

ECONOMIC EVALUATION OF UTTARA MODEL TOWN
(3RD PHASE)

BY

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CERTIFICATE OF APPROVAL

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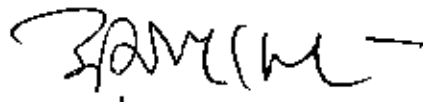
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DEDICATION

This work is dedicated in the memory of my FATHER ,Late Dr.Engr.Hafiz Faruque Ahmed Sharif and to my MOTHER , without whose tireless encouragement I would have given up long ago.

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ABSTRACT

“Uttara Residential Model Town(3rd Phase) project “ is a recent initiative that RAJUK intends to implement in line with “1997 DMDP-RAJUK Master Plan”.The site for the proposed model town is located at the north-western corner of the DCC with URMT(2nd Phase) located to the EAST and Mirpur to South of the Project area.The Project Area is about 2010 Acres and is located entirely within the western Dhaka Flood Protection Embankment constructed along the eastern bank of the TURAG river.The area is divided in four sectors and the project is expected to accommodate six hundred thousand people.Economic feasibility of land development and dredging method is analyzed in this work. Actually this is a work to realize and understand the rehabilitation and living problem of growing population in the DHAKA city .

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Chapter 1 Introduction

1.1 Introduction

Dhaka like most cities of the developing world is a poorly managed city, which leads to the deterioration of urban living conditions. Urban poverty results because in many countries, national and local governments cannot plan for the population increases, and fail to provide the required infrastructure, services and jobs. Government efforts through all these years to provide housing to government servants, to the general public and to the urban poor have not so far been able to make any significant dent in the urban housing scene.

The project intends to scrutinize the effort of government at the end of the 1960s with emphasis on a specific project to solve the housing problem as well as give direction for the growth of Dhaka city. The government is the single largest provider of built up housing in Bangladesh mainly in the form of accommodation for its employees.

Although the number of units provided is far less than the number of employees, government housing continues to be a strong influence on urban housing in general. Other than the built form projects were taken in form of giving access to land and providing infrastructure facilities. The trends established by government housing are followed by other semi-government agencies and to a large extent by private developers. The formal planned developments also influence the unplanned settlements. Government housing can therefore be said to be representational of urban housing in general. So in bringing out the problem related to strategies of the project the intention is that the efforts in future can be made more meaningful and effective.

The objective of this research is also to discuss the housing problem faced by the different income level especially by the lower income group of urban middle class in Dhaka through the analysis of Uttara Model Town housing. The paper would also investigate the dominants form of walk-up houses. In doing so the present housing trend would be investigated with respect to a specific building project.

1.2 Problem Definition

The satellite town was created to solve the housing problem of middle class in the 70s modelled on housing solutions done on 60s in the central area and northern areas of Dhaka city. The project failed to serve the middle class as a whole. Almost 75% of the plots were not inhabited by 80s. Presently more than 50% plots of the newly developed sectors on west of township are still lying vacant.

The main cause is the affordability of the middleclass group. The middle class in the last three decade have stretched to three income groups: the upper income group, the mid income group and the lower income group. The main difference between the low-income middle class and the low-income group is that of education as well as the income level. We see in the late 80s and 90s with the rise of land price a number of plots owned by people were being sold. The buyers were from the higher middle class group who do not own a land in Dhaka or the businessmen of different income.

Some owners are still holding to get advantage of higher land value. Thus in the end the land owners here are predominantly from the high income group.

1.3 Background of the study

The problem was identified in 1998 while the implementation period of the individual house in the Uttara Model Town area. It was observed that the plots adjacent to the site were all vacant. During the construction period of two years of the project, some of the plots have been sold and the construction was beginning on those sold plots. There was also a big concentration of spontaneous settlements nearby in commercial plot of public

ownership, which was lying vacant. So there was also the problem of low-income group housing. The picture clearly explains the situation described. This prompted to undertake this research into the problem of affordability of different income group of middle class. Presently government is planning for similar communities southeastern part of Dhaka city with higher densities. There is a possibility that this new subsidised solutions will be used for speculation by the plot owners, which was the same with the Uttara Model Town.

The planning trend set by this public project has been followed by the private sector. Many of the private sector neighbourhood plans with the same amenities or less have the same subdivision of plots for different income groups but with higher density. There is a need for reevaluating the planning of the plots. There is a need to integrate novel solutions for the different income group within the middle class. Also integration of different social groups should be looked into.

The basic concept of house in our country is to own a structure in a plot. This notion of housing needs to be modified to take advantage of different form of housing. There is a need to introduce innovative solutions. Introducing row houses, multi storied houses; clusters etc. may be needed to add to the variety of housing.

1.4 Objectives

The objective of the study is to 1) find out the economic feasibility of land development and 2) find out the feasibility of dredging method. Economic feasibility of land development will be evaluated looking into investment cost, annual value of output and yearwise return of Uttara Residential Model Town(3rd Phase).

1.5 Method of Study

The dredging work shall have to be completed within certain period of time for different groups. The program is placed in the form of a Bar Chart with the datum as the issue of the order to commence the work. The Bar Chart in the form of CPM (Critical

Path Method) is presented from mobilization to completion of work reflecting all the steps.

Method of the proposed work is related to dredger capacity , booster pump capacity including the dredging , dyke construction , filling ,compaction etc.

Uttara 3rd phase is a self-financing project of RAJUK . RAJUK intends to develop this land through dredge fill materials . The dredging program is undertaken instead of conventional way of "CARRIED EARTH " technique and spreading , compacting etc from the following reasons :

- i. for scarcity of earth resources near the project
- ii. to avoid the delay in the filling work
- iii. to avoid the traffic congestion in the road
- iv. to avoid misuse of farm /agricultural land by digging earth and
- v. to dredge the nearby rivers , which will be helpful for mitigation of flood and improve the efficiency of navigation route .

Necessary "DYKES" are constructed in the project area for proper sequence of work. Dredging work cant be stopped or keep suspended on the plea of DYKE construction during the implementation period , that is, all necessary dykes required in the site must be completed well ahead of the dredging works

The dredging should be conducted out from the TURAG river as convenient from the dredging point of view.

1.6 Scopes and Limitations

This research is essentially an analysis of a specific urban house form and its context that is the Uttara Model Town. A brief sketch of socio-economic development of urban middle class society would also be made.

The information relating the model town would be acquired from secondary sources, both published and unpublished, while the study of the form and context of the contemporary house form would be based on mainly practical experience.

Chapter 2 Literature Review

2.1 Background

2.1.1 Country Level

Bangladesh is a small developing country with a large population of 130million, making it one of the densely populated country in the world. Bangladesh, being located in a tropical region has an average temperature of 24 °C to 38 °C. Rain with high wind is common and also the presence of high humidity. The country is divided into six divisions and each one contains several districts and at present there 64 districts and 127 municipalities. The capital city Dhaka and the port city Chittagong are the major target for rapid urbanization.

Urbanization in Bangladesh

Urban population growth rates in Bangladesh are the highest among the South- and South-East Asian countries. For example, average annual urban population growth rates in India and Thailand in the late 1960s were 4.0%, and 4.8% respectively against 6% in Bangladesh at the same period. Urban areas started to grow steadily particularly in the post British period when the British left the Indian sub-continent. However the rate became more significant after the country achieved independence in 1971. The main reason for this population increase besides the natural growth can be enumerated as following:

1. Change in the status of towns in different levels accompanied with offices, industries, and academic institutions attracting people of various professions.

2. Attraction of socio-cultural, educational and health and others facilities in the city. The concentration of different institution also led to high growth of the educated middle class.

3. Large scale migration following natural disasters (flood, tornado) in different years or man-made calamities like war, famine etc.

4. Deteriorating economic condition in the rural areas, increasing poverty and landlessness pushing the rural poor towards the cities. This resulted in growth of people working in the informal sector within low income range. Household income or consumption by percentage share: *lowest 10%: 3.9% and highest 10%: 28.6% (1995-96 est.)*

2.1.2 Regional Level

City: Dhaka

Dhaka being the capital and largest metropolitan city of Bangladesh with its employment opportunities and other commercial activities has attracted the largest number of migrants from all parts of the country. As a result the population has increased tremendously during this period (1971-80) compared to the expansion in the city area. In 1991 it was estimated that 40% percent of the total urban population live in Dhaka city. Dhaka has grown from a town of just 0.5 million people in 1957 into a metropolis of more than 7.0 million in 1991 over an areas (Dhaka metropolitan development plan-DMDP) of 1528sq km (590 square miles) 2.Dhaka's role includes full range of national government and administrative functions together with high proportions of all national industrial, commercial, cultural and recreational activities. All governmental decisions and the greater part of political activity originate from Dhaka

Migration to Dhaka

Migration figures give a picture on the affinity of the migrants towards the bigger cities. Number of total rural to urban migration was over 2,400,000 in 1961-74. This was 6 times higher than that in between 1951-61 and constituted nearly 60% of the total urban population increase. Three big cities combined absorbed nearly 2/3rds of the whole urban-bound migrants; Dhaka alone accommodated 38.83% of the total migrants

Table 1: Population growth of urban areas and new shelter requirements (1980-2000).

Urban centres	1980 Population (Millions)	1980 Households (000's)	2000 Population (Millions)	2000 Households (000's)	1980-2000 New housing units req (000)
Dhaka	3.6	515	9.3	1691	1176
Chittagong	1.43	220	4.0	727	507
Khulna	0.70	108	2.4	415	310

Housing situation in Dhaka faces the formidable problem of providing minimum shelter of acceptable standard to everybody. The scene is depicted by the volume of slums and squatters, number of families per household, trend in household formation, etc.

The Urban Middle Class

In Indian subcontinent the middle class emerged more as a consequence of changes in the system of law and public administration than as a result of economic and technological development. The members of the middle class belong to the learned professions. The real growth of middle class was more of a 20th C. phenomenon with the growth of government jobs in civil, military, police, railway and river services along with the growth of institutions for professional education of doctors, engineers and advocates. 'This growth of the professions and the number of Indians (before subdivision) in government service coincides with a steady increase in urbanization after 1900 and the faster growth of individual cities. Urbanization introduced major changes in the system of education and occupation. Traditionally, specific trade or occupation of each member of indigenous society was birth ascribed. Achieved characteristics are mainly economic and

refer to formal education and training. Whereas in traditional system children followed their parents into their roles, education was at individual level without formal schooling. Western ideas increasingly infiltrated into the middle-class thinking through their education, in service training and the media- books, journals and press. This influenced gradual change in the concept of family, life-style and living. Metropolitan society and the job structure together created preference for nuclear family to replace the traditional joint family. Westernization encouraged both spatial and temporal compartmentalization of activities in cities as well as in domestic level. The home and work place was no longer synonymous. The cities eventually compartmentalized into residential, commercial, recreational and industrial zones. Single used areas replaced traditional mixed land use. In the domestic level the trend was to isolate spaces according to different activities like sleeping, eating, cooking, etc.

Table 2: Income Groups in Dhaka city, 1987.

Income group	Monthly income of HouseHolds in Taka	Proportion of total HouseHolds in the city (%)
Lower income groups	1000-3000	70
Middle income Groups		28
Lower-middle	3000-5000	
Middle	5001-10,000	
Upper-Middle	10,001-20,000	
Upper income groups	20,001--	2

Following table reflects government's interpretation of middle income group in terms of salary and the built housing provided for them up to 1992. The present pay scale have nearly doubled. The class I represents the middle class even though the private and semi private organizations have much higher salary level. Class II and class III represent the low-income groups.

Table 3: Residential Space Standards for Government Officers and Employees, 1992.
Salary is in Taka and corresponding area is in sq ft.

Category of Officer / Employee	Pay Scale -Taka	Allotable Floor Areas in sq.ft
Class I	8000 and above	1800 + 200 for garage
	7100-7999	1500
	6600-7099	1260
	2850-6499	1000
Class II & III	1225-2649	800
	1125-1725	600
Class IV	1050-1915	500

The middle income-group combined represents approx.28 percent of the city population but cover nearly 65 percent of the residential land. Density in these areas may range from 50-400 persons/acre (124-988 per/ha). This wide range is reflection of the significant variation within the group. There is also a high disparity of income between different income levels of the Middle class. Urban middle class became a dominant power towards the end of colonial period. It gave leadership to all socio-cultural and political activities. After the independence this dominance lead to the planning of housing that only catered only to their need.

2.1.3 Development of Uttara Residential Model Town

The Town ship project was launched with the intention that it will solve the problems as mentioned in the objectives of the project to a substantial extent by encouraging the process of decentralization of some of the functions. The residential units in the proposed satellite town suggested to be self contained with respect to the needs. Each owner had to construct the structure by arranging the finance and other necessary approvals on their own.

The project was called as Dhaka North Satellite Township but was changed to Uttara Residential Model Town by Dhaka Improvement Trust (DIT, presently RAJUK) in 1980.

The high densities, haphazardness of land use and non-availability of land around Dhaka were that was faced DIT and related bodies during the early 60s. More over due to a rough estimate for dwelling unit shortage for Dhaka was made, which showed a backlog of about 34,000 dwelling units in 1965. In the early 60s there was acute paucity of schools, hospitals, parks, playgrounds and related facilities in Dhaka. The problems of space and high land value were the prohibitive for the potential investors in such enterprises. Similarly the realisation of creating a self contained township was felt, to increase the length of the city, thereby alleviating the traffic problems of the central Dhaka and reducing strains on motorists, in addition to solve the haphazardness of land use.

2.1.4 Strategies

In June 1965, a feasibility study was carried out by consultants for the 'Dhaka Improvement Trust', to set up a satellite town near Dhaka city. Finally the development North satellite town on a site of about 2,344 acres were suggested within which the present Uttara model town of 950 acres is situated. 4,302 serviced plots were made available within 9 sector over a period of 1966-67 to 1985-86. The project also paved the way for future growth of Dhaka city.

The project scheme also hoped upon completion by 1971-72, an urgent need of the community will have been met by a scheme, which is self-financing and laid out on a planned basis. On completion the pressure on the population increase of the Dhaka city was expected to be diverted to this new township and there will be employment facilities in and around the Township.

The township has been called a model town and residential area in the official correspondence instead of satellite town. Because of the three different suffixes 'satellite', 'model' and 'residential' with the township, it raised confusion about the scheme. With the lack of information, one local study on the township has confused the scheme in the late 70s.

Site selection Criteria of Uttara Model Town:

The growth of the city is obstructed by the river Buriganga to the south and wide tracts of low-lying areas to the east and west, which is, flooded to 10 inches deep each monsoon. The selected area therefore provides the only and obvious outlet for uninterrupted development for residential purposes.

The provisions in the master plan of the project:

i) It aims at serving a population of about 124,000 with an average net density of 95 persons per acre for low height residential sectors i.e. residence up to 2 storeys high; at a density of up to 135 persons per acre for the multi storied walk-up apartments sectors.

ii) Areas for residential sectors were 1,041 acre for class I employees and 54 acres for class III and IV communities of the total 2,344 acres. The rest were for civic administration, light industries and workshops, recreation and playfields, Schools, parks, squares, lakes, roads etc. The development cost was calculated to be 4rupee/sq.yrds in 1965.

iii) The following were the proposed sizes and number of plots and its percentage:

Table 4: proposed sizes and number of plots and its percentage

Sizes of plots in Kathas ^a	Nos. of plots	% Area under Category
3 kathas = 2160sqft	2900	20
6 kathas = 3600sqft	2500	30
7.6 kathas = 5400sqft	1800	30
10 kathas = 7200sqft	630	15
20 kathas = 14400sqft	100	6

2.1.5 Analysis

It can be seen that the proposals in the 1965 feasibility study were for a community of all income groups. This was never materialized fully by government. It deviated from initial concept to '...have in practice been completely abandoned in favour of providing subsidized housing opportunities exclusively for the upper income group'. One of the positive aspects is that it generated the growth of Dhaka towards the north. The problems that resulted may be broadly classified as of planning stage and implementation stage.

A portion of the township of about 950 acres were detailed out covering only that portion which was enmarked as housing for high income group in the original plan and in all 4,302 housing plots of different sizes were available. There was a shift from the initial planning of plots.

Table 5: Actual distribution plots and the percentage of area.

Area of plots in	Area in	Nos. of plots	% Of Area Under Category
sqft	acres.		
2520sqft	38.76	670	16
2621-2880sqft	32.24	620	12
3600sqft	178.80	2381	55
5400sqft	90.62	761	17
Total	358.40	4302	100

From the initiation of the project the sector plans had to be reviewed which were made to accommodate more and more plots and thereby reducing area for community facilities. This led to the deteriorating of overall conditions of the sectors. The objective of reducing high density in the central city by building independent residential community in Satellite Town was not a practical solution until and unless the same population is decentralized to the township. In practice, the allotment process was open to all, whether the applicant's are from Dhaka central business district or from any other area, who can afford to purchase the plot

Area	1965-75	1975-76	1977	1981	1987
Banani	27,000	226,000	4,00,000	4,00,000	10,00,000
Gulshan	45,000	275,000	5,00,000	10,00,000	
Uttara	45,000		1,50,000	8,00,000	12,00,000

So, in reality, it happened that any one, who had the intention and ability to invest, has applied for a plot in the township and got allotted. So the allottees continued to live in government housing and held the plot for future investment. Out of the applicants maximum number were of government service holders who had the intention of settling after retirements. As a result most of the plots allotted up to 1975 to such persons were vacant till 1980. According to survey in 1984 only 25% of the allotted plots had built-up structures. Of these structures 57% were of single storied buildings, which reflected the low density of population of the township. Again the land and the infrastructure were provided so slowly that the price rise and it becomes a commodity, which the rich buy and speculate in. The roads, electrification works, water supply to all sectors was ensured only in the 1984-85, that is 14 years after the initial completion of work. The problem of providing communication was solved in the late 80s. The schools, colleges and commercial functions began to be built in the late 80s. But still the plots were empty in the new areas of sector 10, 11 etc. So we can easily discern that the housing was not meant for the whole of middle class society.

