Role of Supervision System in Governmental Housing Projects in Eritrea

Case Study: Megareh Housing Project, Keren

Mesgun Abreha Worku

Head of Supervision & Contract Administration Division
Ministry of Public Works, Eritrea

Introduction

Eritrea is located in the Horn of Africa; bordered to the north and west by Sudan, on the south by Ethiopia, on the southeast by Djibouti and to the northeast by the Red Sea. Land area of the country is 124 320 m², with a total population of 3 467 087. Population growth rate is 3.46%, with literacy rate of 25%, based on the 1993 estimate.

Eritrea got its independence after the liberation front entered the capital Asmara on May 24, 1991 after thirty years of armed struggle. But, Eritrea was recognized as a new State by other countries, after the referendum on April 23- 25, 1993.

Figure No. 1, Map of Eritrea
Source: World Map, 1993

- *Ethnic Groups,*

Eritrea is a country of nine ethnic groups, on which, Tigrinya is 50% of the population, Tigre and Kunnama 40%, Afar 4%, Saho 3%, and the remaining 3%; for the other ethnic groups Bilen, Nara, Hadareb and Rashaida.

- *Languages of the ethnic groups are,*

Tigrinya - Tigrinya, Tigre- Tigre, Kunnama - Kunnama, Afar - Afar, Bilen - Bilen, Hedareb - Hedareb, Nara – Nara, Rashaida – Arabic, Saho – Saho.

Historical Background on Housing

In the highland rural areas, people live in communal villages, in which houses are built by the community, i.e., when a member of the community wants to build a house, he should collect part of the construction materials such as stone, wood, straw, and loom soil, otherwise he can ask and mobilize his near neighbors and relatives to collect with him, and build the new house called Hidmo collectively. It is built from stone wall, wooden columns, rafters, doors and windows are made of wood. And also on building the roof wooden riprap leafs or straw is done, and over it soil in sloping outwards not to let rainwater to stagnate on it. In lowlands houses are made as shown in the picture No.2. Nomads live in temporary shelters made of wood and leaf.

During Italian colonial era, which was from 1860 to 1941, Italians settled in the country and developed all the socio-economic structures mentioned above, also light industries and mechanized agriculture was started. The major towns of Eritrea, Asmara the capital, Dekemhare, Massawa, Assab, Keren, etc. were urbanized during this time.

Figure No. 2, Traditional Dwelling in Keren (Tukul)
Source: internet Keren Eritrea
A round hut with a cone shaped straw roof.

During the Second World War Italy was defeated by the British. Then British administered Eritrea for ten years, and finally by decree

of the UN, Eritrea was handed over to Ethiopia as federal state, but this federation did not long last. It was abolished in 1962. Hence, Eritrea was totally annexed with Ethiopia. From this time onwards no development was made. Rather, machineries and other materials was taken to the main land, or stolen by the latter regime. There was little or no housing constructed, especially during the Socialist regime. All the rental houses were nationalized by the Government and left without maintenance.

The thirty years war for independence has ruined almost all the socio- economic structures of Eritrea. That is no job opportunities, families scattered and fled out of the country, or joined the Front. On the infrastructure sector the entire road network, bridges, railways, cable lines and telephone lines, and also the housing development was completely destabilized.

The old house on Figure No 3, was constructed during the Italian era, on which, it remained without formal maintenance, so that, wall was damaged due to leakage through roof and windows, with deteriorated ceiling and wall plaster, broken windows, sanitary and water distribution system out of use. In this condition the Zoba Anseba Administration occupied the building for their office. But, this building was not sufficient enough to accommodate the new local Government office structures. The Local Government of Anseba is the Authority that administers one of the six administrative regions of the country. On which all the regional offices are to be located near each other for making convenient to give quick service to the public. This condition was also similar to all other administration regions, which shows the country's need for housing.

