The Aga Khan Program for Islamic Architecture
at Harvard University and the
Massachusetts Institute of Technology

Design Workshop:

DETERMINANTS OF HOUSING DESIGN

Prepared for the Aga Khan Program for Islamic Architecture
by Francois Vigier

Design Workshop:

DETERMINANTS OF HOUSING DESIGN

Introduction

The rapid growth of cities in the Islamic countries has created a housing crisis that affects, directly or indirectly, practically all segments of urban society. The combination of inflationary trends in construction costs and skyrocketing land prices has put the price of even a modest dwelling beyond the means of approximately one-fourth of urban households. As a result, between one-third and half of new urban housing is being built illegally, often without sewerage or piped water, or on land for which occupancy rights are dubious or invalid. Concurrently, the quality of existing housing is deteriorating at a rate of about 2% per annum, due to the overcrowding resulting from conversions and the low quality of new construction, and infrastructure systems are severely overburdened.

Faced with this urban housing crisis, governments have spent considerable effort and scarce financial resources in an effort to devise housing solutions appropriate to urban conditions. These have ranged from large scale, high-technology solutions, often inspired by European and North American post-war housing types, to so-called "core house" and "sites and services" developments whose lower costs and marshalling of the savings and sweat equity of individual beneficiaries were seen as offering the opportunity to house more people for a fixed public investment.

Both approaches, however, have been rightly criticized for their lack of sensitivity to the lifestyles of users, to climatic conditions, and to indigenous building traditions. Developing a more appropriate response to urban housing, particularly for lower income households,

remains a challenge that few architects and planners have been able to meet successfully.

The purpose of the workshop is to undertake a critical evaluation of the determinants of housing, from the shelter to the functional social groupings of housing units, corresponding to the provision of such public services as elementary and intermediate schools, clinics, and recreational facilities. Particular attention will be given to identifying the relative roles of culturally influenced lifestyles, limited economic resources, and building technology in shaping the physical form of the dwelling and its functional relationships to other uses.

Methodology

Small teams of participants will select housing prototypes from among those presented in the background presentations and reference materials, and evaluate their appropriateness to the needs of one of the population profiles given below and for one of the three climatic conditions described in Annex II. Alterations and improvements to the prototypes or, alternatively, the definition of more appropriate housing solutions are encouraged. Unit cost data, in U.S. dollars, are given in Annex I. The attached diagram describes the general conditions of a 50-hectare site located on the fringe of a large city. Additional land, if necessary, can be acquired on the eastern edge of the site.

The following steps are suggested as a common methodology to be followed by the teams in order to achieve a common level of information for the general discussion on the determinants of housing design in Islamic countries to be held Friday, August 21, at 2:30 p.m.

Step 1. Analysis of the population profile to determine housing and community needs. Determination of ability to afford housing, desirable housing types, alternative modes of occupancy. PRELIMINARY HOUSING DESIGN CRITERIA.

Step 2. Evaluation of housing prototypes. Illustrative diagrams of the arrangement of buildings showing their utiliza-

tion and relationship to community facilities and services. EVALUATION OF ADEQUACY OF PROTOTYPES.

Step 3. Modification of housing prototypes or sketch design of alternative housing solution to better meet the needs of the population profile. FINALIZATION OF HOUSING DESIGN CRITERIA.

Two population profiles are given below, one for a lower income group needing re-housing, and the other for middle level government employees who are a prime target group for subsidized housing programs.

Population Profile A:
LOWER INCOME

The 19,600 people grouped in the 3,500 households described below currently live in a substandard development on the urban fringe. The dwellings are generally small, consisting of one to two rooms on plots varying from 45 square meters to 80 square meters. Approximately half of the dwellings are structurally sound, albeit crudely built; 30% are in need of such major improvements as water-tight roofs; and the remaining 20% are built of makeshift materials. Approximately half of the dwellings are illegally occupying public land, and the remainder lease the land on which they are constructed from absentee owners. About 14% of the 3,900 families pay $15 to $20 per month to rent a single room in a dwelling occupied by someone else.

The development is unsewered, its streets are unpaved, and such community facilities as schools and clinics are located some distance away. Water is provided by public fountains, serving 150 to 200 dwellings.

Of the population 20 years of age and over, 22% were born in the city, the balance having immigrated over the last two decades. Most of the households have moved at least once since they came to the city, usually as a result of being displaced from another squatter settlement. About 43% of heads of households are either unemployed or underemployed, with unspecified occupations in informal economic activities. The median

household income is $136 per month, and 35% of the population is below the urban poverty threshold of $107, as defined by the World Bank.

The following tables summarize salient characteristics of the population that is to be re-housed in a new, planned development.

Table A1
Age-Sex Distribution of the Population

	M	F	Total
Under 1	290	205	495
1-4	1,540	1,345	2,885
5-14	2,365	2,250	4,615
15-44	4,560	4,295	8,855
45-64	1,135	910	2,045
65+	475	230	705
Total	10,365	9,235	19,600

Table A2
Occupational Structure of Heads of Households

Artisans	77
Shop Owners	260
Industrial Workers	637
Daily Wage Workers	647
Service Workers	121
Domestic Workers	56
Government Employees	197
Unemployed or Unspecified Occupation	1,505
Total	3,500

Table A3
Size of Households

Size of Household	Number of Households
1-2 person	75
3-4 person	1,245
5-6 person	1,320
7-9 person	545
10+ person	315
Total	3,500

Average size of household: 5.60 persons

Table A4
Education of Heads of Households

None	2,040
Traditional Primary	90
Modern Primary	715
Modern Secondary	575
Technical Secondary	80
Total	3,500

Table A5
Average Household Expenditures, by Size of Household

Size of Household	Percent of Expenditures by Category				Monthly Total Expenditures ($)
	Food	Housing	Clothing	Other	
1-2 person	78.9	8.4	4.5	8.2	81.00
3-4 person	66.5	11.7	6.9	14.9	116.00
5-6 person	64.7	11.5	10.4	13.4	110.00
7-9 person	57.3	13.0	12.6	17.1	193.00
10+ person	61.7	9.0	10.0	19.3	240.00

Population Profile B:

MIDDLE INCOME

The three tables following provide information on middle level government employees to be provided with partially subsidized housing. It should be noted that, although their income is substantially higher than that of Population Profile A, it is essentially inadequate to compete on the private housing market. This is due to the fact that multiple wage earners are not prevalent in households of this social status, while fixed government salaries rarely keep up with prices in periods of substantial inflation. Furthermore, this group tends to aspire to a lifestyle commensurate with its status as public officials and the educational level of the head of the household, which is higher than secondary level. Similarly, the education of the children, particularly sons, is valued and considerable sacrifices will be made to ensure an adequate education and secure future. In other respects,

this group continues to share many of the traditional attitudes of the population as a whole, including a substantial number of children and an extended family pattern that provides shelter for close relatives with the family.

Table B1
Age-Sex Distribution of the Population

	M	F	Total
Under 1	35	35	70
1-4	315	300	615
5-14	655	795	1,450
15-44	1,455	1,350	2,805
45-64	300	330	630
65+	60	100	160
Total	2,820	2,910	5,730

Table B2
Size of Households

Size of Household	Number of Households
1-3 person	240
4-5 person	320
6-7 person	250
8+ person	160
Total	970

Average size of household: 5.91 persons

Table B3
Average Household Expenditures, by Size of Household

Size of Household	Percent of Expenditures by Category					Monthly Total Expenditures ($)
	Food	Housing	Clothing	Transp.	Other	
1-3 person	39.3	30.1	7.8	5.5	17.3	120.00
4-5 person	40.6	30.3	7.9	5.5	15.7	275.00
6-7 person	41.6	28.2	9.2	3.8	17.2	395.00
8+ person	43.9	24.7	9.8	4.4	17.2	550.00

Annex I:

UNIT COST DATA

Infrastructure Unit Costs

Road Construction	$40 per square meter
Water Supply	$120 per linear meter*
Sewerage	$115 per linear meter*
Electricity	$60 per linear meter**
Hook-up Charges:	
Water	$140 per connection
Sewers	$60 per connection
Electricity	$90 per connection
Ten-classroom Elementary School	$238,000
Health Center	$50,000

* Includes off-site connections.
** Includes one street light every 50 meters.