2.1.6 The Individual House in the Uttara Model Town

The project is situated in the western part of the model town, which developed in the 80s. The client required a design approach, which would accommodate a multi-storeyed walk-up apartment housing with different space requirements for owners and tenants.

The owner family type played a crucial role in determining the different sizes of units, a typical of identical demands of apartment on each floor.

The client is a retired government employee, a first generation Dhakite who showed inclination toward Joint Family concept as outlined in his requirement to share living units with his son and elder daughters—all well settled in their profession and with their own family. The financial aspect of the project was shared between the father, his elder daughter and her husband who are also government employees.

From the first meeting with the architect it was clearly expressed that the units for the son and the daughter had to accommodate more spaces. The units for the son and daughter had to be on the 1st and second floor closer to ground and have definite identification facing the front street. Although the client opted for a more compact layout for tenant unit for renting out, for their own living units they decided to have more space. The apartment was built partially on House Building Finance Corporation (HBFC) loan. As house rent is comparatively more for smaller unit sizes at Uttara, instead of renting out one large space on 3rd and 4th floor, the clients decided to go for 2 smaller units on each floor as the architect suggested. Eventually a floor plan for 1st and 2nd floor was suggested with asymmetric layout distribution of 2 units. The front one facing the street is of larger size than the back unit—a smaller type, more of a compact layout for renting out. The 3rd and 4th floor plan are identical with two same sized apartments on each floor.

The units were specifically designed for tenants—the second generation Dhakaites who have already adopted nuclear family type with limited income but with modern values imposed by city living so that a compact layout would be welcomed as a fresh alternative.

to a over sized loosely laid out apartment. Affordability of such new generation urban tenants of mid income status was taken into account while fixing on the sizes of the apartment. The rental part is necessary to pay-off HBFC loan and to sustain a healthy income in future other than govt. salary. The cost of the building is approx.8.7million taka. Only 29% was paid from loan and rest was shared between the father, his daughter and son-in-law. Uttara-designed as a satellite town with the population being more of a commuter type, the provision for parking for cars was also given due consideration in the design layout.

50% of the ground floor serves a garage space. Survey shows apartment without parking space attracts poor rent and often lie vacant in spite of availability of other modern amenities.

2.1.7 Actors

A comprehensive overview of actors involved in the housing sector in Bangladesh is portrayed in this. This is to show that urban dwellers have to face this varied set of actors. Some of the actors play direct role in Uttara model Township projects while others have more passive role. The actors are narrated in the sequence from National level, Finance and to local level actors.

National Economic Council (NEC)

It is for policy and programme and overall decisions.

Planning Commission

It is responsible for policy and programme review. The Main Institutions and their Respective Responsibilities in the Public Housing and Funding.

The Ministry of Housing and Public Works

The following Departments/ Directorates under it are involved in the public housing provision.

- *The Department of Architecture* is the lone government architectural organization and responsible for designing all government buildings and public housing schemes across the country.
- *The Public Works Department (PWD)* is concerned with the construction and maintenance of govt. offices/ institutional building and public housing for the govt servants. Previously this body also carried out design and drawings. Presently with the formation of the Department of Architecture its role is limited to construction.
- *Housing and settlement Directorate (HSD)* is vested with the responsibility of building houses for general public especially for low and lower middle income housing in the country. HSD has been involved in the provision of serviced plots, core houses, semi-pucca houses, flats, and slum upgrading schemes.
- *The City Development Authority, RAJUK* is responsible for physical plan preparation, land acquisition, land development distribution of plots, regulation and control on private development and building permission as well as slum clearance and rehabilitation.
- *The Urban Development Directorate (UDD)* limits its role only to the urban and regional planning policy and plan preparation.

The Ministry of Finance

It is responsible for funding the public housing. Therefore it supplies finance for house building activities.

House Building Finance Corporation (HBFC)

It gives mortgage lending for housing construction to the people. It was the sole body providing finance to construct houses in the 70s. In the early 80s some private sector banks provided loans for high income generating schemes. The commercial banks of the country also make some housing finance but the government patronized Bangladesh

House Building Finance Corporation still remains the single largest institution for housing finance. Presently Delta brace housing and some NGOs are also providing housing loans for different income group.

There are different agencies that are responsible for regulation and control over the design and construction of housing its location, necessary infrastructure, services and social facilities essential for housing areas.

Water Supply and Sewerage Authority is responsible for water, sewerage and drainage.

Titas Gas is responsible for gas supply.

Dhaka City Corporation (DCC) is for maintenance of urban services, slum improvement implementation.

Housing and Building Research Institute (HBRI) is responsible for research and development on building and materials. But their research related to low cost construction failed to influence the housing activities due to lack of publicity. There were hardly any demonstration projects, which showed the application of techniques developed by HBRI.

Building Contractors

From private sector working for developers to construct houses. They generally use mechanical means to construct. The other actors from informal sector are the small constructors. They in turn sustain the laborer from the informal sector. Their construction process is labor intensive. In Dhaka as well as in Bangladesh 75% of the constructions done is labor intensive.

The Professionals

The technical persons involved in any building projects are mainly the architects and the civil engineers. In order to produce a full-fledged construction document the architects have to coordinate with the civil engineer, quantity surveyors, mechanical

engineer, plumbing engineer and electrical engineer. In some cases the owners only require a detailed architectural and structural drawing. The architect's role may also extend to supervision during the implementation stage.

Individual Plot Owners

They are the beneficiaries who own the plots and subsequently the houses that are constructed on the plots. A plot owner has to employ an architect to prepare the drawings, which is to be approved by RAJUK. Then with the approved plan the owner can apply for housing finance. The infrastructure facilities are normally provided up to the developed plots from there the permission for connections for gas, water and sewage facilities are required.

The actors involved in housing sector all work independently without any coordination or information sharing between bodies. As a result it is the individual house owners who suffer mostly. Most of the bodies have been created in the pre-independence period.

Again there is a overlapping of activities of many agencies like HSD, UDD or the RAJUK. They all look after housing sector but from different perspectives. Some of the site and service schemes for low income in Muhammedpur, Mirpur area of Dhaka city have been implemented HSD. But due to lack of evaluation of its effectiveness these projects have not been replicated. Again the low-income schemes had no relationship to the activities of HBRI, which has a cell that researches low cost houses. The government in policy level had no clear strategy for finance for housing of different income group. But recently there were steps at policy level geared toward the housing sector.

In view of the increasing housing scarcity, the HBFC expanded its housing loan programme all over the country (at the district head quarters) from 1 July 1999 after 12 years of suspension. All its loan programmes were for higher middle income groups. Presently there is a shift towards providing loans to all income groups.

- New apartment loans in the metropolitan cities of Dhaka and Chittagong and for semi-pucca (semi-permanent) houses in the district towns have been introduced.
- A loan scheme for small size flats (550sqft to 1,000sqft) for the middle and lower-middle class people has been introduced.

RAJUK organization plays key role in formulating housing schemes such as the Uttara model town, and the planned development of Baridhara, Banani, Dhanmondi etc. It is sole body that also looks after the set-back rules and its effectiveness that cover all the areas of Dhaka city.

At the national level housing policy of 1993(modified 1999) shows the endeavour by the governments to make housing accessible to all citizens of Bangladesh through various measures, incentives, motivation, planning and management. But still there is need to open up to accept novel ideas, advices and suggestions from different groups and communities.

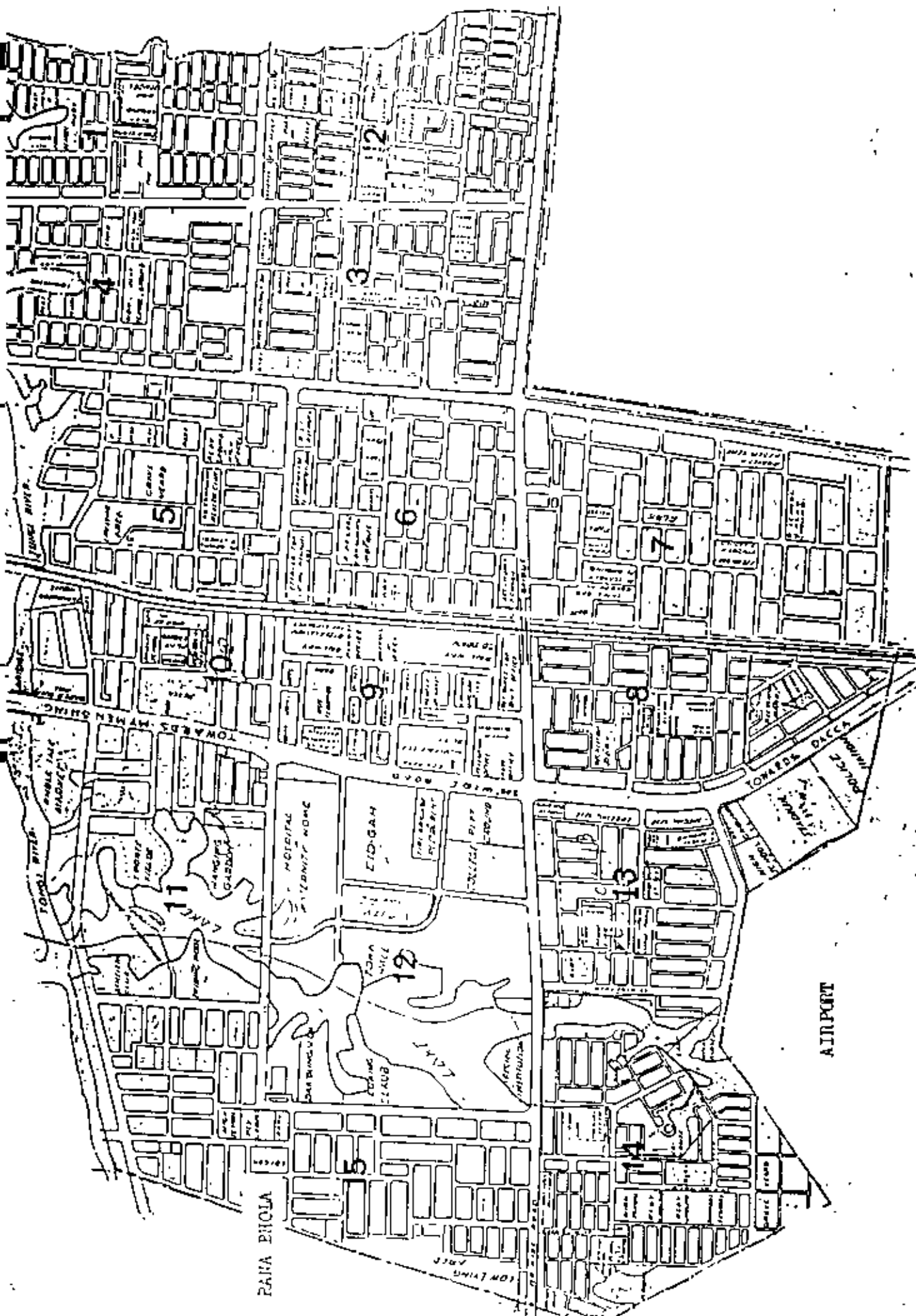
The following analysis related to design is elaborated regarding the master plan. It also relates to housing level and the layout of streets

New approaches in layout of plots

The new layouts as illustrated leave more land for other purposes. Also the buildings are four to five storied walk-ups. Which means we can have five owners in one structure. So the cost of building and the land gets divided between themselves. Sharing infrastructure, sharing services, etc. also adds to the savings.

Master plan of the Satellite town completed in 1965 had some foresight with regard to growth of the Dhaka city (figure 1). The area is now an integral part of Dhaka city, no longer considered as satellite town. The Dhaka –Mymensingh road passing through the town is the highway to northern part of the country. In doing so the area is divided into two segments. The people on East segment have to cross the highway to avail the facilities on west. The Commercial areas are located linearly on north and south near the highway.

fig 1:



The expansion in the 90s have been done towards the west, which is the sectors 12, 11 and 10 are quite far from the commercial area.

The areas even though have community areas but there is lack of open spaces in the sectors in neighbourhood scale. There is also inadequacy of detailing on street level with regards to pedestrian walkways. The planning was only concerned with accommodating the plots or other functions and the vehicular accessibility. The drawback of the design was that it failed to perceive the social activities of people like walking to market, meeting peoples, children playing etc.

The plot layout in the Model Town had been done in grid pattern. The basic concept was that there is a structure in each plot irrespective of size. According to the set back rules by RAJUK approx. 70% can be built-up. Due to high land price the structures always take full if not more advantage of the maximum build area. The form and open area relationship is same as the other areas of Dhaka city. Due to lack of any detail plan the almost all residential buildings of the city have the same form that derives from the shape of the plot and the set-back rules. The height of the building is generally four to six storied walkup types.

As a result different form of housing like cooperative solutions, row housing etc. have not been explored. The design ideas try to address this issue of variations that will not only have different form of housing but also be affordable to all groups. The concept of having a house on a plot also is being modified by having a unit shared with others in a building.

2.1.8 Conclusion and Recommendations

The project design was inherently flawed, with an over-concentration on the physical development of the residential estate and no meaningful attempt to integrate social activities that corresponded to project objectives on the development and institutionalisation of housing policies and strategies. The consequence is that the project

had no impact on national or Dhaka housing development strategies or policies which currently concentrate on high-rise developments or on high income group housing that are not accessible to the lower income middleclass or the poor, and punitive demolition and eviction actions against squatter dwellers.

This represents a missed opportunity, for the Uttara model provides the basis for a sustainable and effective strategy addressing the living environment and livelihood development needs of the urban population. There is no evidence in the present activity of housing to suggest that the experiences gained during the project have in any way informed the policy approach to middle to low-income urban housing. The process of project design, implementation and evaluation needs to be carefully examined, to ensure that.

- There is an appropriate relationship between goals, objectives, activities and outputs.
- The structure and duration of the project reflects the full development process with which it is concerned.
- There is a clear and appropriate designation of institutional responsibilities for all aspects of the project.
- Adequate internal and external monitoring and evaluation processes are integral to the project.

Effective external evaluation is an essential complement to a good internal monitoring and evaluation system and needs to be integrated at the design stage. The success or the failure of the Uttara model should be more widely publicized: not just within the institutions directly involved in its implementation, but also in the wider public domain so that other institutions with an interest in this area are made aware of the results.

Creation of self-sustaining finance systems to meet for affordable finance of the people when purchasing, building or improving their dwelling units should be important component of national and national policies for the achievement of the goal of shelter for all. Housing that meets the affordability of all of middle class must be explored.

Researches in Low cost housing are necessary with reduction in the cost of land and infrastructure.

Clearly, it is important to include a broad variety of housing opportunities to meet changing needs. Encouraging a diversity of housing by type, accessibility, tenure, and cost will ensure that Uttara continues to have a healthy mix of people. But what does variety mean? Where and how should new housing forms be integrated into neighbourhoods? These should be incorporated with design ideas.

Encourage a broad variety of housing types, universal designed dwelling units, tenures and price ranges suitable to meet the needs of everyone in the community, including families, singles, couples, people with disabilities and seniors. *Cooperative solutions for multi-storey dwellings could also be explored.* In Dhaka city we have individual ownership of units in the high-rise dwellings constructed by private entrepreneurs.

As government strategies will have to integrate housing policies and physical planning programmes into economic and social development planning, political will must above all be exercised with imagination. If we are to come up with new formulas, with new advice, housing strategies have to be practical, affordable for different economic groups and replicable within the cultural and social context. As the philosopher Albert Einstein so rightly said, "In time of crisis, imagination is more important than knowledge".

2.2 Phases of Development of Uttara Model Town :

2.2.1. 1st Phase (1971-75)

During the war of independence in 1971, DIT lost many valuable documents through the bombardment. With the lack of documents, how many consultancy firms were approached and what criteria were followed in selecting the consultants for the Uttara Satellite Town planning is not known. The consortium of consultants consisted of Zaheer-Uddin Khwaja & Associate (Architects and Planners) of Lahore and the

Engineering Consultants (Engineers and Planners) of Karachi. The consequences of new town movement through the ages tempted the 3rd world planners in their town planning . In some places they have turned out successfully and in some they have been beset by difficulties . Dhaka's Utara satellite town is one of them , perhaps the worst one in the series of new town development elsewhere in the world. The genesis of the process , in fact began in the last century when cities were places of overcrowding ,poverty, crime , disease, insanitary conditions and potential revolution. The 1st phase project was started in 1966 and ended in 1992. In 1st phase 6000 plots were distributed on 950 acres of land. (Ref.1)

2.2.2. 2nd Phase

Dhaka is one of the busiest cities. People live in this capital permanently for job purpose or business purpose . In the present scenario the living area regarding the population was very little . So Dhaka was losing her beauty day by day. And that is why the 2nd Phase was taken by RAJUK after the 1st Phase in the year of 1992 and ended in the month of June,1998. Around 5315 plots were allotted on 438 acres of land area .

2.2.3 3rd Phase

In 1997 there was a response of 14,000 applicants for only 226 plots in the 2nd Phase. As the demand for residential plot found so high, an initiative was taken to expand the city adjacent to 2nd phase in the low-lying areas and termed as utara residential model town (3rd Phase).The 3rd Phase Project was taken for the following reasons also .