After 1991, when the country became Independent, a huge population influx came to almost all towns of the country, creating shortage of supply on housing. On which the Government should have to try to minimize the problem. The influx was mainly from Eritrean Refugees, which fled the war to Sudan, and returnees from Ethiopia and other countries, the internally displaced (which have been displaced from the towns and villages to the Liberated area, or gone back to their native villages mainly children and aged people), and the Liberation Army.

Figure No 3, Ministry of Regional Government in Keren
Source: Internet Keren Eritrea

The country was new with all kinds of shortages. One of the shortages was lack of adequate professionals to run the day-to-day office works, in different sectors of the public and private offices. The priorities given by the Government, in order to begin with the implementation was to build residential housing projects like Sembel, Massawa and Megareh Housing Projects for accommodation, schools, hospitals and other infrastructure facilities like road network between the regions to facilitate for easy service to the public and airports, etc. In Eritrea based on the Constitution, ratified by the constituent Assembly, on May 23, 1997 the *land* belongs to the State of Eritrea, which can simplify the development of housing.

Problem Definition

The Ministry of Public Works of the state of Eritrea (MOPW) came with the mandate to administer and follow up the construction sector. In the implementation stage the Supervision division was given the follow up role. At the beginning there was no guideline to follow in the country, which defines the role of every actor. And controlling body over the construction projects to monitor, and also to close the shortage gape of professionals in the construction sector.

Hence, the ministry started to define the requirements for next steps to be followed to attain its role on the implementation stage. To begin with the division gave license to consultant or contractor, having an exercise in building design or being contractors, and who wants to open office and work in Eritrea. The license was valid for one year only, until new guideline is issued. In consultation with these new licence holders and others, a study of other countries system was done and come up with selection of a system, which can fit to the condition of the country, and adopt officially with adjustments.

The motivation in studying the role of supervision system in Governmental projects in Eritrea is to discuss and analyze the role of the procedures followed and assess the implication created and which can be created in the country's housing development.

Strategy: The Current System for Supervision of Governmental Housing Project

In order to have follow up and clear monitoring system in the construction works of the country, the supervision division should have to have a system to follow. So that all actors in the sector can work with the procedures. And also it was right time to produce guidelines based on the choice and discussed system on supervision. The strategy followed by the Supervision and Design Department was to:

- *Produce guidelines;*
- *Capacity building and;*
- *Increase awareness in the sector.*

Guidelines

PCP (Practice in Construction Projects) technical guidelines and instructions manuals to be used in the construction sector. PCP contains tender evaluation manuals, and defines the role of every participating party in the construction sector. It defines the supervision

division's role to follow up the construction sites, to give final decision, to evaluate the performance of consultants and contractor.

Contract

The General Conditions of Contracts consisting procedures for:
Bid security bond;
Performance bond;
Bank guarantee;
Variation orders (VO);
Supplementary contracts;
Agreement formats for construction, consultancy services and payments;
Retention, rebate, liquidation damages, and penalties, etc.

Professionals

Professionals who apply for registration should submit satisfactory evidence from the institutes where they study and if they were working from the working place.

Table 1, Professional Registration Criteria

Profession Graduation from	Merit	Work Experience in Years 0 - 5	5 - 15	> 15
Technical School	Certificate	GEA	EAI	EAII
Technical College	Diploma	GAE	AE	AE
University Degree in Civil, Electrical, Mechanical	Degree	GE	PE	PE
Architecture	Degree	GA	PA	PA

Source: Supervision, MOPW

Note: GEA - Graduate Associate Engineering Aid; GE - Graduate Engineer; EA - Engineering Aid; PE - Professional Engineer; GAE - Graduate Associate Engineer; GA - Graduate Architect; AE - Associate Engineer; PA - Professional Architect

Contractors

Construction companies are categorized based on:

- work experience they have in the sector;
- number of professionals they have;
- type and number of construction equipments, loaders, trucks, mixers, crane, etc;
- permanent office; and
- cash flow in the bank.

New local applicants the maximum category is BC 5, and foreign contractor can only apply for category BC 1 or GC 1. (GC - general contractor in addition to building construction, who has the capacity and experience in building roads, and asphalt works also.)

