Infrastructure Projects in Gaza Strip

Upgrading and Rehabilitation of Water, Sewage Systems and Municipal Infrastructure in Northern Gaza

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Summary

During The Israeli Occupation, local government in Gaza Strip has operated under very difficult circumstances, municipalities have been greatly weekend. As a consequence services have seriously deteriorated and physical assets including municipal buildings have fallen into despair. The Palestinian Authority, international agencies and the donor community have undertaken some efforts to increas the capacity of municipalities and rehabilitate seriously deteriorated infrastructure.

This paper descirbes the role of the Palestinian Economic Council For Development And Reconstruction, Job creation program- PECDAR – JCP in the infrastructure projects in the Gaza Strip through introducing the upgrading project, and to give a clear idea about the different stages, that each project go through and emphasize on the design stage , the production stage , and the property management stage.

Where I am going to include the analysis of the different components of each step and the experience that have been gained and at the end the conclusions, then the recommendations, I am working project manager for Jabalia´s projects besides my job as Gaza area manager.

The above mentioned project (Upgrading and rehabilitation of water, sewage systems and Municipal Infrastructure in Northern Gaza, which is the most populated areas, especially Jabalia , which is my Target to talk about it in my paper.

It has poor Municipality with weak management without defined role for it´s staff.

It was agreed with Sida (Swedesh International Devlopment and Cooperation Agency) to finance this project , the total budget was 2,000,000 $.

This was divided to 15 subprojects ,Jabalia had 7 of these subprojects.

This work created 40,000 work day apportunities, improved the living conditions of residents , rehabilitated (and, or) extented 26 km of water nets and 920 m of sewage lines ,made changes to the roads from mud and dirt to clean tiled roads and rehabilitated 2 pump stations.

These projects completely finished in 1998.

After the defferent stages of work in these 7 subprojects and the other 8 subprojects in the other areas comleted , I had some conclusions and recommendations which is :

- Staff training to develop there skills.
- Good coordination between all the actors
- Continuous communication.
- Use of computer and the enternet.
- Quality assurance in future projects.
- Define the role for all the staff.
- Use of modern equippment.

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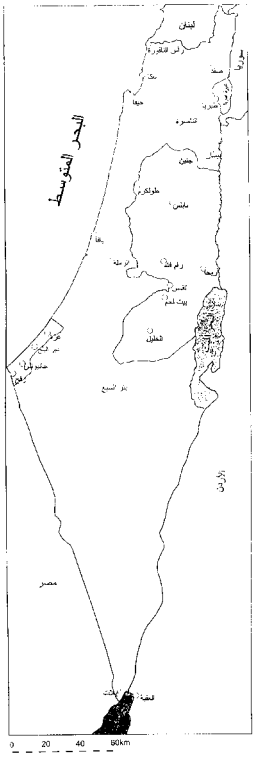


Figure 1: Palestine …..West Bank and Gaza Strip

Introduction

The Aim

This paper describes the construction process of an infrastructure upgrading project in the Gaza Strip. The Palestinian Economic Council for Development And Reconstruction (Pecdar) is the Palestinian Authority hand for all the infrastructure projects, who coordinates with the Municipalities for their plans and projects according to it´s priorities , then marketing these projects and submitt it to the donor countries for having the necessary finance . After that the role of Pecdar starts again in organizing with the Municipalities for the implementation of these projects.The projects here in this paper are infrastructure projects serving a big number of people living in a very bad level of services , Jabalia the Municipality which I am going to write about it is the most populated area in Gaza Strip, the project is Water Line For Jabalia AlNazla, and I will highlight in my paper on the affect of the infrastructure and environment projects on the people life and by illustrating the (upgrading project) with it's 15 subprojects for the Northern area of Gaza Strip, which is distributed as shown in table 1.

In all the subprojects, the project will introduce clean water system, connection to the sewage system and tile the streets with interlock tiles, to the community who used to suffer from bad water carriers, no sewage system depending on percolating pits, while all the streets were either Sandy or Muddy –see figure 2 .

So, the main objectives of the project will remained focussed on the infrastructure and labour sectors, as follows :

a) to improve the living conditions of Gaza residents through the improvement of essential seriously deteriorated municipal infrastructure by rehabilitation of a pump stations, creation of new municipal park, replacement and / or extention of approximately 26 km of water network, rehabilitation of 920m sewage lines and other priority municipal infrastructure works.
b) To alleviate unemployment by ensuring that projects activities are carried out through (labour insentive method) to the maximum extent possibile, this created approximately 40,000 work day opportunities

These projects have a great impact on the environment issues and the people health.