- a. to reduce the pressure of population growth of Dhaka city.
- b. to develop the adjacent undeveloped areas and to boost the economic condition and to establish contact with those undeveloped areas
- c. to develop new job opportunities

Economic Feasibility of Land Development

3.1 Role of IWM & BUET

The Rajdhanı Unnayan Kartripakkha(RAJUK) is entrusted for planning and implementation of different development activities including housing and infrastructures development in the capital city of Dhaka. Recently RAJUK has undertaken the development of Uttara Model Town(3rd Phase) for residential purpose(Annexure-II). In this context RAJUK engaged the Institute of Water Modelling (IWM) to conduct topographic survey and GIS based mapping(Annexure-II) of the project area .

The following outputs by IWM was generated i.e, a) the establishments of permanent BM pillars ,b) identification the Geological Fault and Lineaments in the area(Annexure-II) and c)volume of earth filling .

Again BUET was engaged in regards of utility service assessment of the project area .Construction of roads , utility and community facilities and construction of residential and commercial buildings (construction phase,Annexure-II) is a part of the project activity

BUET suggested a detailed environment management plan covering both construction phase and developed phase should be developed once the detailed plan is finalized . In the IEE , measures needed to mitigate the adverse environmental impacts during both the construction and the developed phases of the project have been identified . A monitoring plan has been prepared as part of the IEE , which suggests monitoring of drainage situation , water quality , air quality and traffic movement . Finally , BUET recommended that a full-scale Environmental Impact Assessment (EIA) be performed prior to infrastructure development phase of the proposed Uttara Residential Model Town (3rd Phase) Project.

BUET in its final report mentioned that the land use plan of Uttara Model Town (3rd Phase) prepared by RAJUK severely lacks in the provision of utility facilities . Keeping the potential demand at full development in mind , provisions have been made by BUET for water treatment plant ,sewerage treatment plant and solid waste processing and disposal unit . A graveyard of adequate size has also been provided in the proposed land use plan.

Provision for **Diplomatic Zone (Annexure-II)** in the existing land use plan is illogical considering the type of potential development and location of the site (Aviation noise). This should be excluded from the proposed plan and this is recommended by BUET and the recovered space should be utilized for the provision of urban civic facilities.

Liquefaction was also taken into consideration. The conversion of a solid or a gas into a liquid is termed as Liquefaction. BUET observed and made several test on the source of the sand and found that fines content (silt and clay sized particles) of most of the river source material is considerably high . BUET said that there can be significant difficulties in handling and placement of these soils if used as fill materials . With increase in clay fraction , these soils are likely to remain in a very loose state , requiring costly ground improvement works for building foundations.

3.2 Recovery Schedule and Calculation

Along with those tests and researches done by BUET and IWM a recalculation of the study has been done and the new values of IRR and NPV are found and which are given in the following section

3.3 Revised IRR and BCR of Uttara 3rd Phase

Table 3.1 to 3.4 show the IRR (financial and economical) and BCR (financial and economical) of the revised project plan . Table 3.5 to 3.8 show the corresponding calculations for the original plan . It can be seen that both IRR and BCR have improved in the revised plan . All background data related to these tables are presented in the Annexure-I.

Revised PP:**Table 3.1 Internal Rate of Return (Financial)**

Year	Total Benefit	Total Investment (PV)	Net Benefit (PV)	Discount factor at higher 25% (p)	Net Present value at Discount factor (M)	Discount factor at lower 15% (S)	Net present value at lower discount factor (N)
y1 2000-01	5000.00	14804.17	(-) 9804.17	10.00	(-) 9804.17	1.00	(-) 9804.17
y2 2001-02	-	50.00	(-) 50.00	0.769	(-) 38.45	0.870	(-) 43.50
y3 2002-03	-	41149.92	(-) 41149.92	0.592	(-) 24360.75	0.756	(-) 31108.64
y4 2003-04	32297.80	20745.89	11551.91	0.455	5256.12	0.658	7601.16
y5 2004-05	54459.39	51907.10	2552.92	0.350	893.30	0.572	1459.91
y6 2005-06	68457.65	40769.52	27778.13	0.269	7472.32	0.497	13805.73
y7 2006-07	79191.48	33553.99	45637.49	0.207	94446.96	0.432	19715.40
y8 2007-08	64904.55	-	64904.55	0.159	10319.82	0.376	24404.11
					(-) 812.85		26030.00

$$IRR = S + N / (N - M) \times (P - S) \%$$

$$\begin{aligned} &= 15 + \frac{26030.00}{26030 + 812.85} \times (30 - 15)\% \\ &= 29.545\% \end{aligned}$$

Table 3.2 Benefit cost ratio

Financial at 15% Discount rate

Year	Investment cost	Discount factor	Discount total cost	Benefit	Discount benefit
Year 1	15786.59	1.00	15786.59	5000.00	5000.00
Year 2	1236.46	0.870	1075.72	----	---
Year 3	46561.72	0.756	35200.66	----	----
Year 4	25578.18	0.658	16830.44	32297.80	21251.95
Year 5	57262.95	0.572	32754.41	54459.39	31150.77
Year 6	43932.79	0.4971	21834.60	68457.65	34023.45
Year 7	33795.49	0.432	14599.65	79191.48	34210.72
Year 8	-----	0.376	-----	64904.55	24404.11
Total	224154.18	---	138082.07	304310.87	150041.00

$$NPV = 150041.00 - 138082.07 = 11958.93$$

$$BCR \text{ at } 15\% = \frac{150041.00}{138082.07} = 1.086$$

Table 3.3:Benefit cost ratio

Economical at Discount factor 15%

Year	Investment cost	Discount factor	Discount total cost	Benefit	Discount benefit
Year 1	12945.00	1.00	12945.00	4100.00	4100.00
Year 2	1013.90	0.870	887.16	----	---
Year 3	38180.61	0.756	28864.54	----	----
Year 4	20974.11	0.658	13800.94	26484.20	17426.60
Year 5	44719.63	0.572	25579.63	44657.11	25543.87
Year 6	32749.90	0.497	16276.70	56135.27	27899.23
Year 7	24097.65	0.432	10410.18	64937.01	28053.22
Year 8	----		-----	53221.73	21891.37
Total			108764.15		124914.29

$$NPV = 124914.29 - 108764.15 = 16150.14$$

$$BCR \text{ at } 15\% = \frac{124914.29}{108764.15} = 1.148\%$$

Table 3.4 Internal Rate of Return (Economical)

Year	Total Benefit	Total Cost(PV)	Net Benefit (PV)	Discount factor at higher 30% (P)	Net Present value at HigherDiscount factor (M)	Discount factor at lower 15% (S)	Net present value at lower discount factor (N)
Year-1	4100.00	12945.00	(-) 8845.00	10.00	(-) 8845.00	1.00	(-) 8845.00
Year-2	-	1013.90	(-) 1013.90	0.769	(-) 779.69	0.870	(-) 882.09
Year-3	-	38180.61	(-) 38180.61	0.592	(-)22602.920	0.756	(-) 28864.54
Year-4	26484.20	20974.11	5510.09	0.455	2451.99	0.658	3625.64
Year-5	44657.11	44719.63	(-) 62.52	0.350	21.88	0.572	(-) 35.76
Year-6	56135.27	32749.90	23385.37	0.269	6290.66	0.497	11622.53
Year-7	64937.01	24097.63	40839.36	0.207	8453.75	0.432	17642.60
Year-8	53221.73	-	58221.73	0.159	9257.25	0.376	21891.37
Total					(-) 5798.84		16154.75

$$IRR = S + \frac{N}{N+M} \times (P-S)\%$$

$$= 15 + \frac{16154.75}{16154.75 + 5798.84} \times (30-15)$$

$$= 15 + \frac{16154.75}{21953.59}$$

$$= 15 + 11.037$$

$$= 26.037\%$$

Original PP:**Table 3.5 Internal Rate of Return (Financial)**

Year	Total Benefit	Total Investment (PV)	Net Benefit (PV)	Discount factor at higher 18% (P)	Net Present value at Discount factor (M)	Discount factor at lower 15% (S)	Net present value at lower discount factor (N)
Year 1	0	67337.73	(-)67308.69	1.00	(-)67308.69	1.00	(-)67308.69
Year 2	354219.00	83380.46	(-) 48132.42	0.847	(-) 40768.16	0.870	(-) 41875.20
Year 3	65124.82	62193.03	2960.83	0.718	2125.87	0.756	2238.38
Year 4	69183.77	-	69183.77	0.608	42063.73	0.658	45522.92
Year 5	70486.51	-	70486.51	0.515	36300.55	0.572	40318.28
Year 6	61944.66	-	61944.66	0.437	27069.82	0.497	30786.50
Total	301958.76	212907.71	-	-	(-)516.88	-	9682.19

$$\begin{aligned}
 \text{IRR} &= S + \frac{N}{(N-M)} \times (P-S)\% \\
 &= 15 + \frac{9682.19}{9682.19 + 516.88} \times (18-15)\% \\
 &= 15 + 0.949 \times 3 \\
 &= 15 + 2.847 \\
 &= 17.85\%
 \end{aligned}$$

Table 3.6 Benefit cost ratio

Financial at 15% Discount rate

Year	Investment cost	Discount factor	Discount total cost	Benefit	Discount benefit
Year 1	67337.73	1.00	67308.69	0	-
Year 2	83380.46	0.870	72515.73	35219.00	30640.53
Year 3	62193.03	0.756	46995.98	65124.82	49234.36
Year 4	-	0.658	-	69183.77	45522.92
Year 5	-	0.572	-	70486.51	40318.24
Year 6	-	0.497	-	61944.66	30786.49
Total	212907.71		186820.40	301958.78	196502.54

$$NPV = 196502.54 - 186820.40 = 9682.14$$

$$BCR \text{ at } 15\% = \frac{196502.54}{186820.40} = 1.05$$

Table 3.7:Benefit cost ratio

Economical at Discount factor 15%

Year	Investment cost	Discount factor	Discount total cost	Benefit	Discount benefit
Year 1	55193.12	1.00	55193.12	-	-
Year 2	65690.19	0.870	57150.46	28879.58	25125.23
Year 3	49067.72	0.756	37095.20	53402.35	40372.18
Year 4	-	0.658	-	56730.69	37328.79
Year 5	-	0.572	-	57798.93	33060.99
Year 6	-	0.497	-	50794.62	25244.93
Total			149438.78		16132.12

$$NPV = 161132.12 - 149438.78 = 1169.34$$

$$BCR \text{ at } 15\% = \frac{161132.12}{149438.78} = 1.08\%$$

Table 3.8 Internal Rate of Return (Economical)

Year	Total Benefit	Total Investment (PV)	Net Benefit (PV)	Discount factor at higher 20% (P)	Net Present value at Discount factor (M)	Discount factor at lower 15% (S)	Net present value at lower discount factor (N)
Year 1	-	55193.12	(-)55193.12	1.00	(-)55193.12	1.00	(-)55193.12
Year 2	28879.58	65690.19	(-) 36810.61	0.833	(-) 30663.23	0.870	(-) 32025.23
Year 3	53402.35	49067.72	4334.63	0.694	3008.23	0.756	3276.98
Year 4	56730.69		56730.69	0.578	32790.33	0.658	37328.79
Year 5	57798.93		57798.93	0.482	27859.08	0.572	33060.98
Year 6	50794.62		50794.62	0.402	20419.44	0.497	25244.93
Total			-	-	(-)1779.27	-	11693.33

$$\begin{aligned}
 \text{IRR} &= S + \frac{N}{(N-M)} \times (P-S)\% \\
 &= 15 + \frac{11693.33}{11693.33 + 1779.27} \times (20-15)\% \\
 &= 15 + 0.867 \times 5 \\
 &= 19.34\%
 \end{aligned}$$

CHAPTER 4

Dredging Technology

4.1 Definition of Dredger:

Dredge is a vessel fitted with equipment of underwater excavation. In the USA it is called a Dredge. Dredging may be defined by 'Excavating with a dredger'. In practice, however, material underwater can sometimes be excavated with land based equipment.

4.2 Dredging equipment and processes:

Different types of equipment are required to carry out dredging works. The dredging process can be divided into four different phases. The equipment may also be broadly divided based upon the function of each equipment. The phases of dredging are

- 1) Pretreatment
- 2) Extraction
- 3) Transportation
- 4) Disposal

Pretreatment: Pretreatment means treatment of the ground before the dredging operation. It usually consists of a separate operation carried out independently of other dredging operation. There are two basis methods of pre-treatment; chemical and Mechanical and both are applied to rock or cemented soils.

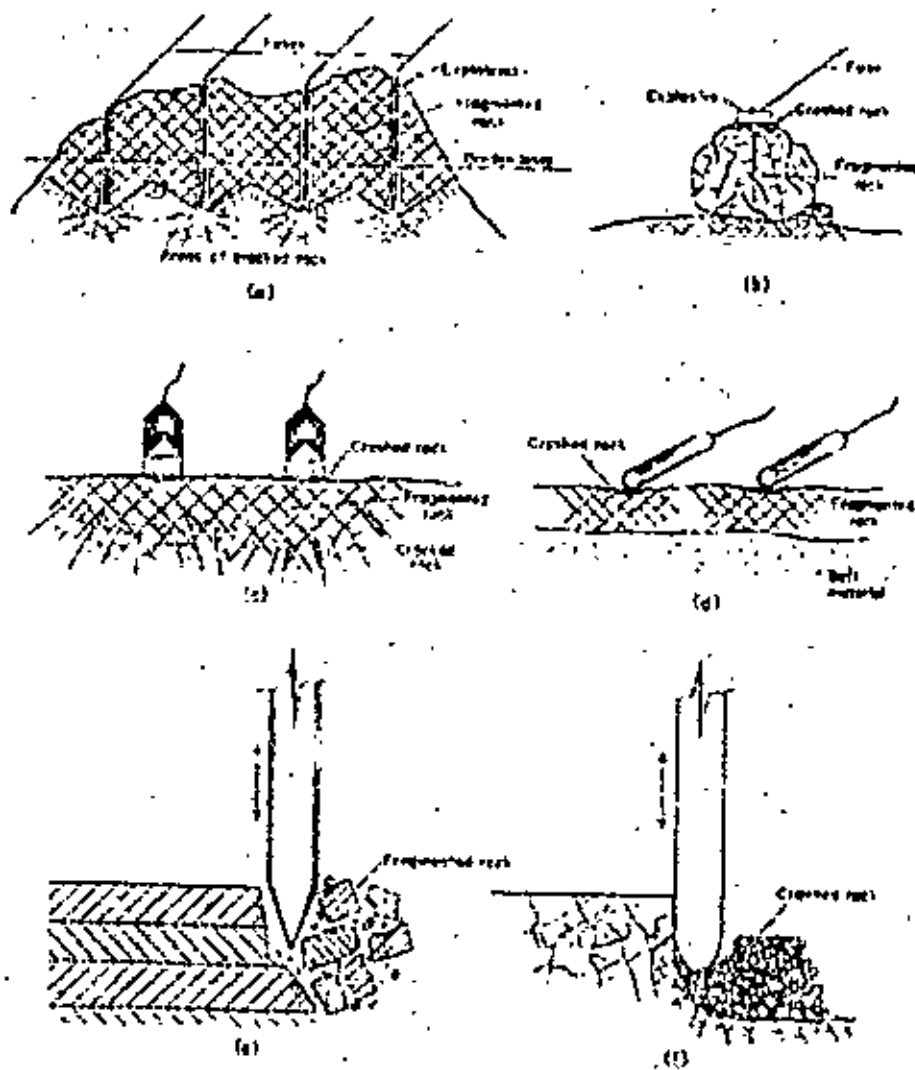
Chemical Method: This method involves use of explosives or use of expanding gas cartridge. The most common method is to place the cartridge in boreholes drilled vertically into the area to be blast. A grid of boreholes is drilled covering the whole area to be pre-treated. Loading and firing of the charges is carried out in convenient group of boreholes. The works is usually carried out from a floating or jack up pontoon but has occasionally been carried out underwater by divers with submersible drills. However, environmental concerns in recent decades reduced application of such methods.

Mechanical methods: Rock Breaker is the most standard mechanical pre-treatment machine is employed when chemical explosive method is undesirable or inefficient. The rock breaker consists

of a pontoon on which is mounted a heavy needle or chisel which can be hoisted and dropped vertically on to the material to be broken. Some versions of the rock breakers are sometimes fitted with pneumatic or hydraulic rock hammers which strike the rock with a frequency of 1.5 -2 blows per second.

Extraction: The extraction process involves the movement of the spoil from its natural or pre-treated position into vertical transportation and is delivered to the transport system. Extraction processes are often a combination of two operations; primary and secondary. The primary extraction can be carried out either by (1) mechanical primary extraction or (2) hydraulic primary extraction.