Table 2 Upper Limits for construction cost

CATEGORY	CONSTRUCTION COST UPTO ERN (2)	CONSTRUCTION COST UPTO ERN (FROM 02/2002) (3)
BC 10	100 000	250 000
BC 9	250 000	500 000
BC 8	500 000	1 000 000
BC 7	1 000 000	2 500 000
BC 6	2 500 000	5 000 000
BC 5	5 000 000	10 000 000
BC 4	10 000 000	15 000 000
BC 3	15 000 000	20 000 000
BC 2	20 000 000	40 000 000
BC 1	> 20 000 000	> 40 000 000

Source: Supervision, MOPW

Note: (2) contractors were limited to construct up to the amount indicated on the table.
(3) new limit for a category (from Feb, 2002)
(4) 13.50 -ERN = 1.00 USD, on 01/02/02

Consultants

Consulting Companies are categorized based on:

- work experience in design;
- number of professionals they have;
- type and number of equipments for design;
- permanent office; and
- cash flow in the bank.

Supervisors

The guideline for supervisors shows the critical parts in construction to be strictly checked and recorded in the site books and reported, also defines the roll of the supervisor and methods to be followed.

Methods of Measurement in Construction

General guideline for preparing bill of quantities and take-off sheets for construction works.

Capacity Building

The methods followed are recruiting expatriate experts to work with the local professionals. The main work of the expert is to assist and guide the local professionals in handling new techniques. Sending staffs to higher studies abroad. In addition to this new Engineering diploma graduates are recruiting for one year before they continue the degree programme for understanding the actual construction works.

Increase Awareness in the Sector

The processes in the construction, the guidelines, the capacity building methods in the implementation process itself increases the awareness in the sector.

Minimize the Professional Shortage in the Country

Certain public projects are designed and supervised, by assigning engineers from the ministry for the process. When client could not get a consulting office for the process.

Case Study: Megareh Housing Project, Keren

Keren the regional town of Anseba was built during the Italian colonial era for 40,000 inhabitants but is now, holding around 60,000 inhabitants. In addition to this, private and public activities and services such as construction of new offices, bank building,

telecommunication building and pharmaceutical plant are completed and will be opened. So, the new in coming workers should also get accommodation. Hence, Zoba Anseba Administration, to minimize the gap between supply and demand on housing for the regional old town proposed and started Megareh Housing Project to be constructed.

Megareh Housing Project is a modern design for 330 Units including small shops and super market. The units are partly ground, and the remaining one-storey type buildings. All of them are duplex sharing walls in order to minimize the cost. There was an intention at the beginning, the design and construction works to be carried out by one foreign construction company as a turnkey project. The construction company to take all the design and construction responsibilities and take the lump sum amount upon the agreed contract conditions. But latter when the design was checked and approved, the Regional Administration decided to be constructed in phases, by local contractors.

The infrastructure condition of Keren is described below.

Road and Path, The roads were designed to be wide partly in the middle of the town being asphalted with open ditch for storm water drainage, and the remaining gravel road with no ditches. Hence now the asphalting work is undergoing with storm water piping and pedestrian walkways. And on the outskirt of the town, mostly houses are on the hill with narrow passage, leaving difficulty for redevelopment.

Megareh Housing project is situated on the western part of the town near main regional highway in good condition

Water. The town gets its water from boreholes situated around ten kilometres within the Anseba River. This river is seasonal which flows during the rainy months of June through October. The pipelines were designed for only few inhabitants. Now it is old, so that leakage is the major problem. But to overcome this problem, the municipality distributes water by trucks, and fills the containers at every house depending the type of reservoir they have and charges for the service. In order to solve the problem of water for the town a dam design is at its final stage. The proposed site for the dam will be south east of the town around 25 km away.

The project does not have accesses to tap water. No pipe network done in the area, therefore all houses will have elevated water tank over the roof and underground reservoir with electrical pump connected to it. Until the construction of the municipality future dam and piping system is completed.