I worked as the project manager for Jabalia subprojects in addition to my original title as Gaza Area Manager directing and controlling different projects in Gaza, and I will emphasize on the acts which had undergone in Water Line of Jabalia Al Nazla Project, Jabalia Municipality – Moen Shada Contractor.

Actors

Donor: Sida (Swedish International Development Cooperation Agency)

No.	Work	Budget u.s. $	Final Budget u.s.$
A- Biet Lahia Projects			
1-	Construction of Water and Sewage Network *Shannan -contractor*	96,590.00	92,567.78
2-	Construction of Salatin area Water Line *Al Watania-contractor*	138,487.00	134,459.94
3-	Sewage Network for Al – Hatabia *Al Faloja-contractor*	74,028.00	73,507.00
4-	Rehabilitation of Pump Station *Abu Shamala-contractor*	217,536.00	213,352.16
5-	Tiling of Arabi Youth Camp Street *Abu Daya-contractor*	11,979.00	15,184.62
6-	Al Qaria Al Badawia Water Line *Al Shwwa-contractor*	34,385.00	33,961.20
B- Jabalia Projects			
7-	Concrete Block Tiling in Alwan Street *Al Najah-conractor*	138,850.00	145,668.00
8-	Water Line for Jabalia Al Nazla *Moen shada-contractor*	144,144.00	142,674.24
9-	Sewage and Water Line for Milan Village *Shannan-contractor*	240,037.00	209,590.00
10-	Rehabilitation of Water Network Al Turok *Al shawwa-contractor*	114,891.00	102,653.00
11-	Sewage Line for naser street *Al Mihwar-contractor*	134,910.00	153,447.80
12-	Al Shahid Mohamad Hamoda Street *Shannan-contractor*	87,778.60	105,598.43
13-	Aloosh Area Development *Abu Daya-contractor*	76,022.50	67,835.10
C- Biet Hanoun Projects			
14-	Wall, Tiling and Park Construction *Amer-contractor*	69,298.70	73,903.28
15-	Sewage Network *Abdel Hadi-contractor*	57,242.24	56,543.91
		1,636,179.04	1,620,946.46

Table 1: Initial budget and final budget of the subprojects

Monitoring and Implementation: Palestinian Economic Council for Development and Reconstruction– (PECDAR), Job Creation Program (J.C.P.) and Project Management Unit (P.M.U.)

Owner: Biet Lahia, Jabalia and Biet Hanoun Municipalities

Soil Testing: Engineering syndicates Laboratory, and Al Farra Laboratory

Designer: Respective Municipality Engineering department, then reviewed in PECDAR

Contractors: Different contractors registered in the Contractors Syndicate

Auditors: Saba and company

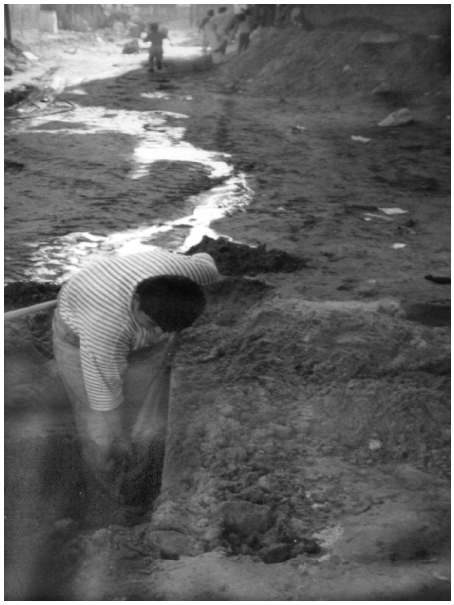


Figure (2) Jablia Al Nazla street before the project started.

Figure (3) Jabalia Al Nazla project.

Country Background

Short Geographic Description

The area, which is presently called Gaza Strip, was formerly part of the Gaza Sub-District of Palestine, during the British Mandate period. It was one of 18 Sub-districts and it included three towns Gaza,Khan Yunis and Majdal and 54 villages. The area was 1111.5 km² of which 49.3 km² were jewish owned.Gaza Stripwith it is present area 365 km² , and it is present boarders and delimiting lines, first came into existence 50 years ago in 1948, after the first Israeli-Arab war. Geographically, Gaza Strip is part of the Palestinian costal plain in Southwest Palestine, where it forms a long narrow rectangle. Its length is approximately 45km, its width 5.7km in the northern section, attaining a maximum of 12km at the Southern end (see figur 1).

Demography

The broad population characteristics of Gaza Strip are strongly influenced by political development, which have played a significant role in the growth and population distribution. A new pattern of settlement evolved with the formation of the eight refugee camps in Gaza Strip after the Israeli-Arab war in 1948.

