



Srinagar is the biggest town in Garhwal hills and a municipal board in Pauri Garhwal district in the Indian state of Uttarakhand. It is the widest valley in the Garhwal hills. The town was laid out initially in a grid-iron pattern, but all the new construction is highly irregular in planning. Newer buildings are all RCC.

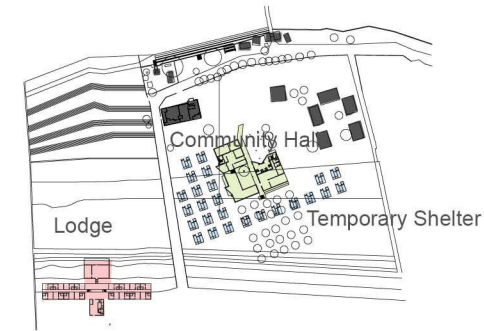
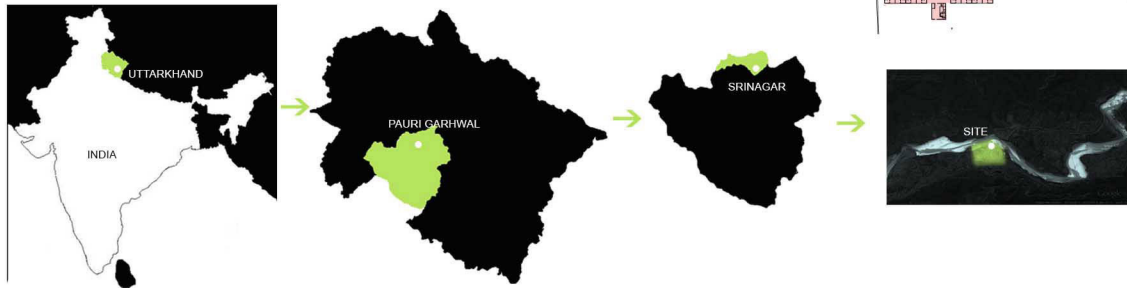
DISASTER:
 EARTHQUAKE & LANDSLIDDE PRONE AREA ; ZONE IV
 POSSIBLTY OF FLOODS IS HIGH SINCE IT IS LOCATED IN AN ANCIENT RIVER BED AND ALSO THE ENTIRE TOWN IS HOUSED IN A VALLEY.

RELIGION: MANY TEMPLES ARE SITUATED IN THE TOWN. THE PEOPLE ARE HIGHLY RELIGIOUS.

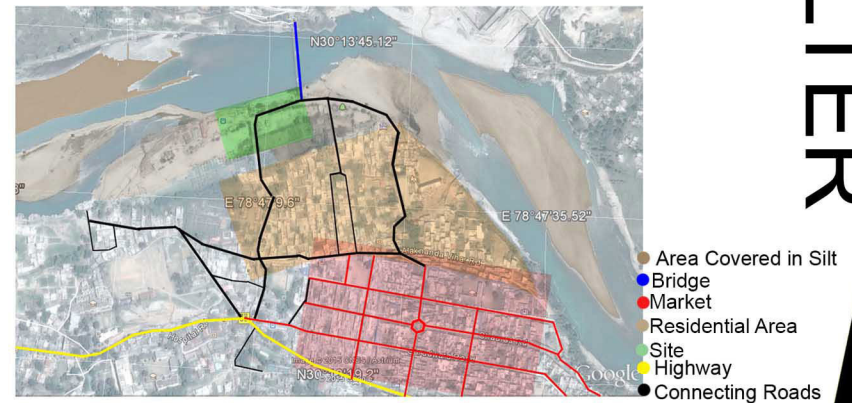
SOCIAL STRATIFICATION: PRINCIPALLY A BRAHMIN TOWN.

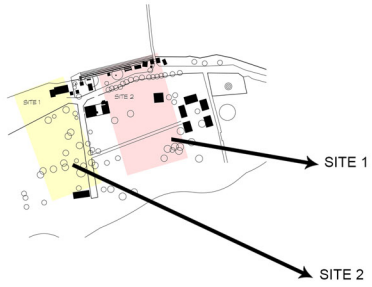
TOPOGRAPHY: THIS PARTICULAR SITE IS LOCATED ALONG THE RIVER BED, GOING DOWN A STEEP SLOPE FROM THE MAIN STREETS OF THE CITY.

INTRODUCTION



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PROPOSED FUNCTION OF BUILDINGS:

SITE 1:- COMMUNITY SPACE
 EDUCATION CENTRE TO PROMOTE TRADITIONAL ARTS AND CRAFTS (LITERACY LEVEL IN SRINAGAR IS 80 %)
 MARKET SPACE
 OFFICE SPACE
 CAFE

IN THE CASE OF A DISASTER THIS AREA BECOMES A FIRST RE-SPONSE EVACUATION AREA. TEMPORARY INDIVIDUAL HOUSING CAN BE BUILT AROUND THIS AND THE OPEN ROOMS CAN BE USED AS GROUP HOUSING CENTRES OR EVEN DISTRIBUTION CENTRES. THE OPEN COLLONADE ALLOWS FOR EXPANSION WITHIN THE BUILT STRUCTURE ALSO.

SITE 2:- LODGE

IN THE CASE OF A DISASTER THIS SITE CAN BE USED FOR TEMPORARY ROW HOUSING WHICH CAN BE MADE AS SEEN IN THE PROPOSAL.