Sanitation, Only at the central part of the town sanitary pipelines are laid and designed for the population density of that time. Now, a new design and construction is under going parallel with the road network system. Otherwise, every house was having septic tank isolated system for collection of household waste, and removing them when filled by a truck.

Megareh housing project will have underground septic tank for every house until the Municipal sewage network system is completed. This type of construction requires a permanent supervisor based on the guidelines, hence, open tender for supervision was announced in the daily newspaper, letting the tender announcement open for one month.

Hence, a private-consulting firm won the tender for supervision and the agreement was signed between the client and the consulting firm.

Power. Previously the town was receiving its power from an old diesel generator, but now starting from mid of 2001, the town receives its electricity from the new built power station at the port of Massawa two hundred kilometres away.

The project is for middle and high-income buyers. (The project consists of different units, with two toilets, a living and dining room, a kitchen, two, or three, or four bed rooms and servants room, depending on the type of flat.), The award for construction was by selection out of four BC-1 category contractors. Then two public contractors took the work, and construction agreement was signed with both. Debat Construction Company to construct 88 units and 3 shops, and Wina Construction Company to construct 48 units and 3 shops.

The tables below show proposal submitted for negotiation with the contractors before the contract is signed

Table 3 Estimated proposal for Megareh Housing Project.

Contractor	City	Supervision		Contract Time (call days)	Contract	
		Permanent	Periodic		Start	End
Debat	Keren	Badaya	MOPW	548	Aug. 2000	Feb. 2002
Wina	Keren	Badaya	MOPW	365	Sept. 2000	Sept 2001

Source: Supervision, MOPW

Table 4, Estimated proposal for Debat's Project

Item	Type	No. of units	Nakfa		USD	
			Cost/unit	Total cost	Cost/unit	Total cost
1	VIII	20	430 227	8 605 547	44 358	887 169
2	IX	44	486 806	21 419 475	50 186	2 208 193
3	XIII	8	441 557	3 532 461	45 521	364 171
4	XIV	4	621 615	2 486 461	64 084	256 336
5	XV	4	506 636	2 026 544	52 230	208 922
6	XVIII	8	411 880	3 295 045	42 461	339 695
7	Shop 5	3	65 297	195 893	6 731	20 195
Total Project Cost			41 561 428		4 284 683	

Source: Supervision, MOPW
1 USD = 9.70 ERN.

Table 5 Estimated proposal for Wina's Project

Item	Type	No. of units	Nakfa		USD	
			Cost/unit	Total cost	Cost/unit	Total cost
1	I	4	491 256	1 965 026	50 645	202 580
2	II	12	432 463	5 189 559	44 584	535 006
3	III	8	437 583	3 500 670	45 112	360 894
4	VIII	20	430 277	8 605 547	44 358	887 170
5	XVIII	4	411 880	1 647 523	42 462	169 848
7	Shop 3	3	62 103	186 310	6 402	19 207
Total Project Cost				**21 094 634**		**2 174 705**

