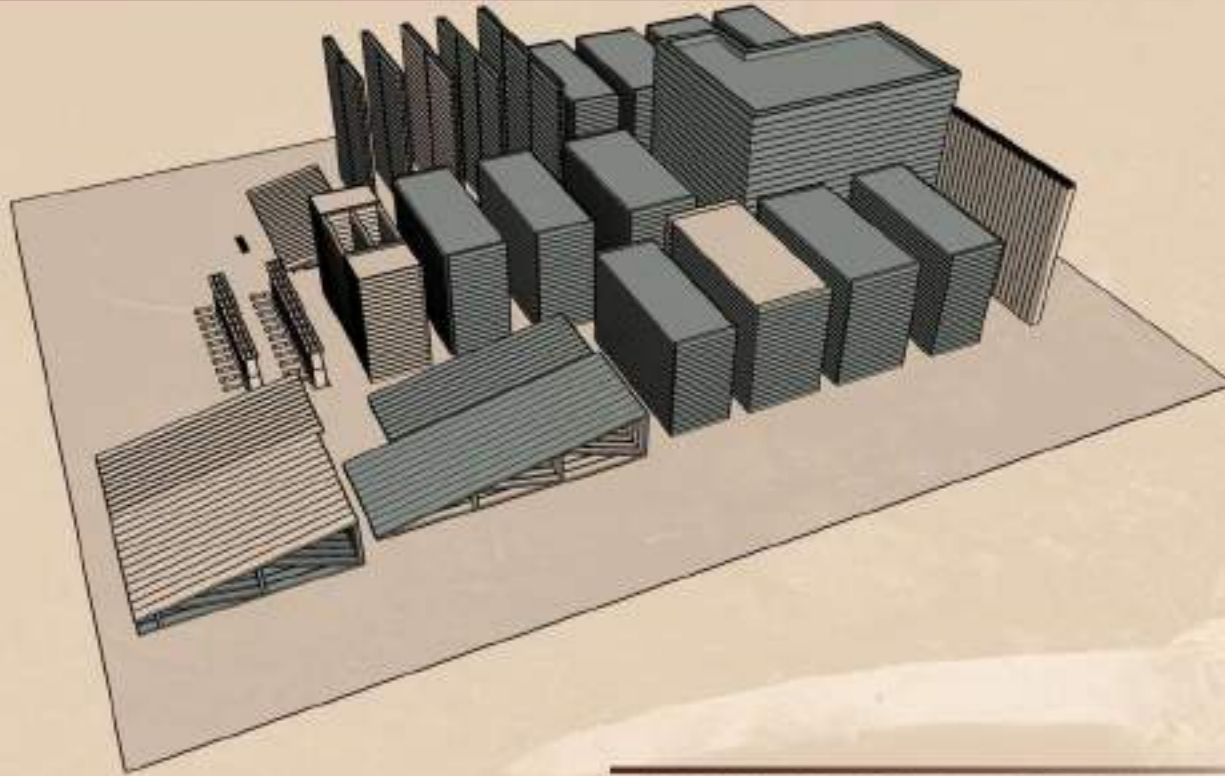


STEP 1: THE PANELS ARE TO BE SLIDED SIDWAYS TO THE VERTICAL FRAMES THAT IS TO PUSHED DOWNARDS TO THE FLEXIBLE CORNER JOINT.



STEP 3: THE PANEL WORKING AND INSERTION IS DONE.

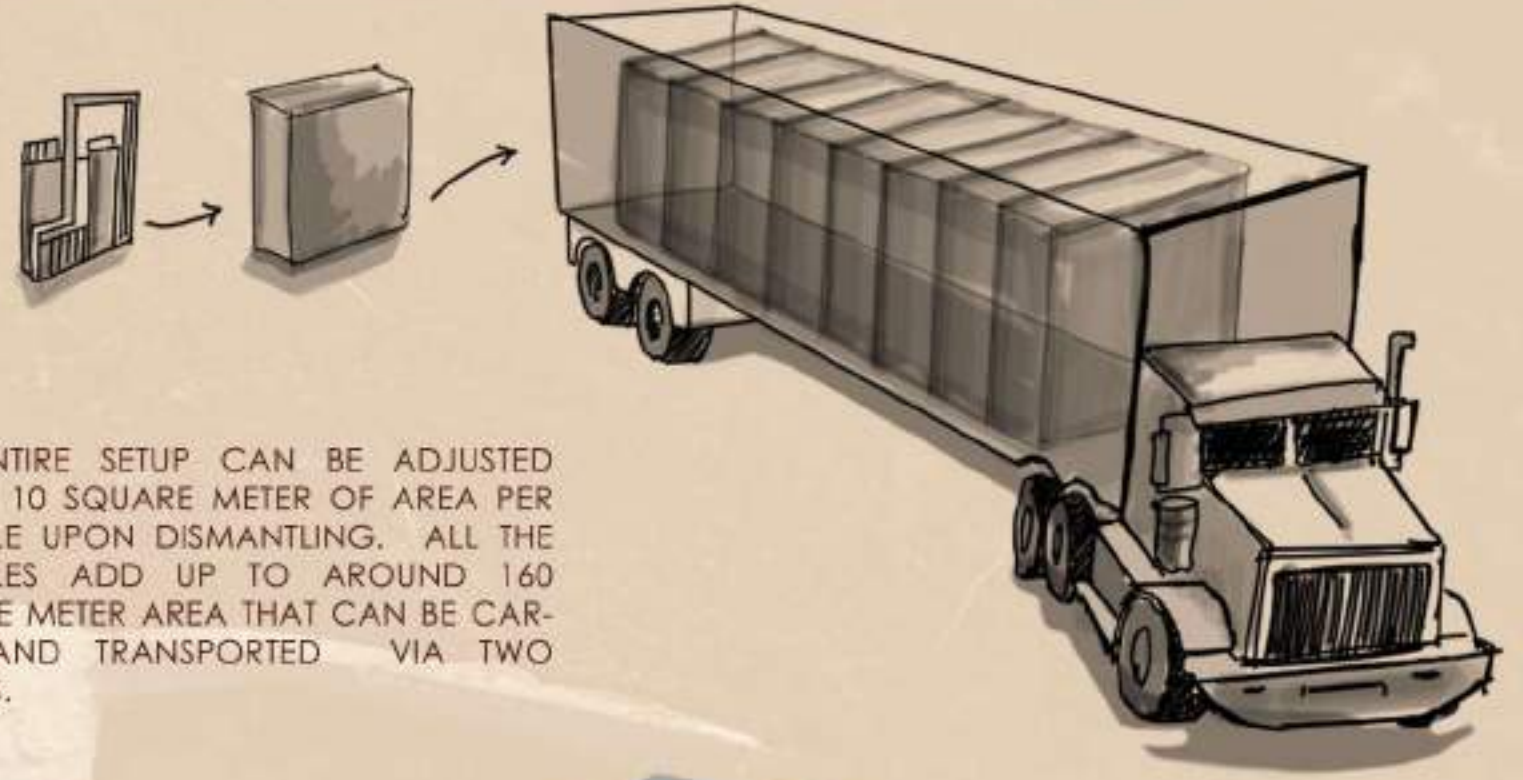
2-D PLANE WITH STACKING OF FRAMES



THE ENTIRE DESIGN IS A COLLAPSIBLE STRUCTURE THAT CAN BE FOLDED UP AND COMPACTED TO A MINIMAL SPACE FOR CONTINUOUS REUSE AND TRANSPORT IT EFFICIENTLY.

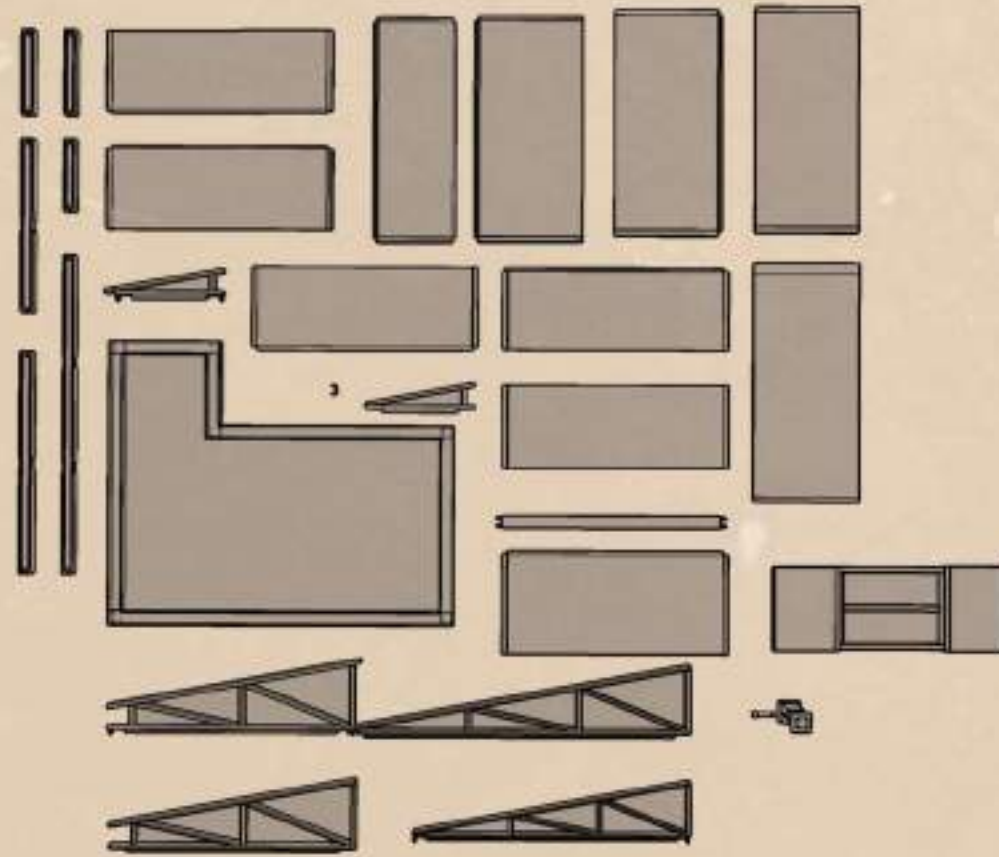
SHOWN HERE IS A STACKING OF ALL 16 MODULES THAT WOULD FIT IN TWO MEDIUM SIZED TRUCKS OF 8 MODULES EACH.

MODULE STACKING AND TRANSPORTATIONS



THE ENTIRE SETUP CAN BE ADJUSTED WITHIN 10 SQUARE METER OF AREA PER MODULE UPON DISMANTLING. ALL THE MODULES ADD UP TO AROUND 160 SQUARE METER AREA THAT CAN BE CARRIED AND TRANSPORTED VIA TWO TRUCKS.

COSTING OF 1 MODULE



SINGULAR FRAMEWORK REQUIRED IN A SINGLE MODULE.



ALUMINIUM FRAMES
RATE: Rs 53 PER SQ. FT.
TOTAL: Rs 12,000



WPC PANEL
RATE: Rs 20 PER SQ. FT.
TOTAL: Rs 5,200



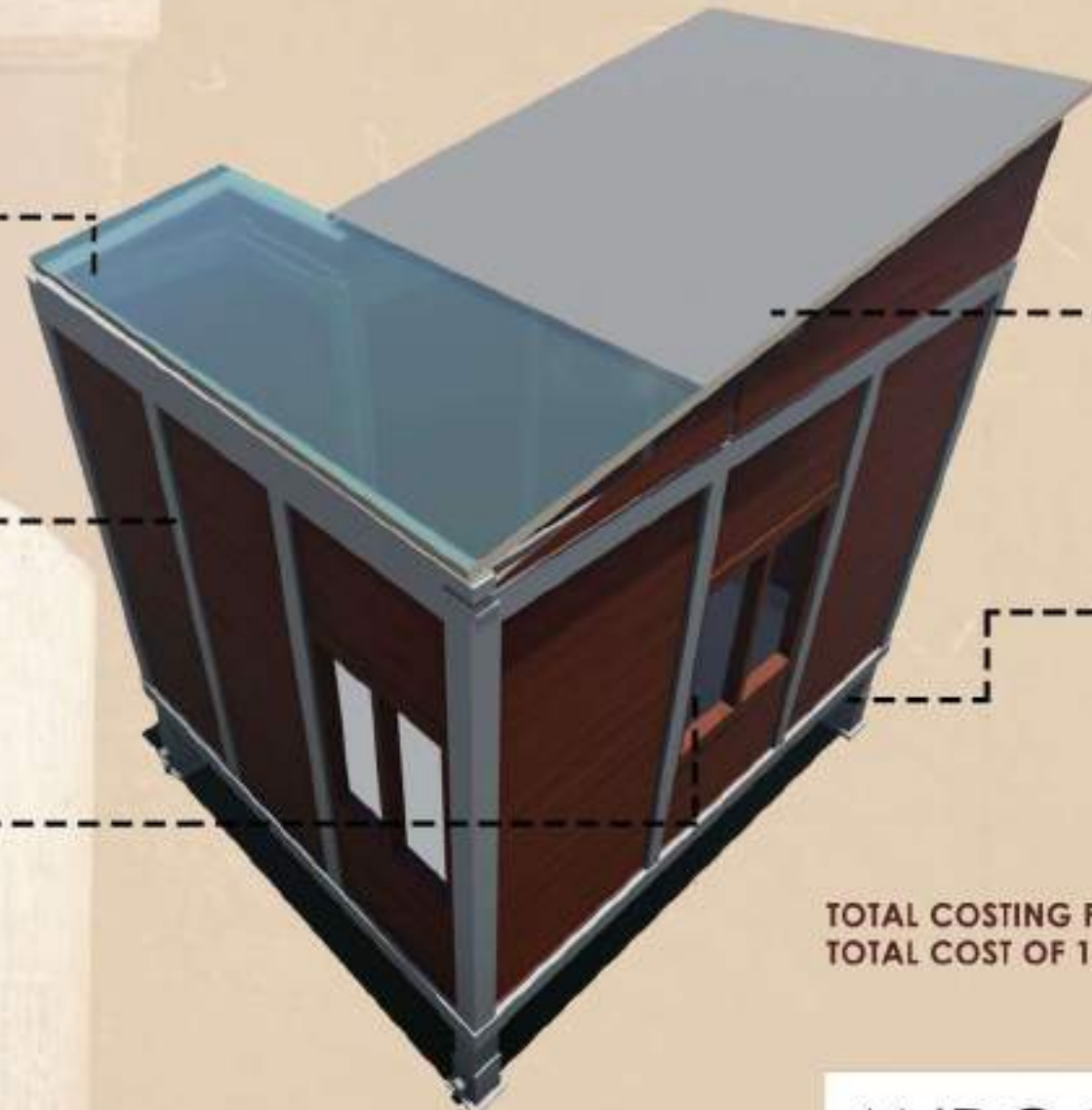
PLYWOOD
RATE: Rs 25 PER SQ. FT.
TOTAL: Rs 6,422



CEMENT-FIBER SHEET
RATE: Rs 20 PER SQ. FT.
TOTAL: Rs 1,352



STEEL FRAMES
RATE: Rs 75 PER SQ. FT.
TOTAL: Rs 3,700



TOTAL COSTING PER MODULE: Rs 28,674
TOTAL COST OF 16 MODULES: Rs 4,58,784

APPROCHING MODERNITY, NEGLECTED THE GRASSROOT OF VISIBLE INDIA?

BRIEF INTERPRITATION

Inconsolably, advancing modernity, acquisitiveness of people cleaved India in "visible India"—blong to most of us and "invisible India"—a part that is unrecognised, un-feted and dusted under the carpets most of the time, belonging to a host of 126 million migrant labourers who work silently.

Community of these migrating labourers is an amalgamation of unity and sense of belongingness who may or may not share same culture or geographical background. Their nature of interdependence, interaction, celebration, recreation and occupation shapes the community. But with their transient lifestyle, they have lost their sense of belongingness and the living conditions are neglected.

In real and physical term, migrating labourers hordes can't be replaced. Labourers have constant life-cycle, with 10 hours shifting daily. They sweated it out, putting together every edifice of everything from ancient structure to modern buildings in place. But by this lifecycle what they acquire? ----"nothing". They trade crucial part of their life for nothing.

Hence, shelter must be prudently designed for the labourers so that they can retrieve the sense of belongingness within them. The design should be mobile and efficient for labourers. It should adapt variety of terrain and construction stage and weather condition. It is time to contribute, understand and provide every point of need—security, safety, privacy end their right to dignified lives- that the labourers deserve.



AIM

- Create a bridge between the lifestyle of construction labourers and employees.
- Feasible flexible and meaningful design with sense of emotional connection between labourers.

OBJECTIVE

- To take into account site considerations and climatic conditions.
- To develop a greater understanding of inter relationship of variety of spaces, various characters such as public, semipublic, private, entertainment centre, commercial, administrative etc.