The influx of refugees to Gaza begun in 1947, although mass movement occured during the period between April and August 1948. The estimateof the palestinian displacement is about 200,000 refugees. The composition of the population at the end of 1948 was 70% refugees and 30% indigenous. As a result of the unique political situation of Gaza Strip there has been three administrative periods from 1948-1998. Thus the evaluation of modern Gaza can be devided into three periods :

1-The Egyptian period from 1948 to 1967 :
This period is characterized by movement of Palestinian refugees towards Gaza.Before the1948 war, Gaza Strip was estimated to have a population of only 80,000 indigenous inhabitants. During the two decades, frpm 1948-1967, the population rose to 454,000.

2- TheIsraeli occupation from 1967 to 1994:
This period is characterized by external migration following the war of 1967.In addition, the population growth rate in this period changed in different decades according to changing circumstances, such as the Intifada Revolution from 1987-1994 the population figurs reached 842,600 inhabitants.

3-The Palestinian period from 1994 until now :
This period is characterized by the immigration towards Gaza Strip. In this period there was a big increase in the average annual growth rate, which reached to between 6-7 %. The population figurs rose to 963,000 inhabitants in 1996.

Today Gaza Strip has a very young population in comparison with other countries, 51 %of the population is 14 years or younger. As much as 21 % of the Gazans are 4 years or younger. In addition,Gaza Strip has an average of nearly 9 persons per household.

The birth rate in Gaza Strip decreased slightly in the last six years.Birth rate in 1991 was 56.1 per 1000 inhabitants and in 1995 it had decreased to 49.9 .

The death rate decreased as well from 5.9 per 1000 inhabitants in 1991 to 4.1 in 1995. This is due to the imroved health conditions after the establishment of the Palestinian Authority.

Climate

Gaza has a mediterranian climate, hot and humid in summer whereas the winter is cold . Rain falls mainly in winter and the annual average is approximately 450mm. In Gaza city, while Rafah city reaches only 200mm per year.

Agriculture

Agricultural land occupies about 170 km² of Gaza Strip. Which is close to 50 % of the total area. Agriculture is the largest single sector in the economy and contributes to 32 % of the economic production. The sector employs approximately 10.8 %of the active labor force. Green houses have been introduced and traditional system of irrigation has been replaced by drip and sprinkler irrigation. Also other crops are replacing traditional crops like citrus, which was added to the old types, such as strawberries, flowers and others.

Agricultural production and products

Rain-fed Agriculture

The main crops are fruit trees (33,900) dunums, wheat (17,800) dunums and rye (14,400) dunums.
(One dunum = 1000 m²).

Irrigated Agriculture

Vegetables are considered to be the main contributer. Total area with vegetable cultivation is 50,000 dunums. Citrus cultivation is the second main crop in Gaza. The citrus area is about 40,000 dunums.