Source: Supervision, MOPW

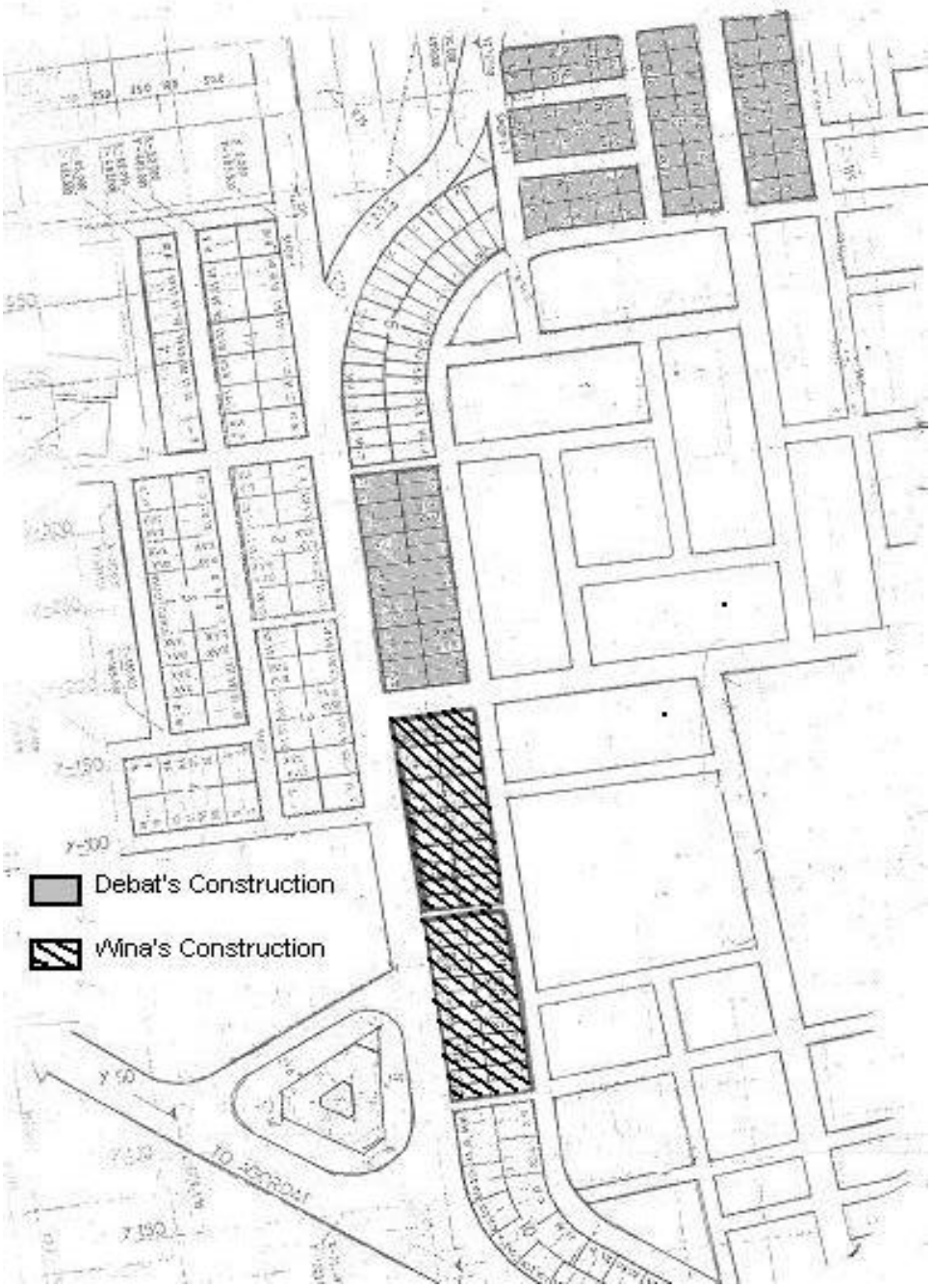

Figure No. 4. Megareh Housing Project Site Plan.
Source: Supervision, MOPW

Actors

The different actors in Megareh Housing Project are the National Government, the local Government, Keren Municipality, Supervision (MOPW), Debat and Wina construction Co. and Badya Consultants and Architects office.

National Level

Government

The National Government is the highest body which formulates the overall policy of the country, including the housing policy, allocates funds for projects, coordinates and supports all actors in the sector, create suitable condition for all stakeholders in the housing industry, and create favourable environment for land use and construction of infrastructures and other services.