Construction Costs

Dwelling Type	Number of Rooms	Floor Area (square meters)	Plumbing	Cost per Square Meter
Minimal	1-2	30	WC	$110
Basic Low-Cost	3-4	45	WC & Shower	$150
Modest	3-5	67	Full Bath	$200
Good/Luxury	5+	100+	All Mechanical in Luxury Units	$270

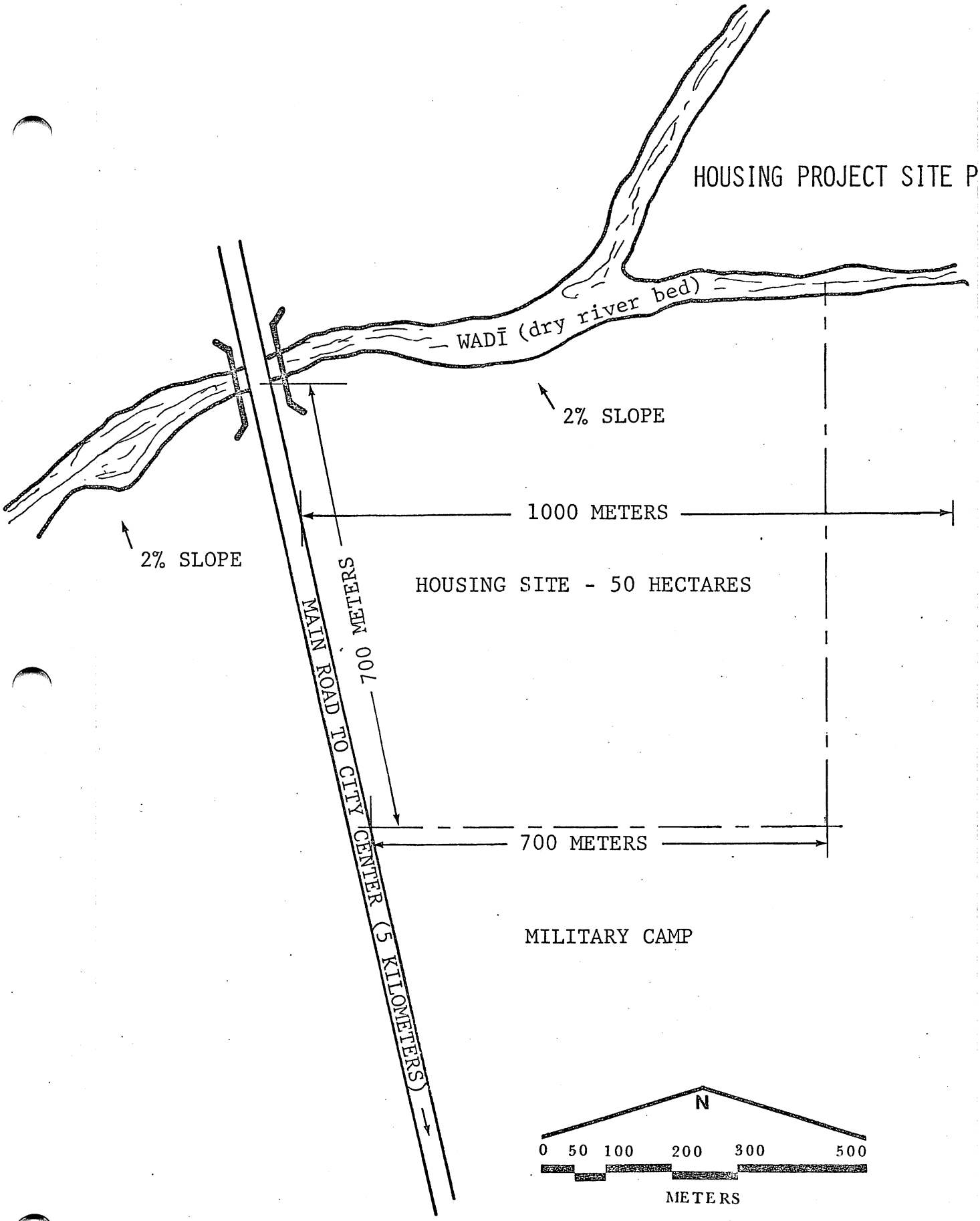
Land Costs

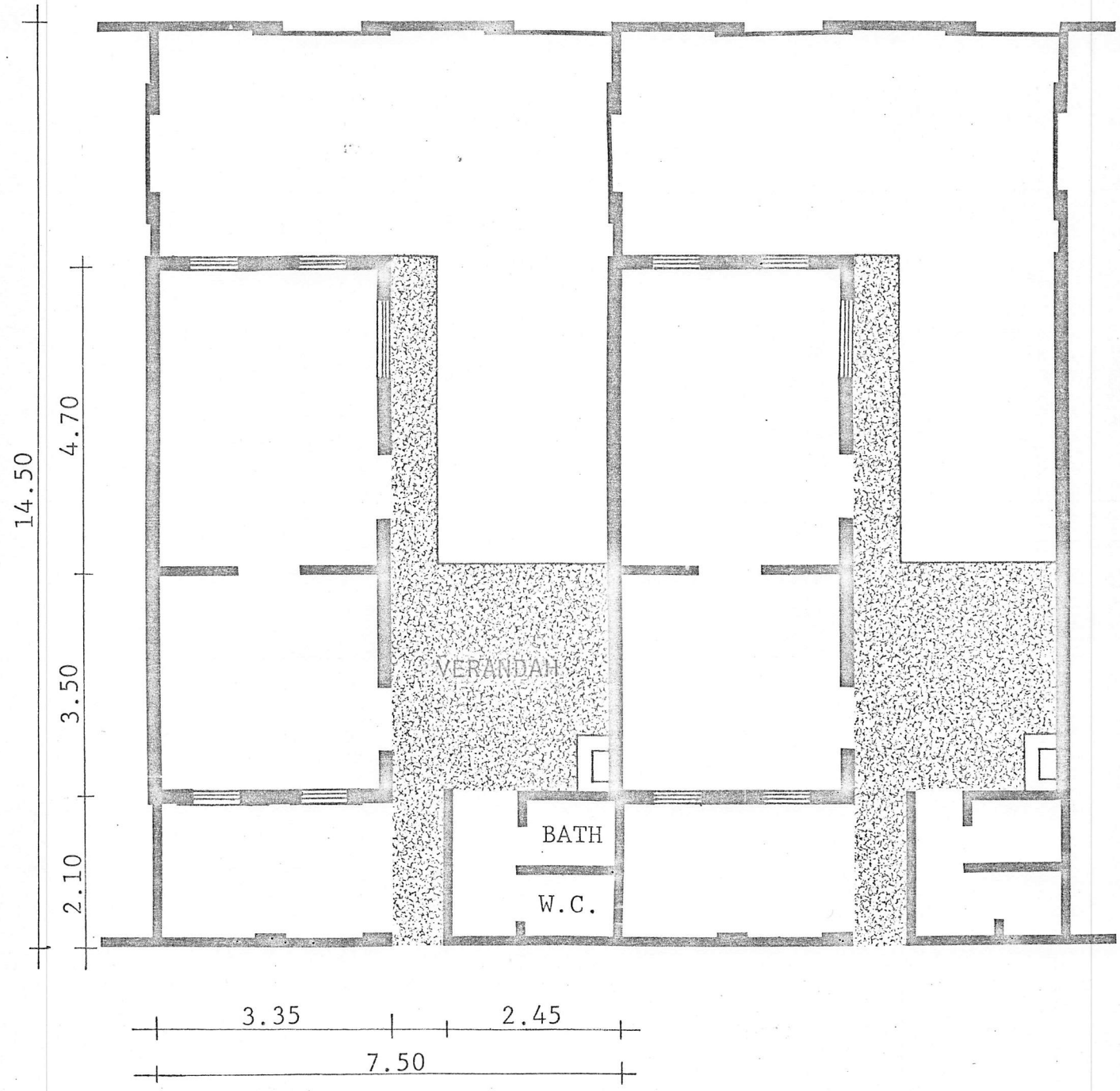
Raw Land	$20 per square meter

Annex II:

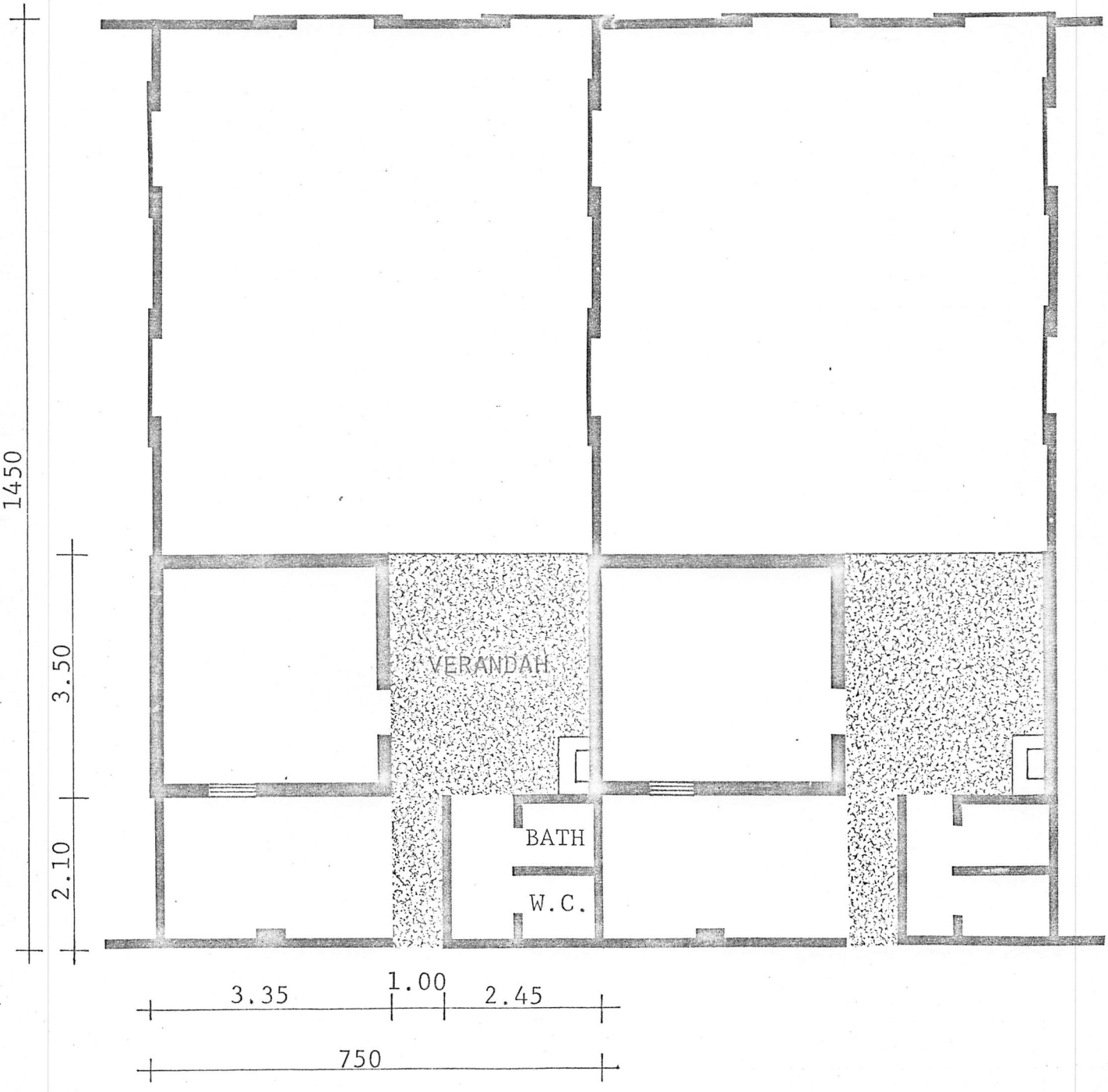
CLIMATIC CONDITIONS

Temperature Data		Arabian Gulf	North Africa	Southeast Asia
Mean Monthly Maximum:	Summer	43°C	41°C	38°C
	Winter	26°C	20°C	35°C
Mean Monthly Minimum:	Summer	26°C	14°C	32°C
	Winter	13°C	1°C	15°C
Precipitation Data				
Monthly Mean:	Summer	3 mm.	10 mm.	320 mm.
	Winter	72 mm.	56 mm.	50 mm.
Mean Annual Rainfall:		242 mm.	524 mm.	1980 mm.
Rainiest Month:		April (96 mm.)	December (147 mm.)	August (340 mm.)


HOUSING PROJECT SITE PLAN
WADĪ (dry river bed)
2% SLOPE
2% SLOPE
1000 METERS
HOUSING SITE - 50 HECTARES
700 METERS
700 METERS
MAIN ROAD TO CITY CENTER (5 KILOMETERS)
MILITARY CAMP
N
0 50 100 200 300 500
METERS



LOW INCOME COURTYARD ROW HOUSE



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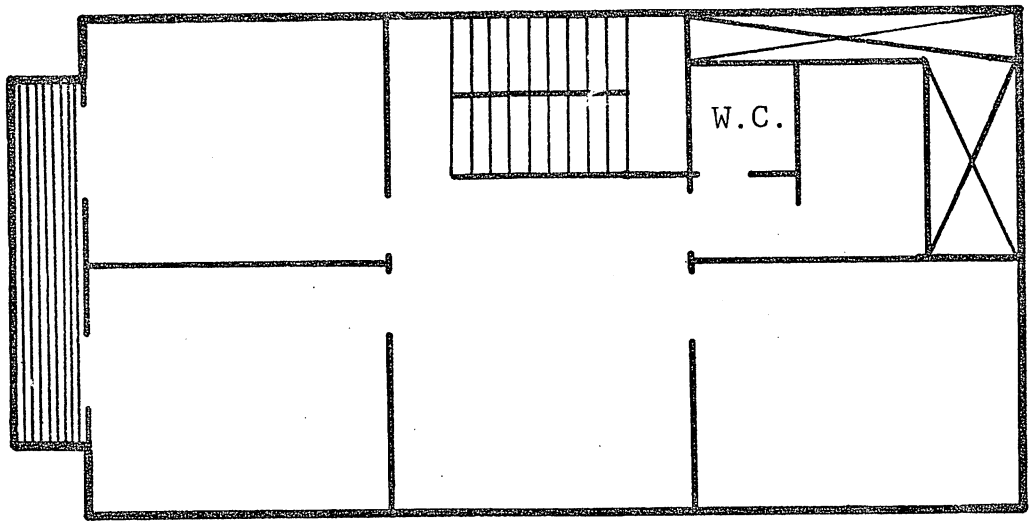