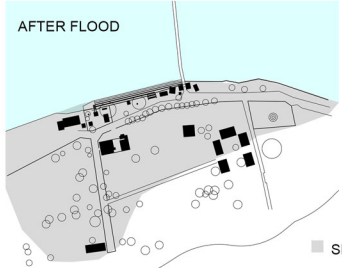
PLAN WITH SURROUNDINGS

- ALAKNANDA RIVER
- POLICE STATION
- RESIDENTIAL AREA
- SCHOOL
- PARK
- RESIDENTIAL AREA
- ORCHARD
- BRIDGE

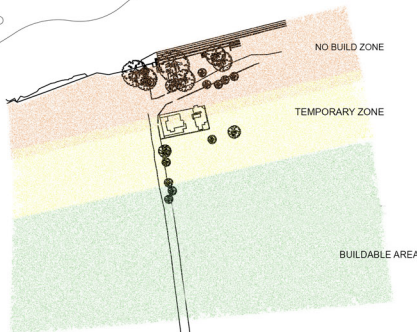


OPEN AND CLOSED SPACES

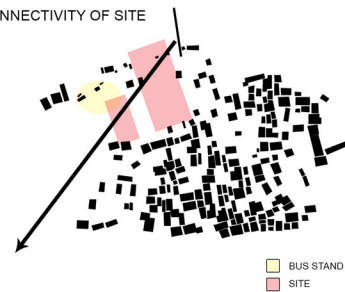
DIAGRAMS SHOWING LEVEL OF SILT AFTER FLOODING



BUILDABLE AND NON BUILDABLE AREAS



CONNECTIVITY OF SITE



THIS PEDESTRAIN BRIDGE IS THE ONLY CONNECTION TO THE OPPOSITE BANK FOR APPROXIMATELY 3 KMS.

HENCE THIS SITE IS ESSENTIALLY A FOCAL POINT IN THE CITY

PRIVATE AND PUBLIC SPACES



FUNCTIONALITY OF SPACES

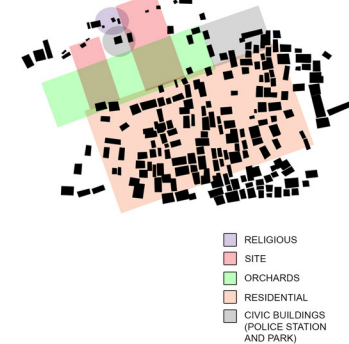


DIAGRAM SHOWING AREA COVERED IN DRAINAGE BASIN

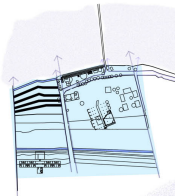
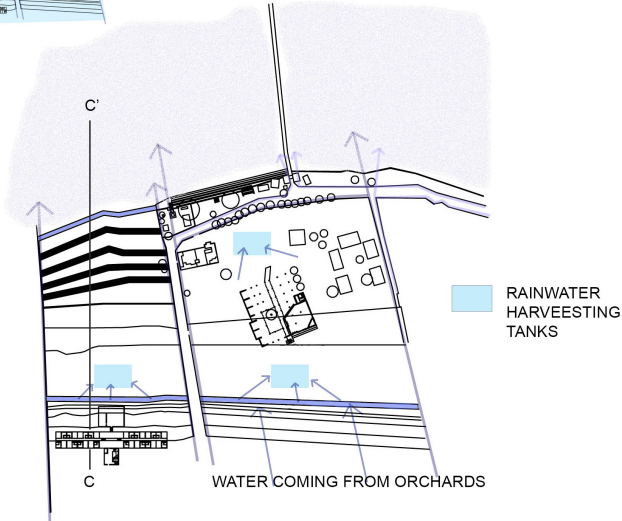
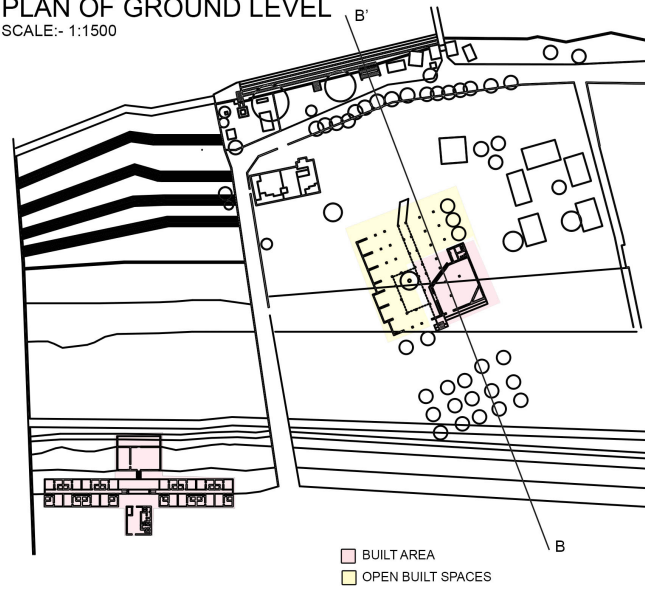