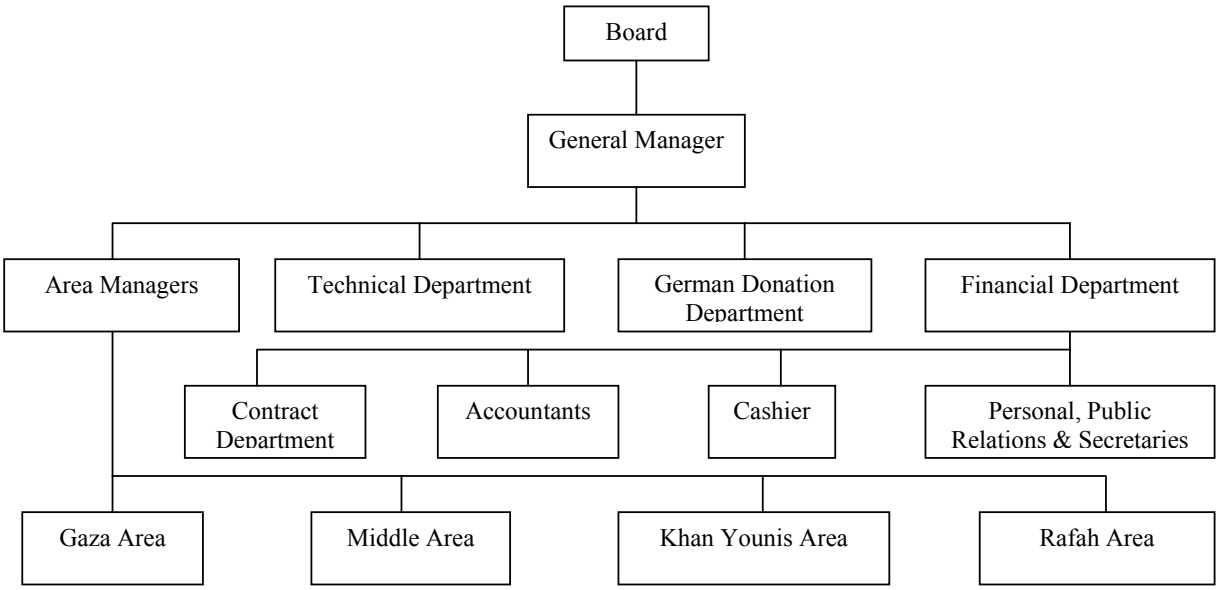
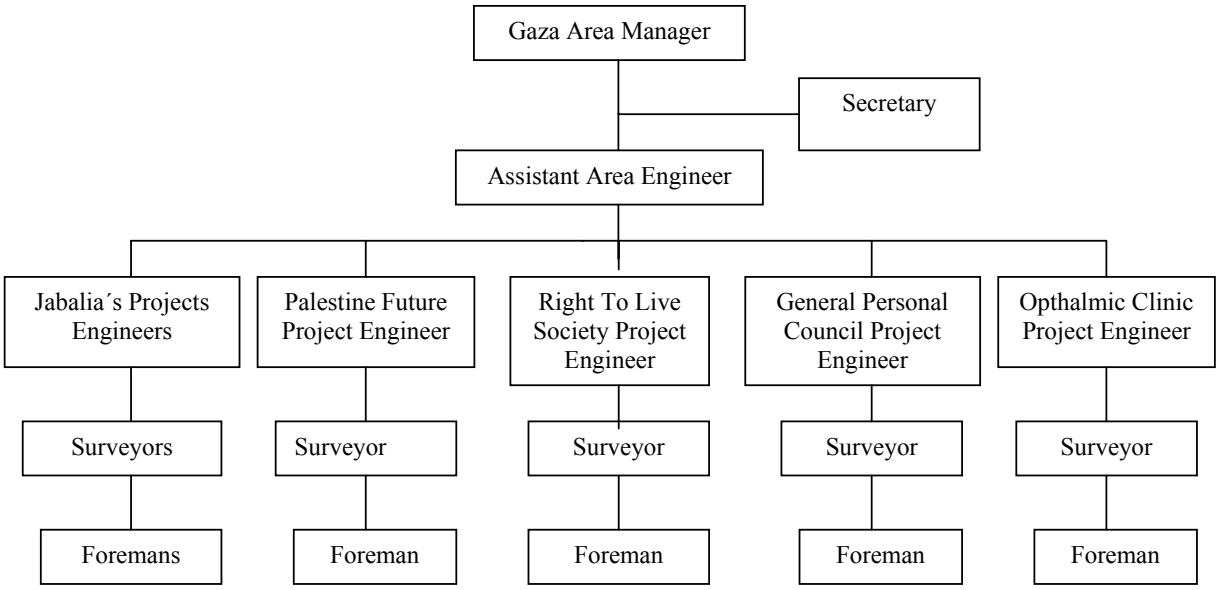


Figure (4) Pecdar ,Job Creation Program, Organization Chart



Figur (5) Pecdar ,Project Management Unit, Organization Chart

Design Stage

Project Organisation

See diagrams above.

Infrastructure

1- Water resources

The only water resource in Gaza ,for domestic, industrial and agricultural use is the groundwater.

Water Supply System Description

Each municipality or village council provides a network for domestic and industrial use inside its boarders. Construction of these networks was carried out without any overall design criteria, or long term plans.

Maps for locating pipes do not exist, but they are under preparation. Pipes in the network are mainly made of asbestos cement and iron.The sizes of elevated reservoirs varies from 100 to 400 m^3, ground reservoirs varies from 5000 to 2000 m^3. Water is pumped directly from wells to the consumers water tap. The reservoirs are not in use because there is not enough pressure in the network. Furthermore, present municipal networks do not provide complete coverage within their areas in any part of Gaza.

Present Consumption Patterns

The total present water consumption in Gaza Strip is estimated at 135-mll m^3/yr. –35 for domestic and industrial use. 90 for agriculture and 10 by the Israeli settlements. Water demand has increased sharply over the last few years due to a very high population growth, while the available water supply has been static. But declining rapidly in quality.

2- Sewage And Waste Water

The sewage collection and treatment systems(see table2) cover an area estimated at 40% in all other locations. Septic tanks, cesspools pit and dry latrines, are still being used.