Supervision (MOPW)

Supervision division of the ministry based on the guidelines participate in categorizing, professionals, consultants, contractors, and finally issue licenses. Starting from the adding inputs to the tender requirement of selection of consulting offices, participate in the tender opening for consulting services, analyse the tender and give approval, checking consulting service agreements and signing as a witness. Check specification and BOQ and engineering estimates, participate in the tender opening for contractors, check the tender analysis and give approval and sign as witness, based on the construction terms and conditions, check for fulfilment by the contractor the performance bond, bank guarantee, approve advance payment if required. Monitoring the construction projects for quality and work progress, assessing the work performance of both the contractors and consultants with regard to the agreed terms and conditions of the signed contract agreement and the guidelines, participate in monthly site meetings to discuss and give decisions on the spot if required.

The site meeting is best way in increasing awareness and is one way of capacity building among the professionals of the contractor, consultant and client. In addition to the above the role of supervision is making certification on payment over measurement of works taken by the supervising agent for the Government sponsored project works with due verification over financial implication and contract documents, deliver decisions based on the guidelines as Arbiter for disputes over execution of project works, participate in Co-ordination with the client in making and issuing of Provisional / Final acceptance certificates of the project works on completion.

Based on the general conditions of contract the division has the power to inform verbally or in written, shortcomings done by contractors or consultants for their rectification, and also through passing the legal procedures to reject illegal contract, terminate professionals, consultant, or consultants, which doesn't fulfil the requirements.

Regional Level

Zoba Anseba Administration is a body, which administers the regional zone of the country, which consists of several small towns and a number of villages. Its role for this project is to prepare a comprehensive plan for the project, get approval for fund for the project from the central Government, collaborate with the parties in getting local resources to be used in the project, get approved plot of land from the Municipality of Keren. Coordinate and give guidance for the development of infrastructure and other related services, sign the construction and supervision agreement on behalf of the client,

participate in construction site meetings whenever required, getting in touch with the supervision division for any changes, amendments, problems which can arise on the project. Certification of payments to the contractors or consultant assesses and administers the marketing for the flats, participate and approve acceptance certificates, (Temporary or Final). Facilitate ownership documents from the Municipality of Keren to the buyer.

Local Level

Municipality

Based on the master, plan of the town allocate plots for the projects, build infrastructures and services such as telephone lines, electricity, water, give ownership certificate of flats upon request by the Local Government, create safe condition in the area.

Contractors (Debat & Wina)

The role of the construction companies is to mobilize their manpower and resource to build the project based on the agreed conditions and terms, suggest or accept new proposals which can be variation or supplementary works, give quotations participate and sign Acceptance Certificates, (temporary or final).

Consultant (Badya)

The role of the consultant is to give written back ground of the assigned resident supervising engineer to all concerned parties, check the layout of each building with reference to the plan and approve. Make test for bearing capacity of soil, and approve depth for foundation, conduct tests of construction materials and approve all construction material to be used in this project, supply monthly report to client and supervision division. And prepare takeoff sheets for completed construction works and prepare a payment certificate for the project with the contractor and facilitate in getting approval from the supervision division, arrange monthly site meetings between all concerned parties, i.e., client contractor supervision division and if required other sub-contractors.

Analysis

The procedures followed by the supervision to make the optional monthly site meeting among all participating actors, in Megareh Housing Project was to convince all to make the meeting mandatory. Which helped all concerned parties to have the same knowledge on the project process, and to get recommendations and suggestions from different participants with different professions. This assessment method has created belongings to the project, and healthy atmosphere among all actors. Finally also helps the Division to assess its guidelines.

In the case of this particular project the shortcomings arise is the regional Administration and the Municipality of Keren could not before hand complete the construction of infrastructure facilities such as water, sanitary lines and telephone lines to be connected directly to the new project so that the end user can have immediate access.

Design

Megareh Hosing Project was initiated by the Local Government of Anseba Administration to minimize the gap between supply and demand in housing in the town. The design was done by a foreign design office with inputs from client and from Ministry of Public Works, Design Division, but since the end user is not known any input was made. The selling of the flats will be open to the public after the project is completed within the maintenance period. On which the maintenance period in Eritrea is one year.

