

AAU Technology Faculty South, Department of Architecture,
Arch 501

COMPATIBLE HOUSING DESIGN FOR THE CITY OF HARAR

Instructors

Ato Solomon Kassa

Ato Birhanu Mussa

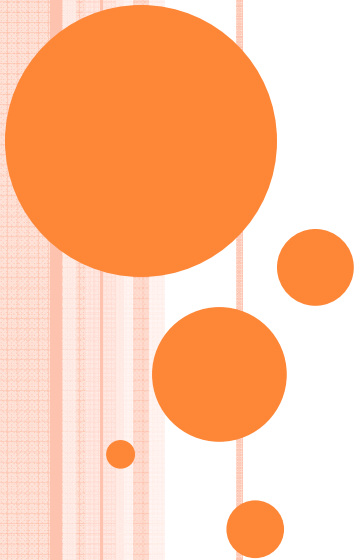
Ato Daniel Alemayehu

Ato Yonas Alemayehu

Ato Tesfamariam Teshome

Prepared by **Yohana Eyob**

23- June- 2008



CONTENTS

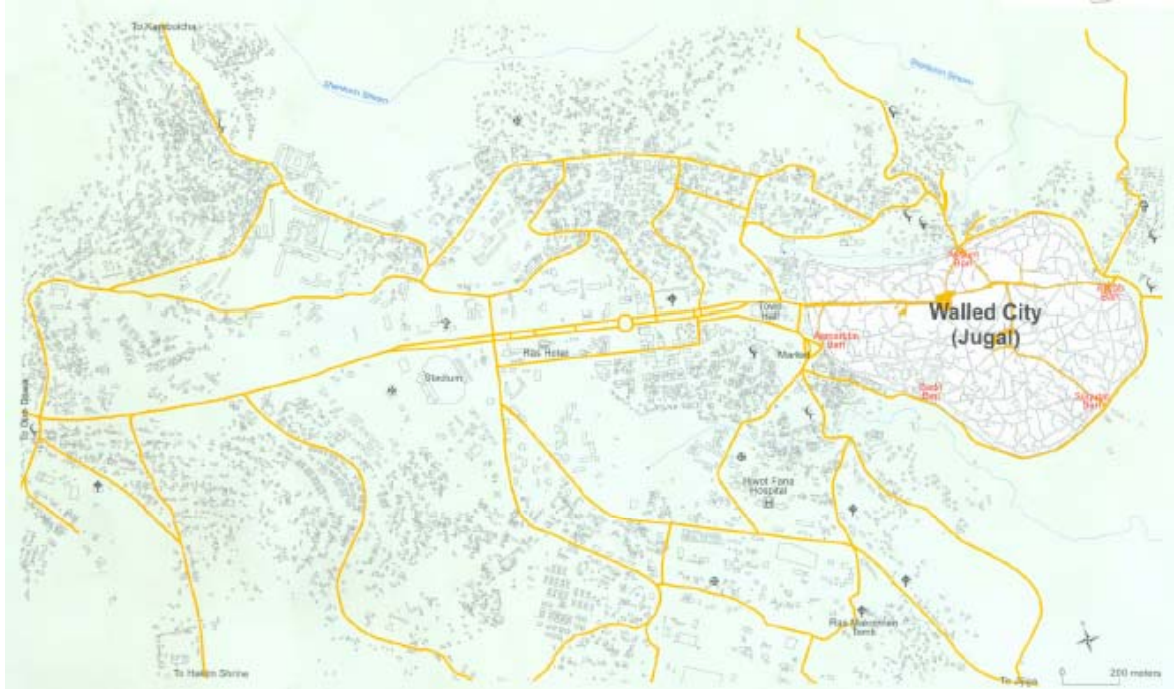
- Introduction
 - Harar
 - Jugal
 - The Harari traditional house
 - Typologies of the Harari – House
 - The Harari type (Ge Abad)
- Problem statements
 - Problem of housing in the city of Harar
 - The issue of buffer zone
- Importance of the project
- Designing principles considered
- Methodology



- Case studies
 - Titan township
 - Low-cost condominium housing in Ethiopia
- Site selection and analysis
- Program of accommodation and analysis
- Literature survey
- Design considerations
 - Compactness
 - Cost efficient way of construction
 - Energy efficient methods
- Financing
- Sources



INTRODUCTION HARAR



Jugal

Harar is one of the oldest and historical cities in Ethiopia which ages 1000 years.

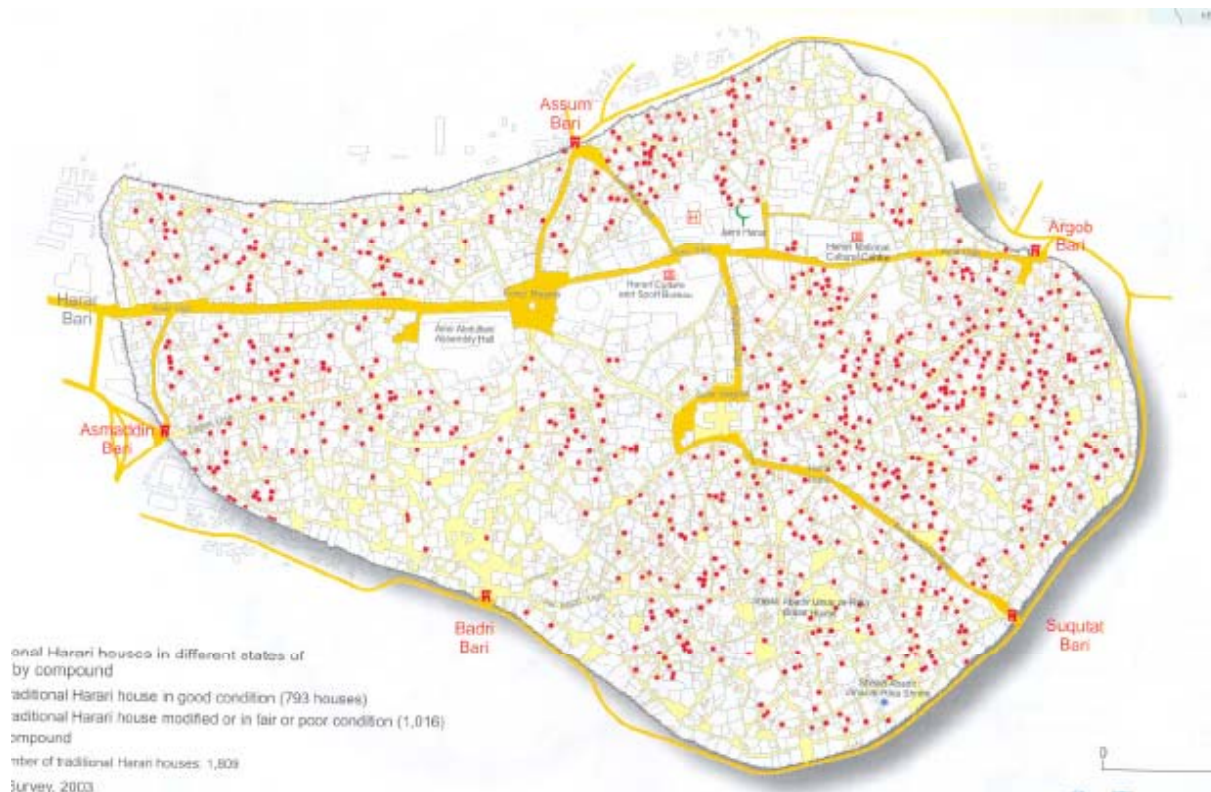
It is found to the east of the country 511 kms from Addis.