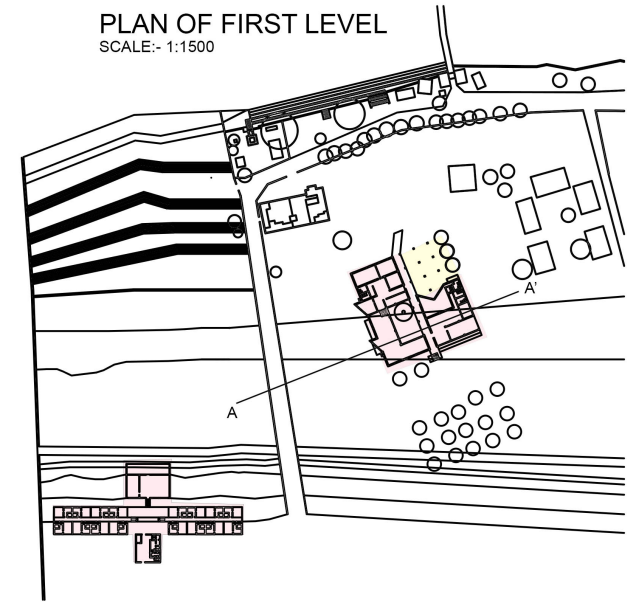
DIAGRAM SHOWING PROCESS OF DRAINAGE OF WATER INTO THE RIVER



PLAN OF GROUND LEVEL
SCALE:- 1:1500



PLAN OF FIRST LEVEL
SCALE:- 1:1500



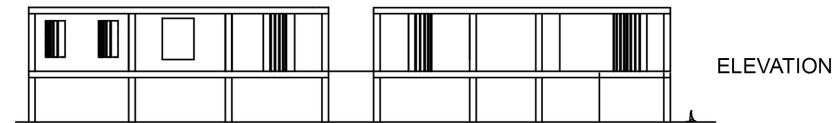
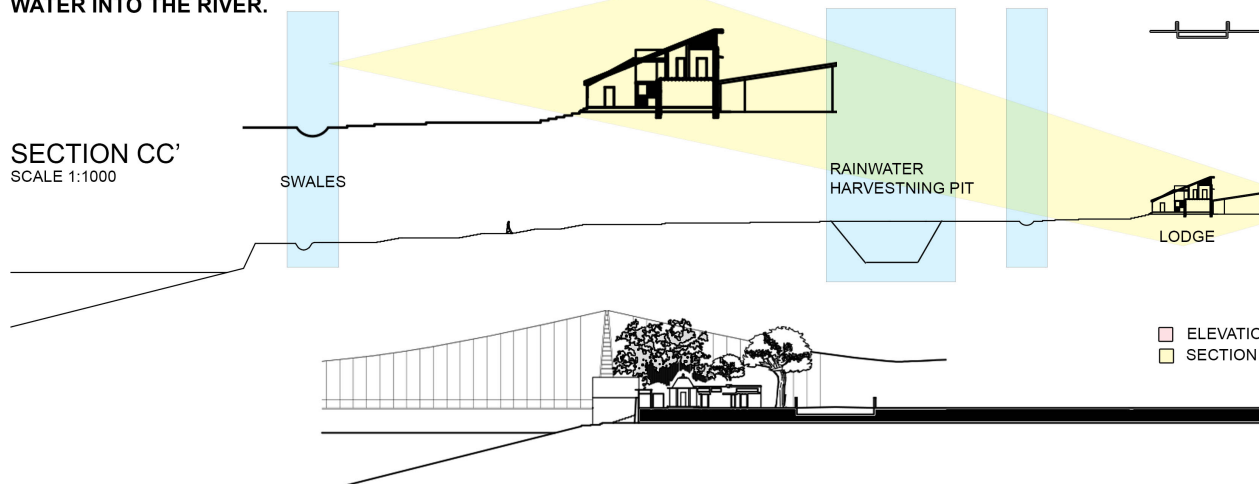
BUILT PART OF THE STRUCTURE IS ONLY ON THE BUILDABLE LAND AND OPEN COLONNADE IS ON THE TEMPORARY ZONE. MAJORITY OF BUILT MASS IS ON THE UPPER LEVEL.

DRAINAGE SYSTEM-

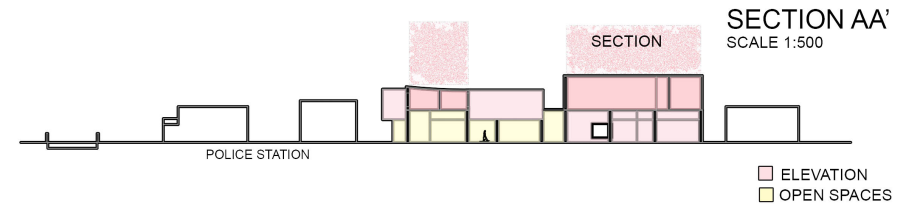
SWALES ARE BEING USED TO REDUCE IMPACT OF FLOODS AND FOR RAINWATER HARVESTING. THESE SWALES COVER THE ENTIRE SITE AND CONNECT TO THE PRE-EXISTING STORM WATER DRAINS RUNNING ALONG EITHER SIDE OF THE ROAD. SWALES ARE ALSO CONNECTED TO RAINWATER HARVESTING PITS.

INUNDATION CANALS CAN BE PROVIDED FOR IRRIGATING THE ORCHARDS. THIS IRRIGATION SYSTEM IS CONNECTED TO NETWORK OF SWALES. HENCE FORMING A DRAINAGE BASIN. THIS WILL REDUCE IMPACT OF A FLOOD TO SOME EXTENT. IN THE CASE OF EXCESS RAINFALL THERE IS ALSO PROPER DRAINAGE OF WATER INTO THE RIVER.

SECTION CC'
SCALE 1:1000

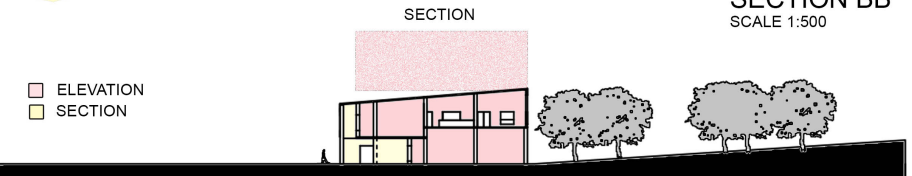


ELEVATION

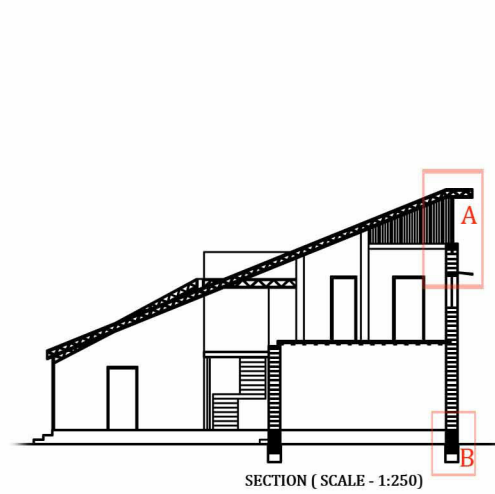


CONTOURS HAVE BEEN MADE SO THAT THE LAND IS SLOPING TOWARDS THE RIVER. BESIDES SWALES EVEN EMBANKMENT WALLS HAVE BEEN MADE ALONG THE RIVER BANK.