Fig.4.1 Various types of pretreatment process



(1) Mechanical primary extraction

Mechanical primary extraction is affected by digging or cutting. Digging is achieved by means of various types of bucket which are forced into the ground in such a way that a portion of the soil is detached from the soil mass and retained in the bucket. The effectiveness of the operation depends to a greater extent on the force which can be applied top the bucket and the configuration of the ring of the bucket which is to penetrate the soil. Typically the following equipments are employed for the purpose

Fig 4.2 Backhoe dredger

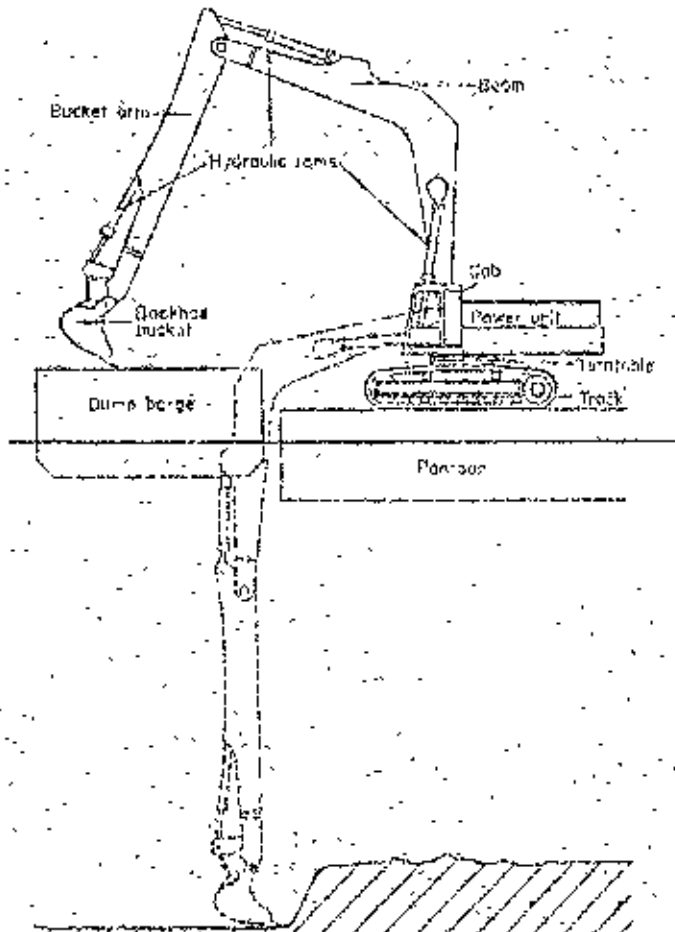
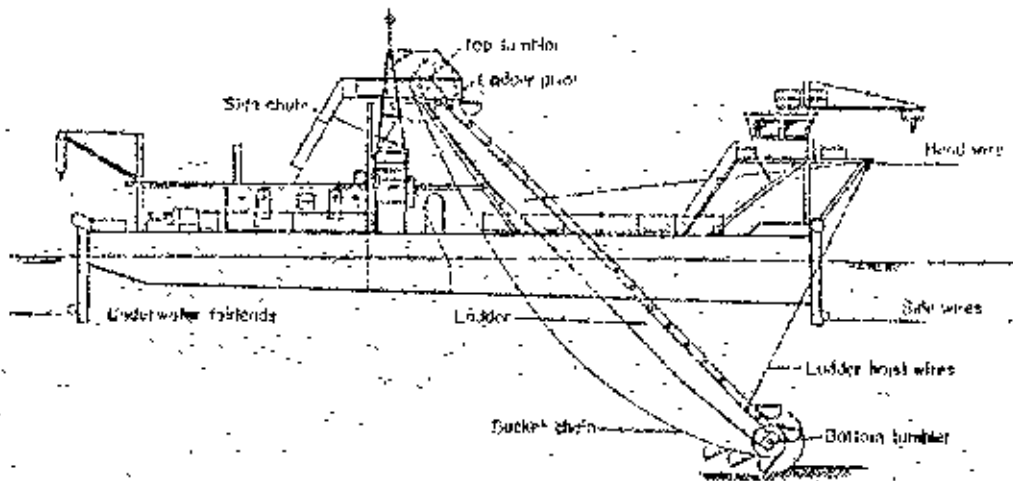


Figure 3.12 The backhoe dredger, hydraulic type (Pöschel-Lüt)

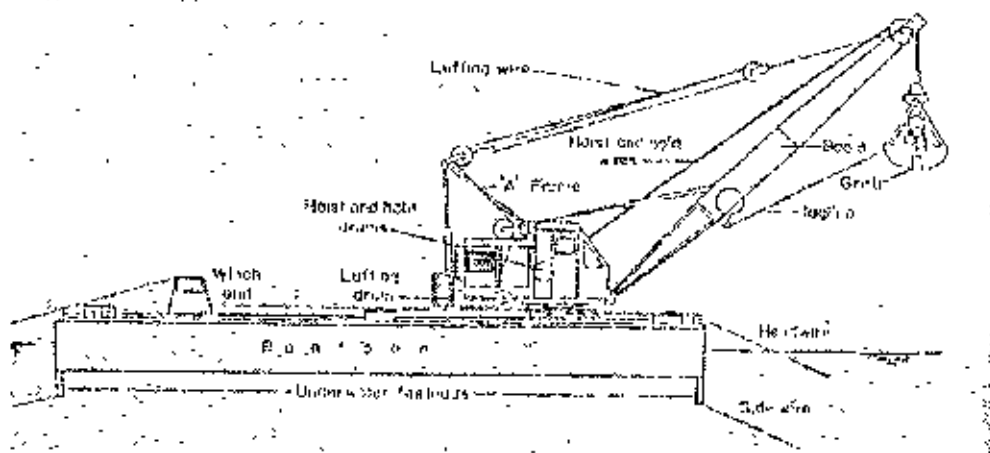
Backhoe dredger: basically an excavating machine mounted on a pontoon

Fig.4.3 Bucket Dredger



Bucket dredger: consisting of a bucket chain fitted with bucket

Fig 4.4 Grab Dredger

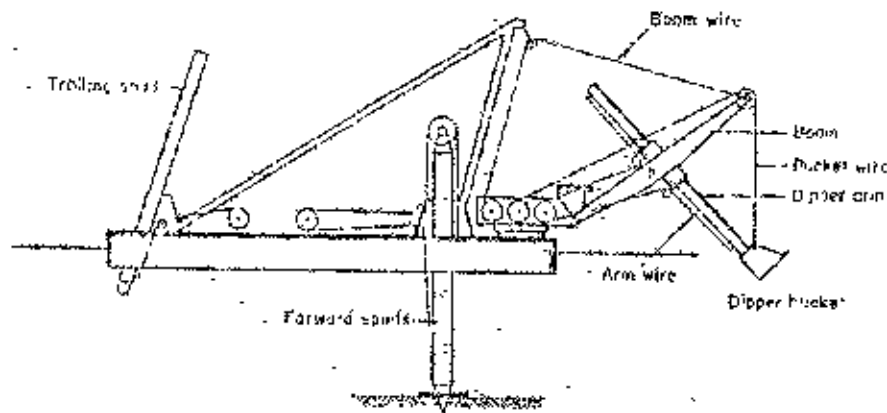


Grab dredger: consisting of a grab suspended by slewing crane. There are various types of buckets such as grab bucket, mud grab, tire grab, rock grab, orange peel or cactus grab etc. The type of bucket is selected based on the spoil type encountered

Bucket wheel excavator: works with a bucket chain but do not require barge to receive the spoil

Dragline dredger: dredges by dragging of bucket rather than rotation of the chain

Fig:4.5 Dipper Dredger



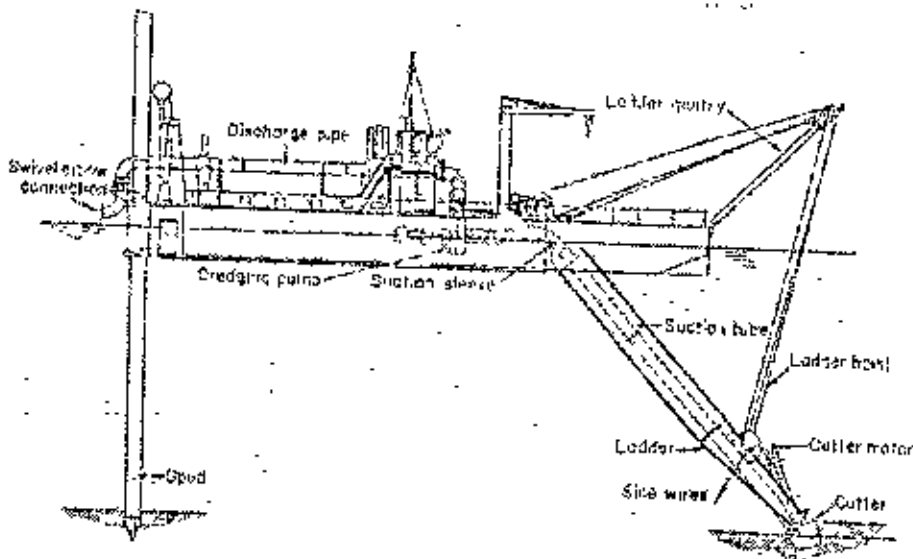
Dipper dredger: a type of mechanically operated shovel and suitable for relatively hard material

(2) Hydraulic primary extraction.

- i) Primary hydraulic extraction method: Extraction of spoil is achieved by the movement of water. The water supply may be available either from the dredger itself or from a second source. Following types of equipment belong to this category

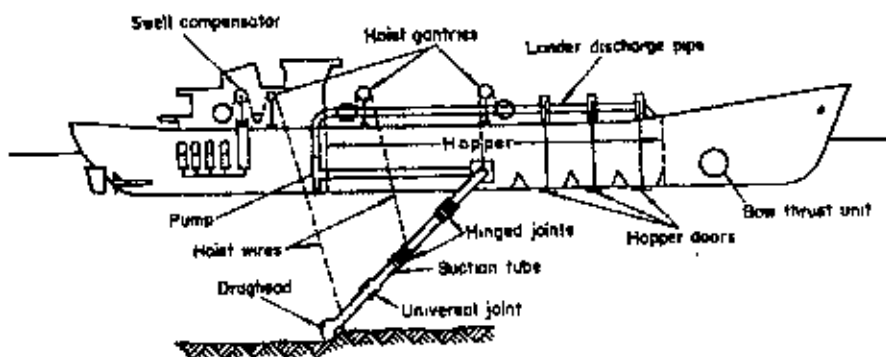
Cutter suction dredger: the most popular type of dredger consisting of a cutterhead to prepare slurry and the dredge pump to discharge the slurry to a defined location. In fact, more than 90% of the dredging works worldwide performed by cutter suction dredgers. Detailed technical features of such dredgers are discussed later in the paper

Fig:4.6 Cutter suction dredger



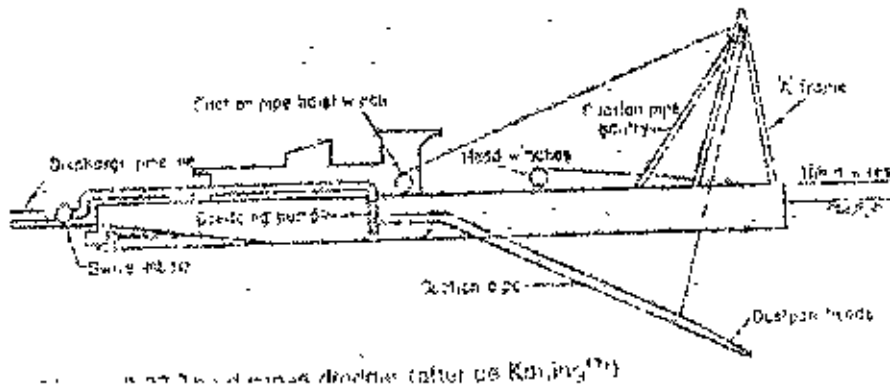
Trailing suction hopper dredger: the equipment is basically a sea going self propelled vessel fitted with dredge pump. The suction pipe of the dredge extends to sea bottom and the same is dragged by the vessel over the sea bed. For formation of spoil slurry, different techniques are employed beginning from use of cutterhead, water jets, cutting blade etc.

Fig: 4.7 Trailing suction Dredger



Dustpan dredger: the principle used is basically same as in the case of a cutter suction dredger except for absence of a cutterhead. The function of cutterhead is substituted by an equipment called dustpan and employ water jet principle in various configurations. Such dredgers are used mainly in rivers and are fitted with self propulsion system.

Fig. 4.8 Dustpan Dredger



Secondary Extraction methods:

The secondary extraction method consists of lifting the dredged spoil and depositing it in the means of transportation. This may also achieve either mechanically or hydraulically. At the mechanical means are usually an extension of a primary extraction process and consists of raising a single bucket or chain of buckets up to the desired level shifting horizontally by the necessary amount and releasing the soil into the means of transportation. The hydraulic methods of lifting soil rely on four different processes.

- i) Centrifugal pumps (method developed in Bangladesh for extraction of sand from river bed)

The pump is used to raise the dredge spoil vertically and transport the same horizontally. The pumps are essentially ordinary centrifugal pumps used for pumping water and other liquids but the impellers and the volutes are designed to allow passage of large solid particles through the pumps and the materials are resistant to abrasion.

- ii) Jet pumps

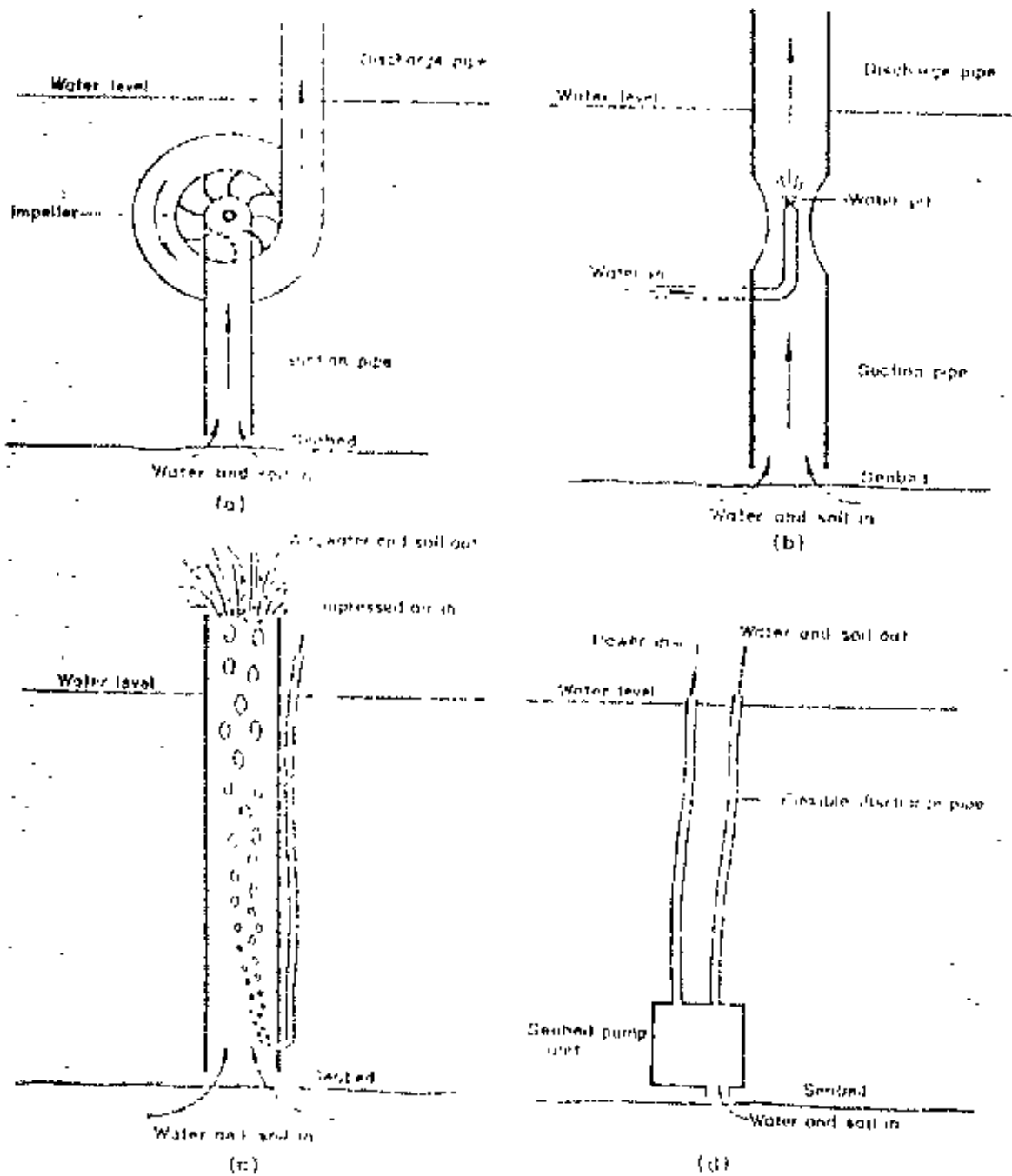
Such pumps are used as an addition to centrifugal pumps. This consists of a high pressure water jet which is directed upward into the stream of liquid flowing up the suction pipe and thus performs function supplementary for the main dredge pump.

- iii) Airlift

The principle is similar to jet pump except in the fact that the function of the dredge pump is supplemented by pressurized air injected into the stream created by the dredge pump. The pressurized air leads the spoils through the discharge pipe flowing upward.

iv) Scabed pump

This is essentially a submerged pump powered electrically or pneumatically. Such pumps are used in deep water where access by other equipment is difficult.



Hydraulic methods for lifting water and soil from seabed: a, cutter suction dredger; b, jet pump; c, pit lift; d, seabed pump

Fig: 4.9 Secondary extraction method

Cutter suction dredger selection criteria based on dependability and low cost with rapid dismantling, mobility, reassembling and start-up; minimizing

downtime and ensuring high productivity. That is why, the other projects of RAJUK named "Jhilmil" and "Purbachal New Town Project" are also dredged like "Uttara Residential Model Town (3rd Phase) Project" with the Cutter Suction dredger.