Harar is famous for its historical town (Jugal), its sociable people .

Harar also has its indigenous people the Hararies who have there own unique living style and architecture.



JUGAL



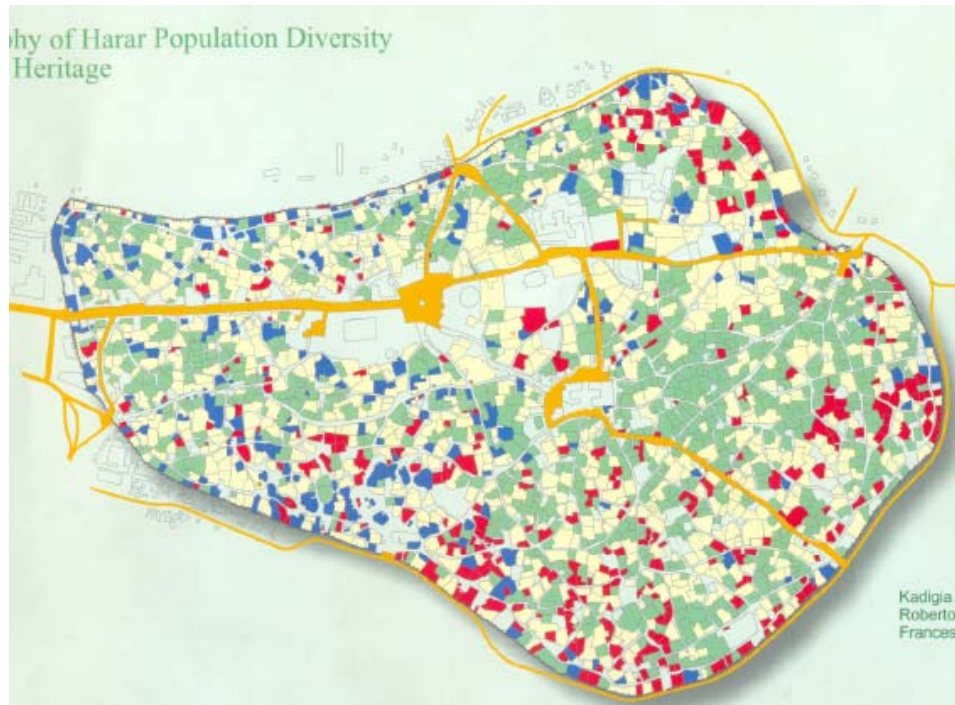
- The famous ramparts of Jugal to become Harar's main identifying feature were built during the reign of Imam Ahmed, Emir Ibn Mujahid,.

- The walls of Jugal are with five gates namely Bedri Ber, Assum Beri, Suktat Beri, Argob Beri, Assmadin Beri.

- The different blocks in this district are accessed by narrow winding streets with interesting views inside and outside of Jugal.



THE HARARI TRADITIONAL HOUSE

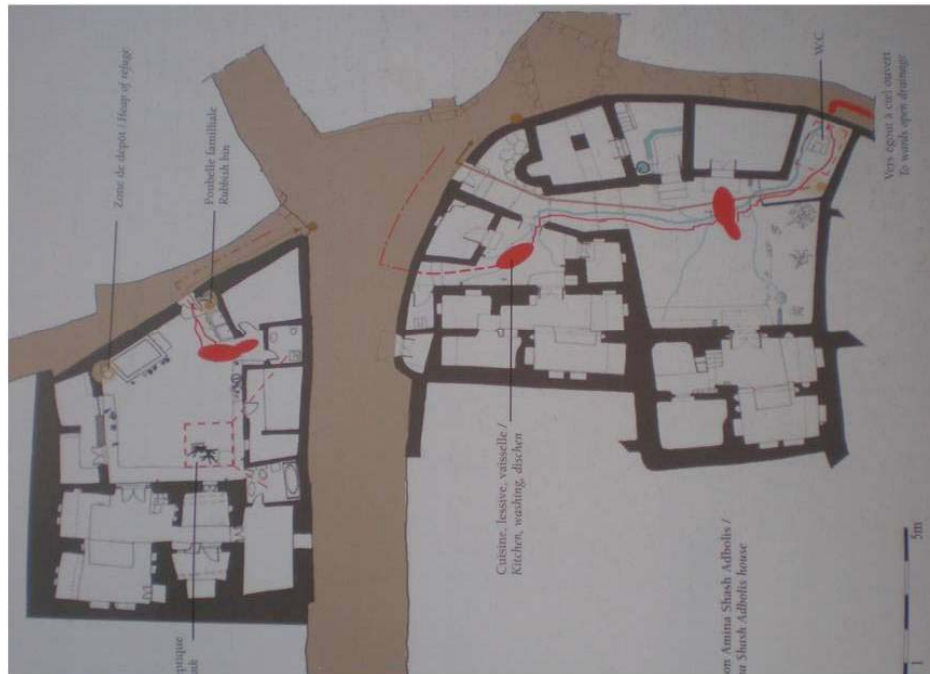


-The traditional Harari house is one of the major property of the Hararies which show their architecture and social structure.

- These traditional houses are also environmentally responsive; which provide moderate inside and outside temperature at different times.



TYOLOGIES OF THE HARARI HOUSE



The residential fabric is first of all made up of two principal architectural types

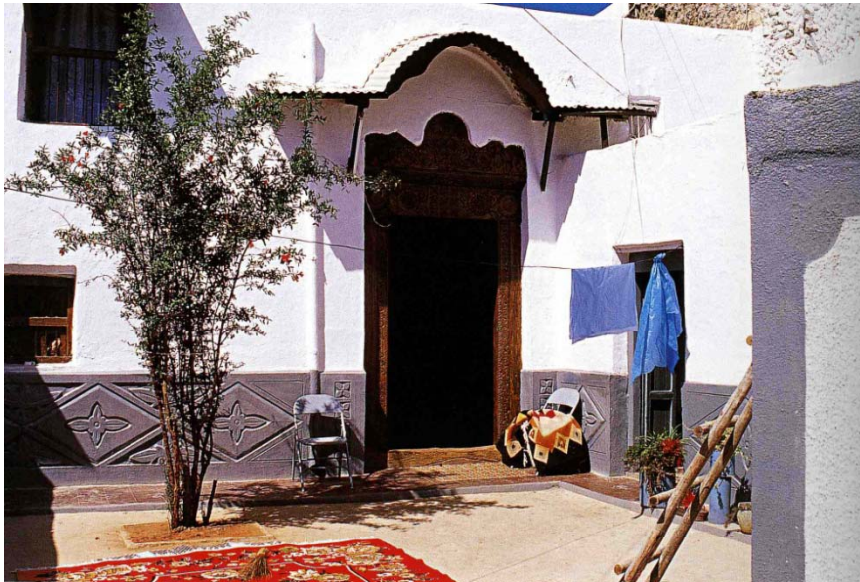
1 - The Harari type – the most prevalent

2 - The Indian type – more sporadic and rare located preferably in the heights of the city

The mixed type – has as basic nucleus the Harari type with an extension that is either vertical or horizontal, but of Indian influence



THE HARARI TYPE (GE ABAD)



-A simple door, often ajar during the day, separates the street from the courtyard.