Description

The project consists of 19 types of units, with different sizes. Some of the buildings are one storey, and others ground only with duplex type. The building is framed structure type with reinforced concrete structure cast in-situ. Walls are constructed with hollow concrete blocks filled with C-10 mass concrete and plastered internally and externally and painted. Roofs are covered with G.I.S. (galvanized iron sheets) with chip wood ceiling. All internal doors are made of Wood, external doors and windows are glazed Aluminium framed.

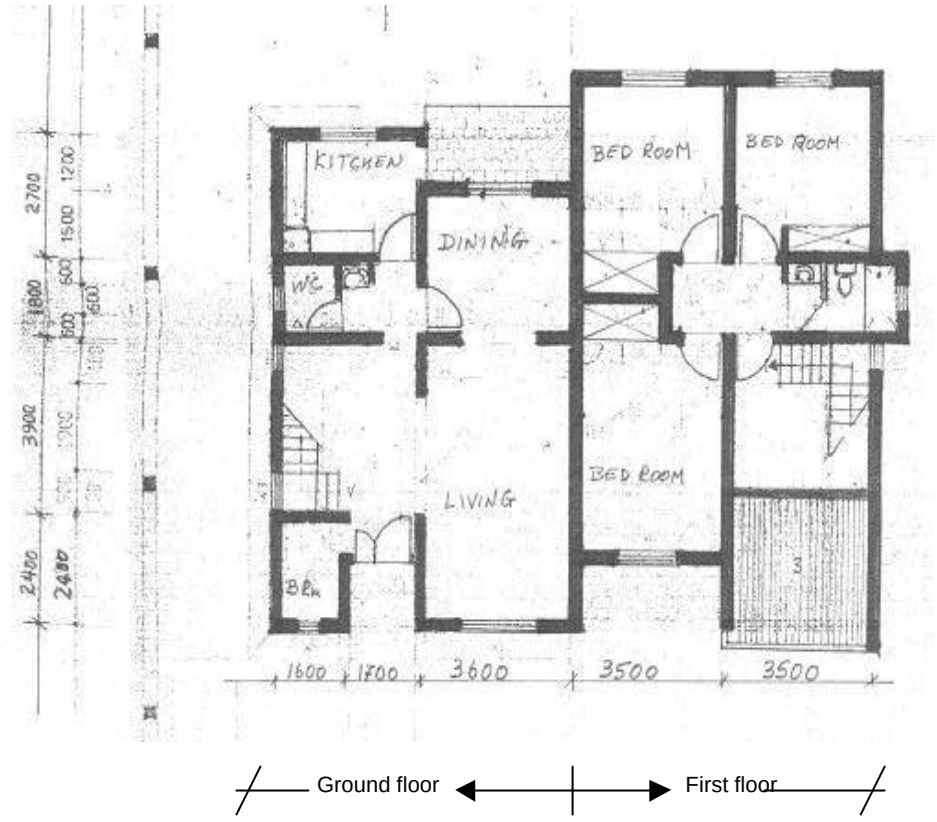

Figure No. 5, Floor Plan for house type No. 1

All units have minimum of three bed rooms, two toilets with hand wash basin, bath near the bed rooms and shower near the living room, a kitchen, dining and living room with court yard. Municipal Sanitary system is not yet finalized and the choice is to have septic tank with capacity of 5 m³ for waste collection, to be cleared every six months, with access to future connection with the main Municipal line. Since the water distribution in the town is not enough, the buildings are designed to have ground water reservoir in the courtyard and elevated water reservoir, over one corner of the house. On which an