Chapter 5

Feasibility of Dredging Method

5.1 Estimation of earthwork volume

Volume has been calculated for filling up of existing surface to +6.0m (PWD). Then the volume for the drainage area was calculated . The net volume of the fill was calculated by deducting the volume of drainage area from total volume of the fill area .

5.2 Survey for source of Fill Material

A huge volume of soil will be required for the project area . Because of the severe problem of accessibility of the project area by road , the filling soil has to be carried through river . Therefore , it is logical to assume that the required soil has to be collected from adjacent river sources . Hence a survey of soil condition at selected locations of the following five river (Turag, Buriganga, Dhaleshwari, Sitalakhaya, Meghna)has been made

Soil samples from these locations were collected during dredging operations that were going on at the time of survey. According to **grain size properties and quality of soil samples collected Turag river** was suitable as fill soil. The following site improvement rate is collected from "Schedule of rates for civil works (10th edition),PWD".

SITE IMPROVEMENT			
1.	Site improvement / earth filling in foundation trenches and plinth in 150 mm layers with carted earth carried by truck or any other means loading & unloading at both ends to be supplied at the contractor's own cost in/c. leveling, watering and consolidating including local carriage each layer up to finished level. in/c cost of water & test (carried from beyond 300 m) etc. all complete as per direction of the engineer-in-charge.		
(a)	For Dhaka Metropolitan area	cum.	Tk. 218.00
(b)	For Narayangonj District	cum.	Tk. 210.00
(c)	For Chittagong Metropolitan Area	cum.	Tk. 196.00
(d)	For all districts except Dhaka & Chittagong Metropolitan Area & Narayangonj district.	cum.	Tk. 189.00

SITE IMPROVEMENT RATE ANALYSIS							
Site improvement/earth filling with carted earth carried by truck or any other means							
Considering 1000 cft. of work <i>in/c consolidation, dressing and local carriage</i>							
a)	For Dhaka Metropolitan Area						
	Loose earth required <i>in/c 15% shrinkage</i>			=	1,150.00	cft.	
1.	Royalty for earth	1150	cft.	@	Tk. 250.00	Per % 0 cft.	= Tk. 287.50
2.	Labour for cutting <i>in/c loading & unloading the truck/cart</i>						
a)	Ordinary labour	7	Nos.	@	Tk. 100.00	each	= Tk. 700.00
b)	Skilled labour	1	No.	@	Tk. 120.00	each	= Tk. 120.00
3.	Truck hire charge	7	Trucks	@	Tk. 475.00	Per truck	= Tk. 3,325.00
4.	Labour for local carriage, levelling & compacting etc. complete:						
a)	Ordinary labour	6	Nos.	@	Tk. 100.00	each	= Tk. 600.00
b)	Skilled labour	1	No.	@	Tk. 120.00	each	= Tk. 120.00
5.	Sundries, T & P etc.				L.S.		= Tk. 50.00
						Total	= Tk. 5,202.50
					Contractor's profit		10.00% = Tk. 520.25
					Overhead expenses		3.50% = Tk. 182.09
							Tk. 5,904.84
					VAT	4.50%	= Tk. 265.72
						Grand total	= Tk. 6,170.56
						Rate per cft.	= Tk. 6.17
						Rate per cum.	= Tk. 217.89
				Say,	Tk.	.00 Per cum.	

					218		

The above analysis maintained by PWD for site improvement but a comparative analysis processed in RAJUK for land filling purpose is shown in details

5.3 Earth / Sand Filling work by Hydraulic Filling Analysis

RATE ANALYSIS

01. Transportation of Sand:

Considered Standard Boat /Vessel/Bulkhead volume=3,500 cft or 100 cum.
 Engine Capacity 180hp with 65% Efficiency Fuel Consumption 210 gm /hp/hr.
 and Speed 10 km/hr. No of Trip per day 1(one) Distance between Source &
 Site 40 km. cost of vessel 40.28 Lac and useful life 10 years use 120 days per
 year

a) Fuel Cost $40 \times 2 \times \frac{600}{10}$	Tk. 4,800.00
b) Depreciation Cost of Vessel (Assumed use 120 days per year) Vessel cost Tk. 40.28 lac and life 10 years $\frac{40.28 \times 100000}{10 \times 120}$	Tk. 3,357.00
c) Maintenance cost of Vessel (per day) L.S	Tk. 500.00
d) Wages of workers 6 nos @Tk.120.00 per day	TK. 720.00
e) Registration, Tax, etc. of Vessel per day (TK.1,200.00 per year)	TK.100.00
f) Maintain proper rout through surveys etc (12000 Tk per year) per day	TK.100.00
<u>Total</u>	<u>=TK.9,577.00</u>

Cost per CUM = TK 95.77

02. Sand Pumping Cost:

Considered Suction dredger Engine Capacity 500 hp with 65% Efficiency.Length of M.S.Pipe line 3500 meter (av), minimum dia 10" and useful life 10 years. Fuel Consumption 210 gm/hp/hr. running period 6 hr/day.Use 120 day/year Cost of suction 30 00-lac and useful life 10 years

a) Fuel Cost TK.1665.65.per hr x 6	= Tk. 9,993.90
b) Depreciation Cost of Suction dredger $\frac{30.00 \times 100000}{10 \times 120}$	= Tk.2,500.00
c) Maintenance Cost of dredger i.e Spare parts and others.	= Tk.1,000.00
d) Wages of workers 6 nos@ Tk.120.00 per day each.	= Tk.720.00.00
e) Salaries (1 B.Sc. Engr. + 2 Diploma Engr. + 2 foreman) (1 x 350+2 x 250+2 x 200)	= Tk.1,250.00
f) Depreciation Cost of Pipe line (300Tk/rft) life 6 year. $\frac{3500 \times 3.281 \times 300}{10 \times 120}$	= Tk. 2,870.87

g) Maintenance cost of pipe line (4 person/day)		
@ Tk.120 per day each		=Tk.500.00.
(h) Fitting, fixing, and laying of pipe line Tk 250.00 per meter		= <u>Tk.3645.83</u>
Use 2 years $\frac{3,500 \times 250.00}{2 \times 120}$	Total	= Tk. 22480.60
Assumed 5 (Five) will be unloosd in 8 hr		
So Cost Per CUM		= Tk. 44.96

03. Cost of sand purchase 1.S. Per CUM = Tk. 40.00

04. Expenses salaries of Technical key persons engaged in the field level & desk level (1 B. SC.Engr. +2 Diploma Engr. +2 surveyor +5 others staff)
(1X350+2X250+2X200+5X100)=TK.1750.00

Cost per CUM = Tk.3.50
Total = **TK.184.23**

05. Income Tax & VAT @ 8.50 % =Tk. 15.66

06. Contractor's profit @10% =Tk. 18.42

Total Cost Per CUM = **Tk.218.31**

Say Tk.218.00/cum.

6.1 Discussion

Dhaka, the capital and the largest city of Bangladesh, has been experiencing a very rapid growth in population during the last couple of decades. The population of the city has increased from 1.6 million in 1974 to more than 10 million at present. To cope with increased demand for housing, RAJUK has taken a number of initiatives for expanding the city area, mostly in the northern direction. Healthy and sustainable expansion of urban areas require proper planning with adequate emphasis on various aspects, including land use and geotechnical issues, hydrology and drainage issues, water supply, wastewater disposal and solid waste management issues, transportation issues and environmental impacts of overall development. RAJUK, as the Planning Authority of the city, bears the responsibility to devise an optimum equilibrium design for the city considering demand for development and long term sustainability.

6.2 Future Perspective

“Uttara Residential Model Town (3rd Phase) Project” is a recent initiative that RAJUK intends to implement in line with “1997 DMDP-RAJUK Master Plan”. The site for the proposed model town is located at the north-western corner of the city corporation (DCC) area, with the Uttara Residential Model Town (2nd Phase) located to the east and Mirpur to south of the project area. The project area is about 2010 acres and is located entirely within the western Dhaka flood protection embankment constructed along the eastern bank of the Turag River. RAJUK has developed a plan for the proposed Uttara Residential Model Town (3rd Phase). The area plan prepared by RAJUK divides the whole area into 4 sectors, which are again subdivided into 40 neighbourhoods. The project is expected to accommodate more than six hundred thousand people within the project area at full development.

6.3 Comments

The implementation period for the “Uttara Residential Model Town (3rd Phase) Project “was from 1997-2002. But due to several reasons the project couldn't be implemented by this time . Another extension till 2008 , for this project has been asked from the GOB . RAJUK has returned the interest of bank (Loan taken for development purpose) of around 17 crores . Though this project of RAJUK is a self-financing one and the installments are taken from the applicants in phases to run the development project but the project implementation period delayed due to tendering procedure , re-tendering due to political influence , frequent transfer orders of PD's and PM's.

Manpower for management may be another reason for delay . As IWM divided the “Uttara Residential Model Town (3rd Phase) Project “ into 59 groups it can be thought of engaging around (59/5) approximately 12 assistant engineers to handle 5 groups individually so that the project can be implemented in a shortest possible time. Another part if included i.e. if number of sectors are increased then there can be an achievement of further progress in implementation of the project . Right now the project is to be developed with 4 sectors only with around 6640 numbers of plots. If this sectors are raised to 10 or more, the project may have some progress due to handing over the sectors consisting of residential plots .

If these circumstances are overcome then definitely the project can be implemented in time and the people can start to build their livelihood in no time

Annexure-I

PROJECT PROFORMA

PART – A

1. Name of the Project : Uttara Residential Model Town (3rd phase).
2. Location of the Project: Place, Zilla/ Upazilla (attach map, where necessary) Uttara Dhaka.
3. Objective of the Project:
 - (a) To reduce the Pressure of population in Dhaka city by creating opportunity of residence for the city dwellers in the close by extended area.
 - (b) To maintain the balance environment by proper Urbanization.
 - (c) To reduce the existing acute problem of Housing.
 - (d) To expand civic facilities by urbanization of the area between Mirpur & Tongi gradually.
 - (e) Development of new township and to expansion of economic facilities.
 - (f) To solve future housing demand.
4. Background of the Project Dhaka Metropolitan city has now been (explain the relevance of the project to the plan objectives and Lakhs of sectoral objective/target.) turned into the busiest densely populated city, people reside permanently in Dhaka city, the capital of Bangladesh for service, business and other purpose. The dwelling

places required for these large number of people are very inadequate. As a result, the residential areas of Dhaka city are turning into overcrowded dirty localities day by day creating unhealthy environment and causing damage to the beauty of the city.

It is possible to reduce the pressure of population of Dhaka to a great extent by developing the surrounding area of Dhaka city in a planned way and establishing permanent residence for these vast population. The proposed new residential town will be established at western side of Uttara 2nd phase. The total area of the project is 2001. 8831 acres. The area is low laying and not acute for agriculture. Dhaka city is growing towards the north, for planned urbanization it is necessary to extend the city. With this end in view preparations have been made to establish the proposed satellite town. No Government money will be required to establish the town. Mentionable portion of development expenditure may be recovered from the interested purchasers by advertisement in the news paper. The Revised cost of the project stands at Tk. 224154.14 lakhs including contingency Tk. 505.00 lakh price escalation Tk. 11128.81 lakh, IDC Tk 19555.26 & other utility services charges. It has been tried to keep the cost of plot within the affordability of low income and middle income group of people with a view to resolving their residential problem.

(1) For low income & lower middle income group of people:

Development of 432 nos. 2.5 Katha residential plots on 17.84 acres of land and construction of 12 storied apartment building on 116.92 acres of land to provide 15700 flats floor area ranging from 600-800 sft. (Type-C)

- (2) **For middle income group of people:** Development of 4995 nos. 3.00 katha plots of 247.74 acres of land and construction of 12 storied apartment building on 206.00 acres of land to provide 18700 nos. flats floor area ranging from 800-1200 sqft (Type-B)
- (3) **For higher income group of people:** Development of 872 nos. 5.00 katha plots on 72.06 acres of land & 340 nos. of 7.5 katha plots on 42.14 acres of land and construction of 12 storied apartment building on 77.44 acres of land to provide 5600 nos. flats floor area ranging above 1200 sqft (Type-A)
- (4) **For Govt. staff housing:** 50.48 acres of land have been earmarked for government staff housing. It would provide 4000 nos. of flat within six storied residential building.
- (5) **Urban Poor & Urban deferred:** 40.51 acre of land has been earmarked for urban poor & urban deferred to provide their permanent residence with the help of local and foreign donor agencies. It would provide re-settlement of 20000 urban poor families.
- (6) **Diplomatic zone:** 168.38 acre of land earmarked for diplomatic zone.
- (7) **Govt. officer & staff qtr:** 15% of the total plots 20% of total flats are reserved for the Govt. officer & staff.
- (8) **Odd size plot & Corner shops:** Rajuk will construct one corner shop in each block of less than one katha odd size plot by its own exertion according to the decision of pre ECNEC meeting. Corner shops have to be made by covered tiles so that no construction work shall remain on it.

The whole project would provide 6640 nos. of residential plots of different size and 40000 nos of residential flats within the 12 storied apartment buildings, and 4000 flats for govt. staff housing. Residential apartment building may be constructed by private concerns under the control of RAJUK. As an alternative RAJUK may develop and allot

those flats adopting joint venture initiative with local/foreign agencies. The project includes 550 nos of commercial plots also provisions has been made for educational institutions, Mosque, recreation place, Bus stand, Police station, Hospital. For sports centre, Health club, Swimming pool, Cinema hall, Auditorium, Library 31.98 acres for Lake, Open space & Park 205.60 acres and for Graveyard and 6.12 acres of land. Population of the project is 5.00 lakh with a density of 240 persons per acre. The estimate has been prepared following the PWD schedule of rates 2002. **Items excluded in the aforesaid one. Plots/flat should be provided to the effected families within the project area.** There is a provision for Project Director for the implementation of the project and other officers and staff of the project enclosed herewith. **Earth work and other construction work should be done in different groups(Group1-group59+2 lakes).** The project will be started on 1999-2000 and completed on 2005-2006.

5. (a) Is the Project included in the current five Year Plan? (Tick one).

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

(b) If yes, what allocation is provided for the Project? (In lakh Taka).

Local	Foreign	Total
Currency	Exchange	
224154.14	-----	224154.14

(c) Indicate in the Table below the allocation Provided for the sector in the current five Year Plan to which the Project belongs and how much has been allocated for projects already undertaken:

(In lakh Taka)

Allocation for	Fund allocated	Allocation for	Balance
----------------	----------------	----------------	---------

the sector in the Five Year Plan. to the Project already undertaken. this project. available for the projects.

(d) What is the position of the project in terms: Progress ongoing.
of priority in the list of projects of the
concerned sector?

(e) If the project is not included in the current :
Five Year plan, why it should now be included
and how it is proposed to be accommodated
within the plan allocation.

6. Administration authorities
responsible for

- (i) Sponsoring : Ministry of Housing and Public works.
- (ii) Execution : Rajdhani Unnayan Kartipakkha (RAJUK)
- (iii) Operation and maintenance : RAJUK.

7. Proposed dates of :

- (i) Commencement : 1999-2000.
- (ii) Completion : 2005-2006., Applied for time extension
of the project

8. Investment Cost of the : (In lakh Taka)

Project (including cost	Local	F.E.	Total
escalation)	224154.14	-----	224154.14

9. Indicate the major items of investment cost:

Sl.No	Indicate the major items of investment	Local	F.E	Total

(a)	Land acquisition and compensation of structure, Land development and Lake development	135793.56	----	135793.56
(b)	Contraction of road, footpath & island	14533.14	----	14533.14
(c)	Construction of site office	45.74	----	45.74
(d)	Construction of Bridge	4000.00	---	4000.00
(e)	Construction of cross drain	14.49	----	14.49
(f)	Masonry Surface drain	1547.83	----	1547.83
(g)	C.I. grating	10.79	----	10.79
(h)	Inspection pit	124.40	----	124.40
(i)	V shaped drain	100.36	----	100.36
(j)	Boundary pillar	28.74	----	28.74
(k)	Plot pillar	30.08	----	30.08
(l)	Pipe drain i/c connection pipe	3048.27	----	3048.27
(m)	Construction of boundary wall	30.90	----	30.90
(n)	Construction of Mosque	198.85	----	198.85
(o)	Construction of primary school	62.16	----	62.16
(p)	Construction of high school	50.11	----	50.11
(q)	Construction of staff quarter & officer quarter	245.96	----	245.96
(r)	TITAS GAS	3531.00	----	3531.00
(s)	WASA	7380.77	----	7380.77
(t)	Machineries & equipment	158.45	----	158.45
(u)	Arboriculture	100.00	----	100.00
(v)	Electrification (DESA)	18960.61	----	18960.61
(w)	Survey and Planning	50.00	----	50.00
(x)	Walkway/Driveway	297.85	----	297.85

10. Indicate the conversion rate of Foreign Currency: Not applicable

11. Mode of Financing: (In lakh Taka)

(i) Local Cost :

(a) Government and /or other source (s) : Bank loan & money return through plot allotment.

(i) Grant :

(ii) Loan : Tk 22000.00 lakh.

(iii) Equity :

(b) Project Aid (RPA) :

(i) Foreign Exchange:

(a) Cash : Not applicable.

(b) Commodity Aid :

(c) Supplier's Credit :

(d) Project Aid (Excluding RPA) :

(e) Barter :

(ii) Debt Equity Ratio :

(iv) Terms of financing (grant, loan, equity rate of interest, down payment, repayment period, grace period etc). : Self-financing from own resources of RAJUK.