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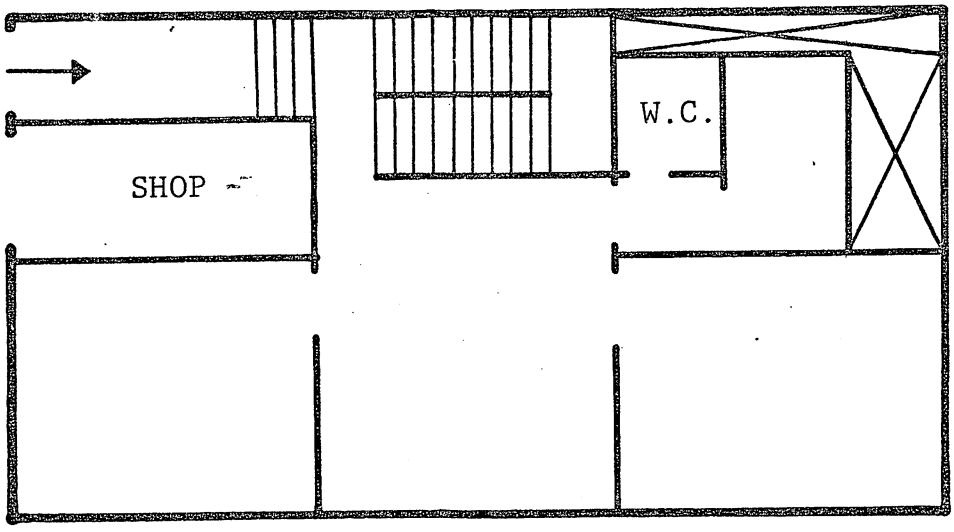
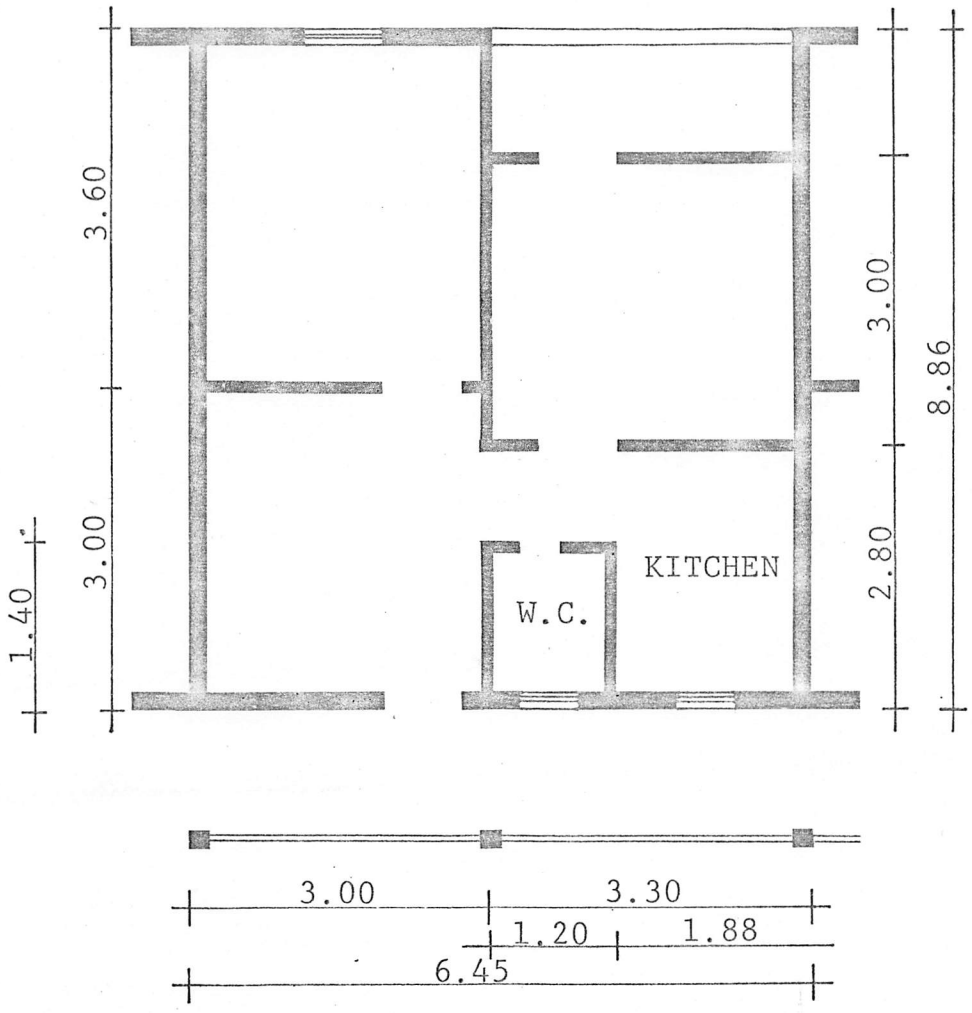
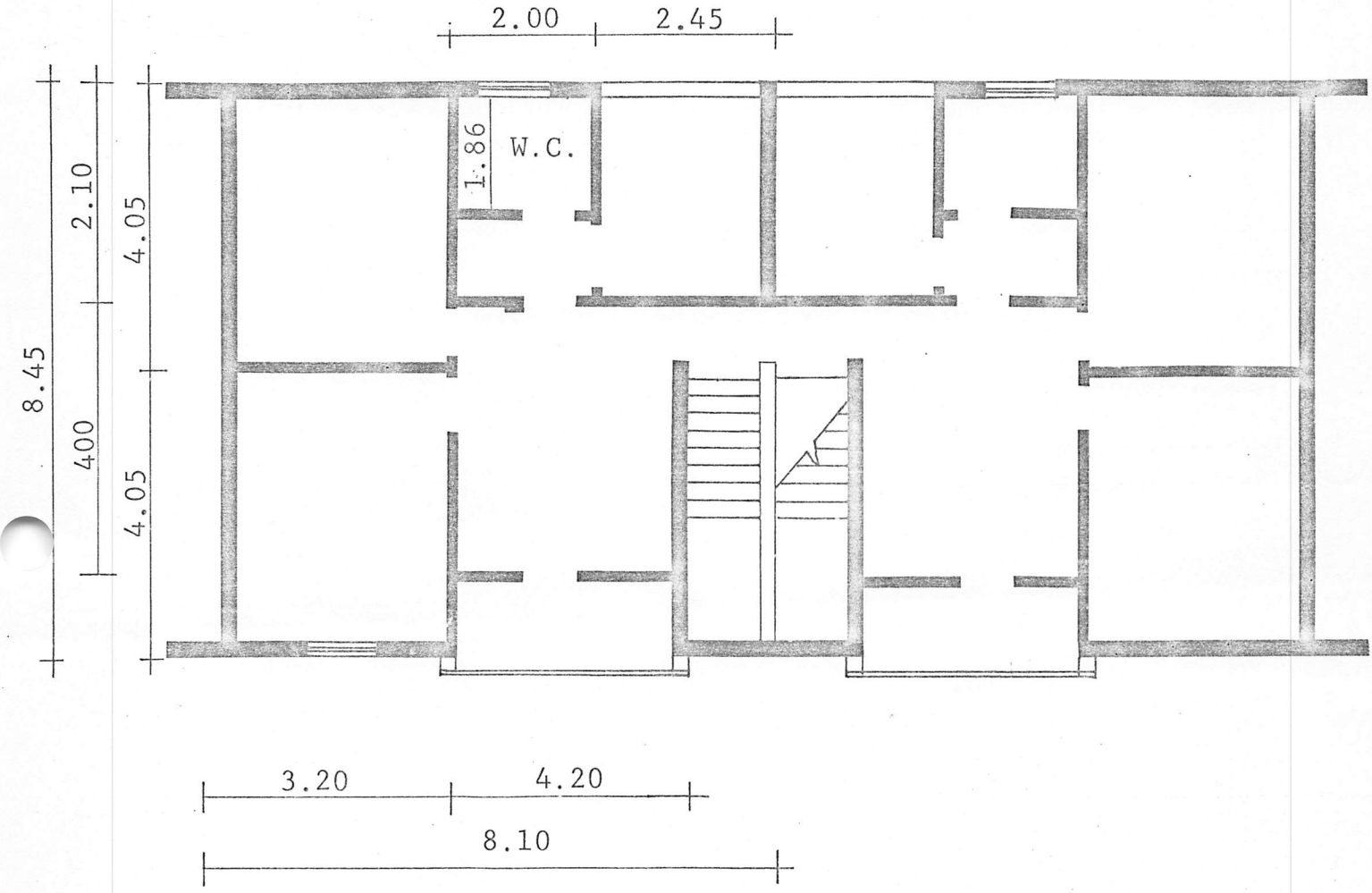


GROUND FLOOR

INFORMAL HOUSING

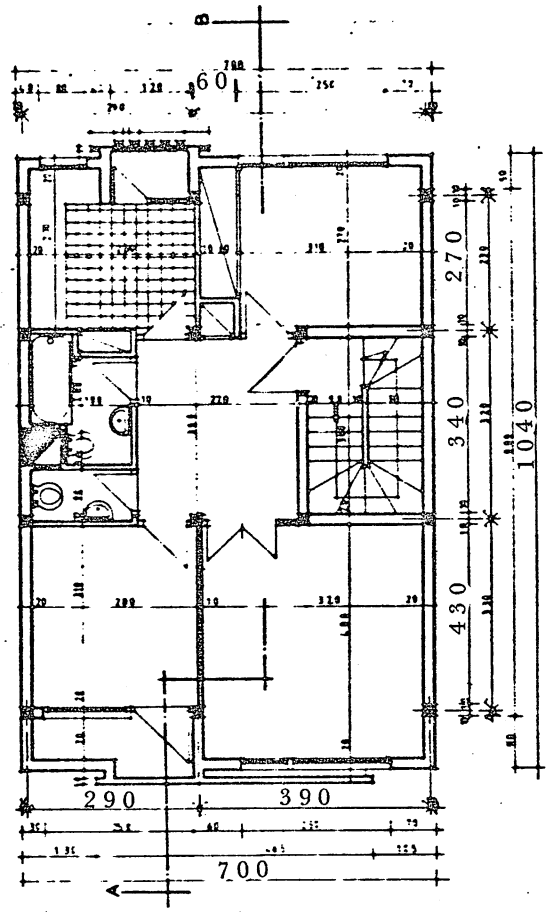


MODERATE INCOME CORRIDOR TYPE APARTMENT



MODERATE INCOME COMMON STAIRWAY TYPE APARTMENT

MODERATE INCOME WALK-UP APARTMENTS



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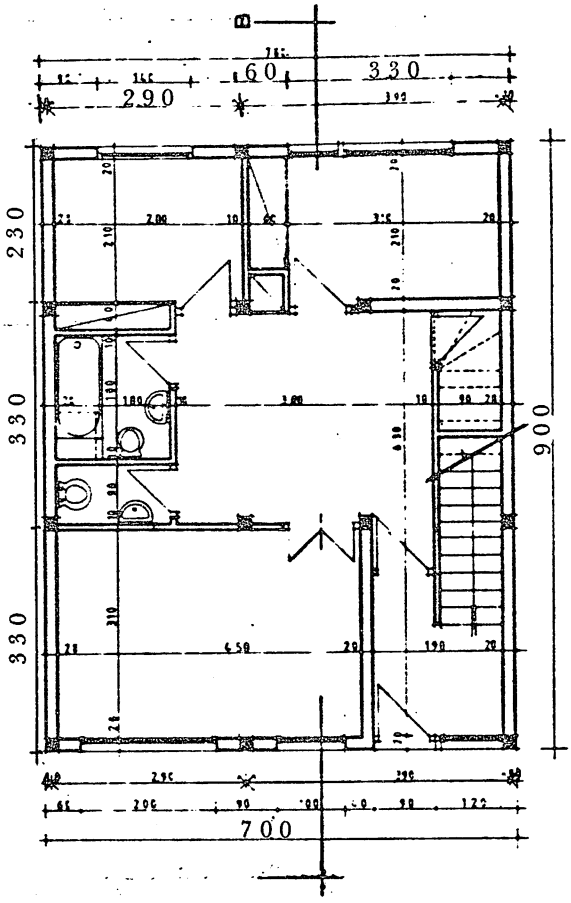