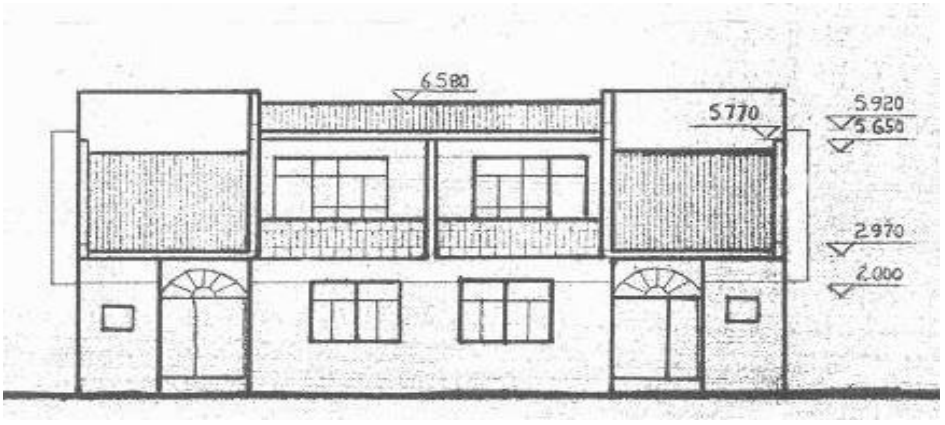

Figure 6 Front Elevation

Electric driven water pump is to be connected to the ground reservoir to pump water to the elevated reservoir.

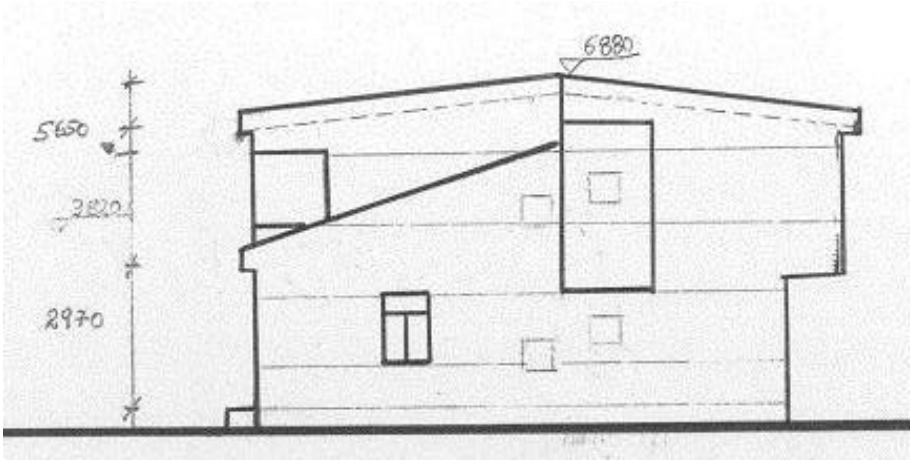

Figure 7 Side Elevation

Analysis

In the design and preparation of Bill of Quantities (BOQ) to satisfy the individual needs, all electrical fixtures are left for the choice of the end user, on which may be good for the high income group, but for the middle income group will be additional cost, because the price of goods, when purchasing in small quantity is higher.

Since the end user was not known from the beginning, there will be certain comments from different buyers after the completion of the project, because of the human need is different. In addition to this the contractors could not complete the project on time, due to many

factors, which can be partly justifiable due to the present inflation in the country, the selling cost of the units will be increased. So that indirectly the end buyers of these flats will be the high-income part of the society.

Conclusions and Recommendation

No guideline produced can be considered as final in the world because of the difference in time and condition, and have to be refined and clarified and changed through process, so also, in this case at least for the time the sector has general procedures to follow, on which this procedures has created ways of arbitrator for any arising problems among the actors. And also, the procedures followed has enabled the Ministry of Public Works develop from simple monitoring body to act as coordinator, capacity builder through arranging on job training to semi skilled labour with the private contractors, for new Engineers in the office, and the role of final arbitrator on the construction phase. And enabled to check whether a project is completed based on the conditions of the contract. In the case of Megareh Housing Project, the delay occurred shows that, gradually, construction works should under go partly labour and partly machine intensive works due to the shortage of labour which is starting to arise. In addition to this, in future projects should have the participation of all actors in the design process, especially the end user. Awareness of the public on construction methods is from time to time increasing; this condition will help to the housing development in the country. So, in conclusion the Division has played its role, and should continue its effort to manage the implementation process for better housing condition in the country.

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