SITE INFORMATION

Number of labourers



8

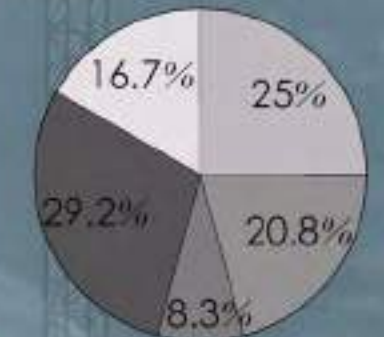


34



8 AM to 7 PM

Percentage of labourers based on state



- M.P.
- U.P.
- Orissa
- Bengal
- Karnataka





SEWAGE LINE AND ELECTRICITY



BUILDINGS AND CONSTRUCTION SITE



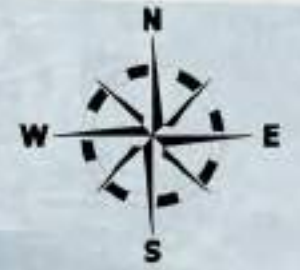
ROAD NETWORK AND SITE ACCESS



VEGETATION AND FARM LAND



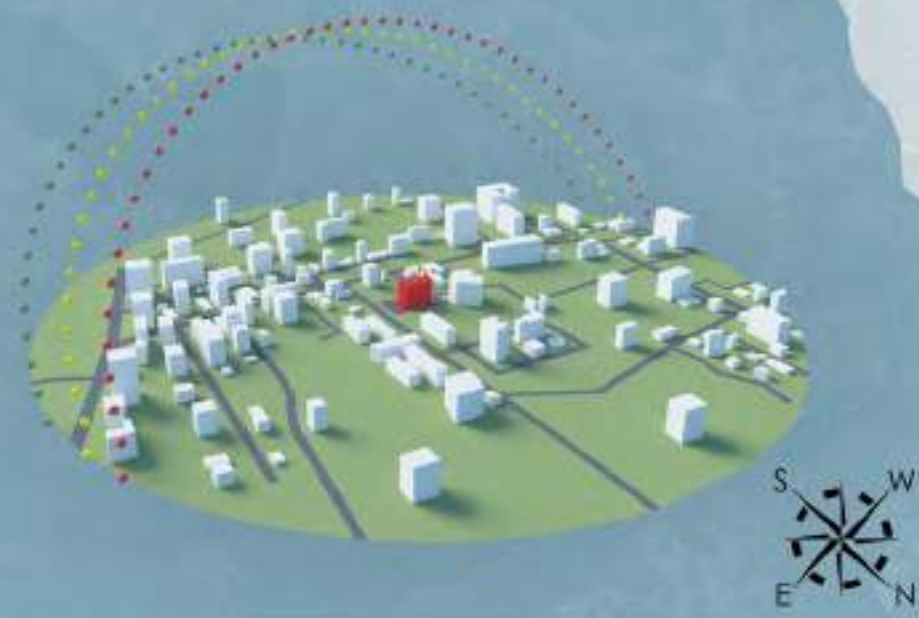
SITE PLAN
 Scale 1:250



WHY THIS SITE?

Punawale is fast developing suburb of pune, close to it hub hinjewadi and its now a growing it hub. Punawale has now emerged as the location of choice for home buyer from information technology as well as manufacturing segment. So large number of medium scale projects are under construction. More the number of sites more will be the workers, so this is creating opportunity for us to provide shleters to the construction workers who are migrating from different states of india. Also these workers have easy availability of work as there are many numbers of sites under construction near our selected site.

SUN AND WIND ANALYSIS



STRENGTH	WEAKNESS	OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> PRIME LOCATION HIGHWAY IS NEAR- EASY FOR THE LABOURS TO MIGRATE. GOOD SUPPLY OF WATER AND ELECTRICITY AND OTHER SERVICES. MEDICALS AND HOSPITALS ARE NEAR THE SITE. 	<ul style="list-style-type: none"> NO GOVERNEMENT SCHOOLS FOR THE CHILDREN. NOISE AND TRAFFIC 	<ul style="list-style-type: none"> SUPPORT IT HUB DEVELOPMENT MORE CONSTRUCTION SITE, MORE JOBS TO WORKERS CONNECTED TO MAJOR CITY AREAS. 	<ul style="list-style-type: none"> POLLUTION DUE TO UNDER CONSTRUCTION SITES.

SOIL ANALYSIS

Shallow Well Drained,
 Clayey Soils On Gently Sloping Lands With Mesas And Buttes With Moderate Erosion And Slight Stoniness,
 Mesas- Flat Topped Or Mountain Hill
 Buttes- Tall Flat Topped, Steep Tower Of Rocks

FORM EVOLUTION



CHARKHA



EVOLUTION-1



EVOLUTION-2



EVOLUTION-3



FINAL FORM

DERIVING AN EMOTIONAL FORM

FLEXIBILITY OF MATERIAL

EFFICIENCY OF DESIGN

DESIGN ETHICS

RECYCLED PLASTIC PANEL :- Used for main framing & for supportive panels as it is extreme weather resistant, durable, economical, Termite resistant, has good insulation, & it is made from recycling plastic waste.

TINTED PLASTIC SHEET :- Used for Side Facade Design as it is durable, waterproof & aesthetically appealing to give an unique identity to design.

POLYSTER FABRIC :- Used for entrance face as it is elastic, versatile, weather & water resistant.

TARPAULIN SHEET :- Used for basecoat membrane for flooring as it is leakproof, flexible & has high tensile strength.

MATERIAL SPECIFICATION

VINYL FABRIC SHEET :- Used for roof shutters as it is weatherproof, Waterproof & U.V resistant.

E.V.A FOAM SHEET :- Used for flooring as it is waterproof, thick, flexible & easy to clean.

▶ **EXPANDING & COMPACTING :-** Used for exterior shutter support.

▶ **ROLLING :-** Rolling method is used for shutters to make module compact.

▶ **SLIDING :-** Sliding method is used for panels to make module compact.

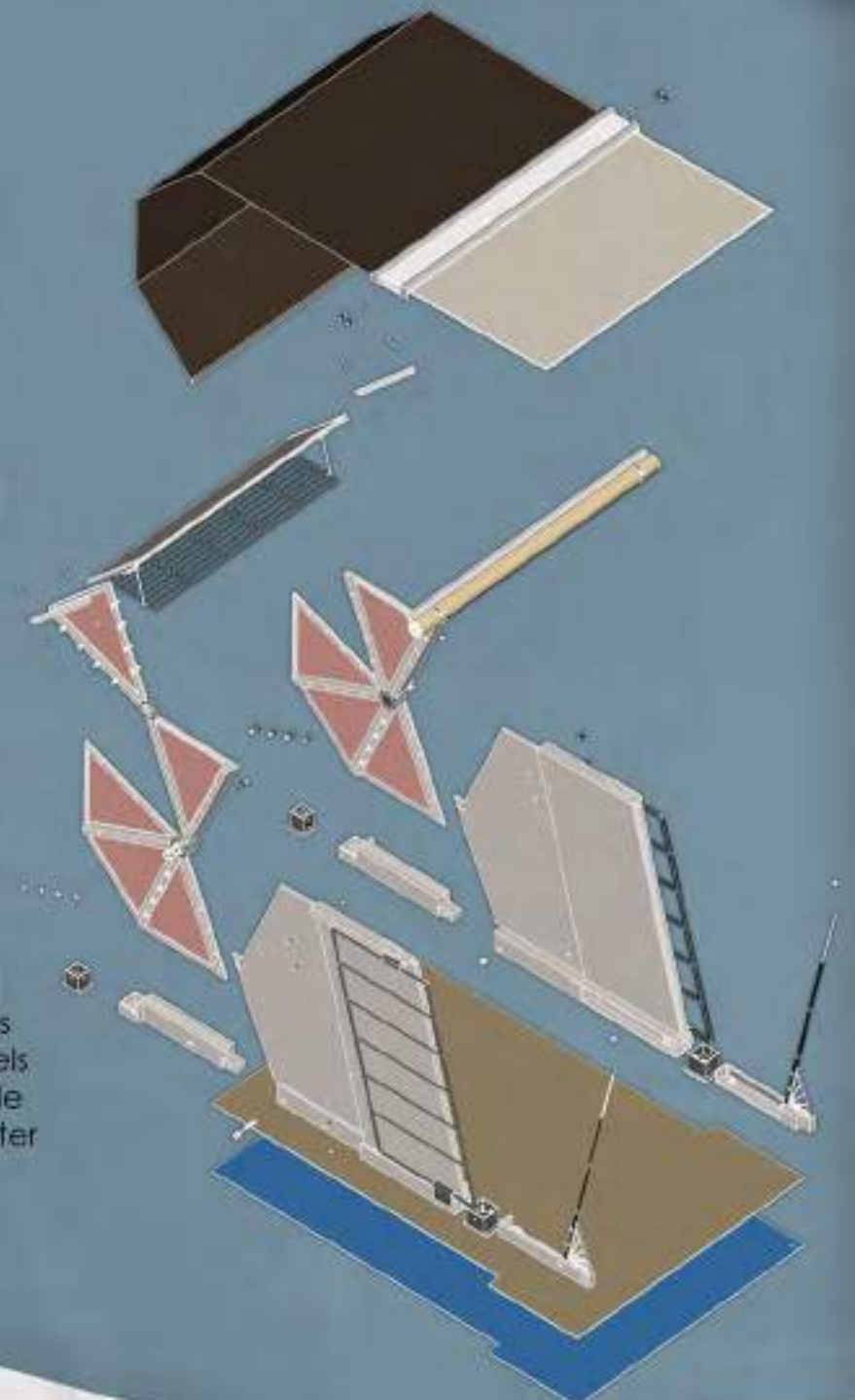
▶ **ROTATION :-** Rotation method is used in back panels making the module more compact after desection.

EMOTIONAL CONCEPT

- ▶ The Charkha represents Swadeshi, self-sufficiency, and at the same time interdependence, it symbolizes the Dignity of labour, equality, unity.
- ▶ Truth and non-violence was the basic concept of Gandhiji to address all type of labourers problems.
- ▶ This is an Indian ideology that unites the laborers under one emotional identity regardless of caste, creed, color, and gender.
- ▶ Instead of observing the reality in terms of efforts, we are observing the reflection which is the final product representing India's Architectural development.

OBSERVING REALITY AND NOT REFLECTION OF NATION

DESIGN EFFICIENCY



S.D.3

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ANDC 2021-22





TOILET:- Seperate male and female toilets has been provided. female wash rooms has been designed as a space for washing area.



RECREATIONAL AREA:- Children Block is considered as an interactive space in evening.



KITCHEN BLOCK:- Seperate kitchen block has been provided for labourers which will act as interactive space



VERANDA:- Each block module has provided a veranda with an awning providing shade and also acting as interactive space.

FIRST AID BLOCK :- First aid block has been designed to provide basic medical health facility.



CHILDREN BLOCK :- Children block has been designed to provide basic educational facility to labourers kids.



S.D.4

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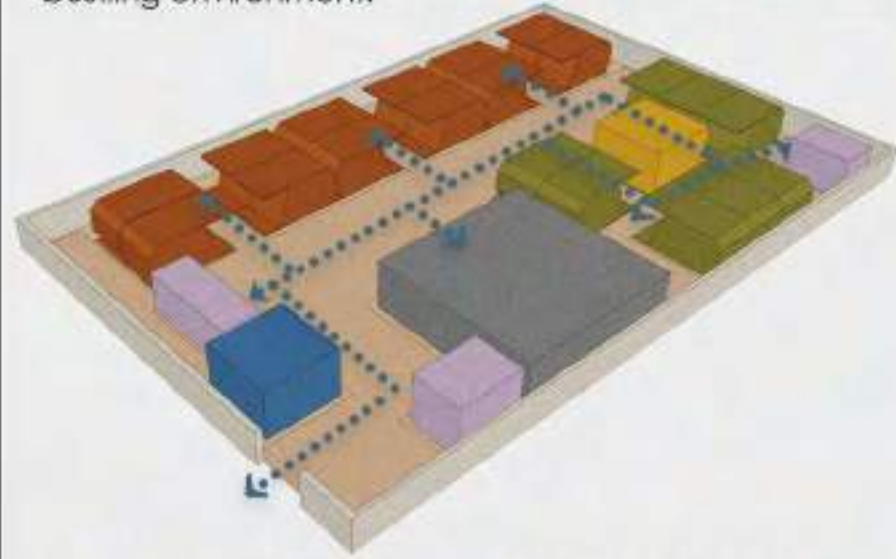
ANDC 2021-22

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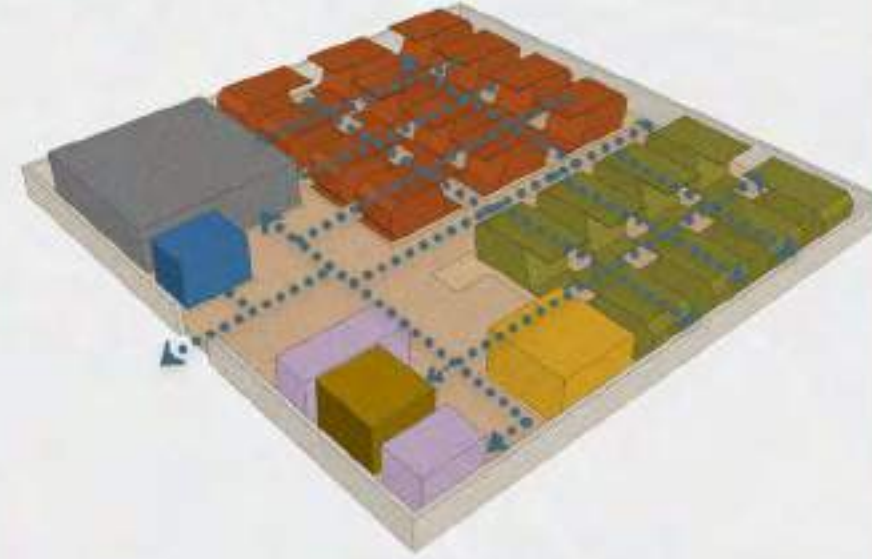


Possible Arrangements In Different Sites

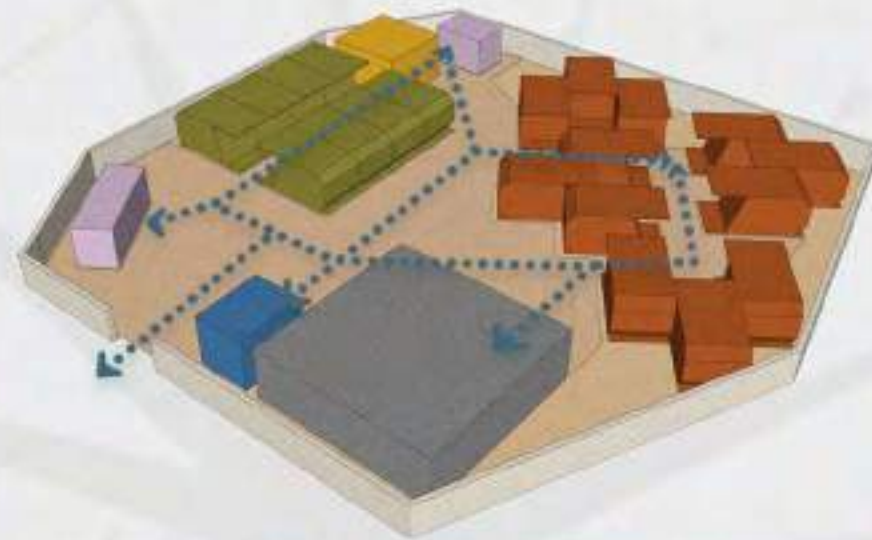
- Design module is designed in such a way, that it is efficient to alter in different arrangements according to 'Average Indian site conditions'.
- Taken design considerations has been made in such way that each block module should satisfy basic human requirements such as sunlight, ventilation and also leads to forming the unified social life in their harmonies core space in the bustling environment.



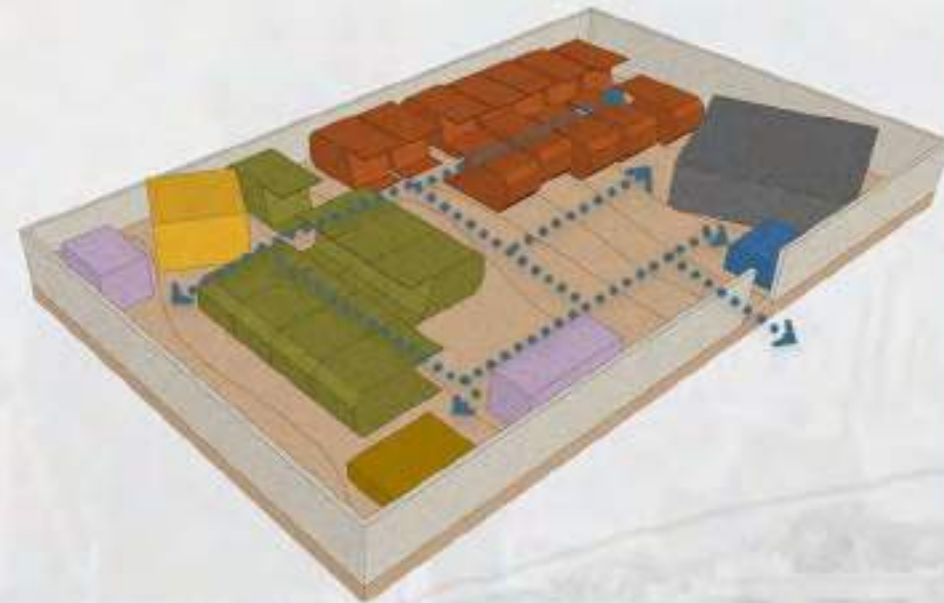
Rectangular site with Cluster arrangement