Table2: Sewer system classification

	Septic Tank(%)	Sewage Network(%)	Others(%)	Total
Gaza City	20	78	2	100
Towns/ villages	56	34	10	100
Camps	52	37	11	100

Plants Capacity and Quality

All the existing treatment plants are either badly designed overloaded, and /or badly maintained with severe mechanical failures. Three treatment facilities were built in Gaza Strip during1980´s : Gaza city , Beit Lahia and Rafah plants.

3-Storm Water Drainage

Storm water may be conveyed in pipes, conduits and in paved streets between curbs in densely developed areas. But few of these systems are seen in the urban areas of the Gaza Strip.

When intense rainfalls occur in typical municipality, village or camp, the water quickly flows from flat or pitched roofs to unpaved street or alleyways, often mixing with sullage flows or untreated sewage . Such flows soon become a nuisance with potential health hazardous or a major flooding problem. Tow main storm water collection ponds exist in Gaza . Abu Rashid pond in Jabalia camp and Sheikh Radwan pond in Gaza city.

4-Solid Waste

Currently, solid waste is disposed in official and unofficial dumps. These include only five official dumping sites in Gaza Strip . For the characteristics,areas and locations of these dumping sites in Beit Hanoun, Gaza,and Deir Al Balah, Al nuseirat and Rafah (see table3). The generated solid waste per capita is around 1 kg / day. Land filling is used to be the ultimate disposal option for solid waste in Gaza. Other alternatives such as incineration, composting and others were never tried.

Table3 :Characteristics and areas of dumping sites

Location	Area(Dunum) Dunum = 1000m^2	Expected Life Span (years)
Beit Hanoun	20	4
Gaza city	130	10
Deir Al-Balah	80	7
Al-Nuseirat	10	3
Rafah	10	0.5

The number of unauthorized dumps exeeds 40. Some dumps have been filled and alternative sites were opened . As shown in table 3 the existing dumps are mainly of limited capacity and span ranging from few months to few years. Hospital and medical wastes are currently collected with other domestic wastes. This represents a serious health risk to the medical care workers, waste management operators, and lead to ground water pollution as well. Some medical wastes are oftenburned on site, contributing to air and soil a big pollution. The existing industries at Gaza are limited in scale and quantity, therefore the generated solid waste is considered small. However, wastes generated from battery manufacturing in Gaza is considered hazardous and disposed on the sea shore or in the sea.

5- Electricity Supply and distribution

Electrical power is presently supplied from Israeli sources. It´s distributed to a limited number of communities through regional and local utility suppliers.

The recent average per capeta energy consumption is estimated at an equivalent of 112 kg oil or437 kwh. The low figurs of construction for Palestinians are mainly due to the absence of substantial industrial activities and relatively large number of communities without electricity.

The electricity is distributed among 13 urban, semi-urban and rural communities , and 8 refugee camps.

All the connected communities in Gaza Strip are supplied directly by IEC(Israeli Electrical Corporation)

through 22kv transmission lines, at 7 linking-up points across the northern and eastern boundaries of Gaza, with an estimated contracted capacity of 50-60(Mega volt).

6-Transportation

The transportation in Gaza Strip is at present only a road-based system, lacking rail, sea and air transport. It is considered to be less developed than the other countries in the region. After 28 years of occupation , the road network had largely been ignored.

Purchasing, Procurement, Contracting Forms

The procurement during design stage was devided in two stages :

1-Soil investigation tender package :

It is a lump sum tender package based on the structural engineer requrement in order to achieve a soil investigation report for all the various layers prior to the design.

The sequence is as follows :

a- Release the tender in the newspaper.
b- Selection of the winner (lowest price) if his bid conforms with thr requrements.
c- Sign the contract between the Municipality and the soil laboratory.

The lab presents the required report and gets paid on a lumb sum basis.

2- Surveying Works Package :

This tender is on unit basis, the Municipality releases a tender to survey specific quantities and they pay the winning firm on unit basis.

The sequence is as follows :

a- Release the tender in the newspaper.
b- Evaluation of bed.
c- Selection of the winner.
d- Sign the contract with the winner.
e- The lap supplies all the levels.
f- The Municipality remeasures the area surveyed and pays the lap on unit basis.

Project planning

Planning is essential to all projects and it is the key to success of any construction project.

When Sida expressed the willingness to support the (Upgrading Project) in northern Gaza, PECDAR technical department prepared a work plan to execute the project with four disbursements, Sida transfered the money accprdingly.

Project Financing

As agreed between Sida and the Palestinian authority, Sida will support Pecdar (J.C.P.) with 2,000,000 u.s.$ for the rehabilitation and upgrading of the 15 sites in northern Area and the administrative cost through a trust fund agreement see project budget table 4.