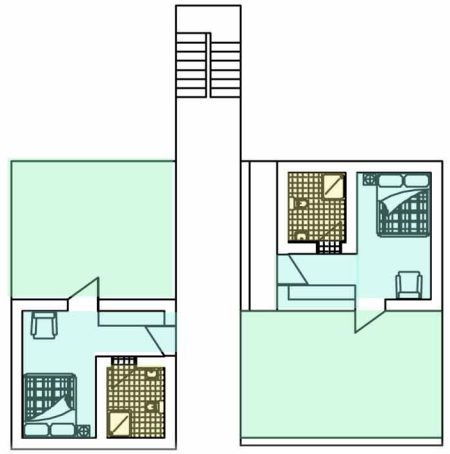
SECTION BB'
SCALE 1:500



PERMANENT SETTLEMENT

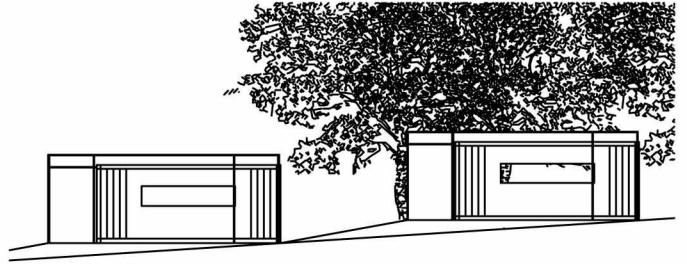


SECTION (SCALE - 1:250)

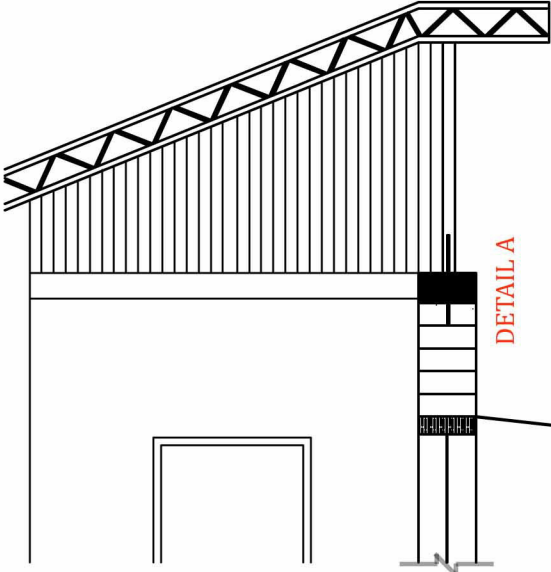


PLAN (SCALE - 1:250)

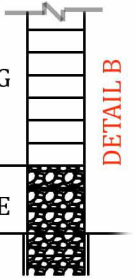
- WET AREAS
- ROOMS
- OPEN AREAS WHICH LATER CAN BE USED AS EXPANSION AREAS



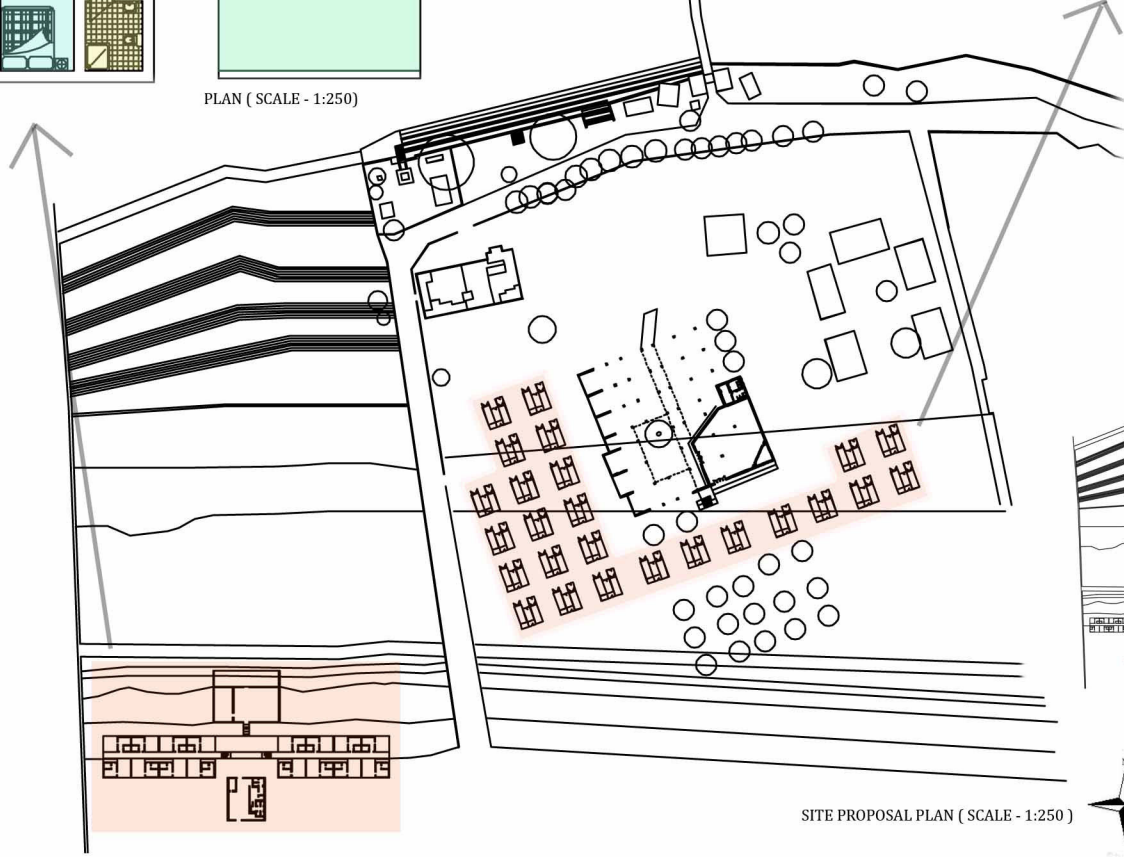
SECTION (SCALE - 1:250)