-the courtyard is the heart of life in the home,

-The parcel or concession , ge abad, groups several structures oriented around the courtyard.

-It is organized around two volumes. The first, accessible by the front door constitutes the principal space, gidir gar, subdivided in two, the entrance – hall part , qeh afar , and the seating part, nedebas.



THE GIDIR GAR



The front door of the ge gar is the only element enhanced by the decoration of its frame and its opening panels.

- The Gidir Gar, Place of the Hararies to the Harari Community

The entrance – hall and seating spaces make an astonishing contrast for two floor areas that are the same.



PROBLEM STATEMENT 1

PROBLEM OF HOUSING IN THE CITY OF HARAR

- According to the 1994 population and housing census results, there were **17445** housing units for **18102** households in Harar city gives an average house hold size close to **4.2**.
- The current population size of the city has been estimated to be close to **109500**. If the average household size in 1994 is assumed to have remained constant until presently, the current number of households in the city would reach around **26000**.
- Based on the population projection, the population of the city is expected to grow to **147800** by the end of the planning period (2017).
- Under the assumption that the average household size mentioned above will remain constant, the total number of the households in **2017** will grow to **35000** close to **9000** additional households entailing the need for **9000** housing units.
- Therefore, to meet the existing as well as future demand for housing units, **16000** housing units have to be built during the planning period.



OTHER PROBLEMS RELATED TO HOUSING IN THE CITY

- Physical condition of housing units
- Informal settlements
- Public bathing and toilet facilities
- Recreational services



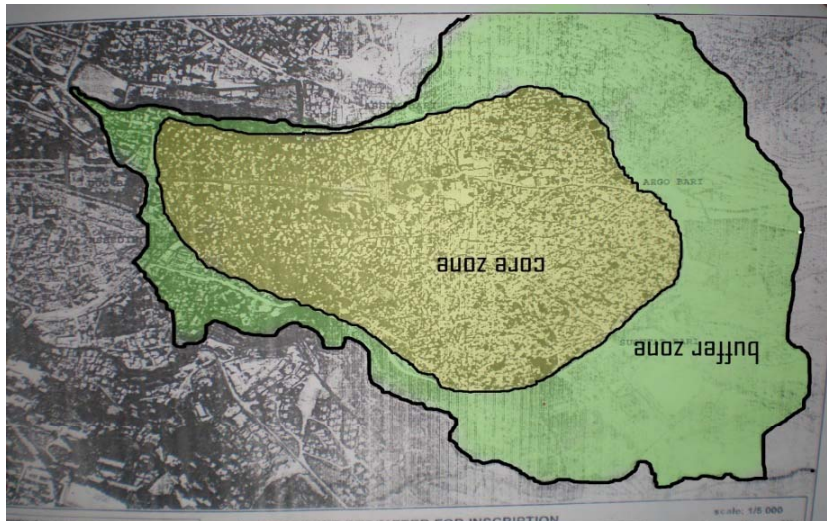
PROBLEM STATEMENT 2

THE ISSUE OF BUFFER ZONE

- Harar recently is recorded by UNESCO as a historical heritage site.
- And different works are being done in order to protect this site.
- Demarcating a buffer zone is one among the several works.
- But there are activities around Jugal which contradict with the idea of buffer zone; example the construction of condominium houses which dangerously affect the view of the historical site.



CONTEXT, SETTING AND BUFFER ZONES



Buffer zones control

- Demolition
- Building heights
- Land use
- Design
- Need clear definition
- Need implementation through
- Strategic framework
- Structure plan
- Development guidelines



EXAMPLES OF BAD DEVELOPMENTS AROUND A HISTORICAL SITE



The imprecise nature of the controls to be imposed in a buffer zone around buildings and sites resulting in historic structures overshadowed by modern high rise towers or surrounded by building of incompatible design

Unprecedented growth and change
Pressure from competing high-value activities
Impact of major infrastructure programs
Environmental pressure
Carrying capacity





The development of greenery and afforestation

The improvement of the appearance and environmental sanitation of urban areas

The preservation of historic and cultural sites



IMPORTANCE OF THE PROJECT

- This project is important because there were no studies made regarding solving housing problems with local context.
- Major issues solved in this design
 - Design of housing units for low and middle income population of the city.
 - Solving problems related with space usage (providing the major functions on a small plot)
 - Since the site is located in the buffer zone; designing houses compatible with the situation



- Integrating natural landscaping and greenery
- Indicating economical way of building houses with environmental friendly materials

And generally the design going with the objective of the Harari strategically plan for year 2011.



DESIGNING PRINCIPLES CONSIDERED FOR THE NEIGHBORHOOD

- Livable and active environment that can integrate with the existing settlement.
- Hierarchy of neighborhood spaces such as-public, semi public and private spaces.
- Compact mixed use pedestrian- oriented neighborhood
- Inward and outward looking solutions
- Development of ecologically and economically sound neighborhoods
- Giving harmony with the historical town of Jugal



METHODOLOGY

- The fundamental method used is :-
 - *Qualitative*
 - analysis of existing situation (housing problem pulse the issue of buffer zone)
 - assessment of some available solutions
 - personal observation
 - discussion with professionals
 - proposal
 - *Quantitative*
 - construction and some related infrastructure cost
 - existing demographic and economic condition



- *Secondary literature*
 - to provide background and perspectives on the Harar city context through recent documents produced by the Harari national state strategic developmental plan for year 2017.
 - to provide a theoretical framework for analysis of housing in Harar



CASE STUDIES

1 TITAN TOWNSHIP

- Project – Housing for factory workers

Architect- Charles Correa

Country – India

Significance of the case study- this design shows how to provide open and private spaces for houses planned very close to each other and its modular arrangements.

Design Concept – a master plan was developed which, within the existing pattern of municipal roads, inlaid a series of square modules of varying sizes that incorporate shared back gardens for the houses, to establish the images of the new town.

The basic square modules are 48m by 48m – and these are combined to form cluster of 2, 4, 8, or 16 modules.



Square modules



The roads serving these modules are kept to very short cul-de-sacs, so they can carry an unusually high level of service infrastructure and yet make it such infrastructure affordable in the Indian context.

In these modules, each house is directly connected to the public roads at one end and to the community back – garden at the other.

Outsider access to these back – gardens is possible only at certain gate – way entrances – at which are located public amenities to provide easy and informal control.



One Block Plan



2 LOW – COST CONDOMINIUM HOUSING IN ETHIOPIA

Project Description

Title: Low cost Housing construction

Client : German Federal Ministry for Economic

Financer : Municipal Administration of Addis Ababa

Context - Land use has no legal underpinning, and extreme overcrowding is the rule. There is virtually no infrastructure.

Objective - The objective is to reduce the housing shortage in Ethiopia. Housing in settlements complete with infrastructure is to be made affordable, especially for lower income groups.

Approach – Construction is proceeding on the basis of LCH simple technology with prefabricated components. People wishing to move into the apartment buildings become owners, paying some 30% of the construction costs.