Table(4) Project Budget

Description	**Cost $**
Biet Lahia Municibality Sub-Projects	720,000.00
Jabalia Municipality Sub-Projects	820,000.00
Biet Hanoun Municipality Sub-Projects	210,000.00
Sub Total	1,750,000.00
Contingencis	53,200.00
Pecdar Administrative Cost	196,800.00
Total	**2,000,000.00**

Budget And Budget Control

After the final design of each subproject the technical department makes a preliminary budget for each subproject, then they compare the total of 15 subprojects with the budget based on the latest unit rates before releasing the tenders.

It was estimated that the project (Water Line for Jabalia Al Nazla) cost 180,000 $.

Figure (6) Jabalia Al Nazla Project
(Preparation for handing over)

Information Technology

- Each Municipality prepare a master plan for all infrastructure facilities, some of them uses G.I.S. (Geographic Infrastructure System) in addition to AutoCad, Excell, Access, and word systems.
- Jabalia has a poor Municipality, they can not afford to G.I.S. system and it lacks the use of modern technology, that´s why it is target Municipality

Figure (6) Jabalia Al Nazla project (Prparation for handing over).

Experience to be used in future projects

The northern Municipalities lacks coordination, rsponsibilities are not defined, their management is weak, and all this step backs caused the delay of design.

Comprehensive revision of design was required, constant cooperation is needed, standardization of specification, conditions and safety regulations are essential to be used

Conclusion

- Coordination is a key role from inception to completion of any project.
- Definite role is required for all staff in any organization.
- Use of modern equipment.
- Cooperation and management are vital in all projects.

Production Stage

Tendering and Contracting

To give the opportunity for competitive bidding, bids has to be advertised and available to eligible bidders. So, advertising for two days in 2 local newspapers focusing on the degree of the contractor is essential, 15 contractors bought the tender “Jabalia Al Nazla Project” only 13 contractors competed and submitted their offers, the lowest bidder was Moen Shada and his price was $ 144,144.00 . The highest was Al Montar Company, his price was $ 190,142.50 .

Rules of acceptance for bidders

The qualification for bidders is already done by the contractors syndicate, which makes prequalification for each contracting company and gives degrees , starting from 1st degree to 5th degree. They specialize the activities of each with its degree such as buildings, roads, mechanical, water and sewage networks, electrical works.

Pecdar’s technical department opens a file for each contractor, attaching the following documents :

- Registration in the contractors syndicate with it´s ranking.
- Registration in the ministry of Justice.
- The registered company´s establishment contract.
- The latest cirriculum vitate.
- Registration in tax department.
- Abiding with safety regulation certificate.
- Abiding with Pecdar specification certificate.

Bidding Documents

The technical department prepares the bids which consists of :

- General conditions.
- Specific requirements and specifications.
- Bill of quantity.
- Drawings.
- Safety regulation.

The administrative regulations shall stipulate the following :

- Source of financing and eligibility with regard to bidding countries, if any.
- Perchasing procedure (Method of procurement).
- Closing date, place and time for bid opening.
- The date up to when the bid shall be binding.
- The method to be used for making of sealed bid envelopes.
- Rules governing the opening of bids.
- The criteria for evaluation of bids.
- That bidders are supposed to state type of company, financial status, country of origin and , ownership.
- The language in which the bid is to be written.
- The right of Pecdar to divide the contract among several suppliers, if found appropriate, or to reject all bids.
- Bidders should be given adequate time to submit their bids not less than 15 days.

Submission of Bids

Bids shall be submitted by hand in sealed and marked envelopes. To be considered for evaluation they must conform to the bidding document. A bank guarantee of 5 % of total bid amount should be enclosed with the offer.

On the specified date the contractors submit their offers to Pecdar technical department where the envelops are gathered in the tender´s box, the technical department does not receive offers after 12:00p.m. .

A committee of four area managers accompanied by the head of contractors department opens the offers and prepare a tender opening form, see table 5.

Then the committee signs the report and closes the meeting. The job of the contract department start now, reviewing the prices and calculations, for our project the General Manager had chosen the lowest bidder, Moen Shada company.

Within 7 days the contractor has to submita 10 % performance bond of the bid value valid all over the project duration , he has to bring an insurance policy covering 25% of the contract value for workers and 75% for the materials, then he has to sign 3 copies of the contract . The first copy remains in the contract department .The second will be handed to the contractor and the third will be submitted to the Area Manager.

The contract of Jabalia Al Nazla Project was signed on 8/11/1997 the work started on site on 1/12/1997 according

to the bilateral agreement conditions contract, and duration was 120 working days.