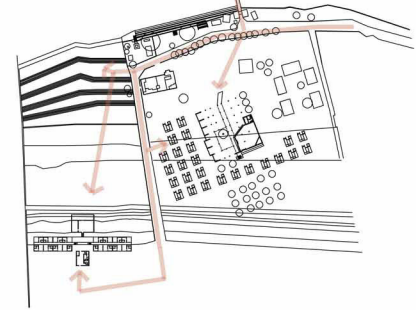
DETAIL A



DETAIL B



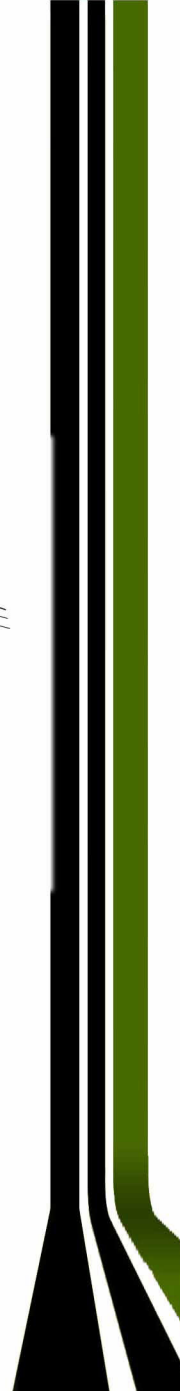
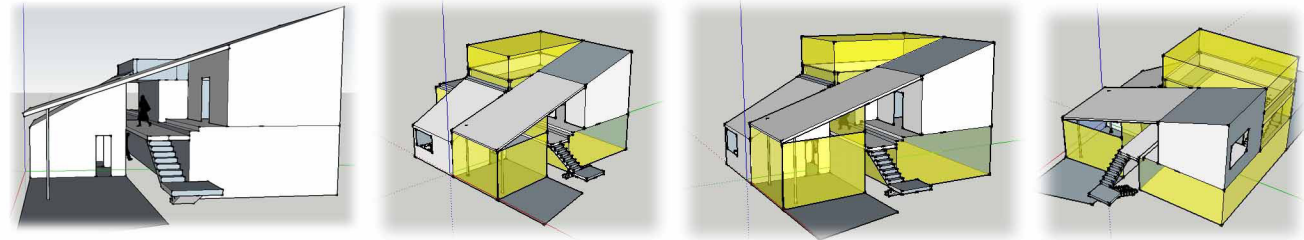
SITE PROPOSAL PLAN (SCALE - 1:250)



MAIN ACCESS POINTS ON THE SITE

THE LODGE CAN BE USED AS SHELTER HOMES, ROW HOUSING SYSTEM AND REFUGEE CAMPS BY EXTENDING THE SPACES TO INCLUDE MORE PEOPLE. THE PLACEMENT OF THE LODGE HAS BEEN DONE IN THE BUILD ZONE SO THAT MINIMUM DAMAGE HAPPENS IN CASE OF ANY NATURAL CALAMITY

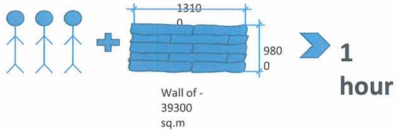
EXPANSION AREAS IN THE LODGE: USING OPEN GARDENS, UNDERGROUND EARTH AND TERRACES AS EXPANSION AREAS



EarthBag structures are inexpensive

COST
 Rs.1920-2240 /sq.metre
 For 1235 sq.metre --> Rs. 2,370,100

Speed of Construction



Per House module →

Transport – the walls for two hundred and fifty 40m² houses or other structures can be built from a single 12m container-load of EarthBags.

Fill Material -Local site sourced fill material

Waste production Is to minimum

- Adaptable** –
 - Easy to alter the position of wall openings during construction.
 - Easy to dismantle and rebuild it with the very same materials.
- Reduce, Reuse, Recycle**- EarthBags can easily be reused locally or emptied and used elsewhere, and the material from which the bags are made is easily recyclable. And the raw material from which the EarthBag is made, is a by-product of the refining of crude oil or coal into petroleum.

NO.OF EARTHBAGS REQUIRED

- Size of Earthbag being used → 380 x 760 mm
- Face Area of wall x 1.43 = Total no. of bags for that wall

SOIL NEEDED
 →0.074 cubic.mt/bag

CONSTRUCTION MATERIAL:-

- Bamboo
- Earthbag
- 4 point Barbwire
- Local available soil
- Gravel →For Foundation

ADDED BENEFITS

- FLOOD PROOF
- Sound Insulation
- Thermal Insulation → regulates humidity → No artificial heating/cooling system required
- Fire Resistant
- Less skill Labour required
- Service are easy to incorporate
- EARTHQUAKE RESISTANT