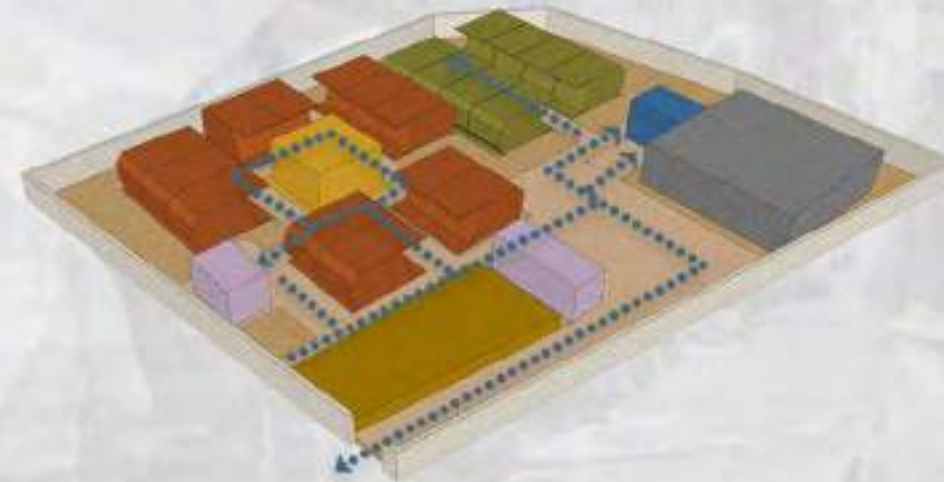
Square site with Grid arrangement



Angular site with radial arrangement



Sloping site with random arrangement



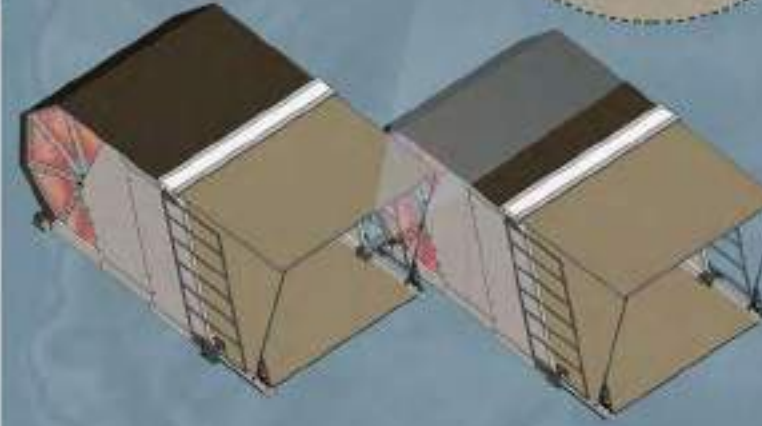
Site Zonning

Legends

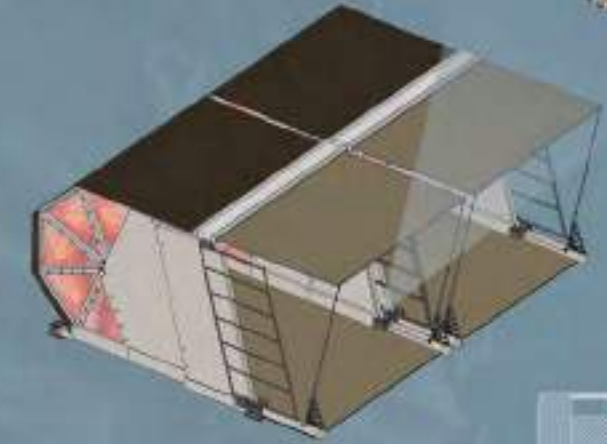
- | | |
|--|---|
|  Family Cluster |  Kitchen Block |
|  Bachelor's Cluster |  Toilets |
|  Children Room | |

Possible Module Arrangements

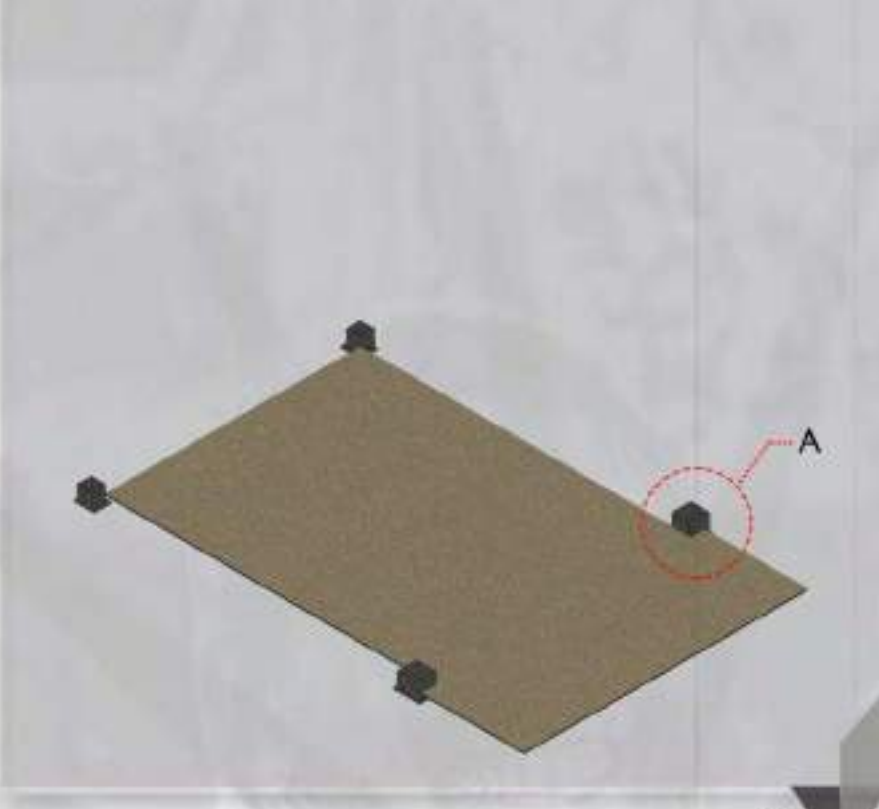
Alternate Joinery



Adjucent Joinery



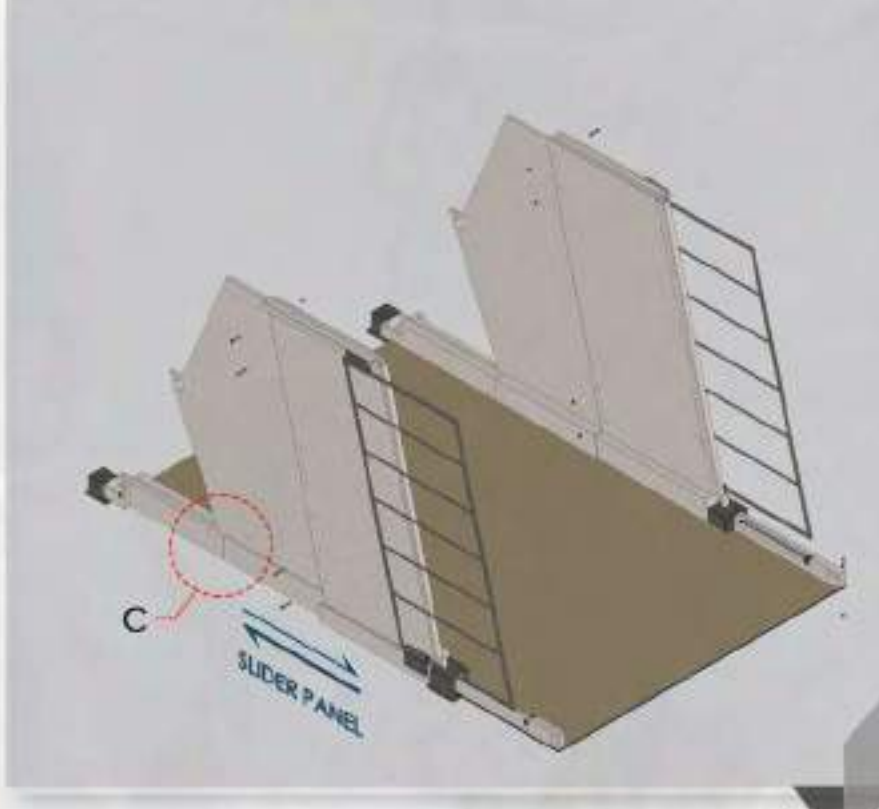
STEP 1
 ► FIXING METAL FOOTING CAPS & LAYING OF FLOORING SHEET LAYER



STEP 2
 ► FIXING OF BASE FRAMING & SLIDER MAIN SUPPORTING PANELS.



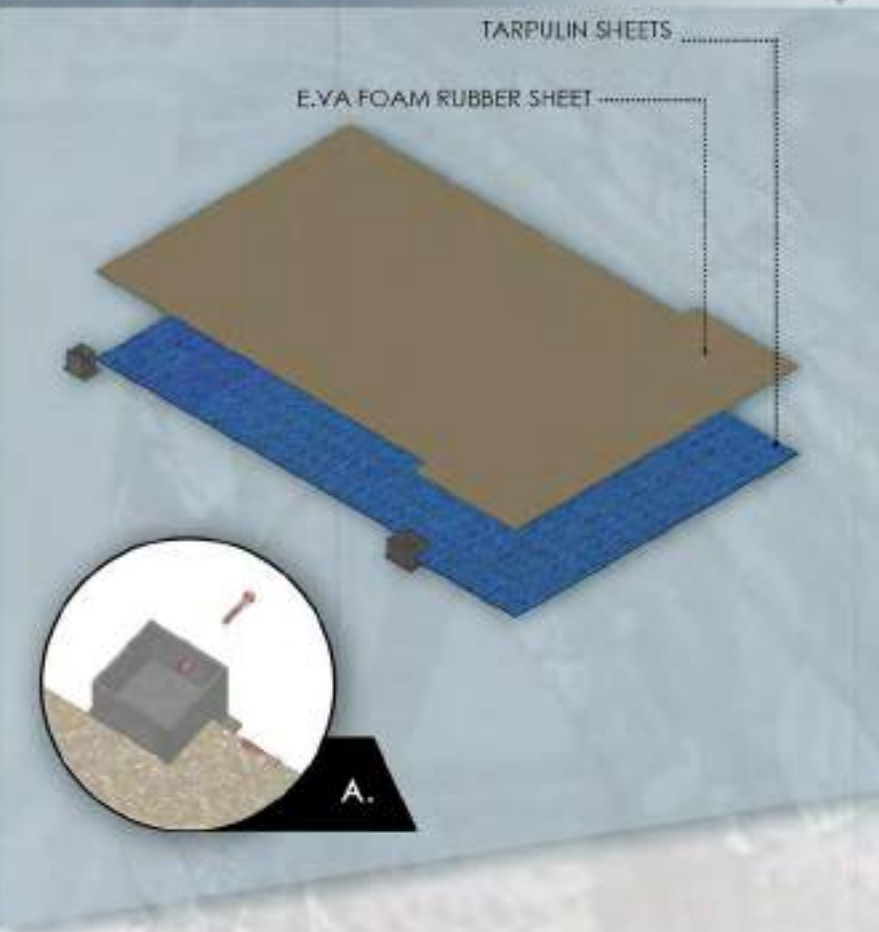
STEP 3
 ► OPENING OF SLIDER PANELS & ITS FIXING WITH NUT BOLTS.



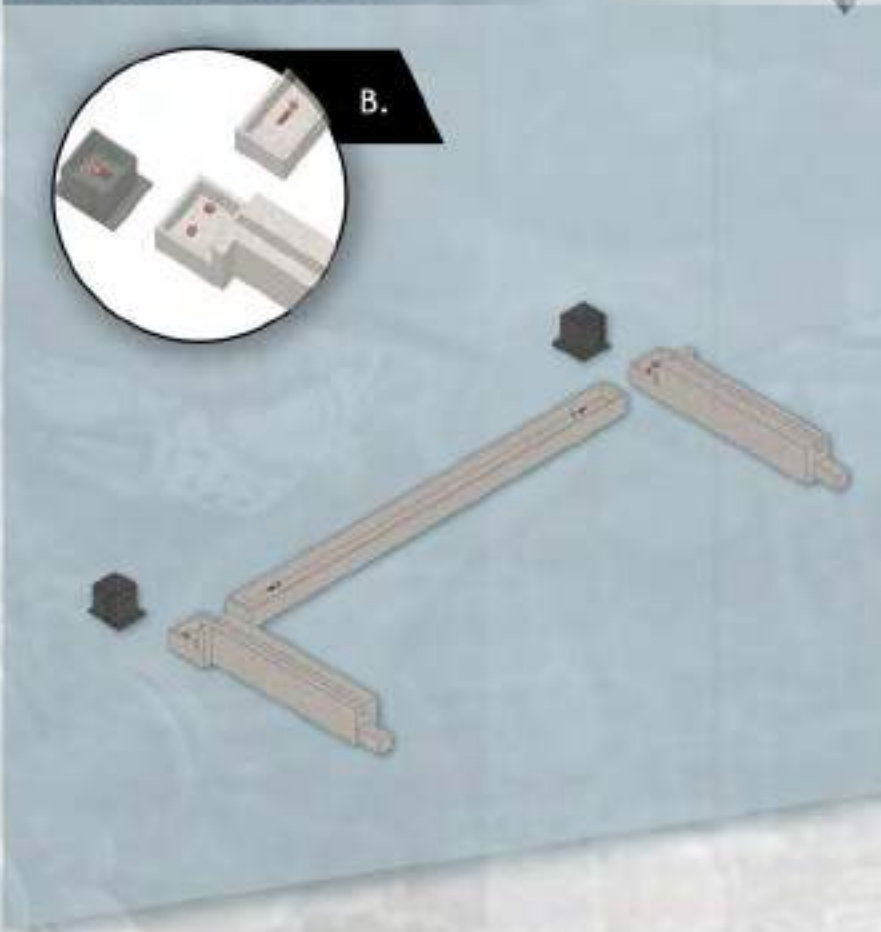
STEP 4
 ► FIXING OF ROUND SLIDING RING WITH BASE FRAME.