Yes

No

12. If the project is proposed to be financed from own resources of the Agencies, has liquidity certificate been obtained from the Ministry of Finance (L. C has been attached (In lakh Taka) Total

13. Annual Operating/recurring expenditure on completing of the project at normal capacity (Tk. Local Currency Tk 1022.45 Foreign Exchange Tk 1022.45

51122.75 × 2%)

14. List of reports on project :
including preparatory surveys,
investigation, feasibility reports
etc.

(a) Completed (attach copies) : Preparatory surveys,
investigations, feasibility
reports etc. were conducted
with departmental Engineers,
planners and other staff.

(b) Under preparation (Indicate :
expected date of completion)

15. (a) Indicate the expenditure Local Foreign (In lakh
incurred on such studies, surveys Currency Exchange Taka)
etc. Total

(i) Government Source Nil Nil Nil

(ii) Foreign Assistance Nil Nil Nil

(b) Give the name and address of
the Consultant who did the
studies etc.:

(i) Local Not Applicable

(ii) Foreign

16. Specify the nature of the Turn key Otherwise
contract for the implementation
of the project (Tick one)

17. Is the project a revision of an Yes No
earlier project? (Tick one)

(b) If yes, indicate the reason or reasons for revision [Tick relevant box(x)]

Exceeds approved cost	Needs change in design	Needs change in scope
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Not

applicable

(c) Revised Cost of the project (In lakh taka)

Already incurred as on date	To be incurred	Total

(i) Local Currency :

(ii) Foreign Exchange

Not applicable

(d) Describe briefly the main features on the revision (Indicate the present stage of the earlier project).

Not applicable

18. Justify the location of the project by giving details with respect to the following

(a) Surroundings and tie in with transportation facilities such as availability of raw material and supplies, nearness to market, concentration of cheap materials and concentration of cheap labour

: The project area is situated at western side of Uttara Residential Model town (2nd phase). There are water supply, electricity, gas, labour, transportation facilities etc. so the location of the project is justified.

(b) Provision of service to special areas etc.

: Not applicable.

(a) Any other. : Nil

19. (a) What is the minimum quantity of land required for the project?

2007.8831 acres (As per acquisition)

(b) Indicate whether it is possible to accommodate the project within the land already under possession of the Agency and/of buildings already constructed.

2007.8831 acres of land is already acquired for this project.

20. (a) Is there any possibility of the participation of the Zillas and Upazilla in the process of the implementation of project?

Yes No

Not applicable

(b) If yes, give the items of work to be implemented by the Zillas and Upazilla

Not applicable

Name of the Zilla and Upazilla	Items of work	Physical quantity of work	Financial provision		
			Total	Local	Foreign Exchange
	1	Not applicable			
	2				

21. (a) Explain briefly the management and direct control system towards efficient

The project will be implemented under the supervision of RAJUK
The progress of implementation

implementation and operation of the project fixing the responsibilities of the implementing agencies.

will be monitored on a regular basis. The progress will be reviewed in monthly co-ordination meeting and necessary remedial measures will be suggested. The Ministry of Housing and public works will co-ordinate with other relevant agencies and supervise for smooth implementation of the project

(b) Is the project dependent on the implementation of project and/or operation of the project of other agencies?

Yes No

(c) If yes, list the related projects or developments which must be completed on time so as not to delay the schedule of work or effective operation of this project

Does not arise

22. Indicate the investment worth of the project in terms of :

(a) Benefit/Cost Ratio:

- (i) Financial : 1.086%
- (ii) Economic : 1.146%

(b) Internal rate of Return:

- (i) Financial 29.545%
- (ii) Economic 26.037%

(c) Net Present value:

(i) Financial : 26030.00 Lakh

(ii) Economic : 16154.75 Lakh

(d) Indicate the discount rates used : 15%, 30%

23. (a) Have the technological alternatives been examined in designing the project?

Yes

No

(b) If yes, justification for the choice along with a list of the alternatives examined in terms of

The technology which is adopted for this project is the technology of the day and is widely used all over the country. There is therefore, no scope to consider alternative technology.

(i) Capital output ratio

(ii) Capital Labour ratio

(iii) Output labour ratio :

(iv) Investment per worker :

(v) Energy intensity :

(vi) Use of major raw-materials :

(c) Have similar types of technologies been tried in other areas in the past ?

Yes

No

(d) If yes, what are their experiences?

Cost effective and satisfactory.

(e) What will be the impact of the technology on the improvement of indigenous technology and/or transfer/adoption of foreign

The technology proposed to be adopted in this project is an indigenous one. So, the introduction of this technology is

technology? (A write-up on technology transfer as envisaged in the project is to be appended with the project proforma as per guidelines provided against item 23 in the Manual)

24. Name and designation of officer responsible for the preparation of this project proforma

25. (a) Recommendation of Head of the Executing Authority.

Date -----

(b) Recommendation of the Head of the Ministry.

Date -----

Secretary

not expected to have any impact on the improvement of indigenous technology.

Project Director

Uttara (3rd) Project
Rajdhani Ummayan Kartipakkaha

Chairman

Rajdhani umayan Kartripakkha
RAJUK Bhaban, Dhaka.

Signature of the Joint

(Dev), Ministry of Housing &
Public works.

PART-B

Project Description

26. Give a description of the project covering the following aspects.

(A) Background : Dhaka Metropolitan city has now been turned into the busiest densely populated city. Lakhs of people reside permanently in Dhaka city, the capital of Bangladesh for service, business and other purposes. The dwelling places required for these large number of people are very inadequate. As a result, the residential areas of Dhaka city are turning into overcrowded dirty localities day by day and creating unhealthy environment and causing damage to the beauty of the city. It is possible to reduce the pressure of population of dhaka to a great extent by developing the surrounding areas of Dhaka city in planned way and establishing permanent residence for these vast population. Considering the above facts, decision has been taken to establish this satellite town.

(B) Objectives and target The cost of land in Dhaka city is very high and it is beyond the reach of the low and middle income group of people. The main objective of the project is to provide the low and middle income group of people with residential plots which they can afford.

(C) Physical and other components of the project.

Sl. No.	Physical and other components of the project.	Local	F.E	Total
(a)	Land acquisition and compensation of structure. Land development and Lake development	135793 56	----	135793 56
(b)	Construction of road, footpath & island	14533 14	----	14533 14
(c)	Construction of site office	45 75	----	45 75
(d)	Construction of Bridge	4000 00	---	4000 00
(e)	Construction of cross drain	14 49	----	14.49
(f)	Masonry Surface drain	1547 83	----	1547 83
(g)	C I grouting	10 79	----	10 79
(h)	Inspection pit	124 40	----	124.40
(i)	V shaped drain	100 36	----	100 36
(j)	Boundary pillar	28 74	----	28 74
(k)	Plot pillar	30 08	----	30 08
(l)	Pipe drain i/e connection pipe	3048 27	----	3048 27
(m)	Construction of boundary wall	30 90	----	30 90
(n)	Construction of Mosque	198 85	----	198 85
(o)	Construction of primary school	62 16	----	62 16
(p)	Construction of high school	50 11	----	50.11
(q)	Construction of staff quarter & officer quarter	245 96	----	245.96
(r)	TIFAS GAS	3531 00	----	3531 00
(s)	WASA	7380 77	----	7380.77
(t)	Machineries & equipment	158.45	----	158 45
(u)	Arboricultural	100 00	----	100.00
(v)	Electrification (DESA)	18960 61	----	18960.61
(w)	Survey and Planning	50 00	----	50.00
(x)	Walkway/Driveway	297 85	----	297 85

(D) Choice of the project

At present, Dhaka city is growing towards the north. But for planned urbanization, it is necessary to extend the city towards the south and the east. So, the location choice of the project is justified.

(i) Experience of other similar project

Other similar projects such as,

1. Gulshan Model town.
 2. Bonani Model town.
 3. Uttara Model town.
 4. Baridhara Model town etc.
- were completed within the estimated cost and time schedule.

(ii) Effect on balance of payment either through import substitution or export promotion.

Does not arise.

(iii) Overall employment generation and alleviation of poverty highlighting the creation of income generating activities for the target groups, especially for women.

Contractors & their employees, will get the opportunity to work in the project during execution of the work. Jobs for 1500 male and 500 female labours will be created during the implementation period of the project

(iv) Income distribution : Not applicable

(v) Effect on population control : Not applicable

(vi) Cost effectiveness of domestic resource utilization. : 100% domestic resources will be utilized in this project. Cost effectiveness of those will be

optimum

27. Give a brief account of the effect on environment as a result of the undertaking of the project covering the following aspects.

(a) Is the site selected for the project congenial as well as adaptable/acceptable from environmental point of view?

Yes

No

(b) Will any exhaustible and non-renewable resources be utilized for the project?

Yes

No

(c) If yes, what remedial measures have adopted for their replenishment

Does not arise

(d) Is there any chance of environmental pollution as a result of adoption of the project?

No

(e) If yes, please indicate whether there is built in external treatment arrangements in the machineries to be used for keeping the level of pollution to a acceptable limit.

No adverse effect

(g) Effect on culture.

: After completion of the project the cultural facilities/opportunities in the area will be developed.

PART – C

Investment cost

(In lakh Taka)

28. Total Investment Cost of the project : Local Currency Foreign Exchange Total

210581.06 --- 210581.06

29. (a) Give date when cost estimates were prepared : November – 1997

(b) If prepared more than six months ago, confirm that they are still valid. Yes No

30. Give the annual breakdown of Investment Cost over the entire investment period as per Table below: Please see the table overleaf

Table C-1
Investment Cost
(at 1997 ----- prices)

Items of work	Total			Year-1			Year-2			Year-3		
	Local	F.E	Total	Local	F.E	Total	Local	F.E	Total	Local	F.E	Total

1. Pre-construction expenditure:

(a) Advance Expenditure

(b) Land Acquisition -- 50389.44 - 50389.44 - 50389.44 - 50389.44 --

(c) Land Development-70795.08-70795.08- 100814.36-100814.36 - 60790.72-60790.72----

Sub-Total-1 --- 121184.52-121184.52-60795.80-60795.80-60790.72-60790.72-

Cost escalation --- 3039.53 - 3039.53 ----- 3039.53 - 3039.53 -----

11. Construction Works:

(a) Road construction (Footpath) 10463.12 --- 10463.12 - - 2000.00 2000.00 8463.12 - 8463.12

Central island)

(b) Boundary pillar	6.57 --- 6.57	6.57 --- 6.27 -	-	-	-	-
(c) Plot Pillar	3.41 --- 3.41	-	-	-	3.41	3.41
(d) V-shaped drain	100.36 -100.36	-	-	-	3.41	3.41
(e) Pipe drain (i/e connection to main drain)	8029.92-8029.92	-	-	-	8029.92	8029.92
(f) C I grouting	10.79 -10.79	-	-	-	10.79	10.79
(g) Inspection Pit	101.50 - 101.50	-	-	-	101.50	101.50
(h) Kutchra drain	27.44 --27.44	-	-	-	27.44	27.44
(i) Lake development	5.00 --5.00	-	-	-	5.00	5.00
(j) Construction of bridge	1847.35 -1847.35	-	-	-	1847.35	1847.35
(k) Construction of site office	17.96 -17.96	-	17.96	17.96	-	-
(l) Construction of boundary wall	24.93 -24.93	-	-	-	24.93	24.93
(m) Construction of cross drain	11.30 -11.30	-	-	-	11.30	11.30
(n) Construction of mosque	148.48 -148.48	-	300.00	300.00	148.48	148.48
(o) Construction of primary school	22.29 -22.29	88.00	88.00	-	22.29	22.29
(p) Construction of high school	34.42 -34.42	-	-	-	34.42	34.42
(q) Construction of staff quarter	53.62 -53.62	-	53.62	53.62	-	-
(r) WASA	7180.77 -7180.77	-	7181.77	7180.77	-	-
(s) DESA	18960.61 -18960.61	-	-	-	18960.61	18960.61
(t) Titas Gas	3531.00 -3531.00	-	-	-	3531.00	3531.00
(u) Arboriculture	3.00 -3.00	-	-	-	3.00	3.00

Items of work	Total			Year-1			Year-2			Year-3		
	Local	F.E	Total	Local	F.E	Total	Local	F.E	Total	Local	F.E	Total

iii) Foundation Cost :

(Up to plinth above the floor level)

iv) Cost of super-structure (Attach designs and specification, if already made)

(a) Other construction works (specify) : (b) Not applicable

(i)

(ii)

(iii)

Details of construction materials used in the above construction works should be given in Annexure "A"

Sub- Total: II	50547.52 – 50547.52 6 57 6 57	4037.96 – 4037.96 – 46502.99 – 46502.99
Cost escalation	2527.79 – 2527.79	201.90 – 201.90 – 2325.15 – 2325.15

III. Machinery and equipment
(including spares)

(a) Imported machinery, equipment : 1.87 1.87
and spares

(i) C.I.F. Cost :

(ii) Duties & Taxes :

(iii) Landing Charges and transportation cost to site. :

(b) Locally produced machinery, equipment and spares :

(i) Ex- factory Cost :

(ii) Duties & Taxes :

(iii) Transportation cost to site.

Furnish item wise details of machinery, equipment and spares in Annexure –B

(iv) Furniture :

Sub-Total III	1.87-	1.87-	1.87-	1.87-	-	-	-	-
---------------	-------	-------	-------	-------	---	---	---	---

Cost escalation

Items of work	Total		Year-1		Year-2		Year-3	
	Local.	F.E Total	Local.	F.E Total	Local.	F.E Total	Local.	F.E Total

(IV) Transport Vehicles 78.40 78.40 78.40 78.40 :

(a) Imported :

(i) C.I.F. Cost :

(i) Duties & Taxes	:	
(ii) Landing Charges and transportation cost to site.	:	
(b) Locally produced/Procured Vehicles	:	
(i) Ex-factory Cost		
(ii) Duties & Taxes	:	
(iii) Transportation cost to site.		
Furnish item wise details of transport vehicle in Annexure –B		
Sub-Total IV	:	78.40 - 78.40 78.40 - 78.40 -
Cost Escalation		-

V. Manpower (Excluding Manpower engaged specifically for construction works):

(i) Foreign personnel, if any:		
(ii) (a) Remuneration:		
(b) Taxes	:	87.12- 87.12 29.04- 29.04 29.04- 29.04
(iii) Local personnel	:	
(a) Managerial	:	
(b) Skilled	:	
(c) Semi-skilled	:	
(d) Un-skilled	:	
(iv) Training and fellowship (Furnish personnel-wise details in Annexure-C)		
Sub-Total V		87.12- 87.12- 29.04- 29.04- -29.04- 29.04 -29.04- 29.04

Cost escalation

Items of work	Total	Year-1	Year-2	Year-3
	Local F.E Total	Local F.E Total	Local F.E Total	Local F.E Total

03. Others :

(a) Contingency 103.00 - 103.00 - 3.00 - 3.00 30.00 - 30.00 -70.00 -70.00

(b) Interest during construction 26839.10 - 26839.10 - 6118.97 - 6118.97 10494.65 - 10494.65 -10225.48 -10225.48

(I,D,C)

Sub total-VI	26942.10 -26942.10	6121.97-6121.97	10524.65-10524.65	10295.48-10295.48
--------------	--------------------	-----------------	-------------------	-------------------

A. Total of sub total

(I,II, III, (IV, V, VI) 198841.53 + 198841.51 - 6631.61 - 6631.61 75382.37 - 75382.37 56827.51 -56827.51

B. Total of Cost escalation : 5566.58 -5566.58 - - -3241.43 - 3241.43 2325.15 - 2325.15

C. Total investment Cost

(A+B) (Tk.198841.53+Tk.5566.58)=Tk.204408.11 lakh

D. Total Duties & Taxes :

31. Compare the estimated investment cost with that the of actual cost of similar and comparable projects giving reasons for difference, if any.

The estimate of this project is based on RAJUK. Schedule of Rates. As such, there is no possibility of variation in rate between this and other similar & comparable –projects

32. If the project is a revision of an earlier project, answer questions in Annexure-D, delineating the changes in cost.

Not Applicable.

PART - D
Financing of the Project

33. Is the project included in the : Yes No
current five Year Plan

(a) If yes, specify actual allocation : Allocation not yet finalised.

(b) If not, how is it proposed to be : Not applicable.
accommodated(Intra-sectoral
adjustments in allocation or other
resources may be indicated)

(c) If the project is proposed to be :
financed out of a block provision for a
sector/sub-sector programme, indicate.

(In Lakh Taka)

Total Block allocation	Amount already committed	Amount proposed for the project	Balance available for other project.
Not applicable.			

34. Was the project included in the : Yes No.
previous Five Year Plan?

(In lakh Taka)

35. If yes, specify. : Local F.E. Total

(a) Allocation in the plan : Not applicable

(b) Actual expenditure incurred : Does not arise.

36. Indicate the sources and amount of : Amount (In Lakh Taka)
financing the local cost of the project. Source (s)

(a) Type/sources of financing

(i) Grant

- (ii) Loan :
 - (iii) Equity :
 - (iv) Project Aid :
 - (v) Sponsoring Agency's own resource :
 - (vi) Non-Government borrowing :
 - (vii) Other sources :
- (b) Terms of financing (terms of each type of financing should be shown separately.)
37. Indicate the likely sources and amount of foreign exchange cost of the project:
- Amount (In Lakh Taka)
- Source (s)
- (a) Type/source of financing
 - (i) Cash :
 - (ii) Commodity Aid. :
 - (iii) Suppliers Credit
 - (iv) Project Aid :
 - (v) Barter :

(b) Terms of financing (terms of each type of financing should be shown separately) : Not applicable.