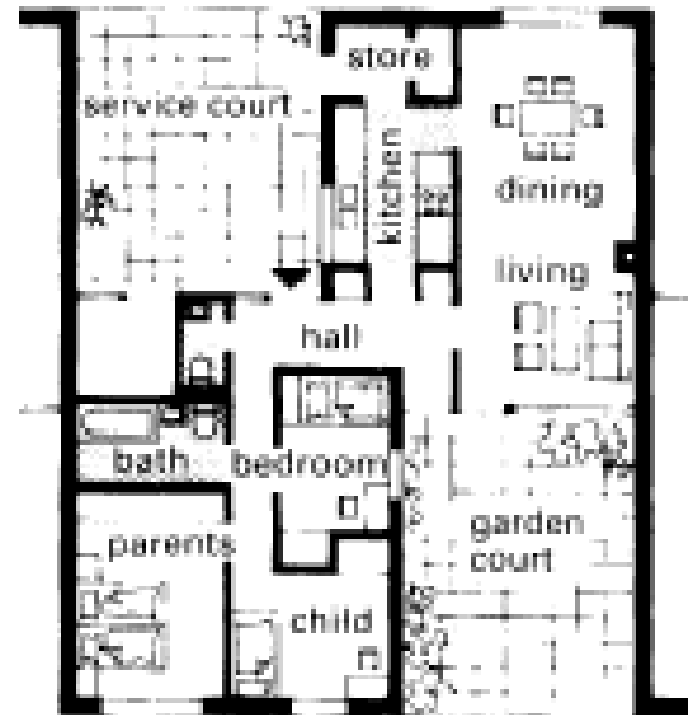
Results achieved so far – A total of 7500 persons – had already become homeowners.



LITERATURE SURVEY

COURTYARD HOUSES

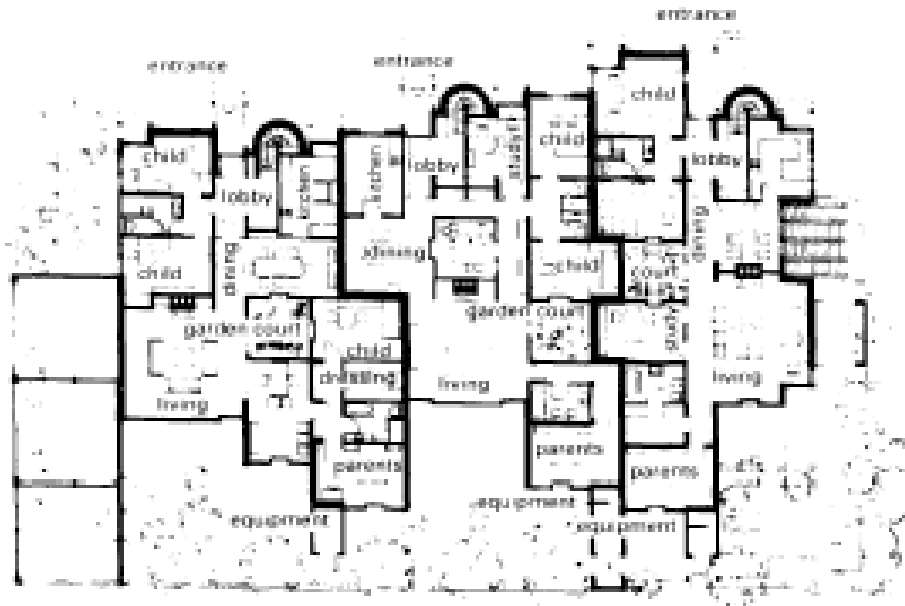
By using courtyards it is possible to provide additional living space that is both sheltered and private. In contrast to detached housing, courtyard developments allow a high quality of life to be offered to occupants using only a comparatively small amount of land area.



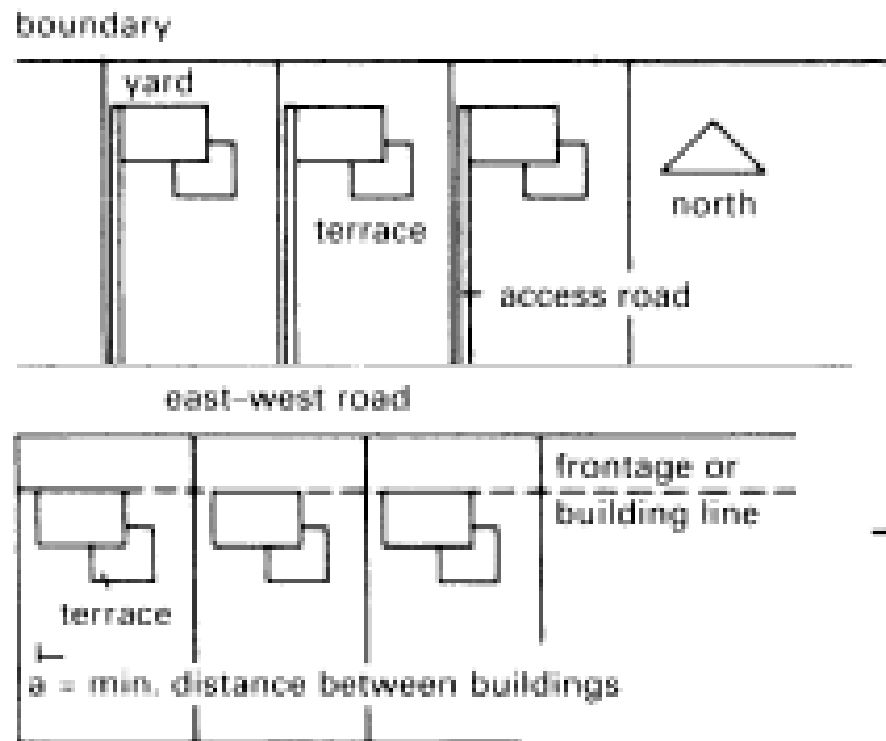
- Enclosed courtyards can be as small as a living room but might need to be artificially lit if the surrounding walls are all higher than one storey. If, however, a garden courtyard is required much larger areas are desirable to take full advantage of the sunlight and allow a full range of plants to be considered



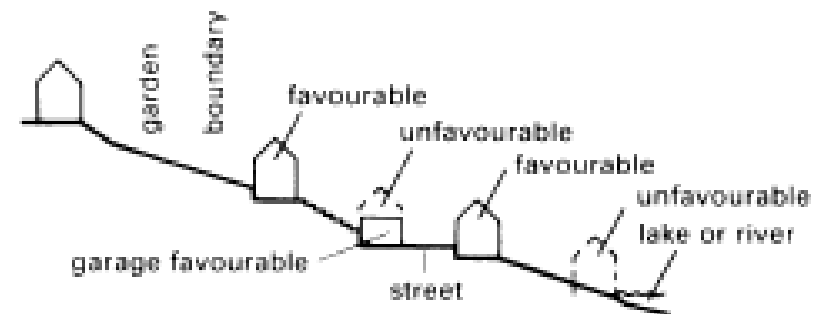
Architect: Butler



HOUSE ORIENTATION



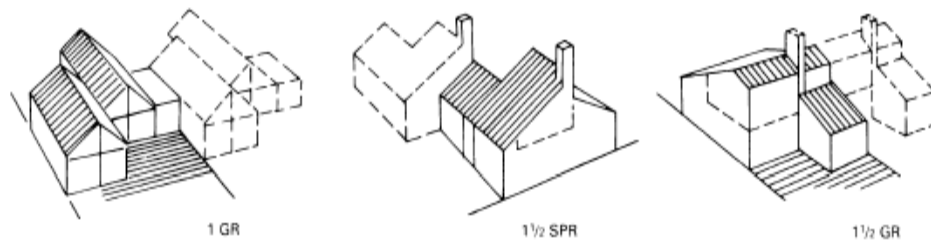
- ① Preferred house orientation on east-west roads



- ④ Favourable (preferred) and unfavourable positions on slopes and streets

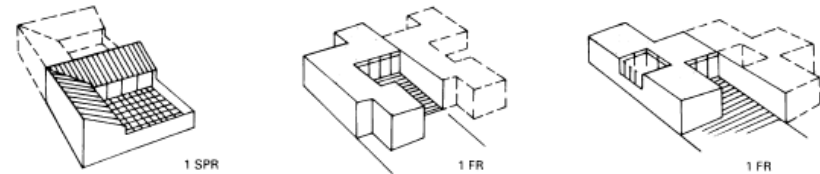


HOUSING TYPES



② Linked housing

Usually used only by developers undertaking large-scale residential projects. The groups of houses are built with uniform plans and designs and can be laid out in compact or spacious configurations. Garages or parking spaces can be incorporated in the individual plots or a separate parking area provided.