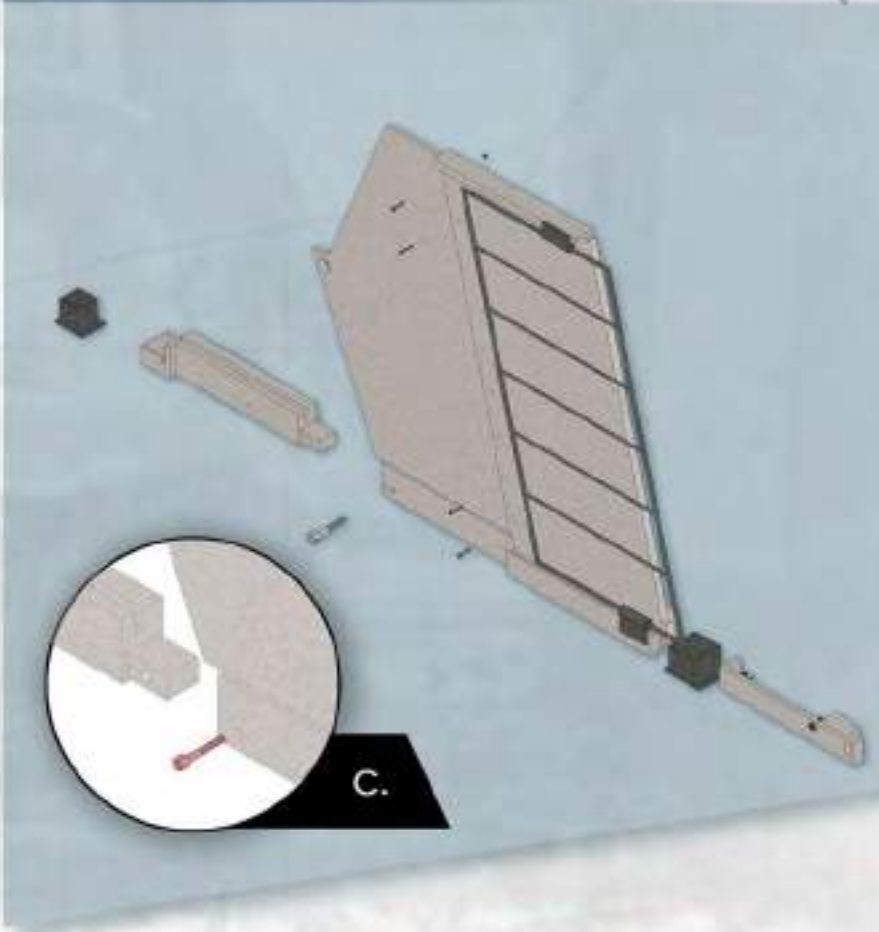
JOINERY INSTALLATION



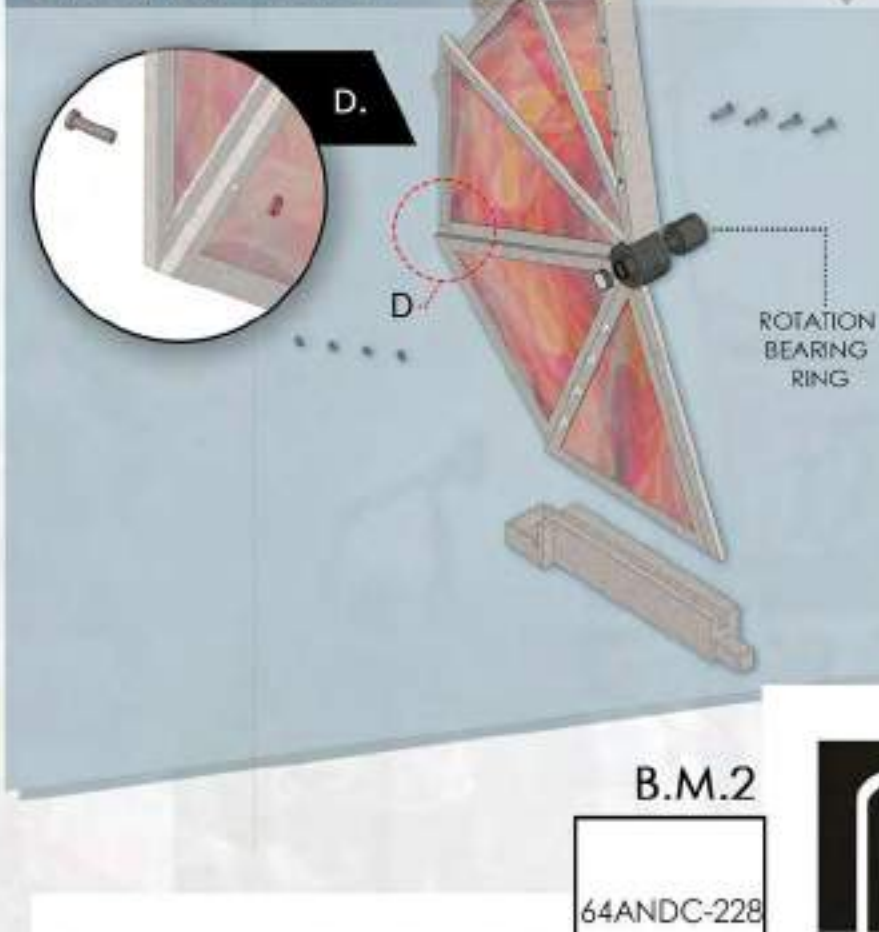
JOINERY INSTALLATION



JOINERY INSTALLATION

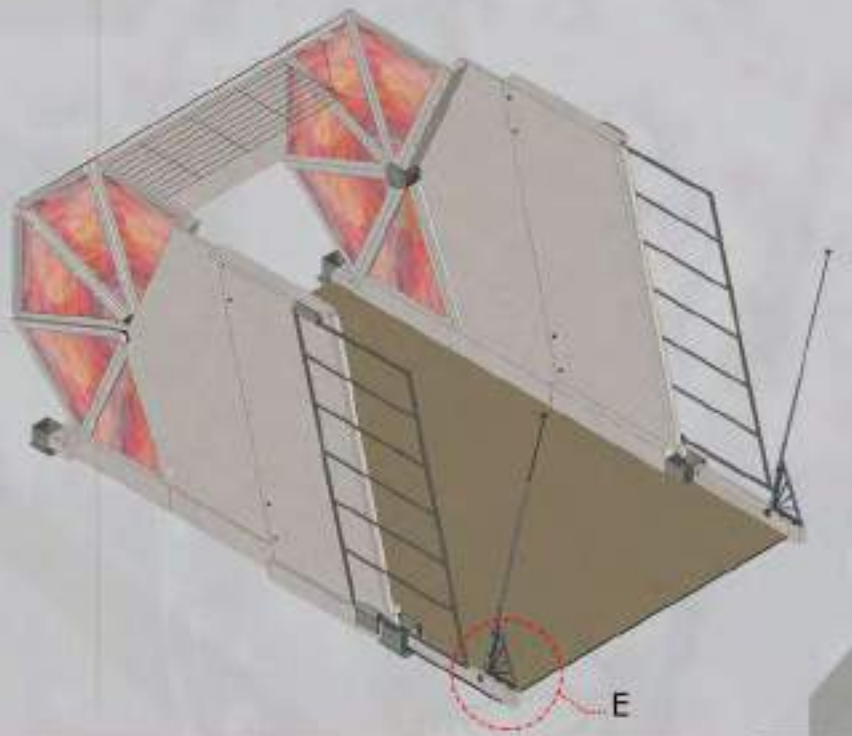


JOINERY INSTALLATION

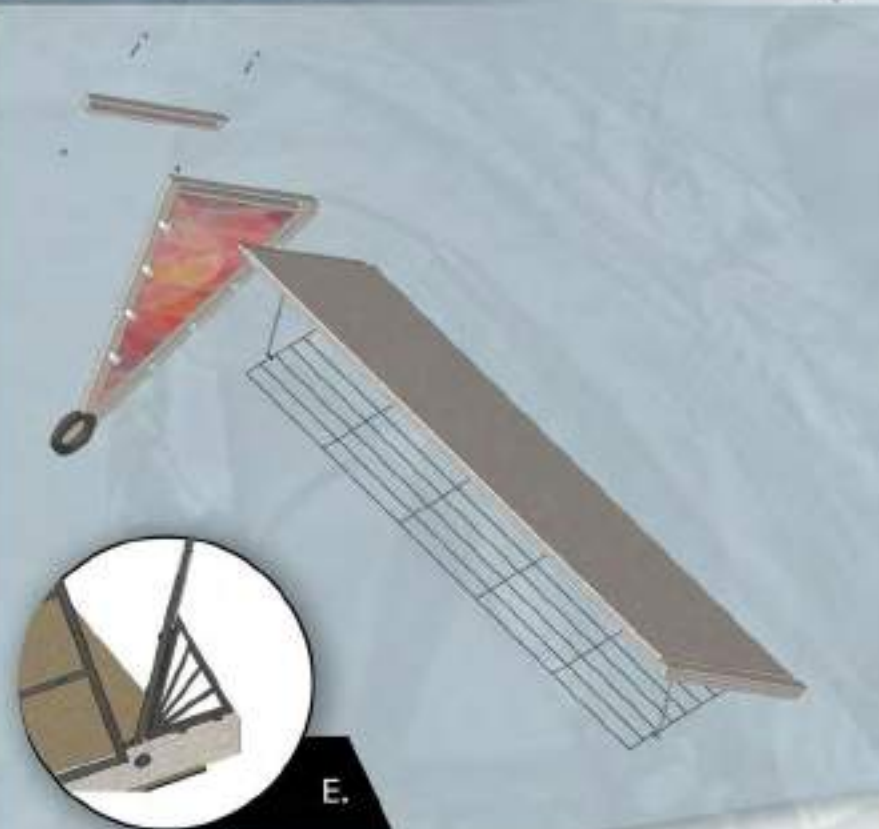


STEP
5

► FIXING OF BACK PASTIC RECYCLED PANELS TO CIRCULAR PANELS

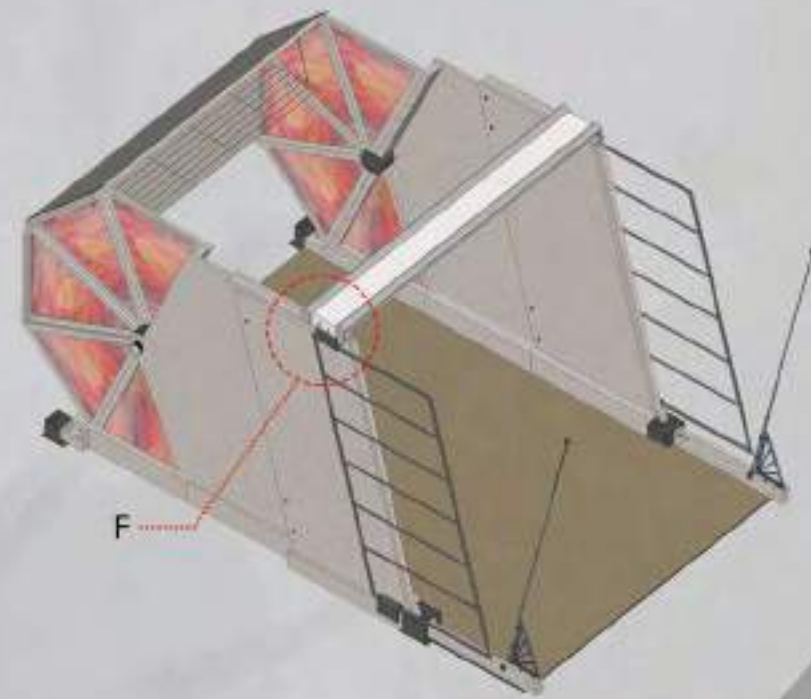


JOINERY INSTALLATION

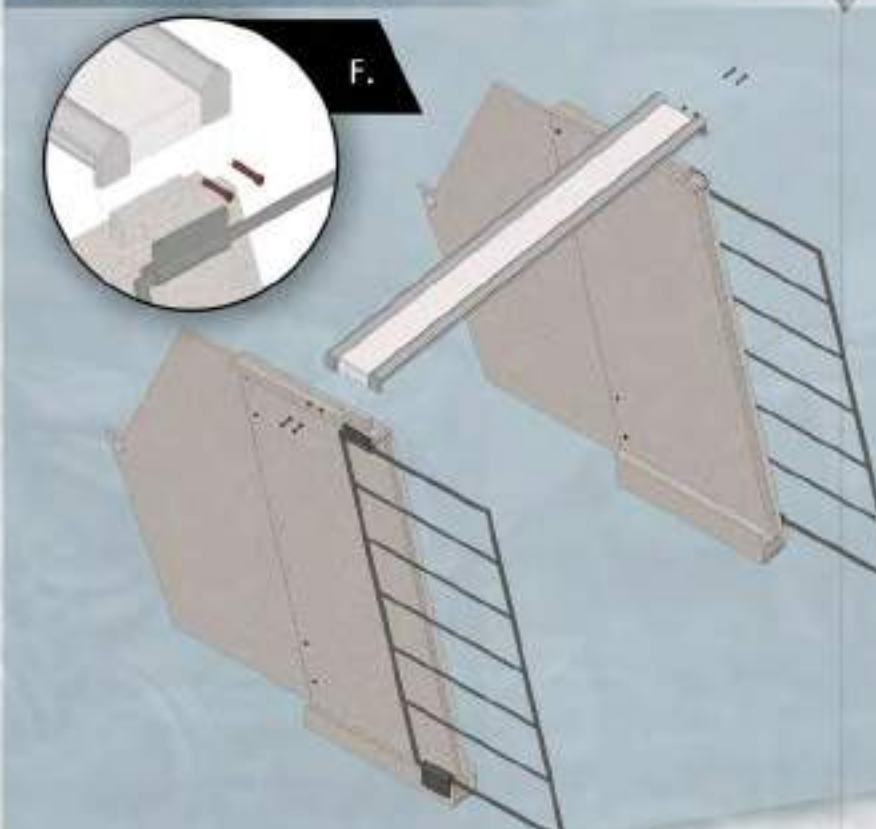


STEP
6

► FIXING OF TWO SIDED SHUTTER ROLLER ELEMENT TO MAIN FRAMES.

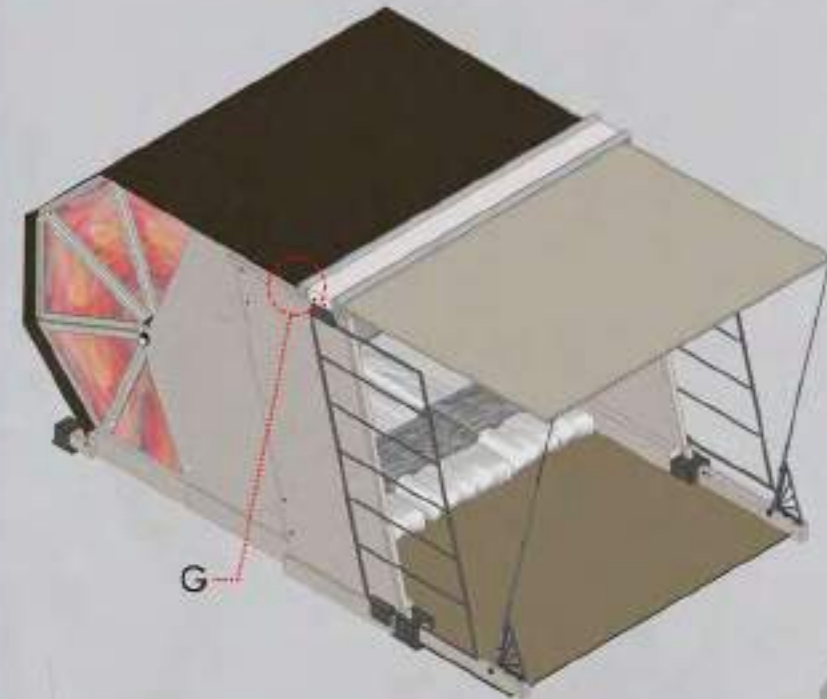


JOINERY INSTALLATION

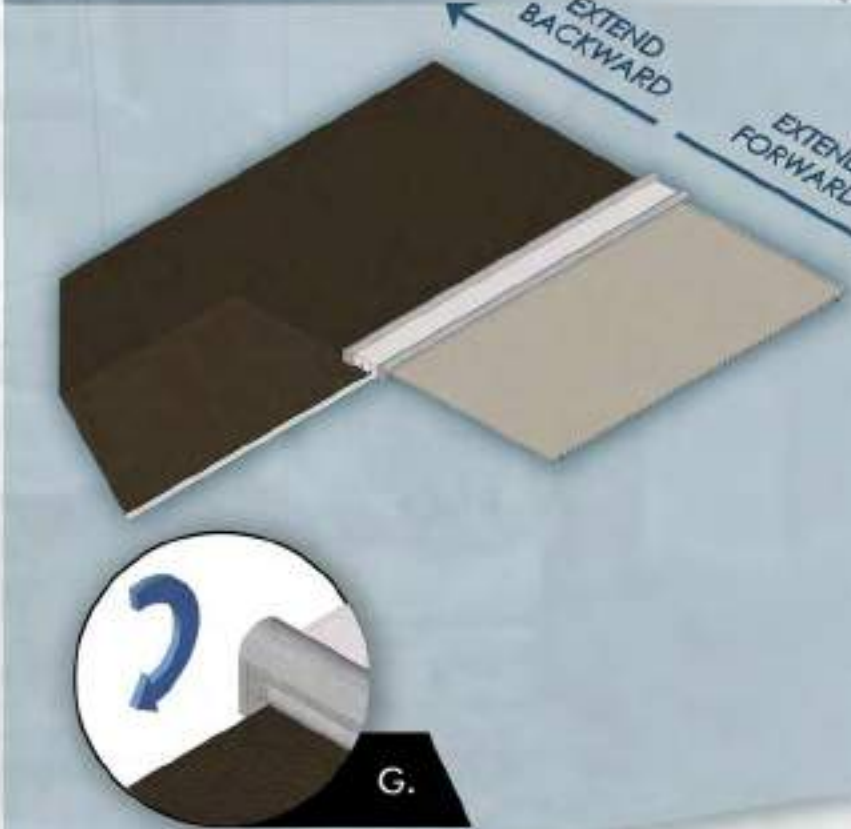


STEP
7

► PULLING OF VINYL FABRIC ROLLER SHUTTER COVERING MODULE ROOF AND BACK SIDE.

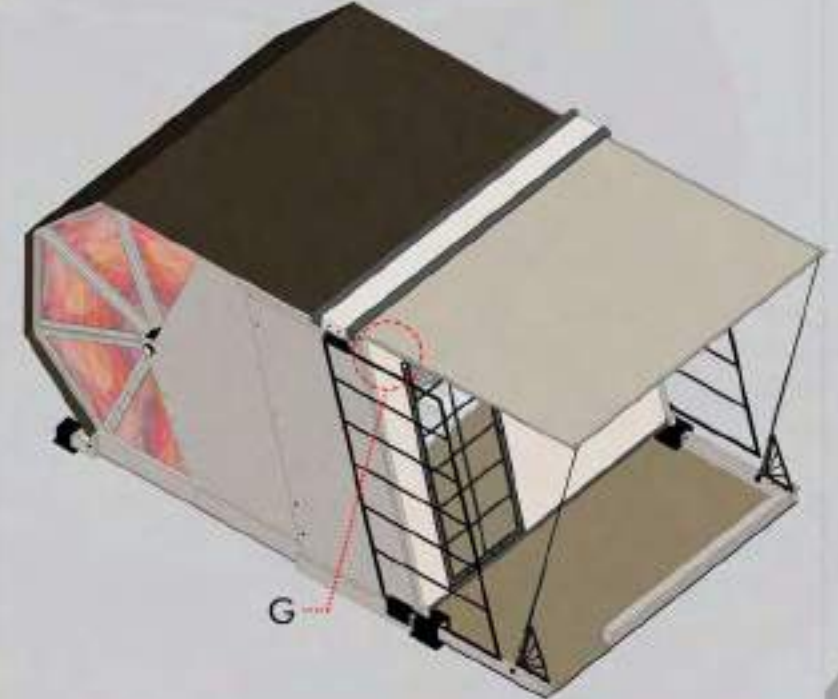


JOINERY INSTALLATION

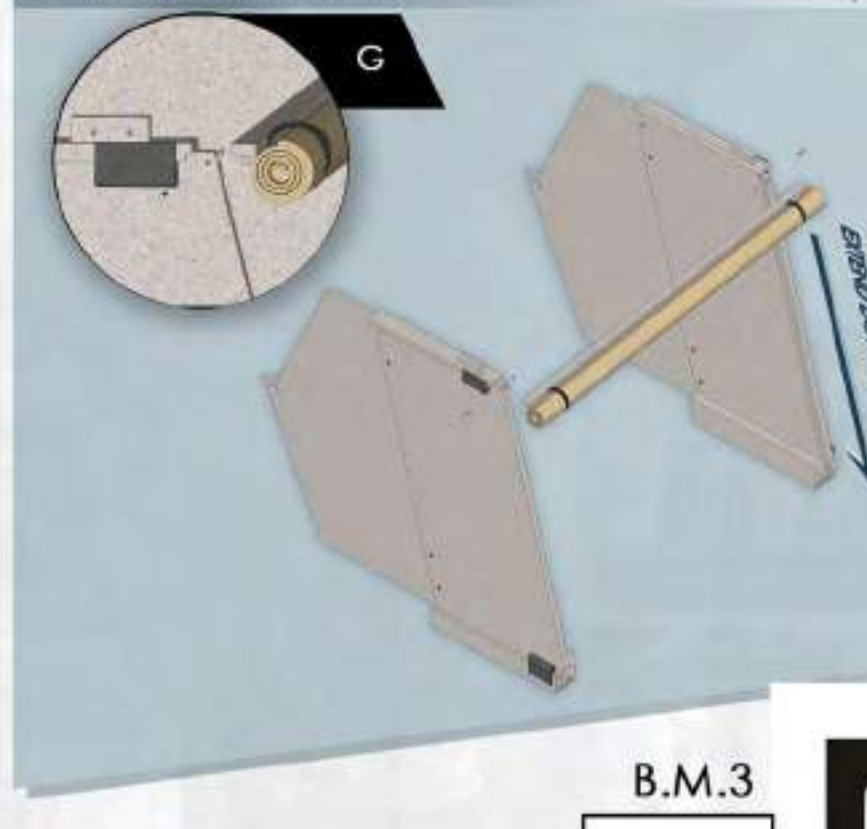


STEP
8

► ROLLING DOWN VINYL FABRIC ROLLER USED ON FRONT FACADE AS A OPENING.