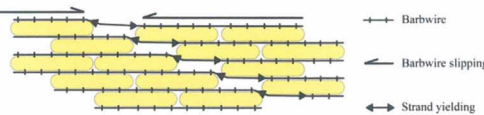
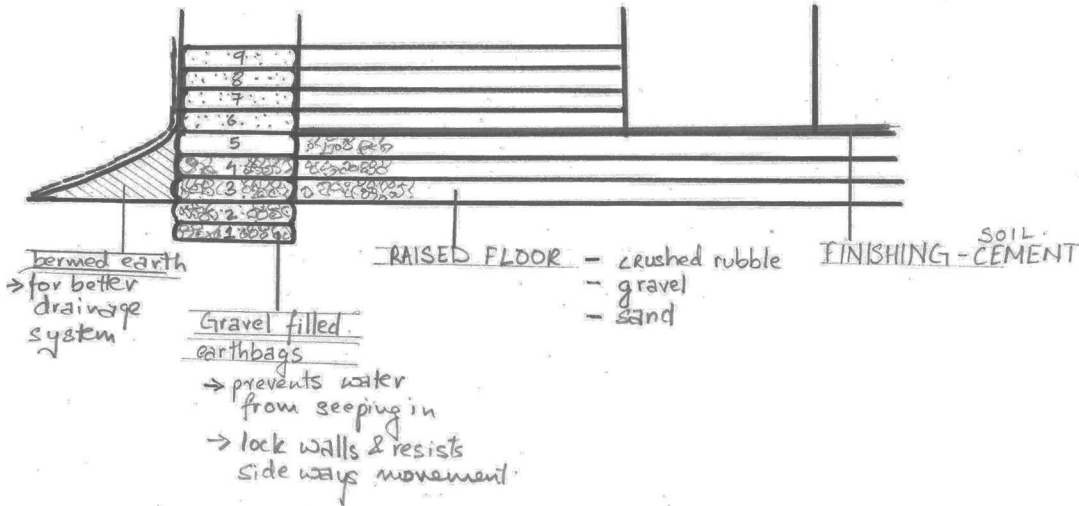
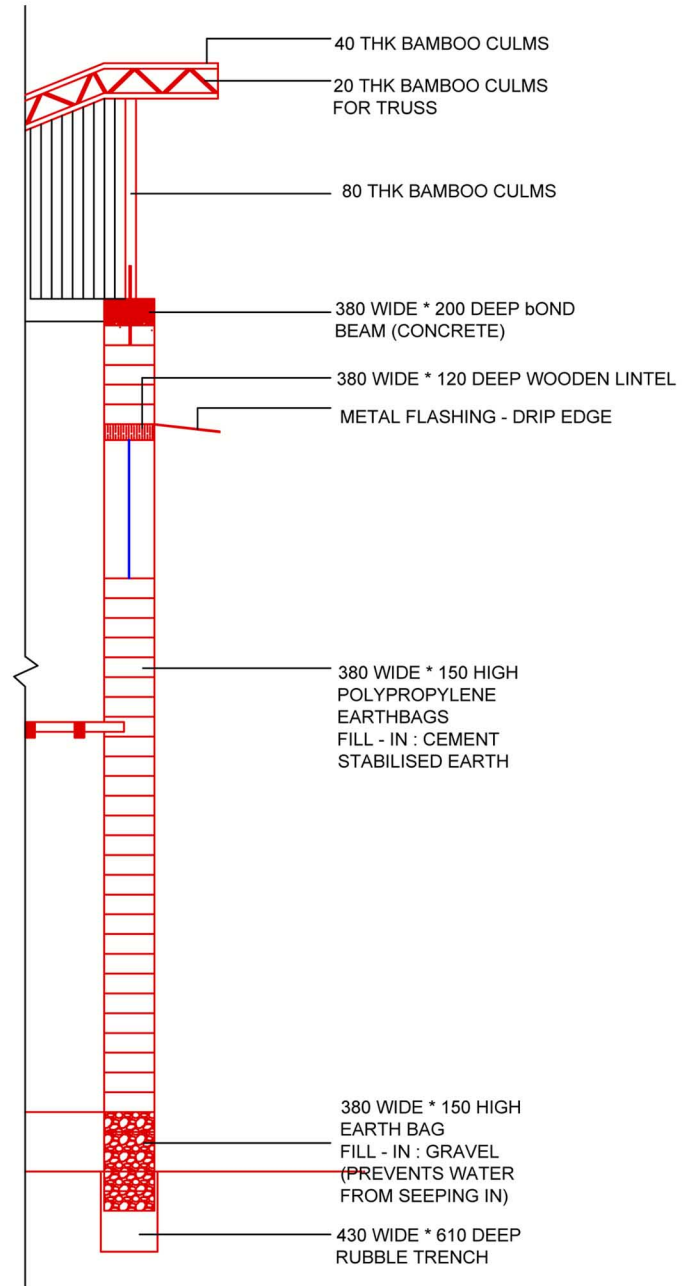


Figure 19 Movement of barbwire in wall under shear

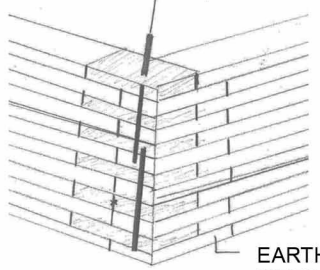


FLOORING



EXTERNAL WALL SECTION

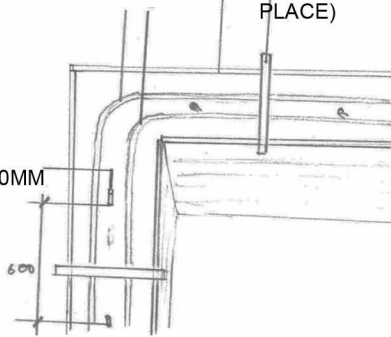
REBER - DIA IS 4 AND A HALF INCHES (AFTER EVERY 1.5M)



EARTH BAGS- ALTERNATE INTERLOCKING AT CONRERS

HORIZONTAL 11MM DIA REBAR

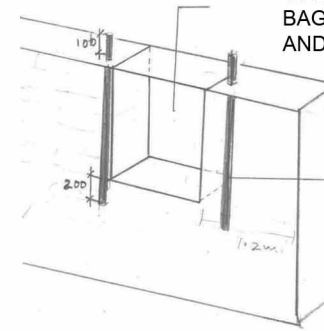
FORMWORK (TO HOLD REBAR AND CONCRETE IN PLACE)