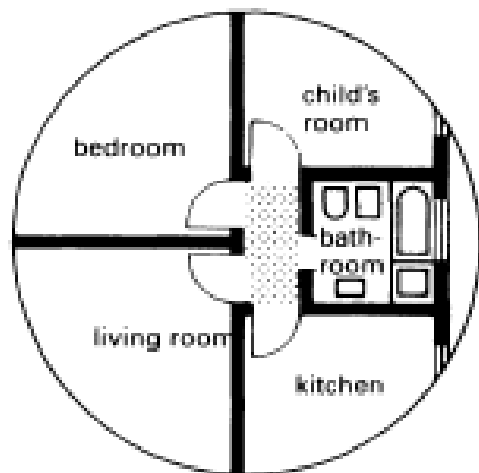


③ Houses with courtyard gardens

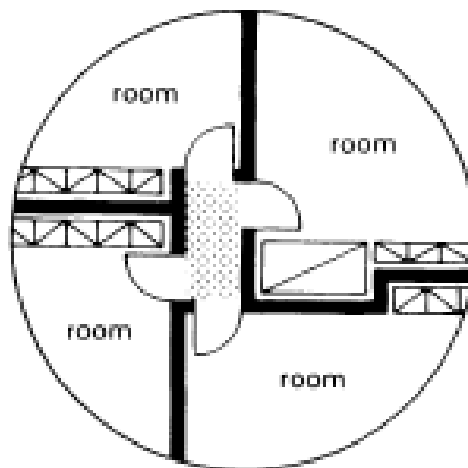
Can be planned as individual buildings or as groups with coordinated design. Groups are usually considered only for large developments. Include individual garages or a communal parking area.



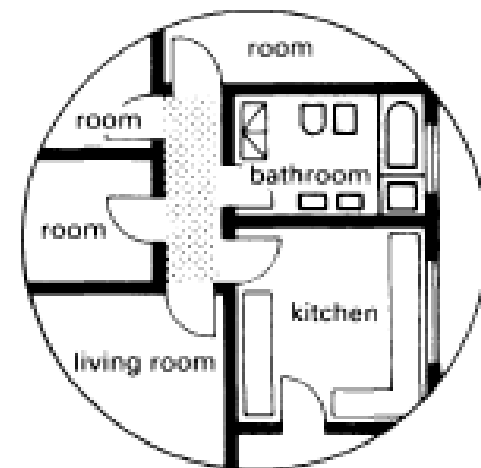
Floor areas required for different numbers of rooms



14 2 m² hallway serving three rooms; otherwise like 13



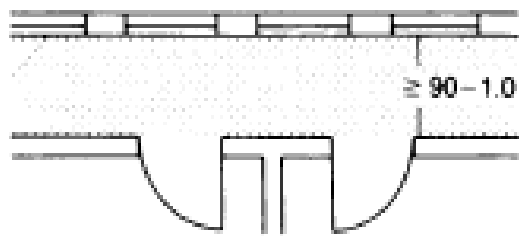
15 2 m² hallway serving four rooms with fitted wardrobes and cupboards



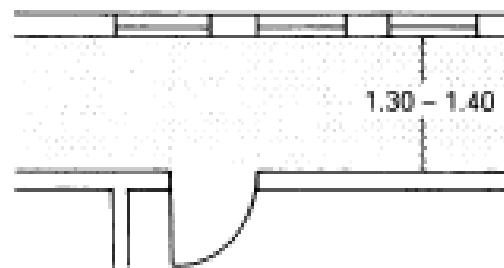
16 3 m² hallway serving six rooms: kitchen, bathroom, three bedrooms and a living room



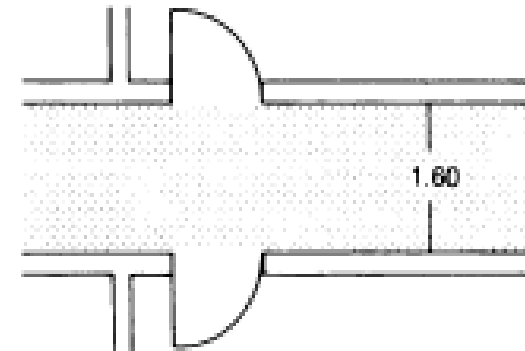
CORRIDORS



doors on one side and low level of traffic: minimum width of 0.9m required (1.0m is better)

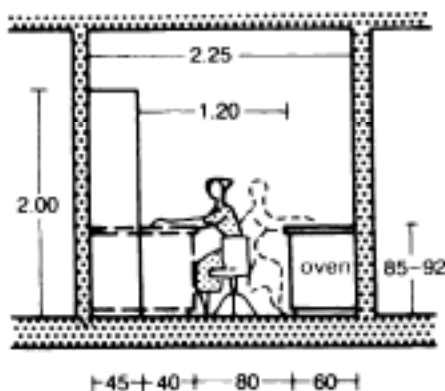


doors on one side, and wide enough for two people to pass one another unhindered: width 1.30 to 1.40m

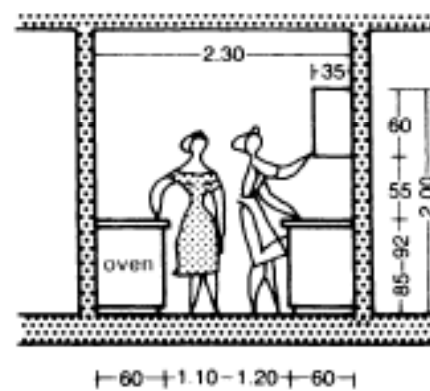


doors on both sides, large volume of traffic: 1.6m width to allow two (2.0m or more for three) people to pass each other comfortably

KITCHENS



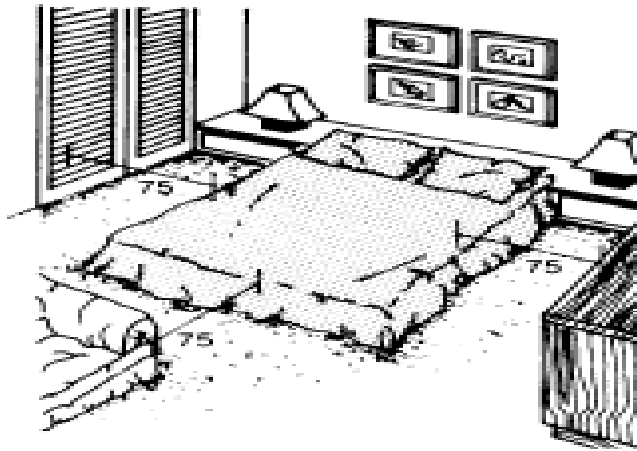
① Section through kitchen with two worktops