JOINERY INSTALLATION



B.M.3

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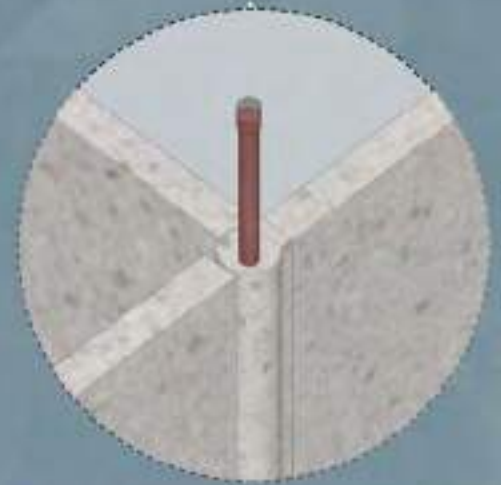
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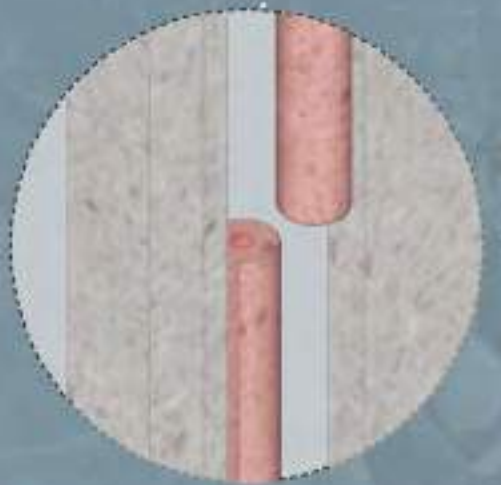
Toilet

Louvers are created in the RPS door panel providing both ventilation & circulation

Recycled plastic panels are used as they resist moisture and are stable in aspect of privacy and against weather .



Steel rod is inserted to fix the position of two panels

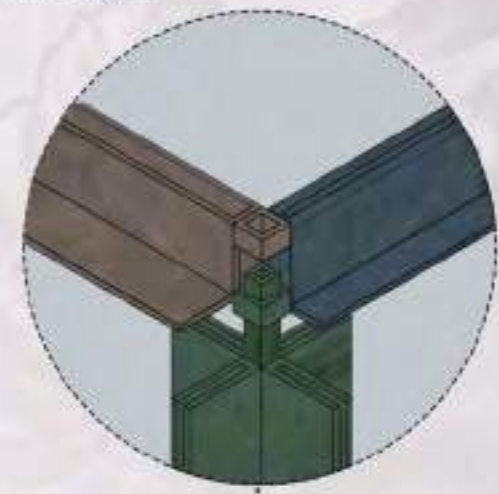


Rotating hinge is provided to easy handling & folding of panels

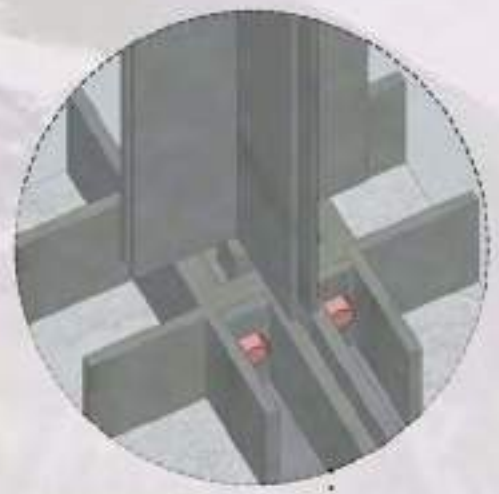


To stabilize the panels steel rod is inserted in footing plate which is fixed by screw.

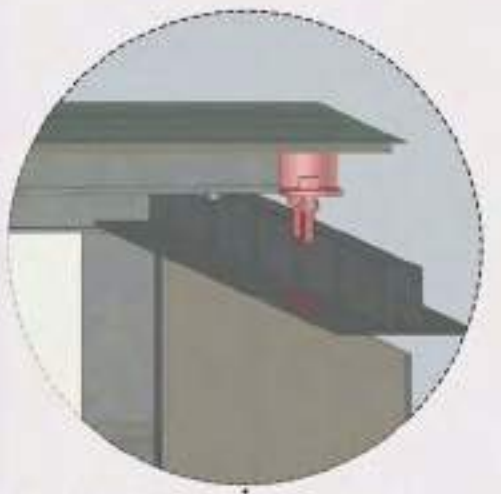
Kitchen



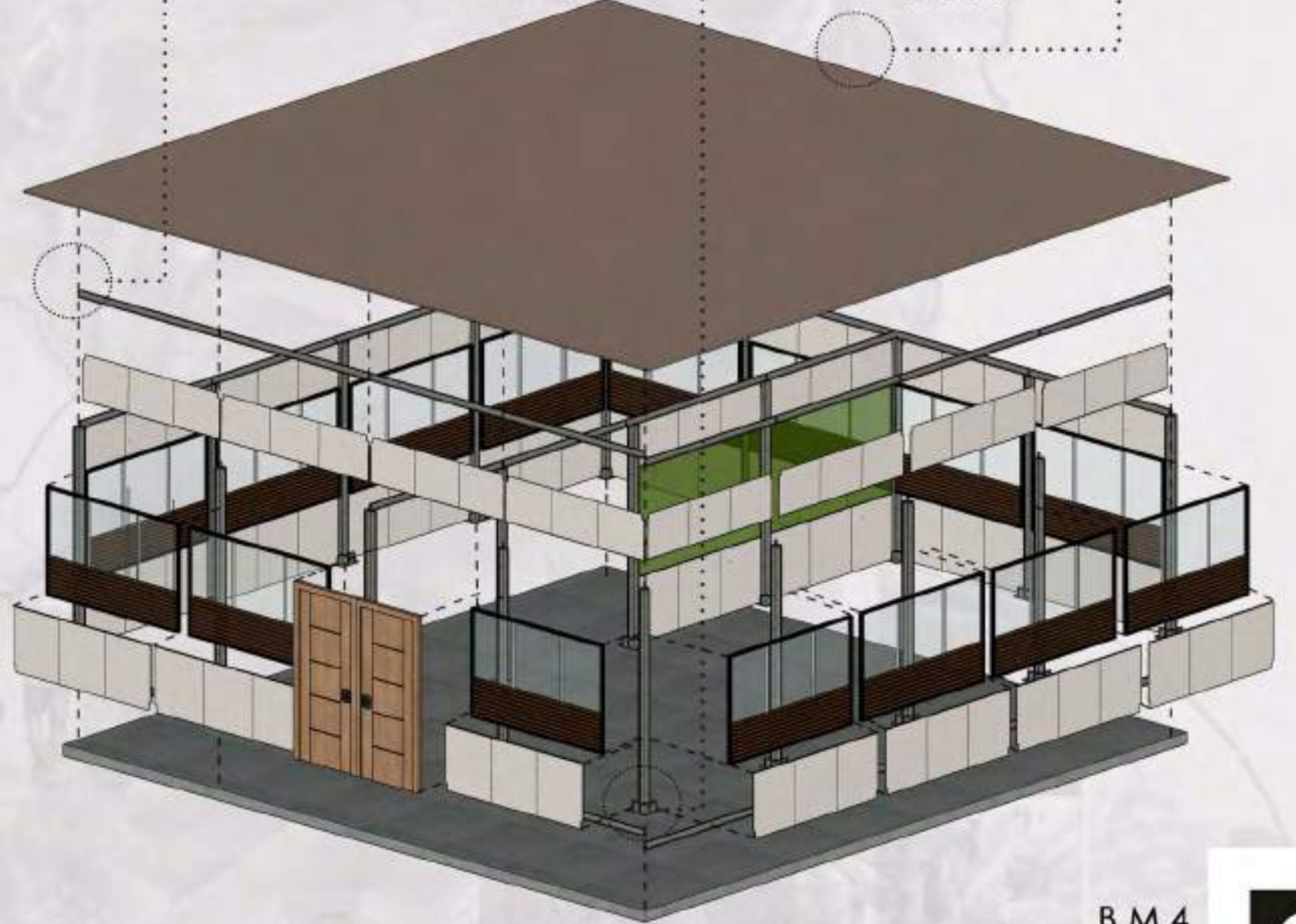
Interlocking system is used to fix two oxidised aluminium section



At base level two aluminium section are connected with nut and bolt



At roof, rafters and aluminium section are connected by screw and bolt



For aesthetic and ventilation purpose glass & louvers are provided in window. Interlocking system is used to fix two oxidised aluminium section

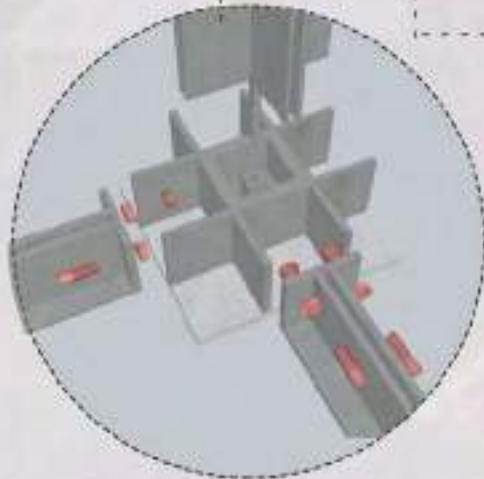
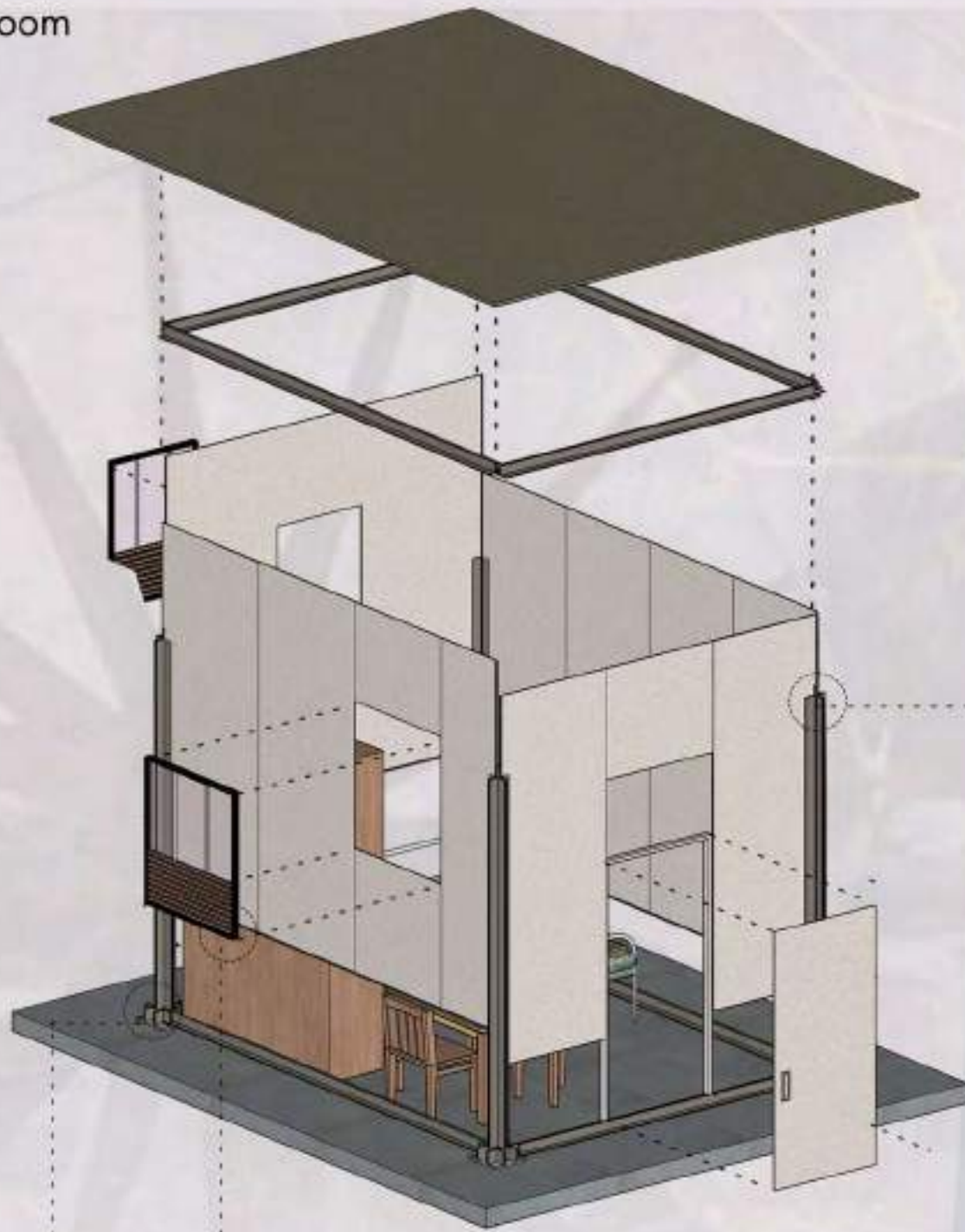
B.M.4

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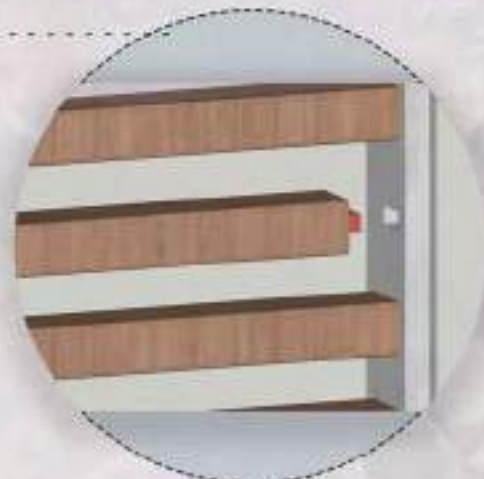
ANDC 2021-22



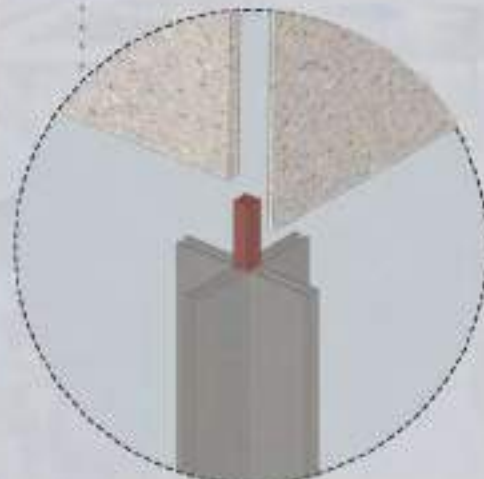
First Aid Room



At junction two aluminium sections and one vertical section are connected to baseplate with nut and bolt and tenon joint respectively