The contractor meets the area manager to start site preparation and to submit his staff credentials which should meet the minimum requirement as per the document , which is consisting of :

Project Manager.
Site Engineer.
Surveyor.
Foreman.
Technicians and Skilled Labors.

Production Planning

1- The contractor has to submit his schedule for the execution of the project during the limited time of the tender.
2- After checking and approving this schedule he has to make weekly and monthly planning for the work. He has to submit shop drawings and all required details to execute the work, daily report has to be submitted to the Engineer showing the activities done, staff, no. of labors, machines, materials arrived to site and problems encountered to be solved, or any delay might happen. In addition to weekly reports, and monthly reports explaining the activities done during the previous month, the area manager compare them with the project timetable.

Quality Assurance

Unfortunately we rarely use ISO standards for construction, but we have quality control on all the building materials used on site.

All materials are specified, all required tests are attatched in the tender documents, and the supervision team of any project which consists of project manager, surveyor and the foreman plays an important role in the controlling of the materials used in the project.

No work can be done without previous inspection and signing of checking lists. Any material or work , which does not meet the requirements, is demolished and removed from the site, if the contractor does not abide with the specification, the supervision team stops the work immediately.

Economic control, Budget review and Reconciliation

Construction cost is nearly fixed but there is always room for variations which should never exceed 25% of the contract value, if for any reason some works are not calculated very well, or some works can not be executed, so we have to use a variation order to do the job.

The Area Manager has to approve the variation submitted from the respective Municipality. After the project engineer convences him with it´s importance, he in turn signs the variation order from the General Manager. The area manager conducts weekly meetings with each project engineer and the contractor, in addition to his random visits to his different sites or projects, so he

Tender Opening Form
Tender 58 - 3 / 97
Jabalia Al Nazla Project
Thursday30/10/1997

No.	Company Name	Total Bid Amount $	Type of Bond	Bid Bond Value $	Registration of the total bid (Yes / No)	Remarks and Deductions
1.	Al Manar	162,575.00	Bond	9,000	Yes	----
2.	Al Shawa	--------	--------	--------	--------	--------
3.	Al Waha Al Khadra	156,897.50	Bond	5,610	Yes	3% Deduction
4.	Al Rabita	163,687.50	Bank Cheque	8,750	Yes	3% Deduction
5.	Al Montar	190,142.50	Bond	10,000	Yes	----
6.	Ryhan	169,100.00	Bank Cheque	8,500	Yes	----
7.	**Moen Shada**	**144,144.00**	**Bank Cheque**	**7,500**	**Yes**	**4% Deduction**
8.	Al Maktab Al Arabi	186,850.00	Bond	10,000	Yes	----
9.	Ziad and Atalla	152,748.88	Bond	8,000	Yes	1.5% Deduct.
10.	Al Ashgar	149,683.28	Bond	7,500	Yes	5.5% Deduct.
11.	Al Najah	153,055.00	Bond	8,000	Yes	----
12.	Al Moasera	--------	--------	--------	--------	--------
13.	Momar	159,959.25	Bank Cheque	8,500	Yes	1% Deduction
14.	Jafra	154,945.00	Bond	8,000	Yes	5% Deduction
15.	Al Aqsa	147,575.00	Bond	7,500	Yes	----

Member Member Member Member Member General Manager

has good communication with his staff by using wireless devices. The Area Manager checks daily, weekly, and monthly reports, review the payment and check the budget of each project, then he prepares a monthly report to the management.

The project handing over was on 30 / 05 /1998, see figure 3 and figure 6 ,the final project value was $ 142,674.24 , and there was some delay of 30 working days because of the closure, “Israeli Army closes our boarders”, and then caused the delay of base coarse, “Granular aggregate used as sub base layer” .

Experience to use in future projects

- Coordination between the Area Manager with his staff, the contractor, the technical department and the respective Municipality is required and essential for the project success.
- Reviewing of design and meeting with the designer, facilitate and expedite the work.
- Staff training, development, periodical meetings are important.
- Use of computers is very vital and essential.
- Allowing the use of Alternative methods and materials is very essential.
- Employing the use of quality assurance in future projects to avoid damage of goods.

Conclusions

Good control is an essential aspect for all projects, sufficient time for the design process should be given to minimize mistakes.

Continuous communication between the site and the management is important, periodical checks and evaluation of the project should be done, the use of technology and adaptation of new techniques expedite the process and help the contractor in finishing the job on time.

Property Management Stage

Management has been developed rapidly in the last years, universities had opened big departments to teach management because of it´s big role in the success of projects.