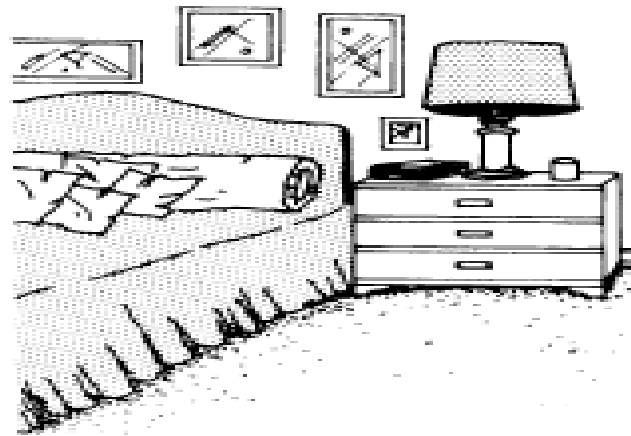
② Section through kitchen; space for two people



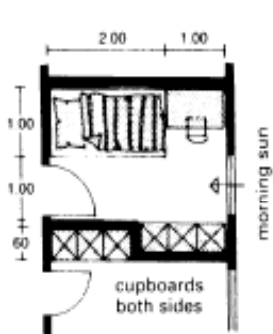
BEDROOMS



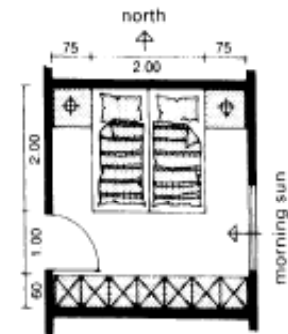
① Allow 750 mm around beds



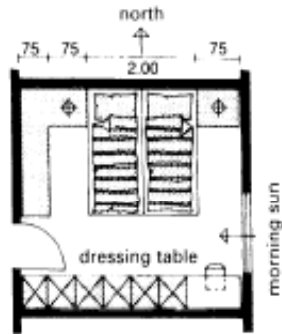
② Storage: bedside table



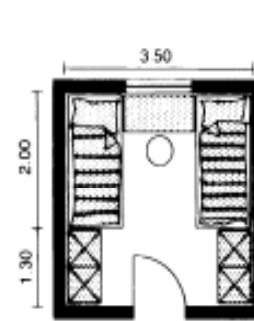
④ Small bedroom for a child



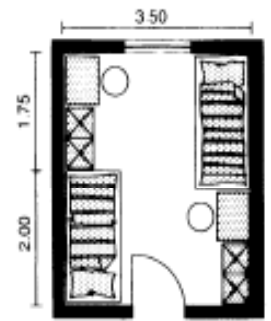
⑤ Standard bedroom layout



⑥ Bedroom with space for dressing table and side cupboard

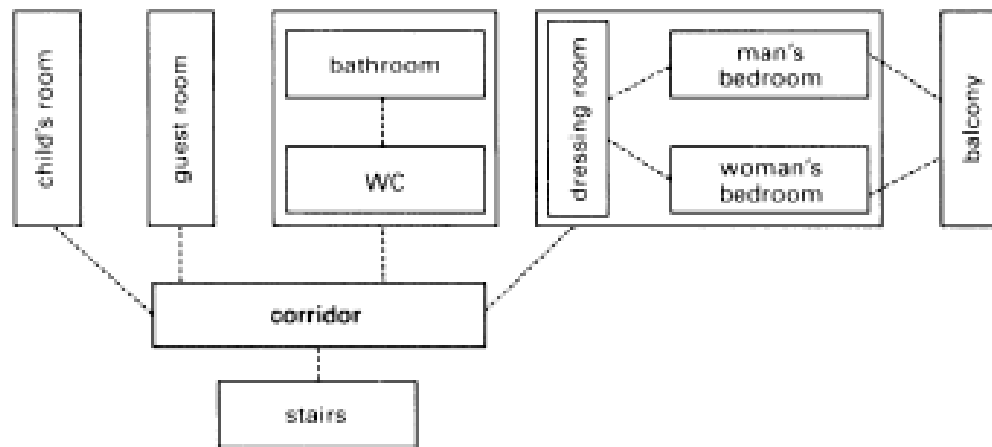


⑭ Two-bed room for children/guests

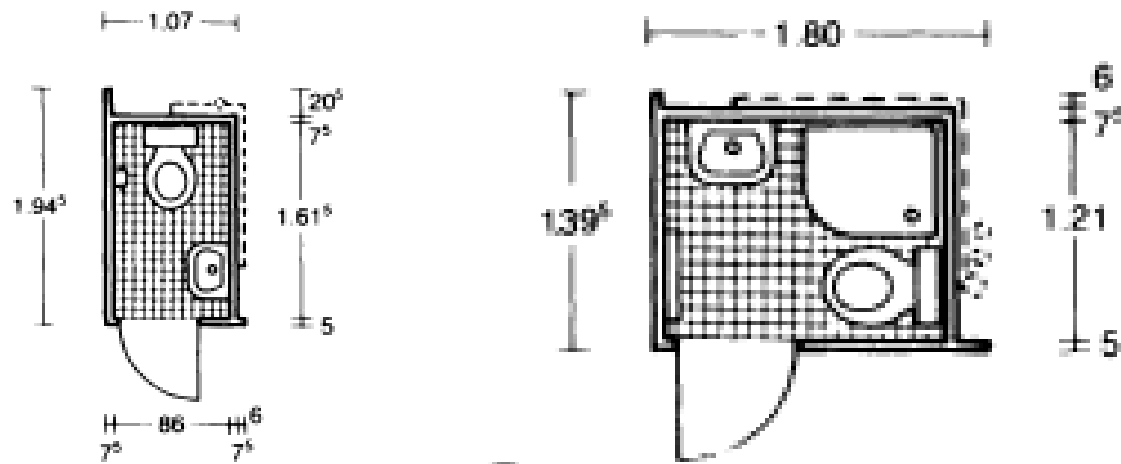


⑮ → ⑭

BATHROOM



① Spatial relationships with the bathroom



PROGRAM OF ACCOMMODATION AND ANALYSIS

- Program Development

The program in this design is developed by considering different issues beyond housing;

- three types of housing typologies
 - one bed room type (75%)
 - two bed room type (25%)
 - studio (25%)
- business generating activities
(shops, cafeterias, restaurants etc
which can possibly getting
customers from tourists)
- public park and green area as buffer
(used as breathing space for the whole
city) area approximately =



Program for housing typologies

Housing typologies	Type of room	Area in m ²	Total area in m ²
One bed room type	Living and dining	25	121.44
	Kitchen	6.5	
	Bedroom	9	
	Bath	3	
	Store	2.2	
Two bed room type	Living and dining	25	183.6
	Kitchen	5.1	
	Bedroom 1	16	
	Bedroom 2	16	
	Toilet	3	
	Bath	3.5	
	Store	1.7	
Studio	Studio		
	Bath		