Tenon joint is used to connect wooden struts and wooden window frame

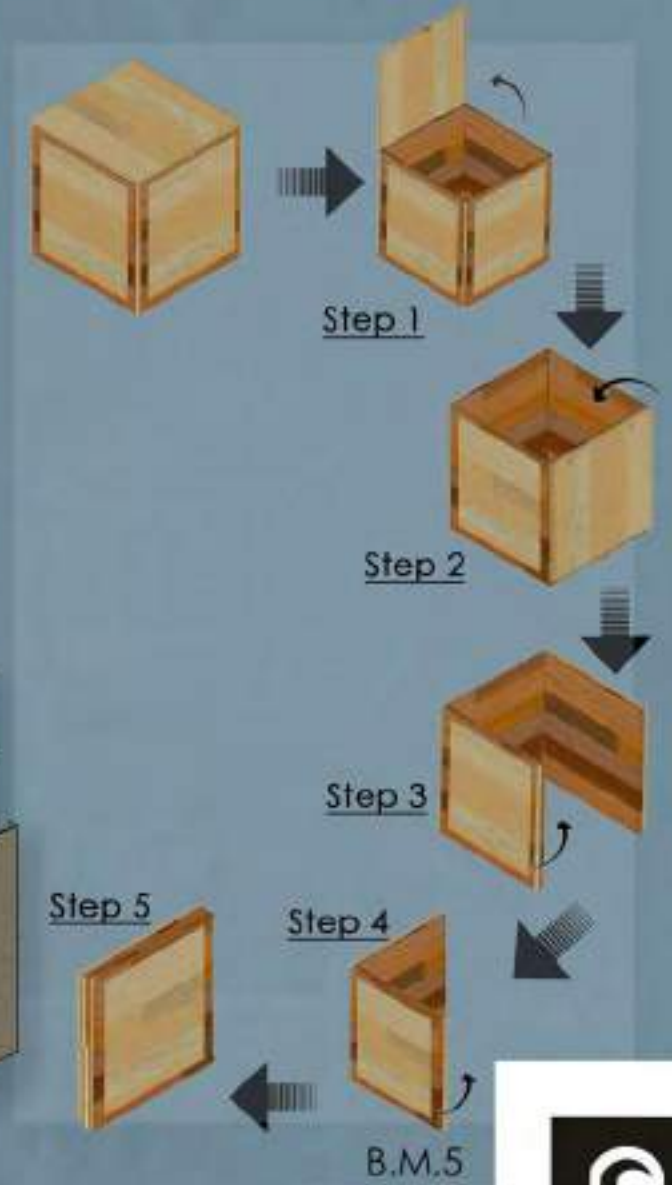
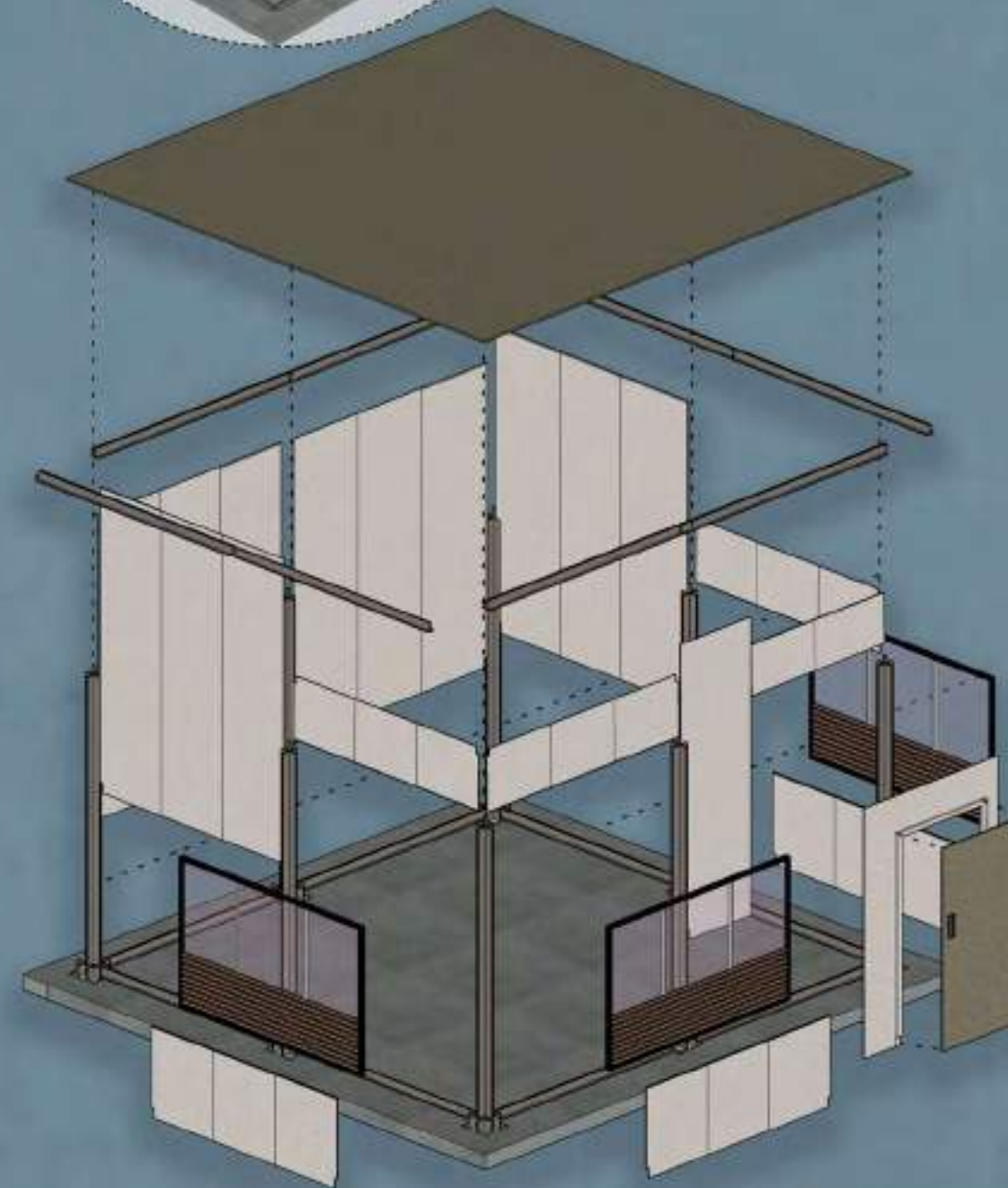
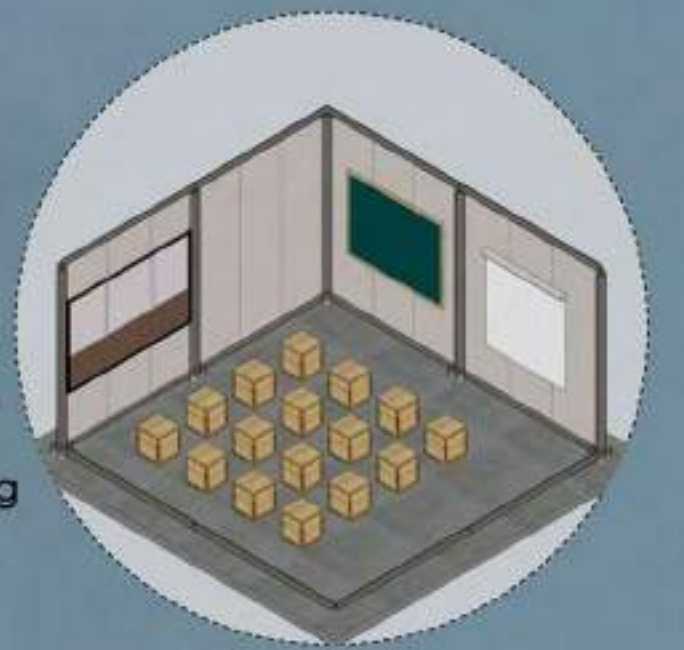


Panels are slide in aluminium section giving chance to subtract or add the no. of structure

Children Room



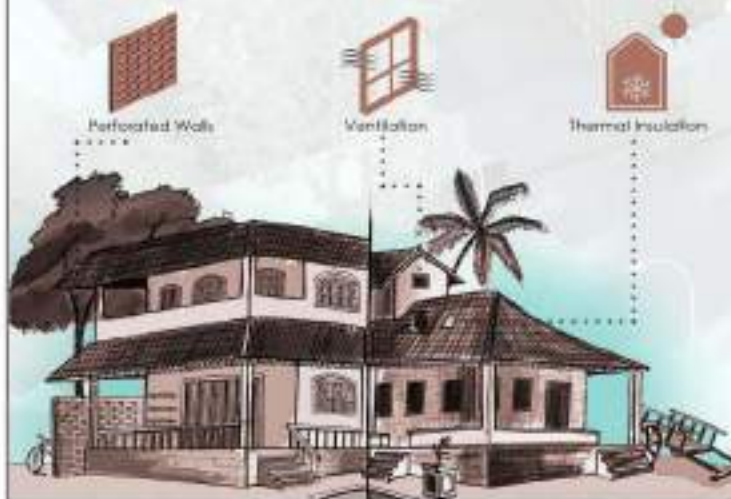
The children area is designed for children teaching in day time & recreational space in evening. Two specific types of arrangements are given of same furniture which are functional according to their activity needs.



BRIEF INTRODUCTION

The construction industry has a major influencing role in the impact created on environment due to human activity. An opportunity to direct this impact towards a positive direction can be paved by use of alternative sustainable materials and design concepts and should be availed by not only the Government bodies but rest of the other organizations as well. Parallel to this, such design implementations should be utilized for the EWS and LIG in urban areas, wherein limited spaces have created a niche, or in remote located locations with cost, availability and access to new/revamped resources are the challenges presented.

The brief thus calls for two adaptive design options comprising of a total of 30 sqm carpet area, single or double storeyed structures befitting the selected geo-climatic zone and environment. Incorporation of modern designs and sustainable or locally available materials is to be made with the successful vernacular strategies pre-existing in the selected area. The design should be such that the amalgamation of modern and vernacular strategies should result in solutions of any ventilation, lighting issues faced currently while also maintaining cost-effectiveness. The design must also showcase capabilities of being self-renewal along with flexibility and utilisation of reused or reusable materials.



AIMS



To present vernacular concepts with potential to adapt the changing requirements in design.



Provision of economical and affordable design for EWS and LIG section.



To create a climate responsive design for selected geo-climatic zone.



Design a space with modern, sustainable and vernacular techniques.



To create a design that integrates zero-waste approach.



Design a space that integrates green principles.

HIGHLIGHTING IMPORTANT WORDS IN THE BRIEF

- **GRASSROOTS:** This year's NASA theme "GRASSROOTS" which basically means bringing in details and connecting design with the locals in a deep level.
- **COMBATING CLIMATE CHANGE:** Specifically using the climatic data of a region or place to determine the design parameter and therefore coming up to an exclusive solution.
- **EWS:** Economically Weaker Sections. (Having an annual income of about 3 lakhs)
- **LIG:** Lower Income Group. (Having an annual income of about 6 lakhs)
- **PROMOTING LOCAL IDENTITIES:** Giving more importance to the locally used elements and materials.
- **COST-EFFECTIVE HOUSING:** Being a project under PMAY-U cost effectiveness is a major factor contributing to our design.
- **ADAPTIVE VERNACULAR DESIGN:** Adapting the existing vernacular Design Strategies and utilising it in a modern way.
- **MUTABLE:** liable to change.
- **RESOURCE-CONSCIOUS SOLUTIONS:** Finding design solutions based on the availability of nearby materials and design strategies, looking it from the local's perspective.
- **ZERO WASTE APPROACH:** Promoting zero wastage of materials in our design.
- **ECOLOGICAL PRACTICES:** Approaching green and sustainable service options such as rainwater harvesting and low cost/green/renewable energy options.

SCOPE



The ongoing climate change issues must be addressed as a major concern in the selected area.



The diverse culture of the zone to be reflected in the design.



Provision of refined dwellings for EWS and LIG.



Utilization of new green materials and technology.

OBJECTIVES



Inclusion of traditional strategies and locally available resources.



Ensure participation and utilization of the local skill sets of people.



Implementing sustainable and green strategies with a mix of vernacular practices.



Consider the impact of the design on nature and human needs occupying the dwelling.

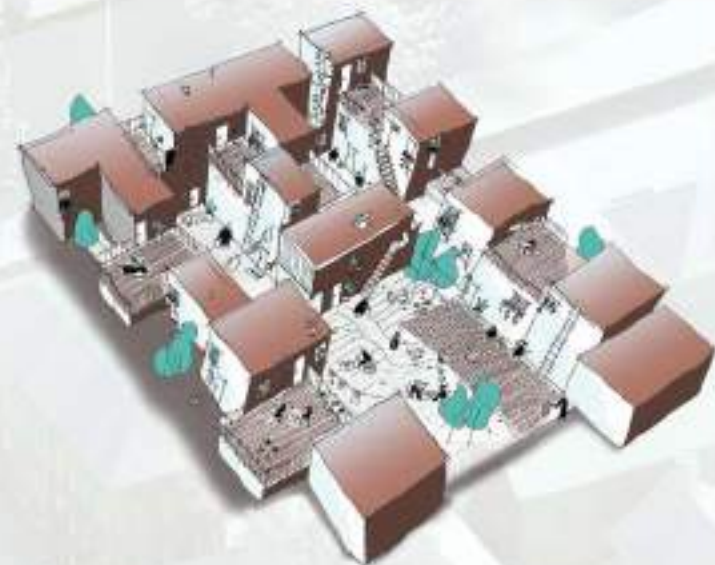
EWS AND LIG GOVT. CONSIDERATIONS

EWS

Complies of households under annual income of Rs. 3 lakhs and no family member can own a "pukka" house in any part of the country. The family members should not avail any housing scheme from the government and should not benefit from any PMAY-CLSS subsidy from Private Lending Institutions (PLI). If a family applies for EWS housing and gets selected, they will be allocated one house. The carpet area for houses should be 30 sqm respectively.

LIG

Complies of households with annual income ranging from INR 3 lakhs to 6 lakhs. Under CLSS (EWS/LIG), interest subsidy of 4.50% is provided on a loan of up to INR 4 lakhs. The tenure of this loan has been increased to 20 years to enable easy repayments. The carpet area of houses should be 60 sqm for LIG, respectively. The beneficiaries can take advantage of this program by building a house of larger area, whilst the interest allotment remains limited to INR 6 lakhs only.



PMAY-U

• "Pradhan Mantri Awas Yojana (Urban) - Housing for All" implemented from 2015 provided central assistance to implementing agencies for provision of houses to all eligible families by 2022.

• It will be implemented as Centrally Sponsored Scheme excluding the component of credit linked subsidy which will be executed as a Central Sector Scheme.

• A family will be eligible for availing only a single benefit under any of the existing options i.e., sum redevelopment with private partner, credit linked subsidy, direct subsidy to individual beneficiary and affordable housing in partnership.

• Mission with all its components has become effective from the date 17.06.2015 and will be implemented till 31.03.2022.

SCHEME DETAILS

• Credit linked subsidy will be provided on home loans taken by eligible EWS/LIG for acquisition, construction of house.

• Housing Finance Companies would be eligible for an interest subsidy at the rate of 6.5% for a tenure of 20 years or during tenure of loan whichever is lower.

• The credit linked subsidy will be available only for loan amounts up to Rs. 6 lakhs and additional loans beyond Rs. 6 lakhs will be at a non-subsidized rate.

• Credit linked subsidy would be available for housing loans utilized for new construction and addition of different rooms to existing dwellings as incremental housing.

• The carpet area of houses being constructed under this component of the mission should be upto 30 sqm and 60 sqm for EWS and LIG respectively. In order to avail this credit linked subsidy.

• CNAs (Central Nodal Agencies) will be responsible for ensuring proper execution and monitoring of the scheme, putting in place appropriate mechanisms for the purpose.



SITE SELECTION CRITERIA

The Site Selection Criteria is done on the basis of the Decision Matrix that is to identify each of the climatic zones with respect to its climatic analysis and design alternative. The site thus selected has covered all the points as addressed in the brief which are Technical, Financial, Environmental Feasibility and Social Acceptability.

Giving a brief table of all of these below, a comparative analysis is brought up that helps one choose the most suitable site. The site chosen provides us with not just challenges of environment but the need of local as well, thus giving our site an extra challenge to meet its conditions specific to the climate.

IDENTIFYING THE CLIMATIC ZONES

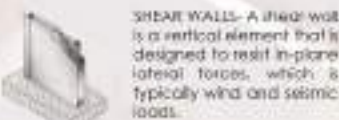
There are generally 5 climatic zones in India, Hot and Dry, Hot and Humid, Temperate, Composite and Cold Climates respectively. A brief comparative analysis table has been given identifying each of the climates major climatic analysis. Based on this data, we find that the most challenging out of all the climates, from climatic and design strategical perspective, Hot and Dry climate provides us with most challenges.



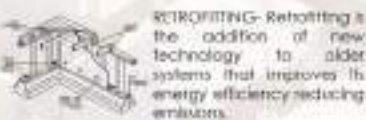
CLIMATE COMPARATIVE ANALYSIS

CLIMATIC ZONE	MEAN TEMPERATURE (°C)				HUMIDITY	PRECIPITATION	SOIL TYPE
	SUMMERS		WINTERS				
	HIGH	LOW	HIGH	LOW			
HOT AND DRY	40-45	23-30	5-25	0-10	VERY LOW 35-40%	LOW <80mm/yr	Sandy Soil
WARM AND HUMID	30-35	25-30	25-30	30-35	HIGH 70-90%	HIGH >1200mm/yr	Saline and Alkaline Soil
COMPOSITE	33-40	27-32	10-25	4-10	MEDIUM 30-50%	HIGH <1300mm/yr	Alluvial Soil
TEMPERATE	30-34	17-24	27-33	16-18	HIGH 40-85%	HIGH >1000mm/yr	Alluvial, Laterite and Red Soil
COLD	17-24	4-17	-7-8	14-0	LOW 10-50%	LOW <200mm/yr	Mountainous Soil

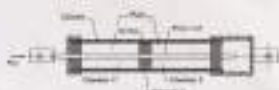
SEISMIC DESIGN STRATEGIES



SHEAR WALLS - A shear wall is a vertical element that is designed to resist in-plane lateral forces, which is typically wind and seismic loads.



RETROFITTING - Retrofitting is the addition of new technology to older systems that improves its energy efficiency reducing emissions.



DAMPERS - The purpose of dampers is to dissipate, restrain or depress the effect of energy or vibration produced during the earthquake.

BASE ISOLATION - Base isolation is a collection of structural elements that substantially decouples a superstructure from its substructure.

HOT & DRY



Greater perimeter to area ratio, greater is the heat gain.

Greater PJA ratios to be applied in certain cases to include features like vegetation and water bodies.



WARM & HUMID

If a site has multiple buildings, they should be arranged in ascending order of their heights and be built on the stilts to allow ventilation.

Staggered layout helps in accentuating wind movement.



take forms in the wind direction of prevailing wind can alter the wind movement pattern for low-lying buildings behind them.



Place buildings at a 30 or 45 degree angle to the direction of wind for enhanced ventilation. Form can be staggered in the wind facing direction also to achieve the same result.



Preferably pitched roof to allow heavy rain runoff, large overhangs protects the walls and openings.



Designing of green walls, providing protection against the solar radiant heat.

NATURAL DISASTERS

CITIES	LANDSLIDE	EARTHQUAKE PRONE	DROUGHT	FLOODING
MAHARASHTRA	YES	YES	NO	YES
ASSAM	YES	YES	NO	YES
ANDHRA PRADESH	YES	YES	YES	YES
GUJARAT	NO	YES	YES	YES
KARNATAKA	YES	NO	NO	NO
JHARKHAND	NO	NO	YES	NO
BIHAR	YES	YES	NO	NO
LADAKH	YES	YES	NO	NO

COLD



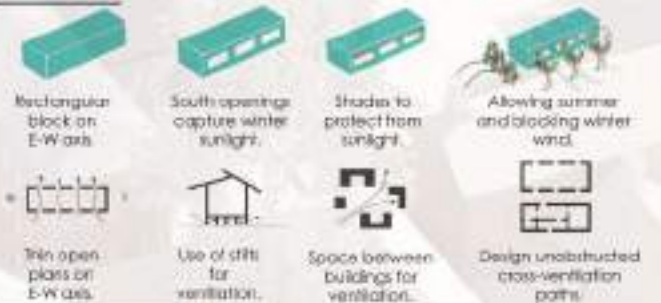
Makes use of passive design principles to provide heat inside the building.

Makes use of passive design principles to provide heat inside the building.

Doors and windows between sunspace are open during the day.

Trombe Walls reduce the need to heat the building using traditional methods.

TEMPERATE



Rectangular block on E-W axis

South openings capture winter sunlight.

Shades to protect from sunlight.

Allowing summer and blocking winter wind.

Thin open plans on E-W axis

Use of stilts for ventilation.

Space between buildings for ventilation.

Design unobstructed cross-ventilation paths.