VERTICAL REBAR 600MM LONG

OPENINGS IN WALLS

OPENING (EDGES OF THE BAGS TO BE STRAIGHT AND PLUMBED



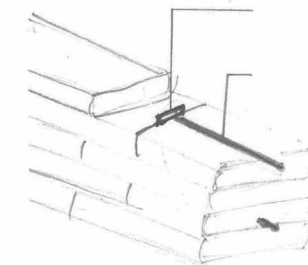
REBAR -300MM LONGER THAT WINDOW HEIGHT 100MM EXTENDED UP INTO THE LINTEL

FOR DOORS- REBARS 120MM OVERLAP IS 450MM

WHEN USING TUBEBAGS-EARTH-BAGS FOR CIRCULAR PLAN SPECIALLY USED FOR WINDOWS

ANCHOR BOLTS TO ATTATCH WOODEN FRAMES TO OPENINGS

AS THICK AS BAG WALLS
 ↓
 PLATE-GALVANISED METAL 152MM LONG- 2 HOLES



ROD- THROUGH METAL PLATE WASHERS AND NUTS USED TO FASTEN RODS TO FRAME

REINFORCEMENTS

CORRUGATED METAL SHEET (NAILED TO THE EATHBAGS)

LINTEL

LINTELS

1.

FLASHING

MESH (FOLDED ONTO THE LINTEL)

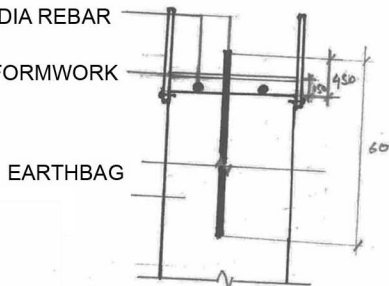
FLASHING BENT (-DRIP EDGE)

FOR LINEAR MODULES
BOND BEAMS

11MM DIA REBAR

FORMWORK

EARTH BAG

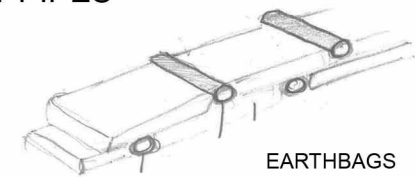


MATERIAL PALETTE

MATERIAL	TEMPORARY / PERMANENT USAGE
EARTH BAGS	WHEN A DISASTER STRUCKS A CITY, THE INHABITANTS ARE ALSO DEEPLY AFFECTED ON MONETARY TERM. THE EARTH IN THE SANDBAGS CAN BE USED BE LATER FOR A MORE PERMANENT OR RCC CONSTRUCTION. THIS WAY THE AFFECTED PEOPLE CAN BE ON FINANCIAL TERMS ALSO AS IT WOULD REDUCE THEIR EXPENDITURE ON NEW MATERIAL
TIMBER	USED FOR ALL THE FRAMEWORK OF DOORS AND WINDOWS AND FLOORING



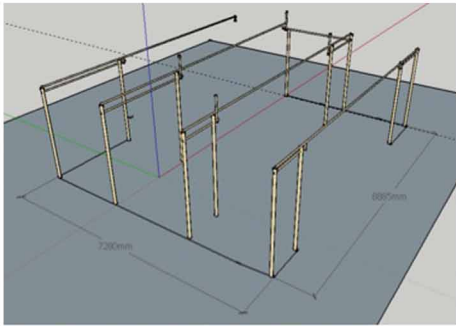
VENT PIPES



EARTH BAGS

VENT PIPES

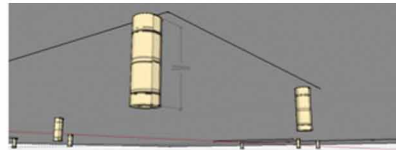




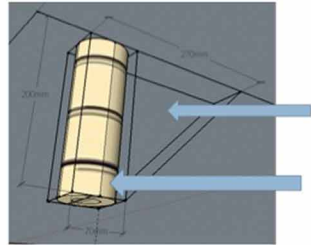
Axo with Bamboo Columns

^ The required plot area for each housing module is 7280 x 8885 mm.

^ The construction materials used are Bamboo and Shipping Containers.



Axo View of Foundation



Foundation Detail

**AXONOMETRIC VIEW and FOUNDATION DETAIL
Permanent Housing Module**

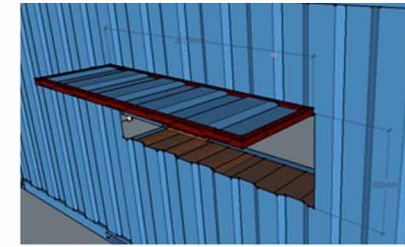


Axo of Shipping Containers

^ Two shipping containers are required in every housing module.

^ Each of them has a window shutter which are made from cut-outs. The edges are sanded down and re-painted before being welded back onto the container.

^ Each of them has a 3400 mm Roll-Up door. They are 26 gauge galvanized steel doors that are equipped with a sliding locking clasp.



Window Shutter



Roll Up Door

**AXONOMETRIC VIEW OF CONTAINERS
Permanent Housing Module**



Front Deck and Boat Space

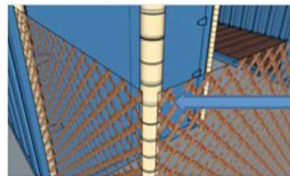
^ The Yotsume style of fence uses unsplit, full-round canes in an open lattice that allows light and air to move through the fence.

^ In this design, horizontal canes weave between equally spaced vertical canes, and the intersections of the horizontal and vertical canes are secured with traditional decorative rope and knots.