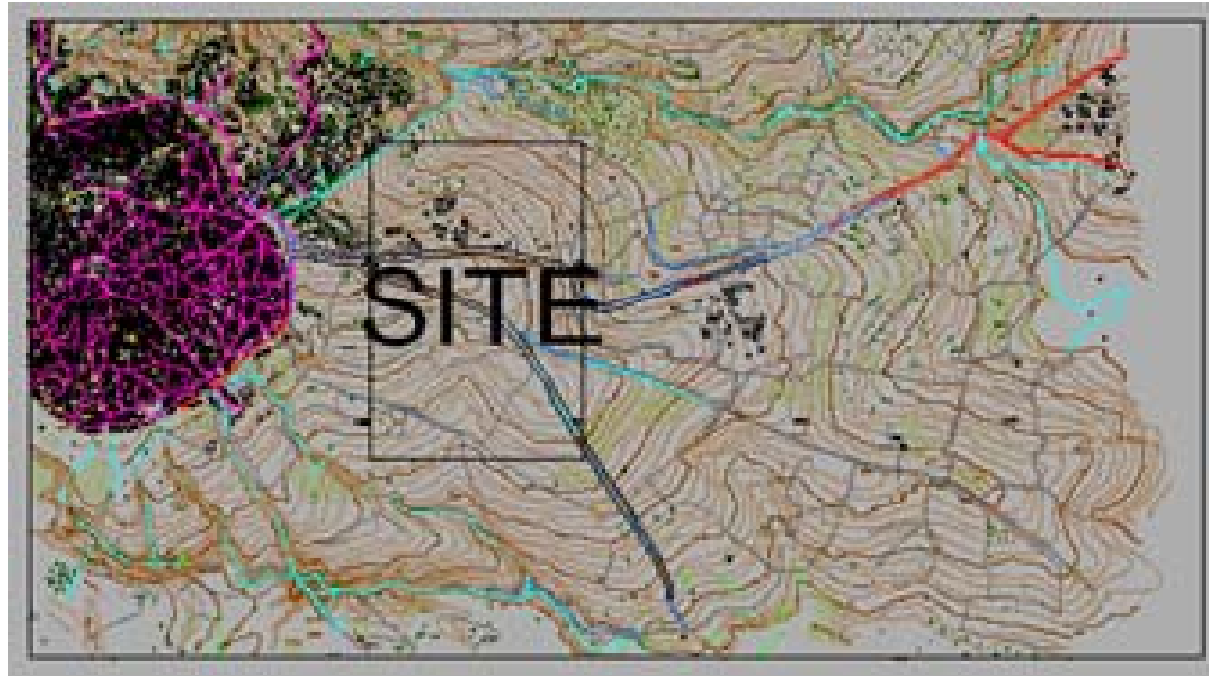


Program for
business areas

Type of room	No of rooms	Area in m ²
Shops (workshop)		
Cafeteria		
Restaurants		



SITE SELECTION AND ANALYSIS



Site Characteristics

The site is located to the east behind Jugal.

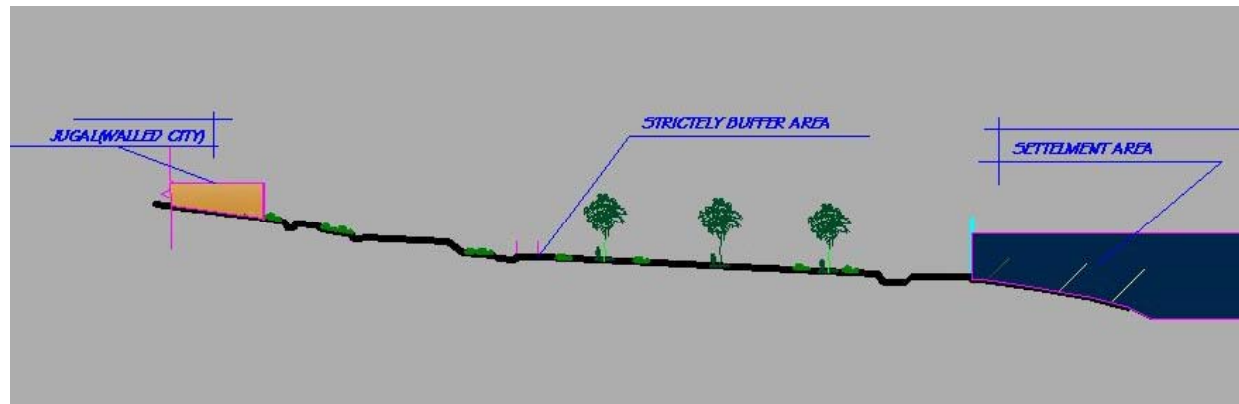
The area of the site is approximately 414718m².

The area is preserved for housing developments by the municipality for housing; and condominium house construction is under going around.

The site used to be covered by vegetation but now a bare land is seen around.



SITE SECTION AND ANALYSIS



The site is sloppy putting Jugal at top and decreasing towards the selected site.

As the site is located inside the buffer zone there should be a green buffer between Jugal and the site for housing. Views from Jugal to the site



Views from Jugal to the site

BUILDING HEIGHT REGULATION

There is no clear regulation about the building heights inside this region.

Since this design considers the historical heritage, building height is one of the major consideration in this design.

So the different units being a ground plus one buildings.



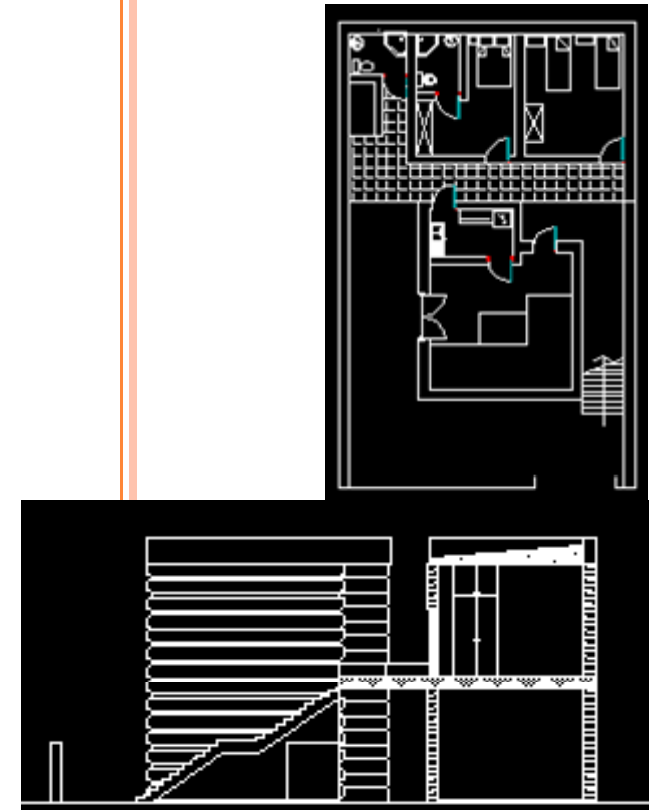
DESIGN CONSIDERATIONS

- Compactness
- Hierarchy of open spaces and greens
- Cost efficient way of construction
- Energy efficient systems in the neighborhood
example solar energy and biogas technologies
- Financing



1 COMPACTNESS

- This is achieved in the design by providing one plot with an area 180m^2 and 122m^2 for two families on two levels sharing a common space in the compound.
- At a neighborhood level this is achieved by providing a common courtyard space for several household units and providing a common communal service giving block.



2 COST EFFICIENT WAY OF CONSTRUCTION

- The application of appropriate technology ideas. The use of mud for construction of the buildings.
- Literature review (taken from Encarta encyclopedia 2007)

Why build in mud?