DECISION MATRIX

LOCATION	Material	Technical Feasibility	Financial Feasibility	Environmental Feasibility	Social Feasibility
LADAKH	STRAW CLAY BRICKS	YES	YES	YES	YES
	RAMMED EARTH THERMAL BLOCKS	YES	YES	YES	YES
GUWAHATI	ICRA	YES	YES	YES	NO
	MUD	YES	YES	YES	NO
	BAMBOO	YES	YES	YES	YES
AMRAYATI	MUD	YES	YES	NO	YES
	PAIANYRA TIMBER	YES	YES	NO	YES
KOTIBANAL	WOOD	NO	YES	YES	YES
	STONE	NO	YES	NO	YES
	SLATE	YES	YES	NO	YES
RAIPUR	REDLAND CLAY	NO	YES	YES	YES
	MUD/ COW DUNG	NO	YES	YES	YES
	BAMBOO	NO	YES	YES	YES
KOCHI	LATERITE STONE	YES	YES	YES	YES
	WOOD	YES	YES	YES	YES

Legends : Technical Feasibility (Green check), Financial Feasibility (Yellow check), Social Feasibility (Blue check), Environmental Feasibility (Red check)



LOCATION

Site: Mattancherry
District: Kochi District
State: Kerala
Latitude: 9.5578° N
Longitude: 76.2557° E

Mattancherry is located near the coastline to the Periyar River. Fishing communities here are found in abundance and are seen to be a large part of this area.



SITE APPROACH

Mattancherry is located within a close proximity to Kochi. People can access various transportation facilities to reach their desired destination.



CLIMATE

Mattancherry is only 4m above the sea level. Here, the wet season is overcast, the dry season is partly cloudy, and the climate is hot, humid and oppressive throughout the year.



WIND

The wind experienced at any given location is highly dependent on local topography and other factors. The average hourly wind speed in Mattancherry experiences significant variation over the course of the year. The windiest month here is June, with an average hourly wind speed of 10.5 miles per hour.



SOIL ANALYSIS:

The soil found here is mostly Sandy Loam soil, which consists mainly of recent sediments (Alluvium, Terric, Brown sands etc.). Hydromorphic saline soils are also found in the areas surrounding the backwaters. The major rock types are Archean-basalt dykes, Charnockites and Gneiss.



MAP ANALYSIS



CHALLENGES



Flood prone

Mattancherry has been worst affected with water from drains and sewers entering houses during floods, affecting the lives of the people living there. During the 2018 floods the area received 2344.3 mm of precipitation, instead of the average 1649.55 mm. Floodwater was between 3-4.5m deep that killed more than 410 people and forced thousands to evacuate their houses.



Slope

The land has very gentle slopes of 3km width with 4m variation that makes the valley formation very short and shallow thus allowing water to flow in a meandering path as can be seen in the canals. The EWS structures of the area are usually located in lowest ground of the slope receiving the maximum waterlog.



Climate

Climatic conditions play a vital role in Mattancherry with average annual high temperature, heavy precipitation and SW prevailing winds. Design elements that not only satisfy the climate responsive design but also keep in mind the climate change affecting the environment.



Pollution

Mattancherry is the most poorly populated area providing insufficient urban services resulting in the need of environmentally responsive design that is efficient enough to not contribute to the preexisting carbon footprint of the surroundings.

NEIGHBOURHOOD CONTEXT



SITE SELECTION AND JUSTIFICATION

Mattancherry is a water-bound island towards the south-west of the mainland Kochi. The town has had a continuous colonial presence for centuries. It has a unique and rich mix of nationalities and ethnicities, which have been drawn to this area owing to the trade opportunities. The INTACH report of 1986 called for the immediate preservation of the architecture in the area, which in turn negatively affected the area from progressing. Kochi became the first urban metropolitan city of Kerala, which led to fast development, which increased the living costs. The progress of Mattancherry and other islands slowed down. The difference in the living costs in these adjacent places lead to migration of the EWS and UG to Mattancherry, while the upper classes stayed closer to the city.



Mattancherry has a blend of at least 5 different communities and settlements that present a wide variety of design options as well as elements to work with. All the communities have their own unique identity.



Mattancherry is heavily populated due to the sudden rise in population without any development in housing sector. The proximity to the coastline brings in excess moisture and flooding due to the drainage blocks.



The chaotic and unplanned living conditions of existing fishing communities and EWS/UG population calls for reform and planning.



The area is extremely vulnerable to island flooding as well as numerous drainage blocks in the periphery adding to the problem of flooding and the main challenge is to direct proper drainage.



HUDCO TROPHY 2021-22

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ABOUT MATTANCHERRY

Located less than 10 kms from the heart of Kochi, lies Mattancherry, a town popularly known for its spices, tea and rice bazaars. This peninsular region is flanked by various settlements like the Jews, Konkani, Gujarati, Jain and Marathi. Mattancherry also gives a peek into the lifestyle of the ruler of Kochi.

The name Mattancherry comes from 'Anchery Mattom', which the foreign traders then pronounced as 'Matt-Anchery'. The city has been the centre of attraction for many people for its great trade opportunities.

Landmarks like the Mattancherry Palace, Synagogue Church, the Ammannokoil Temple, the Bazaar Street and the Jew Street along with the buildings of the colonial era have marked their importance in the town. Mattancherry is the most vibrant spot in Kochi, which is also evident in its brightly painted walls. Now, it has transformed into a fusion coastal enclave where different cultures, beliefs, customs, and faiths sprawl together in harmony.



JEWISH SETTLEMENT

Many believe that Jews arrived in Kerala after the destruction of the Second Church of Jerusalem in 70 CE. The main cause for growth of this settlement was the occupation, creating many spaces for their trading activities. This also derived house forms with shops at ground floor and houses at 1st floor. The buildings are arranged linearly in a staggered manner with less gathering space inside the house.



GUJARATI SETTLEMENT

Gujarati settlement had traders who migrated to Kochi in the 17th century. The major social factors like religion, safety, security, the need for privacy and occupation influenced house form and settlement pattern in this community. Houses are arranged around a courtyard which is used for gathering and common activities. The Gujarati houses in Mattancherry are a reflection of their culture which has many similarities with a typical Gujarati house.



KUTCHI MUSLIM SETTLEMENT

Kutchi Muslims migrated to Kochi in the 19th century that has contributed much to the social and economic life of Fort Kochi and Mattancherry. Quran laws and principles have profound influence on overall planning aspects of this settlement. The public places like mosques, shops etc. are located in the outer boundary and the houses at the center of the settlement. The features include narrow streets, small window openings.



GOUDA SARASWAT BRAHMIN SETTLEMENT

They migrated in the period between 13th to 16th century. They established a temple in the late half of 14th century with the help of Raja of Kochi. The major development occurred around the Konkani temple established in 16th century and this is the main social space in their settlement where they meet for common functions. Religion plays a wide role in determining the form and character of each space whereas the street is a major living space.



TAMIL-BRAHMIN SETTLEMENT

Tamil Brahmins migrated to Kochi when the king invited them for conducting royal religious functions. This settlement is a multiple family settlement with linear house pattern and the layout is guided by influence of status of community, association with the temple and their patronage of the royal. The street, which is strictly pedestrian, acts as an extended living space. They give more importance to interaction within the community and prefer to live in groups for safety and security reasons.



FLOOD SCENARIOS

Since the great flood of '99 occurred when the Periyar River in Kerala state of India flooded in the month of July 1924, Kerala in general has been witnessing floods quite often due to the incessant rains almost 3-4 times every year. Last year Kerala in specific has witnessed rainfall almost every month. Scores of residential areas lying close to the backwaters around Kochi were affected by floods following the high tide. The five districts that get affected the most due to floods are Wayanad, Malappuram, Thrissur and Kottayam. It has been noted according to reports that 14.52 percent of the state's total area was flood-prone. The year 2021 has been the rainiest in Kerala in the last six decades, having received 110 percent excess precipitation from the north-west monsoon.

ARCHITECTURAL TYPOLOGIES IN MATTANCHERRY

Four types of house forms have been found here, all derived from the basic traditional house form of Kerala-Nalukettu, which has a courtyard in the centre which is used for various purposes. They are Street Forms (row houses arranged linearly along the street), Bungalow Forms (individual bungalows with landscaped area and sea view), Row House Forms (away from the street, but connected through inner streets), Court Yard Forms (Many Houses arranged around a courtyard).

House forms are mostly rectangular with a small inner courtyard. This form is derived from the basic Nalukettu house form of Kerala. Spatial arrangements are based on the cultural needs of people in different communities.

Visual connectivity in each settlement is an isolated urban unit with proper physical integration between each other. The streets are slightly distanced at an angle to maintain visual privacy of two different community settlements within a particular settlement.



Sloping roof



Arch Openings
(Jews Settlement)



Arch Openings
(Kutchi Muslim Settlement)



Brick Wall
(Gujarati Settlement)



Square Window
(Gouda Saraswata Brahmin Settlement)



Tiled Window
(Tamil-Brahmin Settlement)

BACKWATERS OF KERALA

A network of brackish lagoons and lakes lying parallel to the Malabar Coast. There are 34 backwaters in Kerala, formed by more than 300 kilometers of waterways, by the action of waves and currents creating low barrier islands across many rivers flowing from the Western Ghats.

Backwaters have a unique ecosystem where freshwater from rivers meets the seawater, but then it is kept intact by building barrages. Kuttanad, Kollam, Kasargod, Malappuram and Munroe Island are some of the Backwaters of Kerala.



CONCEPT: HARMONY IN CHAOS

The concept for this year's HUDCO design is "Harmony in Chaos". The site selected for the project is Mattancherry. It has a vast socio-cultural influence that is not only seen in its streets named after the communities, but also with perspective to locals. Its architectural style is a blend of all the communities pre-existing there since the earliest of times. Thus the use of varied elements and colours are seen in the area, defining Mattancherry in its own way. It has increased number of elements in a specific area thereby creating chaos. Taking up the challenge of creating order, we are bringing solutions to combine these elements to give a feeling of home which is called "Vasathalam" in Malayalam.

The concept involves the whole process of design, formits planning, selection of materials, to its functions.



CONCEPT WITH CONCEPTUAL SKETCHES

The conceptual sketches, graphically represent the different elements that have been observed in Mattancherry. The elements cover allowable diffusion of light into the spaces, louvers for sun-shading from harsh sun-rays. Coating of inside walls. The use of arched doors and windows and use of color is done to amplify the ambience around.

The conceptual sketches are given in stages of different elements that are to be utilised, highlighting the major elements.

The use of vaults and sloped roof in the famous Synagogue church and the Dutch palace respectively have inspired the design structure to amalgamate vernacular and contemporary design strategies that is required in this design.

Jali walls

With enhancing the aesthetic of the architecture, Jali Walls help in better lighting and circulation.



Vaults

It is a self supporting arch form that serves to cover a space with a ceiling or a roof.



Tinted glass:
Tinted glasses alter the transmission of solar energy and modifies the color.



Sloped Roof:
Sloped roofs are a common feature of buildings which can be in varied shapes.



Green Facade:
A green facade is a wall completely or partially covered with vegetation.

Skylight:
Skylights are used for the main purpose of providing aid in warming and cooling a home. In summers they allow hot air to escape whereas they insulate in the winters. They also provide natural lighting inside a home reducing energy costs.



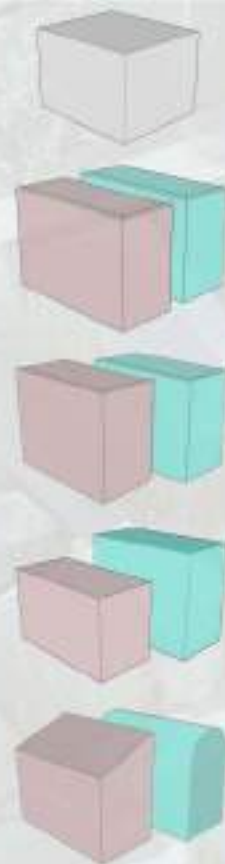
ZONING

The zoning has been done in three stages:

- First segregate the plan into three zones i.e Public, Semi-Public & Private Zones.
- Excluding vastu from specific spaces, the planning had been done, keeping function as the primary focus.
- Considering climatic conditions, the orientation of the plan has been set to obtain maximum amount of cross ventilation, utilizing full advantage of the site in all three stages.



FORM EVOLUTION



MATERIALS



CASE STUDY CONCLUSION

Case Study 1: Belapur Housing, Navi Mumbai.

Pros:-

1. These houses are an unconventional and appropriate solution to the huge population of Mumbai.
2. The project has an individual plot for future expansion.
3. The semi open spaces are private and secure.
4. Each and every house is provided with an open to sky courtyard.

Cons:-

1. No provisions were made for the common spaces in the center of each cluster.
2. Most of the houses have been destroyed or remodeled and rebuilt.

Case Study 2: Thannal Housing, Karnataka.

Pros:-

1. All the material are re-usable.
2. The houses are completely sustainable.
3. Mud walls are porous and breathable.
4. Locally available resources and labors are used.
5. The components used in building a house are entangled in the day to day lives of the inhabitants.

Cons:-

1. building a mud house won't be a smooth process.
2. The architecture might not be suitable for cold regions.
3. Insects can enter, if there are gaps in-between the walls and roof.

DESIGN OPTION I



EAST ELEVATION



WEST ELEVATION



SOUTH ELEVATION



NORTH ELEVATION



SECTION - AA'



SECTION - BB'

SCHEDULES

SCHEDULE	
First level	450 mm
landing level	1940 mm
st level	750 mm
first level	2100 mm
Column size	230 x 300 mm
Beam size	230 x 300 mm

WINDOW SCHEDULE		
W	UPVC Window	1200 x 1200 mm ²
A	Acrylic columns	1400 x 1200 mm ²
B	Raincoat covers	1400 x 1200 mm ²
J1	Sliding glass screen	1200 x 1200 mm ²
J2	Sliding glass screen	1200 x 2400 mm ²
V	Garment Ventilator	400 x 400 mm ²

SCHEDULE	
Living	2400 x 2800 mm ²
Kitchen	2400 x 2200 mm ²
Bedroom	2700 x 2700 mm ²
Lobby	2540 x 1719.99 mm ²
WC	2700 x 1400 mm ²

DOOR SCHEDULE		
D1	Recessed Wood	1800 x 2100 mm ²
D2	Laminated Flush Door	900 x 2100 mm ²
D3	Laminated Flush Door	800 x 2100 mm ²

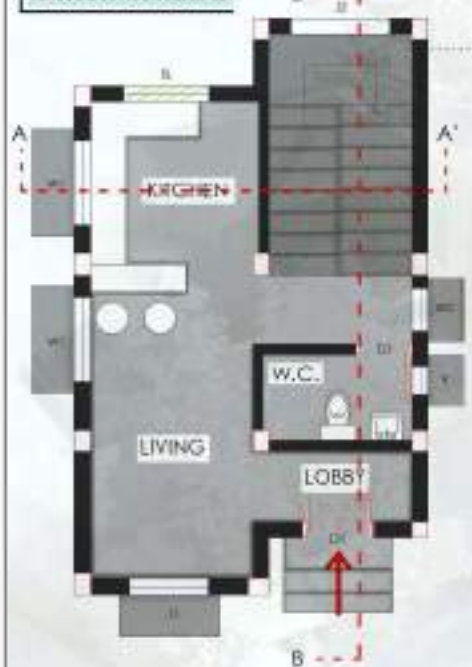


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DESIGN OPTION II



GROUND FLOOR PLAN
CARPET AREA: 29.32 M²

Provided for IIG Category, is a G+1 structure that consists of an Entrance Lobby, Living Space, Kitchen and Two bedrooms with one attached and one common Washroom.



SCHEDULES

DOOR SCHEDULE		
T1	Recessed Wood	1000 X 2100 MM ²
T2	Laminated Flush Door	900 X 2100 MM ²
DR	Laminated Flush Door	800 X 2100 MM ²

WINDOW SCHEDULE		
W1	UPVC Window	1000 X 1200 MM ²
W2	Awing Window	400 X 600 MM ²
M	Barbedo window	1400 X 1200 MM ²
J1	Slip Airflow	1500 X 1200 MM ²
J2	Slip Airflow	1400 X 2000 MM ²
V	Slip Airflow	400 X 600 MM ²

SCHEDULE	
Living	2400 x 2900 MM ²
Kitchen	2400 x 1770 MM ²
Lobby	2000 x 1900 MM ²
W.C.	3000 x 1200 MM ²
Bedroom 1	2380 x 2000 MM ²
Bedroom 2	2000 x 2875 MM ²
Balcony	2140 x 1500 MM ²

SCHEDULE	
Floor Level	450 MM
Landing Level	150 MM
St Level	400 MM
Wall Level	2100 MM
Column Size	230 X 300 MM
Beam Size	220 X 300 MM



G+1 STRUCTURE CONSTRUCTION DETAILS



COLUMN LAYOUT

140.5 214 230 214

COLUMN LAYOUT

A column is generally a vertical member in compression where the ratio of effective length to least lateral dimension is greater than 3. The reinforcement used here are 6 bars of 12 mm dia for ϕ 230mm c/c each that have been used for a column size of 230 x 300mm. Cover of column is 40 mm both for durability and for the resistance of upto 2 hours. Spacing of longitudinal reinforcement measured. Columns are typically constructed from material such as stone, brick, block, concrete, timber, steel and so on which have good compressive strength. In classical architecture, columns are often highly decorated, with standard designs including Ionic, Doric and Corinthian. Since our project is for IWS and IIG sections, the columns designed are simple, made up of RCC. Reinforced concrete columns have an embedded steel mesh to provide reinforcement. Tied columns used in the project are closed lateral ties spaced approximately uniformly across the column. The spacing of the ties is fixed in a way that they must be close enough to prevent failure between them and are kept far apart that they do not interfere with the setting of the concrete.

BEAM LAYOUT

A beam is a structural element that primarily resists loads applied laterally to the beam's axis. Its mode of deflection is primarily by bending. The loads applied to the beam result in reaction forces at the beam's support points. The size of beam taken is 230 x 300 mm, bottom main steel maybe in one or more layers. Main steel is the second layer vertically above the first row of steel. Design shear strength for M25 Grade Concrete is from 0.29 to 0.92.

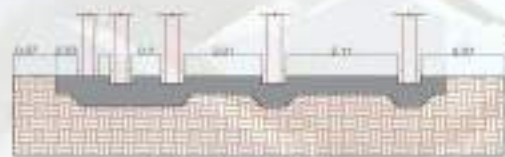
FOUNDATION EXPLANATION

The foundation used in the design is Raft Foundation. This type of foundation is generally preferred when the strata is unstable. It is used in areas with poor soil bearing capacity, having uneven settlement with the presence of mixed soil types. The type of foundation used is an RCC type foundation with waffles made beneath. Steel rods of 8 and 10 tor have been used for the G and G+1 structures respectively.