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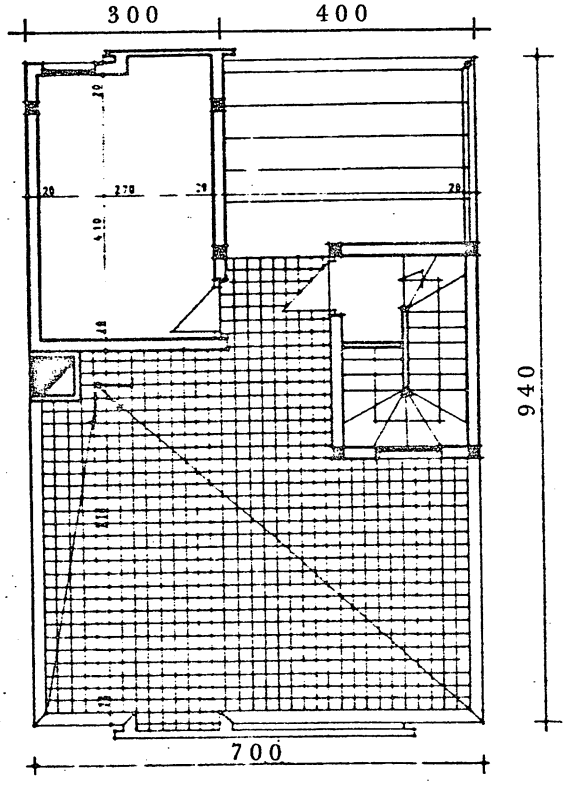
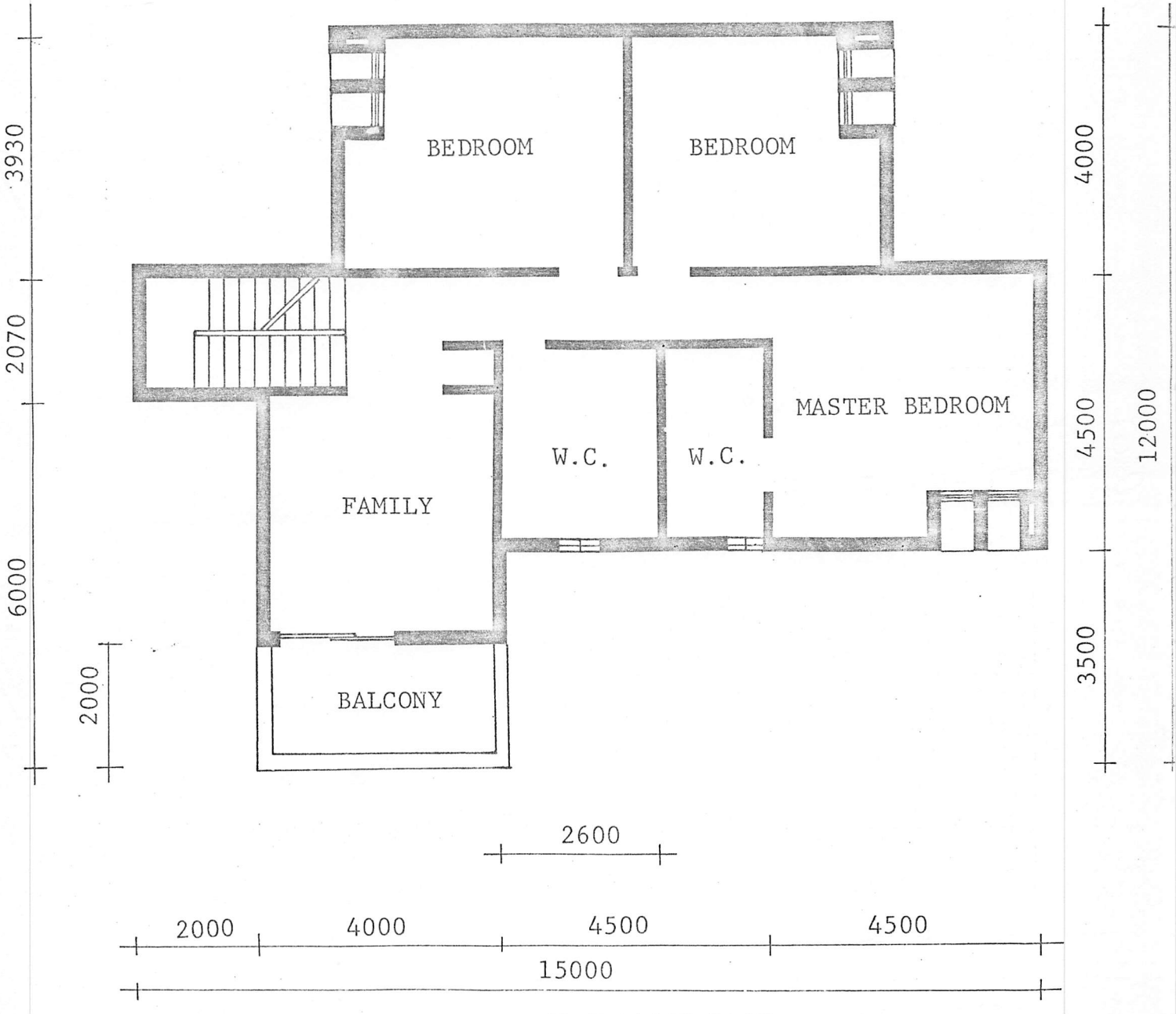
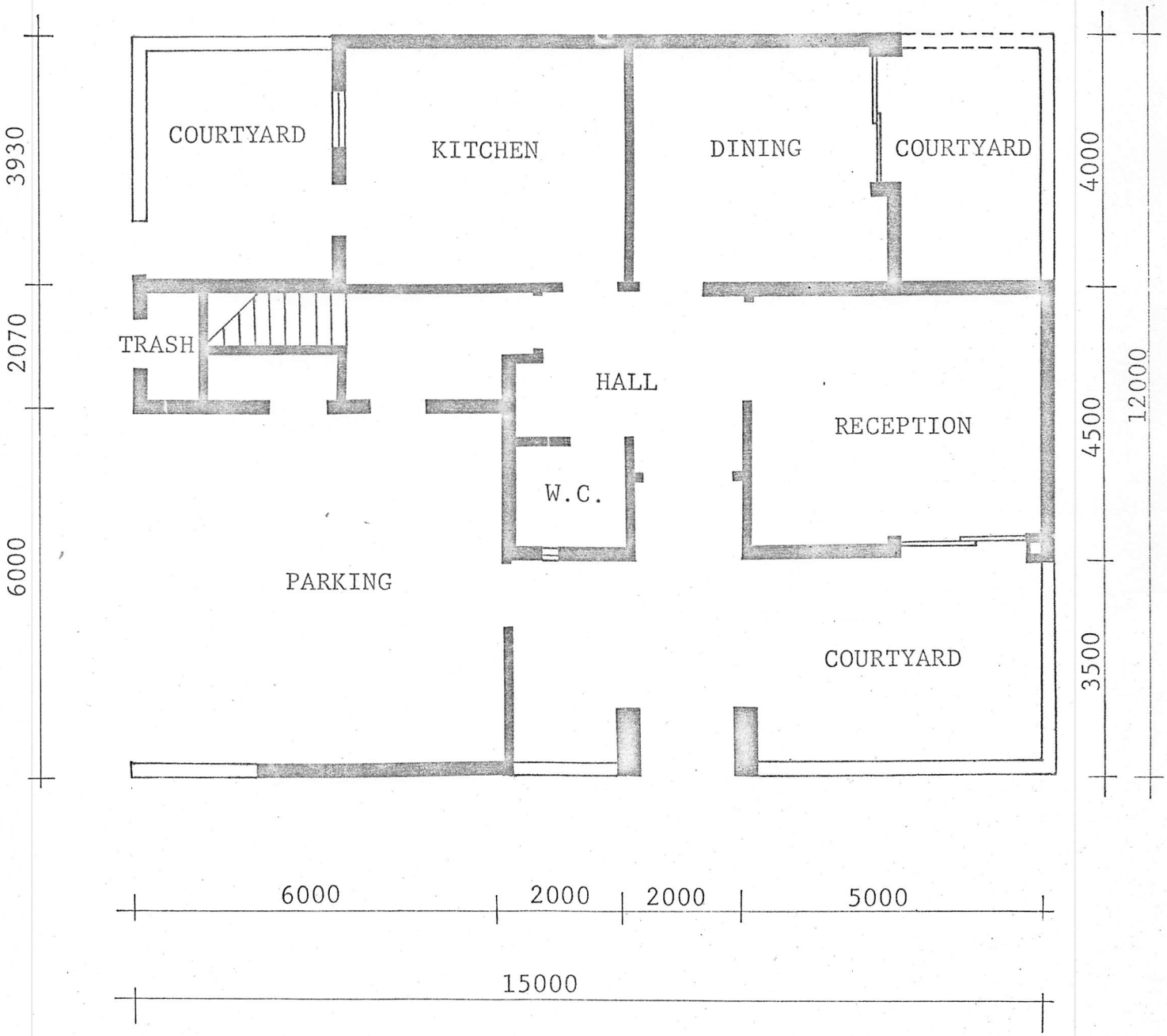