Mud is cheap, practical, and attractive. It's easy to work with, and it takes decoration well. Mud is also abundant, especially where other building materials—such as stone or wood—are lacking. In northern Africa, mud architecture evolved from local necessity. No other building material was available.

Although people in damp climates have built with mud in the past, mud is especially effective in dry climates where it dries out and doesn't face erosion from water.

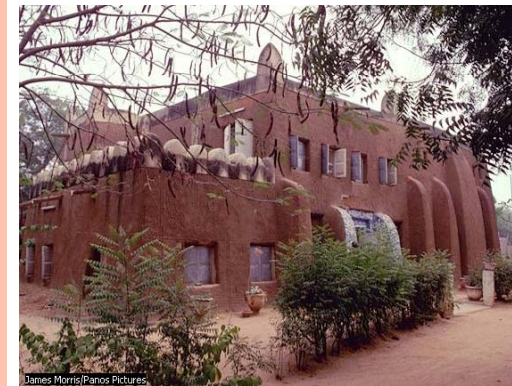
Ways of building in mud

Several methods of building in mud have developed over time.

Overcoming mud's architectural limitations

Mud buildings are usually very sturdy, so long as strong foundations support them. The same cannot be said of many of the shoddily built modern buildings found in some African cities. But using mud for building does pose certain problems.

Building tall



The chief disadvantage of mud for building is its lack of tensile strength, a quality that limits the height of mud buildings and creates difficulties in roof construction. [Nevertheless, in some places, such as the mud city of Shibām in Yemen, buildings that rise 30 m (100 ft) are not uncommon.] In most of northern Africa, however, low population density eliminates a need to build upward.

Providing light and ventilation

Building walls of mud presents no problem, but mud pulls away from a door or window frame as it dries. Builders traditionally worked around this difficulty by creating only a few openings, leading many people to believe that mud buildings could not be adequately lit or ventilated.

Many residents improve this traditional air conditioning by stacking fodder on the roof to provide insulation from the sun and by wetting the dirt floors to cool the rooms and keep dust under control.

Preventing erosion

Traditional mud architecture erodes, as wind, rain, and other abrasions tear at it. As with any building, maintenance is important. Regular reapplication of coats of dung plaster, whitewash, or paint can protect surfaces and enable mud structures to last.

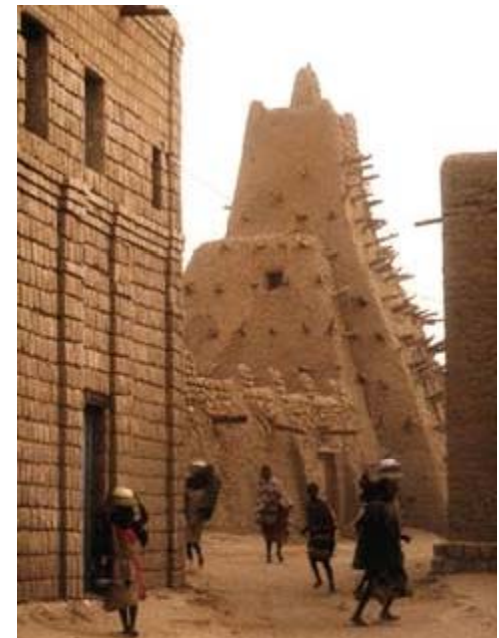


These materials often must be imported, making these “modern” buildings wastefully expensive. The result, in many African cities, has been a high level of expenditures on small numbers of buildings.

The future of mud architecture

Using wood, concrete, steel, and glass for building construction can waste both money and resources in areas of Africa where mud is available. Because mud is cheap, accessible, and ecologically sound, efforts are underway throughout Africa to overcome negative perceptions of this traditional building material.

The use of machinery and the addition of concrete as a binding agent have breathed new life into the timeless technologies of adobe brick and jalus. Mud bricks can be produced quickly and cheaply, and made almost as strong as concrete blocks.



Betty Press/Woodfin Camp and Associates, Inc.



- In Mali local health authorities have built a modern hospital with a Western design out of mud (with a 10 percent admixture of cement) and steel bracing rods. To build a structure in Mali of comparable size and entirely from reinforced concrete would have been prohibitively expensive, yet no more stronger, durable, or attractive. Similar successes have earned Malians international awards for architecture.
- The basic structure of new, brightly painted mud houses across northern Africa remains essentially the same as in ancient times, even if now one may see a truck parked outside or a satellite dish protruding from the roof. Although viewed in some quarters as a symbol of backwardness, Africa's traditional building material may prove to have a future as rich as its past.



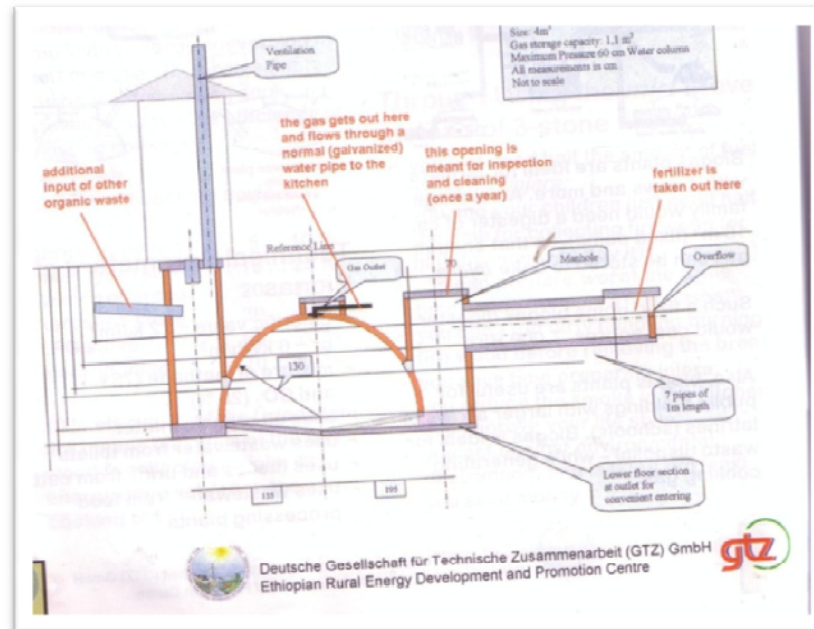
3 ENERGY EFFICIENT METHODS

- Bio gas technology
How bio gas work

the gas gets out here and flows through a normal (galvanized) water pipe to the kitchen

this opening is meant for inspection and cleaning (once a year)

this opening is meant for inspection and cleaning (once a year)



fertilizer is taken out here



FINANCING

According to the report of the Harari region strategical plan – to fulfill 75% of the existing and future demand for housing until 2011

- Construction of housing units by the government in order to enable the low income groups owners of house through a long term repayment; and
- Production of construction materials in large amount in order to reduce the increasing high cost of materials



- The financing of this project is basically covered by the government. As stated in the plan the government show interest in the production of alternative building materials.
- The basic material in this project ,loam , which is still abundant in the city sounds perfect for such problems including other places.
- Building with loam costs mach less than cement or concrete.
 - materials used
 - loam soil + sand
 - stone (which is abundant in the area)
 -



SOURCES



A Muslim city of Ethiopia Harar

Philippe Revault & Serge Santelli
Editors

Architects' Data

Architects Data

Third Edition
Ernst and Peter Neufert



Critical Issues and Challenges of Urban Conservation in Asia

Encarta Encyclopedia 2007