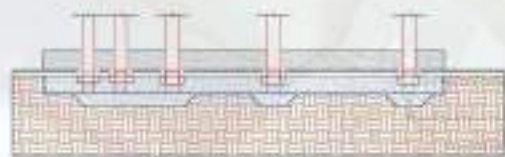
Its main advantage is that the loads coming from the superstructure are distributed over a large area, and it requires less excavation. And the main disadvantage of using this type of foundation is that they are prone to edge erosion, but since the soil type found in Mattancherry is Sandy Loam, this risk is eliminated.



Raft Foundation Detail



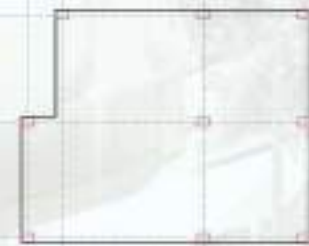
RAFT FOUNDATION ELEVATION



RAFT FOUNDATION SECTION

RCC bed
20mm dia Main steel bars
barth

G STRUCTURE CONSTRUCTION DETAILS



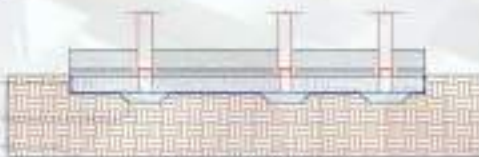
COLUMN LAYOUT



BEAM LAYOUT



RAFT FOUNDATION ELEVATION



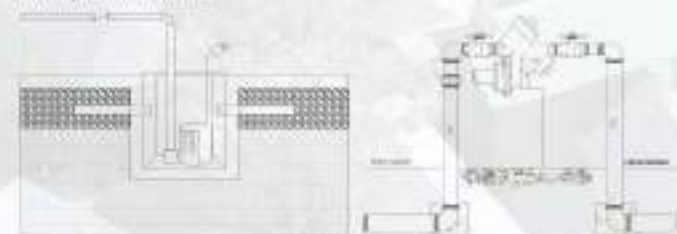
RAFT FOUNDATION SECTION

DRY FLOODPROOFING SYSTEM

Dry flood proofing is a system that describes a range of strategies to seal the exterior of a building from flood waters. Dry flood proofing is only viable in buildings that are structurally sound in areas with low-velocity, relatively shallow flooding (below 3 feet).

Dry proofing makes a building watertight and substantially impermeable to floodwaters. Important factors to be considered in dry proofing are watertight closures for doors and windows and prevention of floodwater seepage through walls. The flood proof function must work sufficiently for design flood level and additional freeboard is recommended because the flood depth estimation includes a certain error and may be influenced by future development in the basin. The installation of check valves to prevent the backflow of floodwaters or sewage flows through drains and anchoring of the building is executed to resist floatation and lateral movement.

Roadways with fewer/smaller openings are simpler to design and require less warning time to install protective floodwall closures, but can limit access, if requires less amount of surrounding vacant land and are typically suitable for densely developed communities.



Sump Pumps

Backflow Preventer Assembly

FLOODPROOFING USED IN DESIGN

The concept of Flood proofing used in the design is Dry Flood proofing systems. As the flood level in Mattancherry reaches up to 500 mm, the best measure is to protect the buildings from floods externally instead of protecting it internally. Flooding can cause sewage from sewer lines to back up through drain pipes. These backups not only cause damage with waterproof membranes, but they also create health hazards. To protect these hazards we install backflow valve, which temporarily block drain pipes if water travels up the wrong way. The use of sump pumps is required to control the level of seepage of water. Floodwalls are typically constructed of reinforced concrete or masonry, provide a barrier against inundation, and protect structures from hydrostatic and hydrodynamic loads.



Flood wall



Devator



Section



SERVICES

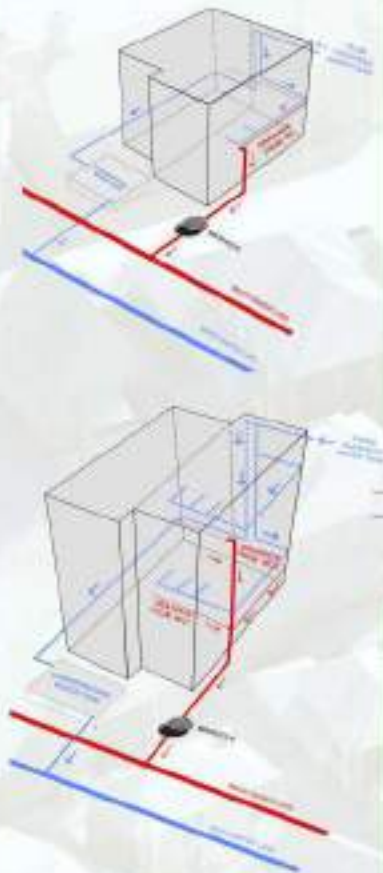
G STRUCTURE



The structure has two tanks, one underground and other overhead. The corporation mains are connected to the underground water tank. Then the water is carried to the overhead water tank and further supplied through the structure through openings.

The structure is well managed with drainage by taking care of proper placement of fixtures and traps throughout the layout. All the waste is collected from the WC and connected to the main sewer line. As the area is flood prone, septic tank is not provided. Inspection chambers are provided at certain intervals for proper functioning of the drainage layout.

ISOMETRIC LAYOUT



G+1 STRUCTURE



LEGEND

	P TRAP
	G TRAP
	INSPECTION CHAMBER
	GULLY TRAP
	MANHOLE TRAP
	NON-RETURN VALVE
	MAN HOLE
	3 INCH PVC PIPE
	4 INCH PVC PIPE

GROUND FLOOR

RAIN WATER HARVESTING STEPS

Rain water harvesting is the process used is a simple water harvesting system. Rain water is collected from the sloping roof.

Water is collected in bamboo which is scooped out and a groove is created. Grooved bamboo is then joined with the rafters.

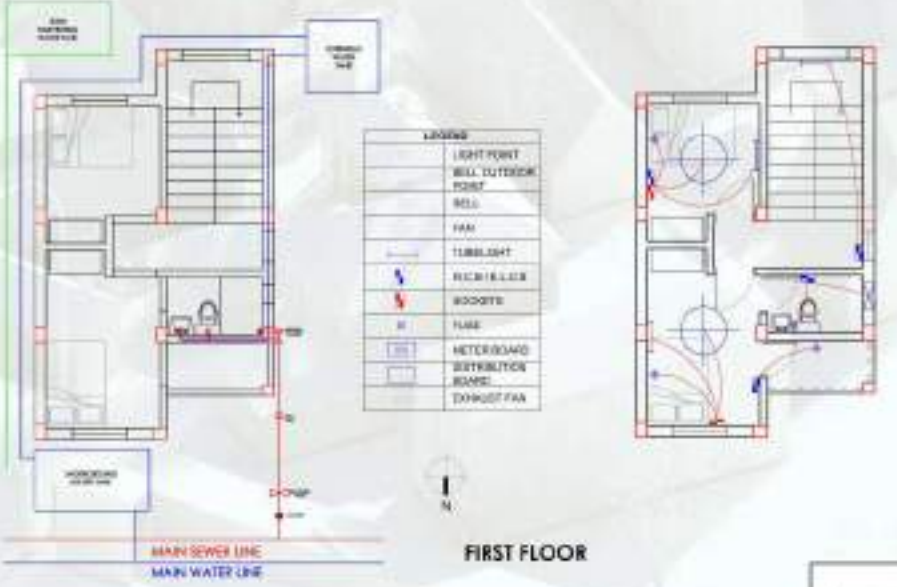
Mouth drain of gutters and is installed with wire mesh for filtration of rainwater. Collected water is transported to collection pit.

The collected water is further transported to the harvesting pit for more purity of filtration.

A harvesting pit of gravel, sand, and pebble is designed for filtration.

The filtered water is either absorbed by the groundwater or it is collected in a storage tank by the consumer for reuse.

RAINWATER HARVESTING PIT DETAILS



LEGEND

	LIGHT POINT
	WELL/OUTDOOR POINT
	BELL
	FAN
	TUBELIGHT
	RISER/ELLER
	WOODGATE
	TEE
	METER BOARD
	DISTRIBUTION BOARD
	DUSTLESS FAN

FIRST FLOOR



MUTABILITY AND CLIMATE RESPONSIVE



Mutability in the design is achieved through the use of different types of windows and shading devices that allow the structure to stay warm during winters and cool during summers, thereby liable to change and co-operate in all seasons.

Making the structure climate responsive allowed the full use of light and shadows to play in the interior of the structure. Following the wind patterns the windows have been provided with chajjas and square windows to allow full ventilation inside and out of the structure. The use of both cross ventilation and stack ventilation have been used to get the humid air out of the structure allowing maximum circulation of air.



Brooms are provided with horizontal louvers predominantly for the natural ventilation to reduce heating and cooling cost.



Sloped Roof is a significant factor distinguishing the architectural style of Malanchery. It is important in areas with heavy rain throughout the year.



Recycled PVC pipe and Bamboo jali that lights up the living space and also provides an aesthetic look for that area.



Recycled jali to light up the staircase area and give a rustic look to the southern facade.



Tiled shutter that provided for ventilation along with a contrast lighting style over the living space replicating the ones in land-brann settlement.

Bamboo jali provided on the southern and northern facade to permit diffused sunlight and helps relieve the south western winds effectively.



The Skylight allows hot air to escape and insulate in the winter time. Thereby, providing an overall cool environment inside.



COST EFFECTIVENESS

Louvers made of recycled cheap bamboo have been that is both cheap and sustainable.

WPC used in balcony railings available at half the price of regular steel railings with additional advantage of being non-corrosive.

Entrance door made using reclaimed wood to cut down the cost of wood.

Rat-trap bond is a principle that was again derived by Ar. Laurie Baker which saves cost by 30-40% than normal English or Rerish bonds.

ZERO WASTE APPROACH

The zero waste approach seeks to maximize recycling, minimize waste, reduce consumption and ensure that products are made to be reused, repaired or recycled back into the nature or the marketplace.



Plastic bottles have been recycled as small potted plantations used in the green facade that would contribute to our zero-waste approach.



The Bricks that have been discarded or wasted during the construction of the vaults are being reused in the Green facade's base above which soil and plants are to be planted.



Scrap materials for the jali that have been used for are also re-sourced locally from the area.

Metal sheets are used to close the month brass from the side as they are inexpensive.

AESTHETICS AND VERNACULAR PRINCIPLES

Using Vaults have been a part of Kerala's architecture in most recent times, providing contemporary and modern view's to the structure.

The use of jalis in the form of bricks and other forms have been seen from the times when Ar. Laurie Baker had introduced designs using bricks. From then the use of bricks have been extensively used and seen in Kerala in the form of contemporary designs. It not only provides an aesthetic look but also used as a shading device.

The use of tinted glasses are found in the Jami-brahmin settlements, and are seen all over the settlements scattered around. Tinted glasses provides a great control when light falls on it.

SELF-RENEWAL

Sustainable materials such as green facades help the structure breathe with time and therefore increases the flexibility of the structure.

The use of lime mortar instead of utilizing normal cement mortar strengthens the structure as a whole with time.

Bamboo used at different parts of the structure in addition to being renewed also acts as carbon sink absorbing atmospheric carbon.

The use of cement oxide for flooring saves cost by utilizing the cement that might go wasted otherwise during different stages of construction.

The use of Green Facade has been added to the project to implement Green Building techniques into the design. The Facade cools down the building temperature as a whole and therefore has been used on the West Side that receives most of the sun's harsh rays.



Warming glass is used here due its easy growth, long life and low maintenance. Small ornamental plants planted on recycled plastic bottles have been used.



"Quality, affordable housing is a key element of a strong and secure society."



INTERIOR VIEWS



VASASTHALAM

वासस्तलम

Vasasthalam meaning 'home' has been rightfully chosen as the project's name as it justifies the argument involving EWS and LIG's search for a place to live with the increase in population according to recent times.

The G unit presents a warm ambience where the visitors are welcomed by the arched opening into the living space well lit by the skylight and recycled jali.



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"Quality, affordable housing is a key element of a strong and secure society"



INTERIOR VIEWS



VASASTHALAM

വാസ്തുനിർമ്മാണം

The meaning of home has been signified in this project with respect to Kerala's vibrant architectural life.

The G+1 unit follows a similar arched entry followed by the living space. The private spaces lie on the first floor maintaining privacy for the residents.



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NORTH ELEVATION



EAST ELEVATION



SOUTH ELEVATION



WEST ELEVATION

VASASTHALAM

The entry is through the vaulted arch. On the interior a very calm tint of brown of mud-lime plaster is seen. This gives a very subtle ambience to the space, while still being true to Mattancherry's character. As we start walking through the living room to the kitchen the bamboo jalis perform circles and slight glares from the pvc create an interesting light and shadow effect.



SECTION A-A'



SECTION B-B'



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NORTH ELEVATION



EAST ELEVATION



SOUTH ELEVATION



WEST ELEVATION

VASASTHALAM

A similar vaulted arched entry leads to the living space followed by the rest of the private spaces. The sciography inside the house is produced by the skylight on the sloped roof and the jali on the south facade. The green facade placed on western wall of the house is responsible for absorbing excess heat and regulating Vasasthalam's comfortable temperature.



SECTION A-A'



SECTION B-B'



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COSTING

G UNIT

The first design option is a Ground Floor structure that consists of a kitchen space, a common washroom, a bedroom and a lobby space that has been filled in a 2954 m² plan. The use of all the elements that have been mentioned in the sheets prior to this have been implemented and thus the costing of this unit including labour charges sums upto an approx of 5.5 lakhs.



G+1 UNIT

The second design option is a G+1 structure that consists of the same elements as a Ground Floor does only adding an extra attached washroom and an extra bedroom with a balcony on the first floor. All the elements have been mentioned prior in the sheets. The costing of this unit project including labour charges it amounting to about 7.4 lakhs.



SR. NO.	STRUCTURAL ELEMENTS	QUANTITY	UNIT	RATE (₹)	UNIT	AMOUNT (₹)
1	Excavation Filling Work/Earthwork	54.6	Cum	1276.8	Per Cum	69713.3
2	Plinth Beam	2.41	Cum	6320	Per Cum	15231.2
3	Foundation	27.7	Cum	6140	Per Cum	170078
4	Columns	1.46	Cum	6210	Per Cum	9066.6
5	Beams	2.41	Cum	6320	Per Cum	15231.2
6	Floor Slab	36.7	Sqm	544	Per Sqm	20073.6
7	Underground Tank	1	Cum	6000	Per Cum	6000
8	Rat Trap Bond Masonry Work (230 mm thick wall)	9.09	Cum	3654	Per Cum	33214.86
9	Masonry Work (150 mm thick wall)	17.93	Sqm	725.8	Per Sqm	13013
10	Plastering	110.45	Sqm	220	Per Sqm	24299
11	Flooring	29.54	Sqm	673.2	Per Sqm	19886.3
12	Main Door (Reused)	1	Per piece	16070	Per piece	16070
13	Laminated Doors	2	Per piece	3500	Per piece	7000
14	Damp proofing	47.83	Sqm	290.52	Per Sqm	13895
15	WC Tiling	8.8	Sqm	560	Per Sqm	4928
16	Windows	4	Per piece	7890	Per piece	31560
17	Mangalore Tile Roofing	297	per piece	30	Per piece	8910
18	Brick Vault	32.59	Cum	520	Per Cum	27346.8
19	Steel Truss	583.23	Kg per m	83	Kg per m	48408.09
				TOTAL (₹)		553924.95

EXPECTED COSTING FOR G STRUCTURE AROUND : 6.5 LAKHS

ACTUAL COSTING FOR G STRUCTURE : 5.5 LAKHS

SR. NO.	STRUCTURAL ELEMENTS	QUANTITY	UNIT	RATE (₹)	UNIT	AMOUNT (₹)
1	Excavation Filling Work/Earthwork	56.9	Cum	1276.8	Per Cum	72649.9
2	Plinth Beam	2.71	Cum	6320	Per Cum	17127.2
3	Concrete Work For Foundation	30.66	Cum	6140	Per Cum	188252.4
4	Columns	3.74	Cum	6210	Per Cum	23349.6
5	Beams	2.67	Cum	6320	Per Cum	16874.4
6	Floor Slab	36.67	Sqm	544	Per Sqm	19948.5
7	Slab	29.81	Sqm	544	Per Sqm	16216.64
8	Underground Tank	1.5	Cum	6000	Per Cum	9000
9	Rat Trap Bond Masonry Work (230 mm thick wall) G and 1st floor	19.75	Cum	3654	Per Cum	72166.5
10	Masonry Work (150 mm thick wall) G floor	15.86	Sqm	725.8	Per Sqm	11511.2
11	Masonry Work (150 mm thick wall) 1st floor	25.06	Sqm	725.8	Per Sqm	18188.5
12	Plastering	156.6	Sqm	220	Per Sqm	34452
13	Flooring	54.8	Sqm	673.2	Per Sqm	36891.4
14	Main Door (Reused)	1	Per piece	16070	Per piece	16070
15	Laminated Doors	5	Per piece	3500	Per piece	17500
16	Damp proofing	46.54	Sqm	290.42	Per Sqm	13516.8
17	Windows	6	Per piece	7890	Per piece	47340
18	WC Tiling (G and 1st floor)	8.8	Sqm	560	Per Sqm	9866
19	Mangalore Tile Roofing	270	Per piece	30	Per piece	8100
20	Brick Vault	44.08	Cum	520	Cum	22921.6
21	Steel Truss	807.4	Kg per m	83	Kg per m	67014.2
				TOTAL (₹)		738946.84

EXPECTED COSTING FOR G+1 STRUCTURE AROUND : 8.5 LAKHS

ACTUAL COSTING FOR G+1 STRUCTURE : 7.4 LAKHS



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V A S A S T H A L A M



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