There are some conditions affect the property management, such as :

a) Financing (donation, loan, the rate of interest, period).
b) Running costs (water, electricity, telephone, cleaning and garbage collecting).
c) Maintenance costs (internal or external)
d) Tax regulations.
e) Construction technics and construction economics.

In order to have a proper management we should know the price of materials, the price of ericting and it´s life span and compare it to the price of maintaining these materials and it´s prolong life span.

Life-cycle Economy

This cycle commences from the erection of the infrastructure till the decision is made to construct new infrastructure.

Making periodical maintenance and comprehensive maintenance is essential for the life span of any project.

For proper management many items should be considered :

- Project evaluation.
- Techniques
- Maintenance cost.
- Finance.

Maintenance Planning

- Preventive maintenance.
- Comprehensive maintenance.
- Needed maintenance.

The contractor Moen shada was asked to submit two copies of as built drawings for all the works he performed on site. One is kept in Pecdar, (PMU) and the other is handed to Jabalia Municipality.

After the contractor had finished all the work on 30/5/1998, he became responsible for the all the needed maintenance for all the project activities for one year.

He submitts to Pecdar a 5% bond of the contract value for one year. Before this year ends a committee from Pecdar and the Municipality inspects the site and all the infrastructure facilities.

Preventive Maintenance

After handing over the site to the respective Municipality, the Municipality only clean the roads from dirt and sand, the real role of the Municipality starts after the final handing over were they have to make preventive maintenance which consist of cleaning of sewage manholes, inspect water line by compairing the reading of the main meter to the total of the meters of the neighberhood, to find any leakage or any illegal connnection. Cleaning of streets by sweepers, and for rainwater drainage, before the raining season, the Municipality checks the water collection inlets and cleans them.

Comprehensive Maintenance

The Municipality uses jet machine to clean the whole Sewage System. Where as the Municipality uses labor force to go inside the rainwater collection and removes all the participated sand and dirt.

Public health department of each Municipality tries to exterminate Roaches, Rats and other insects by spraying gas, and the use of insects exterminating materials.

Needed Maintenance

The Municipality has an emergency team to treat any sudden trouble in the infrastructure networks, on 24 hour basis. This team consists of skilled labors for water, sewage, electricity and tiling workers.

They have their own store with all the equippments and materials needed, they don´t have to wait , full authority to solve any critical problem ,no matter how much it costs.

Connection to Design Stage

Feed back from the site to the designer is very essential, it is required that the supervision team consuls the designers whenever they face a problem for two reasons, the first is to find a solution for this problem, the second is to imrove the design and not to repeat the problem again.

The Municipality should prepare clear drawings for all the underground services,and include in the design for future expansion, ask for warning tapes from the contractor for all infrastructure facilities.

1- Enlarge Manholes for easy maintenance.
2- Use of typical patern for the infrastructure facilities; e.g. specialize one side of the road for main water pipe line and main sewage line and the other side for telephone and electricity conduits.
3- Check that proper slope of pipeline is considered so the system can work properly by gravity.

Experience To Use In Future Projects

Maintenance of infrastructure facilities has been recognized very well in our country. The lack of financing for new infrastructure projects led the engineers to concenrate on maintenance to prolong the life span of these services.

A lot of researches have been made on new materials to minimize corrosion and water leakage, and the use of long life materials.

After the estableshment of the Water Authority, the engineers and consultants oredered the Municipalities to use Plastic pipelines for all new water systems, the old system consisted of Asbestos water pipeline, which is harmful for the people health, and steel pipes.

- The use of Geographic Infrastructure System “G.I.S” is very essential to minimize network breakage and for faster fixing of any arising problem.
- Researches on new materials.
- Encourage any new method of work.
- Establish a data base for the infrastructure facilities.
- To follow the master plan of each Municipality in executing the project which should be part of the country master plan.
- Training of engineers, foremen, skilled labors and technicians is important, teaching them about new techniques to facilitate and expidate their work.

Conclusions

- If we follow the lessons learned from the three different stages that any project encounters, which is the design stage, the production stage and the property management stage, we will have a successful project and all the actors in this project will be satisfied.
- Proper maintenance for all infrastructure services is essential, by implementing the running maintenance which is divided to urgent and non urgent maintenance, and the planned maintenance which is divided to preventive and longterm planned maintenance.
- Proper coordination between all the actors is needed.
- Working according to the designed economical control system.
- Working according to studied strategic plan, then we can make several budgets with shorter prespective to guide the daily work operational plans.
- Using the analysis for Diagnosis and Prognosis.
- Implementing the cash flow theory for the property management.