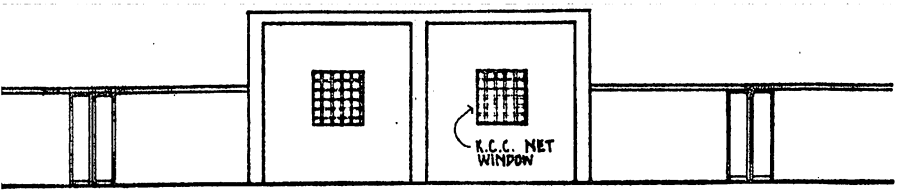
TERRACE



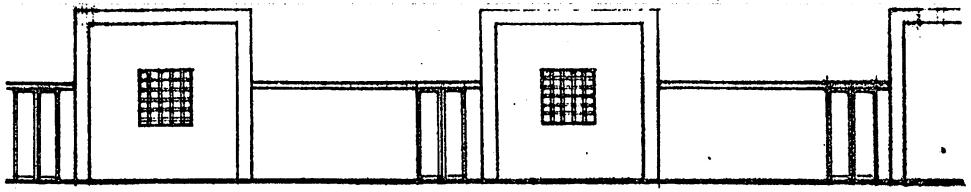
TOWNHOUSE FIRST FLOOR PLAN



TOWNHOUSE GROUND FLOOR PLAN



ELEVATION



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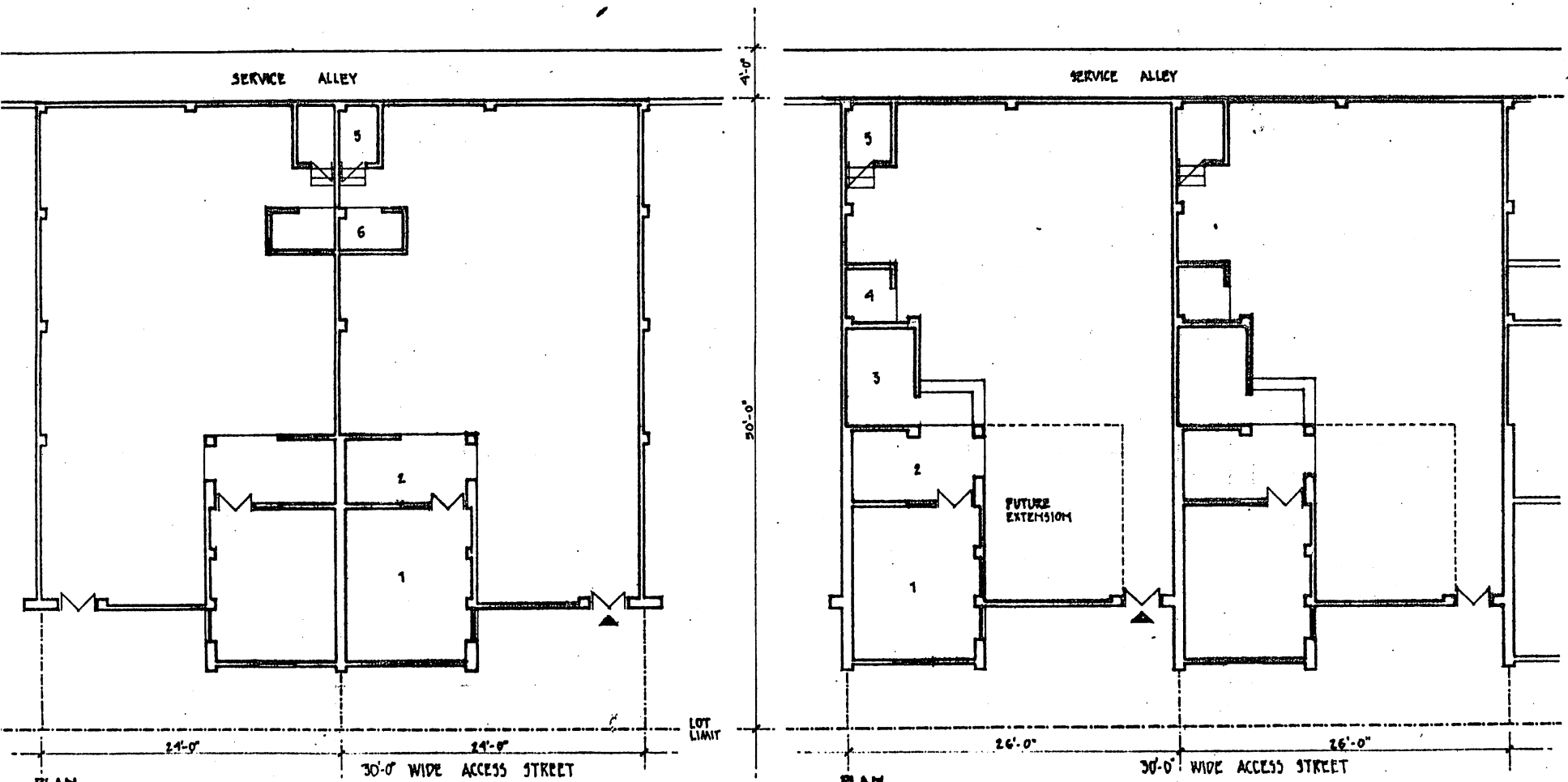


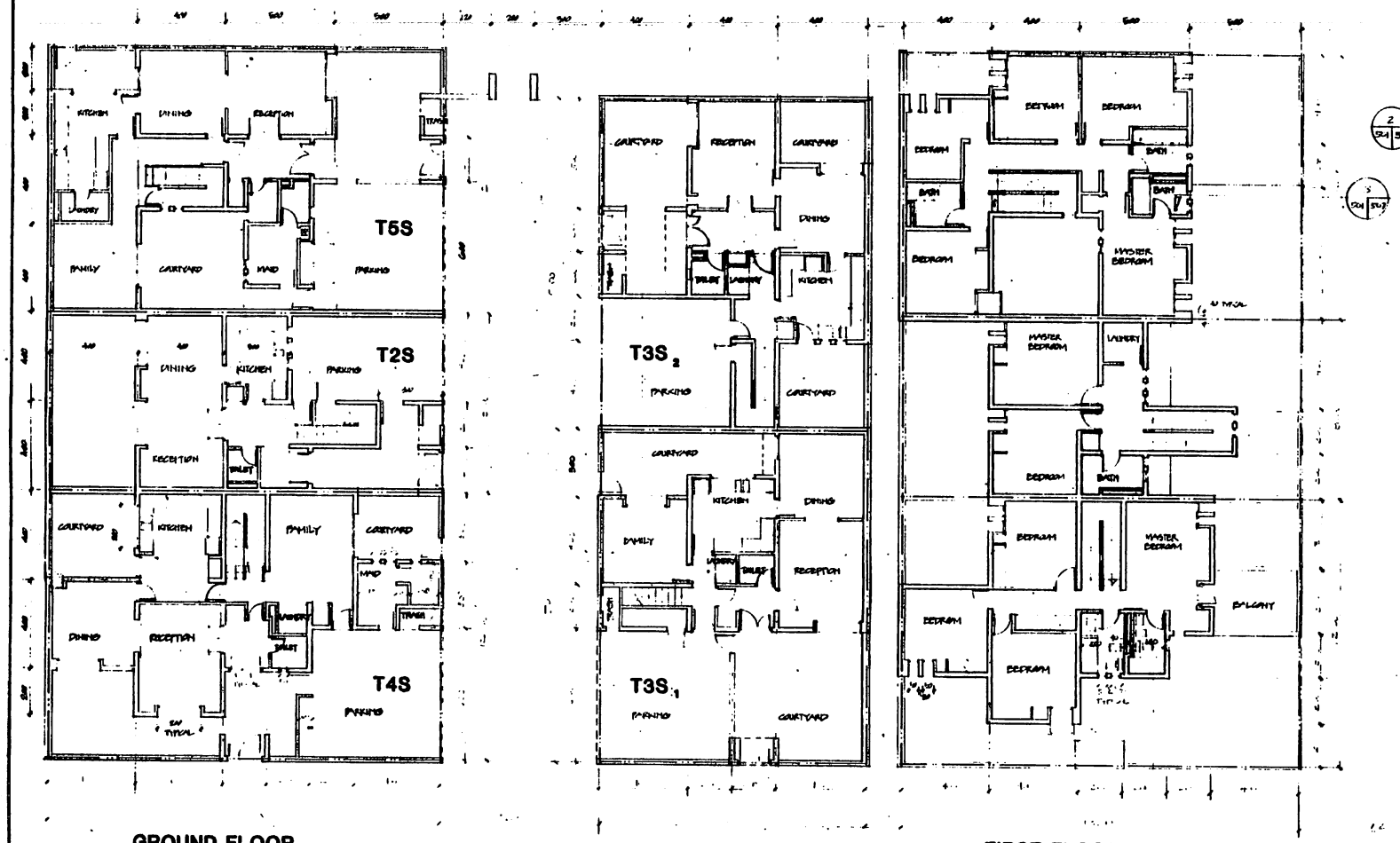
PLAN
CORE HOUSE TYPE 'B'