38. Have appropriate measures been taken with regard to

(a) Status of aid negotiation :

(b) Clearance from appropriate authorities for imported products for banned items from ministry of Commerce.

(c) Clearance from Ministry of Industries for products which are locally available. : Not applicable

(d) Clearance from NBR with regard to non-payment of custom duties, fares etc.

(e) Consent of the LGRD, BRDB etc. for utilisation of the output of the project where applicable. :

(f) Any other :

39. (a) Is it proposed to recover investment cost of the project from the beneficiaries? (Tick one)

Yes

No

(b) If so, how? :

By selling plots to be created under the project to the interested buyers.

	(In Lakh Taka)		
	Local	F.E.	Total
40. Initial working capital			
(a) Indicate the amount of working capital required, if any In lakh Taka.	204408.11	---	204408.11
(b) State how the required working capital is proposed to be financed.	Own resources of the RAJUK and Bank loan.		

Part-F

Project Implementation

41. Give the proposed dates of
- (a) Commencement of the project : 1999-2000
- (b) Completion of the project : 2001-2002
42. Give the implementation plan for the project in terms of Logical Framework Approach (This may be appended with the project Proforma.) : Appended at annexure-1
43. Give details of the proposed management setup for the implementation of the project. : Management set-up attached herewith
44. Give year wise financial phasing and physical work of the project for the entire investment period in the following Table (E-1).
45. Give location wise break up of the work components as indicated in Table E. with allocation provided for during the implementation period of the project. (This should be appended with the project proforma). : All work indicated in the table E-1 will be executed in one location.

46. Give a procurement schedule of : All materials required for this both foreign and local equipment and material for the project (Attach a bar diagram showing the major items of procurement). project will be supplied by the contractor. No foreign materials will be required. **So procurement schedule is not necessary.**
47. Give the major item wise schedule of physical work in terms of time schedule with the bar diagram and in the case of large project, in terms of net work analysis such as CPM. Bar diagram attached at annexure-II.

Part –F

(Operation of the Project)

A. Operating /Recurring cost of the Project

48. Give annual breakdown of the operating cost over the economic life of the project in the Table below:

TABLE F-1
Operating/Recurring cost

Items of work	Year-1	Year-2	Year-3
	Local. F E Total	Local. F E Total	Local. F.E Total

1. Raw materials and supplies :
- (a) Imported raw materials, supplies and spares :
- (i) C.I.F. cost Not applicable.

(ii) Duties and taxes :

(iii) Landing charges and transportation :
cost to site

(iv) Others :

(b) Locally produced raw materials,
supplies and spares

(i) Ex-factory cost :

(ii) Duties & Taxes :

(iii) Transportation cost to site :

(iv) Others :

(Furnish itemwise details of raw
materials & spares in Annexure "E"

(See page 27 of the pp.)

Sub-Total : _____

II. Fuel and Power :

(i) Electricity :

(ii) Oil ---- :

(iii) Gas --- :

(iv) Coal --- :

(v) Others :

(Furnish details in Annexure "E" _____

Sbu-Total -II . _____

III. Manpower :

(i) Foreign personnel, if any :

(a) Remuneration ----- :

(b) Taxes ----- :

(ii) Local personnel	:	Not applicable.
(a) Managerial	:	
(b) Skilled ----	:	
(c) Unskilled ---	:	

(Furnish personnel-wise details in Annexure "F")

(See page 28 of the pp.)

Sub Total -III :

IV. Other Cost:	:	
(i) Depreciation	:	Nil
(a) Machinery and equipment	:	Nil
(b) Buildings and other construction	:	Nil
(ii) Maintenance ---	:	1012.55 Lakh
(iii) Interest ---	:	Nil
(iv) Miscellaneous ----	:	Nil
(v) Unforeseen ----	:	Nil
(vi) Taxes, if any -----	:	Nil
Sub - Total IV ---	:	1012.55

Total operating cost.

(Total of Sub-Total I, II, III, IV). 1012.55

49. Indicate how the operating/ recurring cost of the project will be financed: by Dhaka City Corporation.

50. Indicate:

(i) The economic life of the project : **Unlimited.**

(ii) The year of normal capacity output 2001 B. Benefits of the project

Project-specificity of cost and benefits defies all attempts to standardize a proforma for eliciting comprehensive data on cost and benefits. The difficulty is more acute in the case of estimation of benefits. In order to arrive at the

investment worth of the projects whose benefits are tangible and can be quantified, projects have been classified into two types:

Type "X" : Self- financing projects i.e. projects which earn revenue of services. These may also be called directly productive projects. Notable example of this type of project is in the industry sector. It is to be noted that even such project may include direct and intangible benefits.

Type "Y" : Productive but non-revenue earning project i.e. projects which give rise to tangible outputs, benefit of which do not accrue directly to projects themselves but to other parties Notable examples are irrigation projects.

51. For an "X" Type project give annual value of out put directly attributable to the project for the entire life period of the project in the following table:

TABLE F-2
Annual Value of output

(I) Items of output	Year-1		Year-2		Year-3	
	Quantity	Ex-project value	Quantity	Ex-project value	Quantity	Ex-project value
(a)						
(b)						
(c)						
(d)						
Sub- Total I						

(II) Transportation cost to market for items:

Year -1 Year-2 Year-3

- (a)
- (b)
- (c)

(d)

Sub- Total II

(III) Indicate taxes on items: Year -1 Year-2 Year-3

(a)

(b)

(c)

(d)

Sub- Total III

Market value of items (Total of Year -1 Year-2 Year-3

Sub -totals I,II, III)

(a)

(b)

(c)

(d)

Total Market value of output

52. If any quantity of output is proposed to be exported fill up the following Table:

TABLE F-3
Annual Value of output

(In Lakh Taka)

(I) Items of output	Year-1		Year-2		Year-3	
	Quantity	Ex-project value	Quantity	Ex-project value	Quantity	Ex-project value
(a)						
(b)						

(c)

(d)

Sub-Total ----

(II) Transportation Cost to Year-1 Year-2 Year-3
port for items:

(a)

(b)

(c)

(d)

Sub-Total I --

(III) Port handling Charge for
items

(a)

(b)

(c)

(d)

Sub-Total III --

(IV) Export duty/subsidy for items: Year-1 Year-2 Year-3

(a)

(b)

(c)

(d)

Sub-Total IV --

V. Total FOB value for items

(Total of Sub-Totals

I,II,III,IV):

- (a)
- (b)
- (c)
- (d)

Total value of export _____

53. For "Y" Type projects i.e. for productive but non-revenue earning project i.e. projects which give rise to tangible benefits which do not accrue directly to the projects themselves but to other parties.

Table F-4
Benefit to the project and other parties
Year-1

(I) Benefit to the project

(II) Benefit to other parties in terms of additional output due to the project	Year-1			
	Qty	Ex-project value	Indirect Taxes	Transportation cost to market

Items:

- (a)
- (b)
- (c)
- (d)

Total _____

(III) Additional cost for additional output of items	Cost excluding indirect taxes	Indirect taxes	Transportation cost to project aid	Total cost at market prices
--	-------------------------------	----------------	------------------------------------	-----------------------------

- (a)
- (b)
- (c)
- (d)

Total

54. In relevant cases indicate the proposed marketing arrangement for the output/outputs of the projects.

55. Give a brief description of the management arrangement for operation of the project including organogram etc.

PART-G

Benefit Cost Analysis

56. Indicate the assumed discount rate used in the calculation

57. Fill up the following Tables to show the financial benefit cost analysis.

PART-G-1
Benefit Cost Ratio
(Financial)

(In Lakh Taka)

Year	Investment cost (PV)	Operating cost (PV)	Total Cost (PV)	Discounted Total Cost	Benefit (Pv)	Discounted Benefit
(1)	(2)	(3)	(4)	(5)	(6)	(7)

Total

NPV=Total of items 7-Total of items 5, BCR=Total of item 7/ Total of item 5

PART-G-2
Internal Rate of Return
(Financial)

Year	Total Benefits (PV)	Net benefit (PV)	Discount factor (Higher)	Net present Value (at higher discount factor)	Discount factor (Lower)	Net present value (at lower discount factor)
------	---------------------	------------------	--------------------------	---	-------------------------	--

$$IRR = S + \left[\frac{N}{N + M} (P - S) \right]$$

58. Fill up the following Table to show the economic benefit cost analysis:

PART-G-3
Benefit Cost Ratio
(Financial)

(In Lakh Taka)

Year	Investment cost (AV)	Operating cost (AV)	Total Cost (AV)	Discounted Total Cost	Benefit (Pv)	Discounted Benefit
------	----------------------	---------------------	-----------------	-----------------------	--------------	--------------------

Total NPV =BCR

PART-G-4

Internal Rate of Return

(Economic)

Year	Total Benefits (AV)	Net benefit (AV)	Discount factor (Higher)	Net present Value (at higher discount rate)	Discount factor (Lower)	Net present value (at lower discount rate)
------	---------------------	------------------	--------------------------	---	-------------------------	--

NPV=IRR

Annexure 'A' (Reference Item II of Table C-1)

Requirements of construction materials and Manpower for Construction Works.

(In lakh Taka)

	Total	Year-1	Year-2	Year-3
--	-------	--------	--------	--------

A) Construction materials:

i) Imported items:

a) C.I.F. Cost:

b) Duty Taxes: Not applicable.

c) Landing charge and transportation cost to site

Sub-Total NIL.

ii) Indirectly imported item:

a) Ex-factory cost:

b) Duty/ Taxes: Not applicable.

c) Transportation to site:

Sub-Total NIL.

iii) Local Items:(In lakh)

SL No	Material	Total	Year-1	Year-2	Year-3
1.	Brick=204576795 nos.@ Tk. 2.60/- p/no	Tk.5319.00	265.95	531.90	4521.15
2.	Khoa= 829293 00cft. or 7048991 no of Brick @ Tk. 2.60/-p/no	Tk. 183.27	9.16	18.32	155.79

3.	Stone =2048483.70 cft. = 58006.05 m ³ @ Tk. 1412.55/- m ³	819.36	-	75.24	744.12
4.	Cement = 396660 bag @ 250/- /bag	Tk. 991.65	49.50	99.16	842.99
5.	Pea gravels = 502018.50 cft =14215.45 m ³ @ Tk706.30	Tk.100.40	-	30.12	70.28
6.	Bitumen=10614.77 ton @ Tk. 10230/ton	Tk. 1085.89	-	325.77	760.12
7.	Sand: viti =1833173.62 cft =51909.21 m ³ @ Tk. 150/-/m ³ local = 9657209.50 cft =273459.14 m ³ @ Tk. 300/-/ m ³ Sylhet= 866876.50cft =24546.98 @ Tk. 470/-/m ³	Tk. 77.86 Tk. 820.38 Tk. 115.37	3.89 41.04 5.77	11.67 82.04 11.54	62.30 697.32 98.06
8.	M.S. Rod =11508.42 quintal =1150.84 ton @ Tk. 17010/-p/ton	Tk. 195.76	19.58	58.74	117.44
9.	WASA	Tk. 7180.77	-	-	7180.77
10.	3'-0" dia RCC pipe 120913.74 m @ Tk 6620.00 per/m.	Tk. 8004.49	-	-	8004.49
	3'-0" dia RCC pipe 3628.16 m @ Tk. 701 per/m	Tk. 25.43	-	-	25.43
11	TITAS GAS	Tk. 3531.00	-	-	3531.00
12	C.I grouting 3968 nos @ Tk. 272 /no	Tk. 10.79	-	-	10.79
13.	Inspection pit 3968 nos @ 2558 p/n	Tk. 101.50	-	-	101.50
14.	DESA	Tk 18960.61	-	-	18960.61

15	Arbori culture	Tk. 3.00	-	-	3.00
		Tk 47526.53	394.95	1244.50	45887.08

B) Construction manpower (a)

i) Managerial: Tk. 3020.99

ii) Skilled:

Sub-Total Tk. 50547.52

Total construction cost (b)

a) Information sought under this item will relate only to construction activities which should not be duplicated in item V of the investment Cost Table (Table C-1)

b) This total must tally with sub total of item II of the investment cost Table.

ANNEXURE 'B' (Reference items III and IV of Table C-1) Requirement of machinery and Transport Vehicles and spares.

Items	Local	Imported	Total
	Quantity Cost	Quantity Cost	Quantity Cost

1. Machinery:

a) Theodolite 1 no @ Tk. 1.45 lakh Tk. 1.45

b) Leveling Instrument 1 no @ Tk. 0.42 Tk. 0.42

Tk. 1.87

2. Spares:

a)

b) Nil

3. Transport Vehicles:

- a) Jeep 3 no @ Tk. 19.00 each Tk. 57.00
b) Pick up 1 no @ Tk. 15.00 each Tk. 15.00
c) Motor cycle 8 no @ Tk. 0.80 each Tk. 06.40

Tk. 78.40

4. Others:

a)

b)

c)

Nil

d)

(3+1) =(78.40+1.87) = 80.27

(ANNEXURE "A" + ANNEXURE "B") =Sub Total II

= Tk. (50547.52+80.27)

= Tk. 50627.79 Lakh.

ANNEXURE 'C' (Reference Item V of Table C-1) Requirement of manpower for execution of the project (Excluding manpower for construction works).(In lakh)

Type of personnel	Year-1	Year-2
	No. Annual remuneration	No. Annual remuneration

I. Managerial:

a) Foreign

(i) Designation

Not applicable.

(a)

(b)

(c)

Sub-Total 1 (a)

(b) Local:

(i) Designation :- Existing establishment of RAJUK will take care of the execution of the Project

(a)

(b)

(c)

Sub-Total 1 (b)

(II) Skilled :

(a) Foreign

(i) Designation :- Not applicable.

(a)

(b)

(c)

Sub-Total II (a)

(b) Local:

(i) Designation :- Existing establishment of RAJUK will take care of the execution of the Project

(a)

(b)

(c)

Sub-Total II (b)

Type of personnel	Year-1	Year-2
	No. Annual remuneration	No. Annual remuneration

(III) Un-Skilled:

(i) Designation

- Existing establishment of RAJUK will take care of the execution of the Project

(a)

(b)

(c)

Sub-Total III
Grand Total (Total of Sub- total) I (a), I (b) II, (a), II(b) and (III)

ANNEXURE 'D' (Reference question No. 32) Revised cost estimates.

I. Comparative cost estimates of the original and revised scheme.

(In Lakh Total)

Items	Quantity	Original Estimate	Quantity	Revised Estimate
		Cost		Cost
		Local F.E. Total		Local F.E Total

1.

2.

3.

:- Not applicable.

II. Give reasons for the revision in cost estimate:

Items	Variation in cost over original			
	Due to cost variation over original scope and quantity of work	Due to variation in foreign exchange rate over original scope and quantity of work	Due to variation in scope of work.	Reasons for variation.

- 1.
- 2.
- 3.
- 4.
- etc.

: - Not applicable.

III. Total expenditure incurred so far and progress of work.				
Items	Work done	Expenditure incurred	Balance Work	Expenditure to be incurred.
		Local F.E Total		Local FE Total

- 1.
- 2.
- 3.
- 4.
- etc.

: - Not applicable.

ANNEXURE 'F' (Reference Items I and II of Table F-I) Requirement of materials supplies and fuel for operation:

(In Lakh Taka)

Items	Local	Imported	Total
	Quantity Cost	Quantity Cost	Quantity cost

I. Materials :

- (a)
- (b)
- (c)
- (d)

: Not applicable.

II. Supplies

: Not applicable

III. Fuel and Power

: Not applicable.

- (a)
- (b)
- (c)
- (d)

ANNEXURE 'F' (Reference Item III of Table F-) Requirements of manpower for operation of the project.

Type of personnel	Year-1	Year-2
	No. Annual remuneration	No. Annual remuneration

I. Managerial

(a) Foreign

(i) Designation : Not applicable

(a)

(b)

(c)

(d)

Sub-Total I (a)

(b) Local

(j) Designation Operating of the project will be carried on by the existing manpower of RAJUK

(a)

(b)

(c)

Sub-Total I (b)

II. Skilled:

(a) Foreign

(j) Designation :- Not applicable

(a)

(b)

(c)

Sub-Total I (a)

(a) Local

(j) Designation

Operating of the project will be carried on by the existing manpower of RAJUK

(a)

(b)

(c)

Sub-Total II (b)

(III) Unskilled:

(j) Designation

Operation of the project will be carried on by the existing manpower of RAJUK

(a)

(b)

(c)

Sub-Total III

Total (Total of Sub-Total I (a), I (b), II (a), II (b), & III,

ANNEXURE 'G'(Reference Item III of Table F-1) Other costs

(In Lakh Taka)

Items	Year-1	Year-2	Year-3
	amount	amount	amount

(I) Depreciation :

(a) Machinery & Equipment.

Not applicalbe

(b) Buildings & Other construction

Sub-total (I)

- -

Sub-Total I (a)

(b) Local

(j) Designation

Operation of the project will be carried on by the existing manpower of RAJUK

(a)

(b)

(c)

(II) Maintenance.

Not applicable

Sub-Total (II)

(III) Interest payment.

Not applicable

Sub-Total (II)

(IV) Miscellaneous:

(a)

(b)

Not applicable

(c)

Sub-Total (IV)

(V) Unforeseen.

(a)

(b)

Not applicable

(c)

Sub-Total (V)

(VI) Taxes, if any

Not applicable

Sub-Total (V)

Total (Total of sub-total i, ii, iii, iv, v & vi).