^ Finished lattice fence panels are attached to fence posts with screws.



Washroom and Wet Storage



Fixing Detail

^ Bamboo lattice tied to the strut using strings.

**AXONOMETRIC VIEW OF BAMBOO LATTICE
Permanent Housing Module**

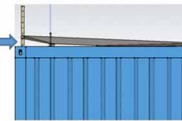


Axo showing Primary Roof

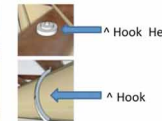


Plan showing Roof coverage

^ The higher side of the roof is 100mm higher than the lower side.



**PRIMARY ROOF STRUCTURE
Permanent Housing Module**

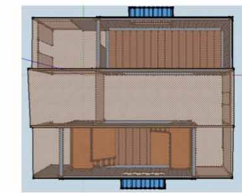


^ Hook Head

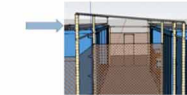
^ Hook



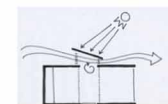
Axo showing Secondary Roof



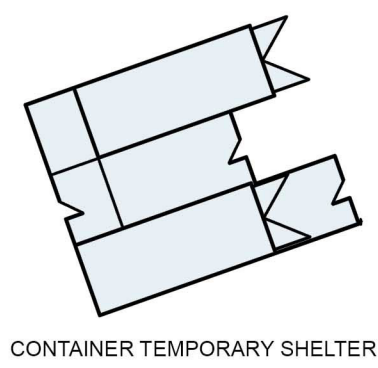
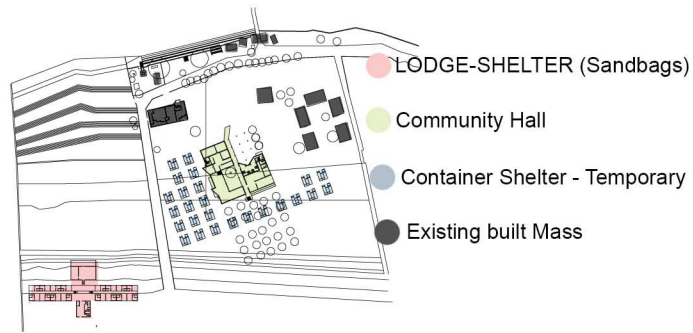
Plan showing Roof Coverage



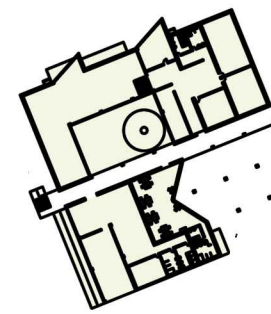
**SECONDARY ROOF STRUCTURE
Permanent Housing Module**



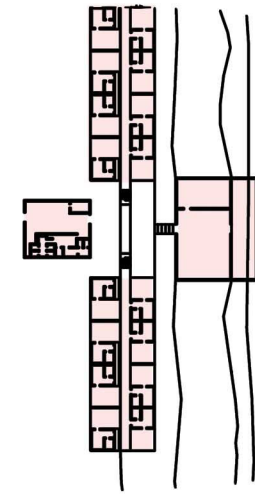
Concept Drawing



CONTAINER TEMPORARY SHELTER



COMMUNITY HALL/POTENTIAL SHELTER



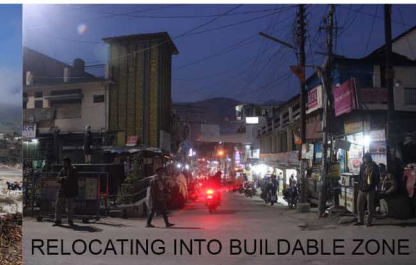
LODGE/PERMANENT SHELTER

TASK	AUTHORITY/DEPARTMENT CONCERNED
Rescue and first aid	Local Police and Clinics
Assessment of Damage	Municipal Departments
Provision Of Funds	Government and PWD
Site Analysis and design	Project Manager and Design Team
Procuring Equipments	Whole Team with help of the Local Government Body
Construction of Shelter	Masons and labors
Allocation of Shelter	Municipal Departments

To reduce the impact of the damage and provide immediate relief to the victims bodies of the following types are required to take immediate action. Safe evacuation of people and relocation in safe shelter homes is required.

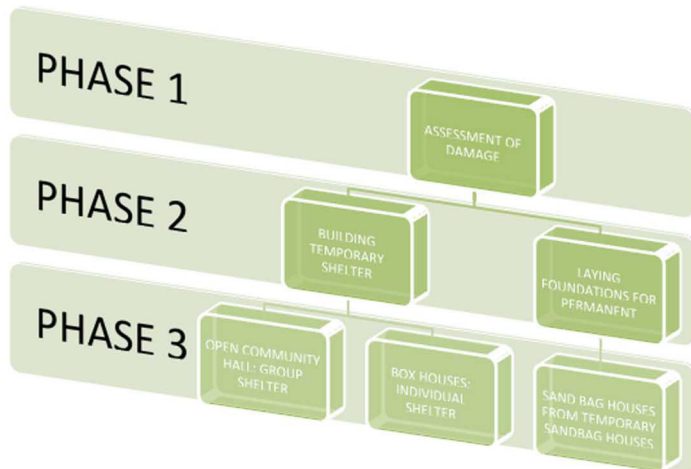


UNSAFE SHELTER



RELOCATING INTO BUILDABLE ZONE

ORGANISATION & DIVISION OF WORK



S. No.	TASK	NATURE	TIME REQUIRED
1	Local Community - Assessing needs		1 day
2	Sourcing Materials		1-2 days
3	Designing and constructing shelter	Temporary	1-2 days/per 5 shelters
4	Procuring equipments and manpower	Permanent Shelter	
5	Laying Foundations		30 days
6	Building walls and roof		10 days
7	Expansion plan of this settlement		180 days