PLAN
CORE HOUSE TYPE 'A'

LEGEND
1. MAIN LIVING ROOM
2. VERANDAH
3. KITCHEN
4. BATH
5. LATRINE
6. BATH PLATFORM

MOHAMMADPUR CORE HOUSING
TYPICAL UNITS

0 5 10 20 FT



KINGDOM OF SAUDI ARABIA

المملكة العربية السعودية

Royal Commission for Jubail and Yanbu

VANBU INDUSTRIAL CITY

مدينة ينبع الصناعية

Residential Community Design Package for Area R-4

TOWNHOUSES FLOOR PLAN STANDARD CLUSTER

TAC / SHIHABI / CONSECO
P.O. Box 2600
Riyadh, Saudi Arabia

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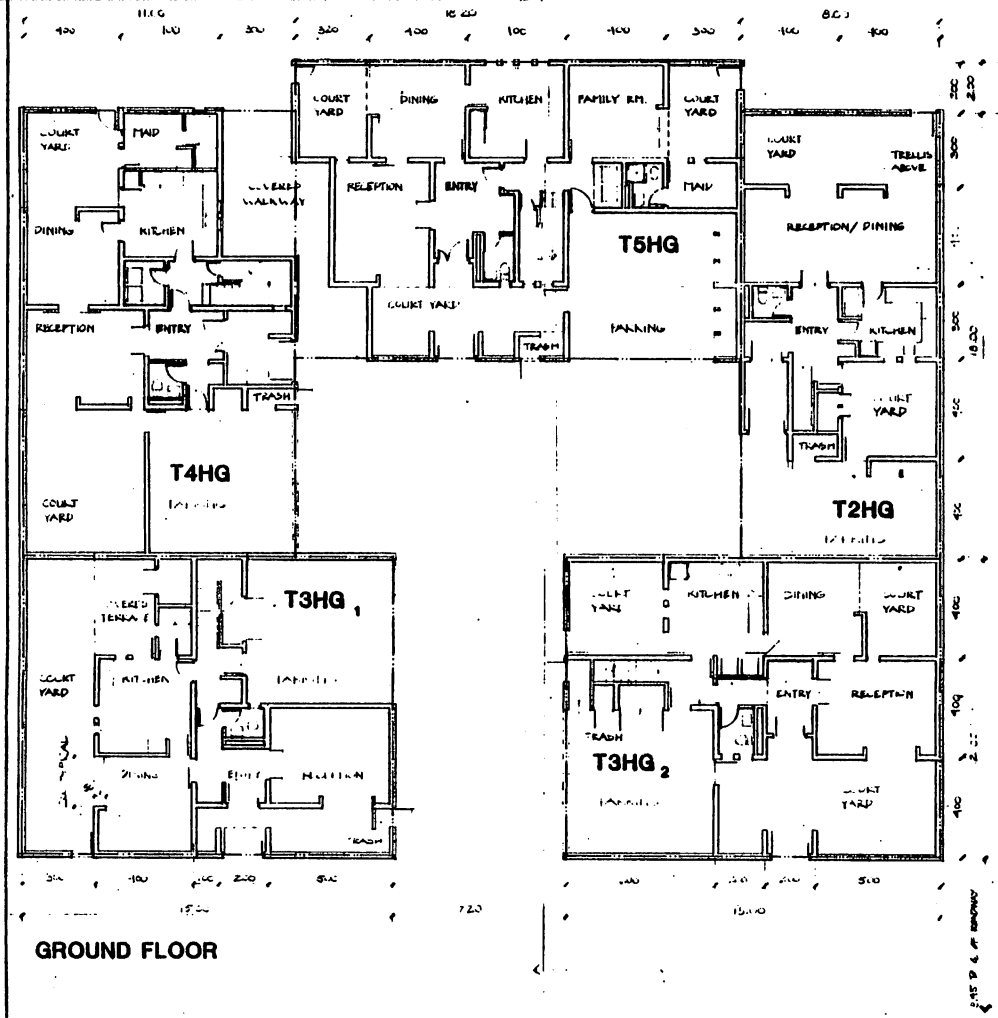

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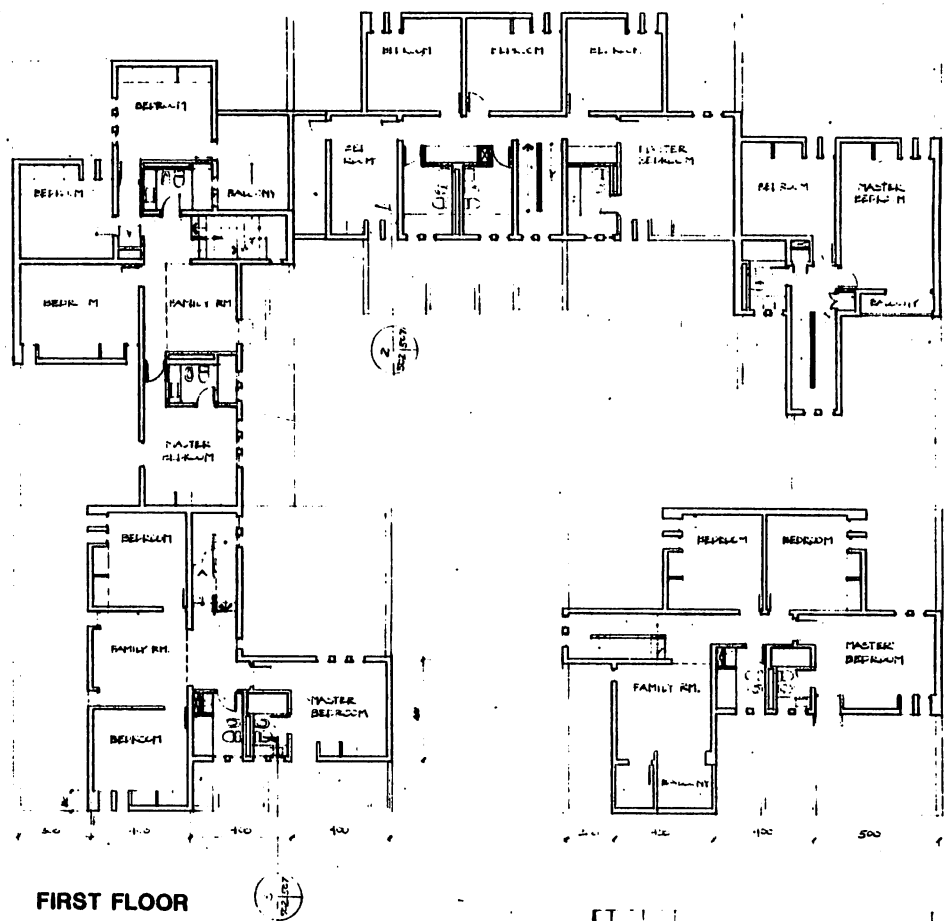

FIRST FLOOR

KINGDOM OF SAUDI ARABIA

المملكة العربية السعودية

YANBU INDUSTRIAL CITY

مدينة ينبع الصناعية

TOWNHOUSES FLOOR PLANS
HIGH GRADE CLUSTER

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Riyadh, Saudi Arabia

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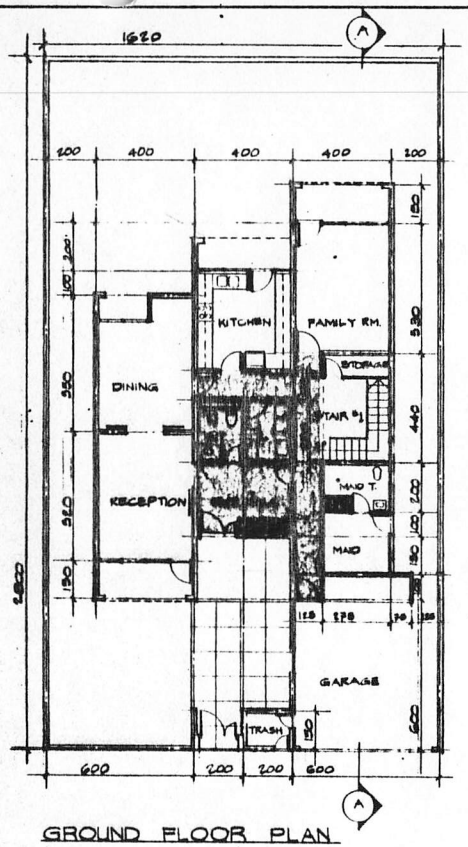

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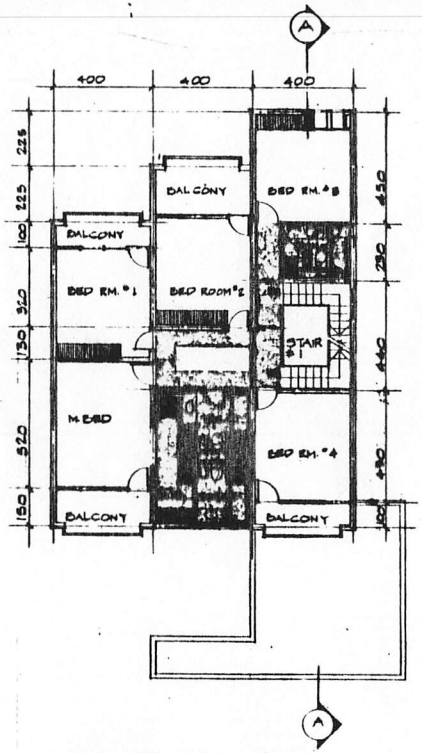

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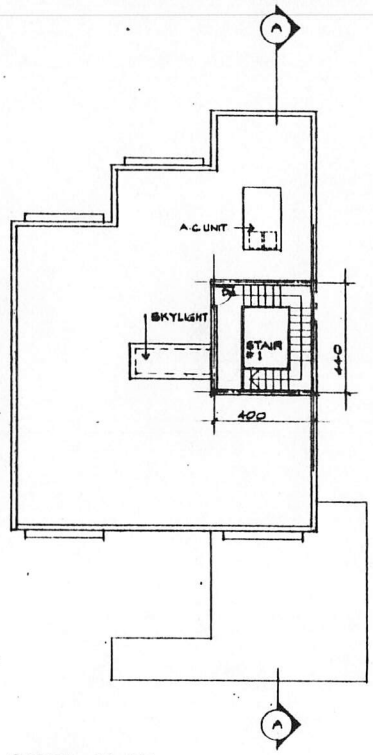
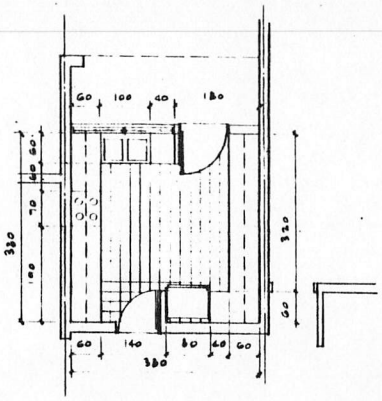


ROOF PLAN



KITCHEN PLAN
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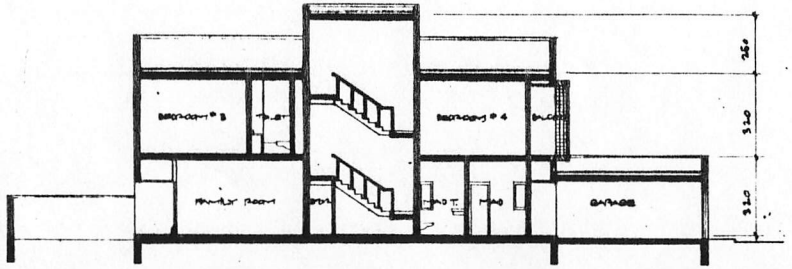

SECTION A-A 1:100

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REVISIONS

KINGDOM OF SAUDI ARABIA
Royal Commission for Jubail and Yanbu
Directorate General for Yanbu Region

المملكة العربية السعودية
الهيئة الملكية للجبيل وينبع
الادارة العامة لمنطقة ينبع

YANBU INDUSTRIAL CITY
مدينة ينبع الصناعية

Residential Community Design Package for Area R-4

VILLAS
V5-S1: PLANS, SECTION

DRAWN BY: JSC
CHECKED BY:
PROJ. MGR.
QUAL. ASSURANCE
H.C. APPROVAL
DATE 20 AUG 88

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P.O. Box 2600
Riyadh, Saudi Arabia

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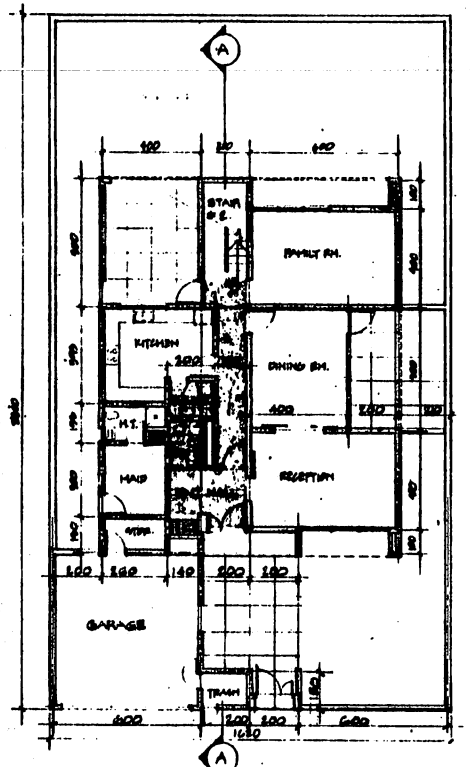

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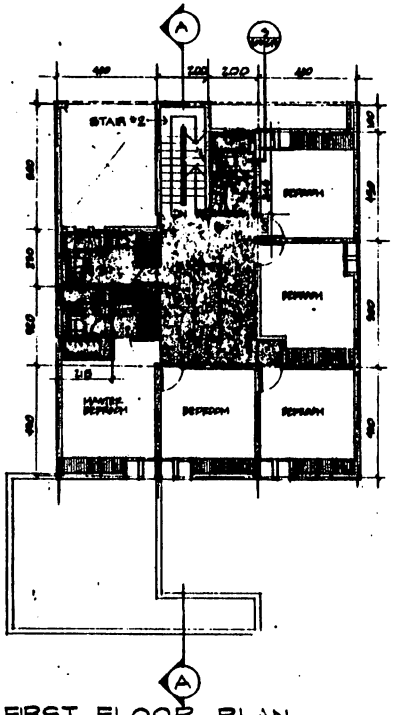

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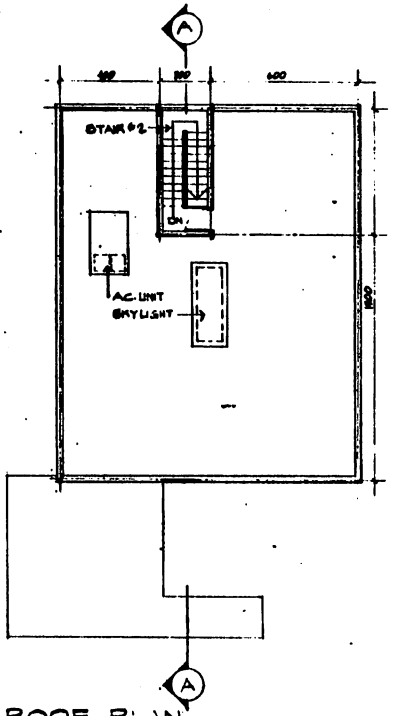
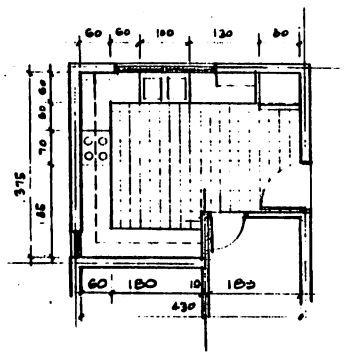
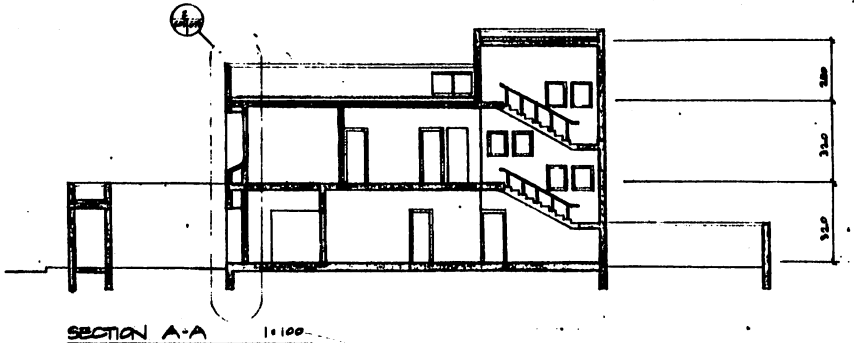


ROOF PLAN



KITCHEN PLAN
SCALE :- 1:50



SECTION A-A 1:100

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REVISIONS

KINGDOM OF SAUDI ARABIA — المملكة العربية السودية
Royal Commission for Jubail and Yanbu — هيئة الملكية للجبيل وينبع
Director-ate General for Yanbu Region — الإدارة العامة لمنطقة ينبع

YANBU INDUSTRIAL CITY — مدينة ينبع الصناعية

Residential Community Design Package for Area R-4

VILLAS
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