Table 3.1 RECOVERY SCHEDULE

Figure in Lakh

01	<p><u>Residential</u></p> <p>= 2.50 katha = 432 Nos</p> <p>= 3.00 katha = 4996 Nos</p> <p>= 5.00 katha = 872 Nos</p> <p>= 7.50 katha = 340 Nos</p> <p>Total = 6640 Nos</p>	<p>17.84 Acre@ Tk. 150.00 lakh/acre Tk. 2676.00(2.50 lakh/katha)</p> <p>247.74acre@ Tk. 180.00 lakh/acre Tk. 44593.20(3.00 lakh/katha)</p> <p>- 72.06 Acre(4.00 lakh/katha) ,, Tk 17440.00</p> <p>= 42.15 Acre@ Tk. 300.00 (5.00 lakh/katha) ,, Tk. 12750.00</p>
02	<p>Diplomatic zone Land area = 168.38 Acre</p>	<p>= 168.38 Acre @ Tk. 360.00 lakh/acre Tk. 60616.80 (6.00 lakh/katha)</p>
03.	<p>High rise Residential Apartment block</p> <p>(a) Apartment size above 1200 sft (A- Type).</p> <p>(b) Apartment size 800 sft -1200 sft (B- Type)</p> <p>(C) Apartment size 800 sft (C-Type)</p>	<p>= 77.44 acre @ Tk. 240.00 lakh/acre Tk. 18585.60 (4.00 lakh/katha)</p> <p>= 206.00 acre @ Tk. 180.00 lakh/Acre Tk. 37080.00 (3.00 lakh/katha)</p> <p>= 116.92 acre @ Tk. 150.00 lakh/Acre Tk. 17538.00 (2.50 lakh/katha)</p>
04.	<p>Govt staff housing area</p>	<p>= 50.48 Acre @ Tk. 120.00 lakh/acre Tk. 6057.60 (2.00 lakh/katha)</p>
05.	<p>Commercial plot 10 katha=550Nos.</p>	<p>= 90.90 Acre @ Tk. 300.00 lakh/Acre Tk. 27270.00 (5.00 lakh/katha)</p>
06.	<p>Central plaza 25% × 41.83 Acre</p>	<p>= 10.46 Acre @ Tk. 300.00 lakh/Acre Tk. 3138.00 (5.00 lakh/katha)</p>

07	Department store/corner shops, clinic, Central ware House, Kutcha bazar etc.	= 17.56 Acre@ Tk. 300.00 lakh/acre Tk. 5268.00 (5 00 lakh/katha)
08.	Educational Institutions, Hospital, Cinema hall, auditorium, Library, Sports center, Health club, swimming pool etc.	=65.48 acre. @ Tk. 180.00 lakh/acre Tk. 11786.40 (3 00 lakh/katha)

Total = 1183.41 Acre. Tk. 264799.00 lakh

Year wise Return @ 16% per Annum

Fig. in Lakh.

1. Price of one acre Residential Apartment,

Apartment size 800 sft- (C-Type)

Rate per acre = Tk.150.00 lakh (2 50 lakh/katha)

Down payment = Tk 30.00 lakh

Year	Principal	Interest	Total
Year-1	Tk 30.00	Tk.--	Tk. 30.00
Year-2	Tk. 30 00	Tk. 4.80	Tk 34.80
Year-3	Tk. 30.00	Tk. 9.60	Tk. 39.90
Year-4	Tk. 30.00	Tk. 14.40	Tk. 44.40
	Tk. 120.00	Tk. 28.80	Tk. 148.80
Down payment	Tk. 30.00	-	Tk. 30.00
	Tk 150.00		Tk. 178.80

2. Price of one acre Residential plot (5.00 katha) &

Apartment size above 1200 sft (A Type)

Rate per acre = Tk. 240.00 lakh (4.00 lakh/katha)

Down payment = Tk. 60.00 lakh

Year	Principal	Interest	Total
Year-1	Tk. 45.00	Tk.--	Tk. 45.00
Year-2	Tk 45.00	Tk. 7.20	Tk. 52.20
Year-3	Tk 45.00	Tk 14.40	Tk. 59.40
Year-4	Tk. 45.00	Tk. 21.60	Tk. 66.60
	Tk. 180.00	Tk. 43.20	Tk. 223.20
Down payment	Tk. 60.00	-	Tk. 60.00
	Tk. 240.00		Tk. 283.20

3. Price of one acre [Residential plot 3.00 katha & apartment size 800sft-1200 sft. (B Type)]

Education Institution, Hospital, Cinema hall, Auditorium, Library,

Sport centre, Health club, Swimming pool

Rate per acre = Tk. 180.00 lakh (3.00 lakh/katha)

Down payment = Tk. 30.00

Year	Principal	Interest	Total
Year-1	Tk. 37.50	Tk.--	Tk. 37.50
Year-2	Tk. 37.50	Tk. 6.00	Tk. 43.50
Year-3	Tk. 37.50	Tk. 12.00	Tk. 49.50
Year-4	Tk. 37.50	Tk. 18.00	Tk. 55.50
	Tk. 150.00	Tk. 36.00	Tk. 186.00
Down payment	Tk. 30.00	-	Tk. 30.00
	Tk. 180.00		Tk. 216.00

2. Price of one acre (Commercial plot, Central Plaza)

Shopping mall & market, Department store/Corner shop,

Clinic, Kutchha Bazar.

Rate per acre = Tk. 300.00 lakh (5.00 lakh / kahta)

Down payment = Tk. 80.00

Year	Principal	Interest	Total
Year-3	Tk. 110.00	Tk. 35.20	Tk. 145.20
Year-4	Tk. 110.00	Tk. 17.60	Tk. 127.60
	Tk. 220.00	Tk. 52.80	Tk. 272.80
Down payment	Tk. 80.00	-	Tk. 80.00
	Tk. 300.00	Tk. 52.80	Tk. 352.80

5. Diplomatic zone:-

Rate per acre = Tk. 360.00 lakh (lakh/katha)

Down payment = Tk. 60.00

Year	Principal	Interest	Total
Year-1	Tk. 75.00	Tk. 48.00	Tk. 123.00
Year-2	Tk. 75.00	Tk. 36.00	Tk. 111.00
Year-3	Tk. 75.00	Tk. 24.00	Tk. 99.00
Year-4	Tk. 75.00	Tk. 12.00	Tk. 87.00

	Tk. 300.00	Tk. 120.00	Tk. 420.00
Down payment	Tk. 60.00	-	Tk. 60.00
	Tk. 360.00	Tk. 120.00	Tk. 480.00

1. Residential plot 7.50 katha

Rate per acre = Tk. 300 lakh (5.00 lakh/katha)

Down payment = Tk. 60.00

Year	Principal	Interest	Total
Year-1	Tk. 60.00	Tk. ---	Tk. 60.00
Year-2	Tk. 60.00	Tk. 9.60	Tk. 69.60
Year-3	Tk. 60.00	Tk. 19.20	Tk. 79.20
Year-4	Tk. 60.00	Tk. 28.80	Tk. 88.80
	Tk. 240.00	Tk. 57.60	Tk. 297.60
Down payment	Tk. 60.00	-	Tk. 60.00
	Tk. 300.00	Tk. 57.60	Tk. 357.60

7. Govt. staff housing.

Price of one acre = 120.00 lakh

Down payment = 30.00 lakh

Year	Principal	Interest	Total
Year-2	Tk. 30.00	Tk. 14.40	Tk. 44.40
Year-3	Tk. 30.00	Tk. 9.60	Tk. 39.60
Year-4	Tk. 30.00	Tk. 4.80	Tk. 34.80
	Tk. 90.00	Tk. 28.80	Tk. 118.80

Year wise return

Year -1 = 0

Year-2

a.	Residential plot (2.50 katha)	= 17.84 acre x 30.00	Tk. 535.20 lakh
b.	Residential plot (3.00 katha)	= 247.74 acre x 30.00	Tk. 7432.20
c.	Residential plot (5.00 katha)	= 72.06 acre x 60.00	Tk. 4323.60
d.	Residential plot (7.50 katha)	= 42.14 acre x 60.00	Tk. 2528.40
e.	Apartment size above 1200 sft (A Type)	= 77.44 acre x 60.00	Tk. 4646.40
f.	Apartment size 800 sft -1200 sft	= 206.00 acre x 60.00	Tk. 12360.00

	(B-Type)		
g.	Apartment size 800 sft (C-Type)	= 116.92 acre x 30.00	Tk. 3507.60
h.	Education	= 65.48 acre x 30.00	Tk. 1964.40
			Tk. 37297.80 lakh

Year-3

a.	Residential plot (2.50 katha)	= 17.84 acre x 30.00	Tk. 535.20 lakh
b.	Residential plot (3.00 katha)	= 247.74 acre x 37.00	Tk. 9290.25
c.	Residential plot (5.00 katha)	= 72.06 acre x 45.00	Tk. 3242.70
d.	Residential plot (7.50 katha)	= 42.14 acre x 60.00	Tk. 2528.40
e.	Apartment size above 1200 sft (A Type)	= 77.44 acre x 45.00	Tk. 3484.80
f.	Apartment size 800 sft - 1200 sft (B-Type)	= 206.00 acre x 37.50	Tk. 7725.00
g.	Apartment size 800 sft (C-Type)	= 116.92 acre x 30.00	Tk. 3507.60
h.	Diplomatic zone	= 168.38 lakh x 123.00	Tk. 20710.74
i.	Educational	= 65.48 lakh x 37.50	Tk. 2455.50
j.	Govt. staff housing	= 50.48 lakh x 30.00	Tk. 1514.40
			Tk. 54459.39 lakh

Year-4

a.	Residential plot (2.50 katha)	= 17.84 acre x 34.80	Tk. 620.83 lakh
b.	Residential plot (3.00 katha)	= 247.74 acre x 43.50	Tk. 10776.69 lakh
c.	Residential plot (5.00 katha)	= 72.06 acre x 52.20	Tk. 3761.53
d.	Residential plot (7.50 katha)	= 42.14 acre x 69.60	Tk. 2932.94
e.	Apartment size above 1200 sft (A Type)	= 77.44 acre x 52.20	Tk. 4042.37
f.	Apartment size 800 sft - 1200 sft (B-Type)	= 206.00 acre x 43.50	Tk. 8961.00
g.	Apartment size 800 sft (C-Type)	= 116.92 acre x 34.80	Tk. 4068.4
h.	Diplomatic zone	= 168.38 acre x 111.00	Tk. 18690.18
i.	Educational	= 65.48 acre x 43.50	Tk. 2848.38
j.	Govt. staff housing	= 50.48 acre x 44.40	Tk. 2241.31
k.	Commercial plot	= 118.92 acre x 80.00	Tk. 9513.60
			Tk. 68457.65 lakh

Year-5

a.	Residential plot (2.50 katha)	= 17.84 acre x 39.60	Tk. 706.46 lakh
b.	Residential plot (3.00 katha)	= 247.74 acre x 49.50	Tk. 12263.13
c.	Residential plot (5.00 katha)	= 72.06 acre x 59.40	Tk. 4280.36
d.	Residential plot (7.50 katha)	= 42.14 acre x 79.20	Tk. 3337.49
e.	Apartment size above 1200 sft (A Type)	= 77.44 acre x 59.40	Tk. 4599.94
f.	Apartment size 800 sft -1200 sft (B-Type)	= 206.00 acre x 49.50	Tk. 10197.00
g.	Apartment size 800 sft (C-Type)	= 116.92 acre x 39.60	Tk. 4630.03
h.	Diplomatic zone	= 168.38 acre x 99.00	Tk. 16669.62
i.	Educational	= 65.48 acre x 49.50	Tk. 3241.26
j.	Govt. staff housing	= 50.48 acre x 39.60	Tk. 1999.01
k.	Commercial plot	= 118.92 acre x 145.20	Tk. 17267.18
			Tk. 79191.48 lakh

Year-6

a.	Residential plot (2.50 katha)	= 17.84 acre x 44.40	Tk. 792.10
b.	Residential plot (3.00 katha)	= 247.74 acre x 55.50	Tk. 13749.57
c.	Residential plot (5.00 katha)	= 72.06 acre x 66.60	Tk. 4799.20
d.	Residential plot (7.50 katha)	= 42.14 acre x 88.80	Tk. 3742.03
e.	Apartment size above 1200 sft (A Type)	= 77.44 acre x 66.60	Tk. 5157.50
f.	Apartment size 800 sft -1200 sft (B-Type)	= 206.00 acre x 55.50	Tk. 11433.00
g.	Apartment size 800 sft (C-Type)	= 116.92 acre x 44.40	Tk. 5191.25
h.	Diplomatic zone	= 168.38 acre x 87.00	Tk. 14649.06
i.	Educational	= 65.48 acre x 55.50	Tk. 3634.14
j.	Govt. staff housing	= 50.48 acre x 34.80	Tk. 1756.70
k.	Commercial plot	= 118.92 acre x 127.60	Tk. 51174.19
			Tk. 64904.55 lakh

S.L No	Item of work	Total Tk. (Lac)	Year - 1 2000-01	Year -2 2001-02	Year 3 2002-03	Year 4 2003-04	Year 5 2004-05	Year 6 2005-06	Year- 7 2006-07
	A) Road construction, footpath, central (Central island)	14533.15	-			500.00	10000.00	4033.15	
	B) Boundary pillar	28.74			14.00	14.74		-	
	C) Plot pillar	30.08	-	-		10.00	10.00	10.08	
	D) V-shaped drain	100.36	-	-		30.00	30.00	40.36	
	E) Pipe drain (i/c connection to main drain)	8029.92	-	-		1500.00	3500.00	3029.92	
	F) C I. grouting	10.79	-	-		2.00	5.00	3.79	
	G) Inspection pit	124.40	-	-		30.00	50.00	44.40	
	H) Masonry surface drain (600 mm) day.	1547.83	14804.17	-		500.00	700.00	347.83	

S.L No	Item of work	Total Tk. (Lac)	Year -1 2000-01	Year -2 2001-02	Year 3 2002-03	Year 4 2003-04	Year 5 2004-05	Year 6 2005-06	Year-7 2006-07
	I) Lake development	500	-	-	100.00	200.00	100.00	100.00	
	J) Walkway/Driveway	297.85	-	-		100.00	100.00	97.85	
	K) Construction of 4 Nos bridges	4000.00	-	-		1000.00	1500.00	1500.00	
	L) Construction of site office	45.74	-	-	10.00	35.74			
	M) Construction of boundary wall	30.90	-	-		10.00	10.00	10.90	
	N) Construction of X-drain	14.49	-	-		3.00	5.00	6.49	
	O) Construction of Mosque	198.85	-	-			100.00	98.85	
	P) Construction of primary School	62.16					40.00	22.16	

S.L. No	Item of work	Total Tk (Lac)	Year - 1 2000-01	Year -2 2001-02	Year 3 2002-03	Year 4 2003-04	Year 5 2004-05	Year 6 2005- 06	Year- 7 2006-07
	Q) Construction of high school	50.11					30.00	20.11	
	R) Construction of 2 nd class officers' quarters	145.76					72.88	72.88	
	S) Construction of staff quarter	100.20					60.00	40.20	
	T) WASA	7380.77	-	-	-	2380.77	2500.00	2500.00	
	U) DESA	18960.61				5960.61	6500.00	6500.00	
	V) Titas gas	3531.00				531.00	1500.00	1500.00	
	W) Machineries & equipment	3057.20		90.00	100.00	2000.00	867.20	---	
	X) Arboriculture	100.00				20.00	40.00	40.00	
	Y) Survey & Planning	50.00			30.00	20.00			
	Total - II	62930.91		90.00	254	14847.86	27720.08	20018.97	

S.L No	Item of work	Total Tk. (Lac)	Year - 1 2000-01	Year -2 2001-02	Year 3 2002-03	Year 4 2003-04	Year 5 2004-05	Year 6 2005-06	Year- 7 2006-07
	Price escalation 5%	6517.25				742.39	2772.01	3002.85	
	Sub total - III	69448.16		90.00	254	15590.25	30492.09	23021.82	
03.	Others								
	a) Contingency	505.00	2.00	3.00	5.00	50.00	200.00	245.00	
	b) 7% Overhead charge $142722.27 \times 7\%$	9990.56	50.00	100.00	200.00	3200.00	3200.00	3240.56	
	c) Implementation of man power (Excluding RAJUK officers staffs)	621.04	50.00	100.00	100.00	100.00	135.52	135.52	
	d) Interest during construction (I.D.C)	6129.33	1490.62	1668.98	2484.87	1279.44	1183.75		
	Total -III	19224.26	901592.62	1871.98	2789.87	4624.44	4719.27	3621.08	

S.L No	Item of work	Total Tk. (Lac)	Year - 1 2000-01	Year -2 2001-02	Year 3 2002-03	Year 4 2003-04	Year 5 2004-05	Year 6 2005-06	Year- 7 2006-07
	Price escalation 5%	1246.56				231.47	471.93	543.16	
	Sub total - III	20470.82	1592.62	1871.98	2789.87	4860.91	5191.20	4164.24	
	Total Price escalation 5%	15454.98				2223.86	6243.94	6987.18	
	Grand total (sub total -I+ sub total -II +sub total -III)	236900.77	16396.79	1961.98	44193.79	52096.57	68603.12	53479.93	

S.L No	Item of work	Total Tk. (Lac)	Year - 1 2000-01	Year -2 2001-02	Year 3 2002-03	Year 4 2003-04	Year 5 2004-05	Year 6 2005-06	Year- 7 2006-07
	a) Road construction footpath, central (Central island)	14533.15	-				15000.00	4033.15	
	b) Boundary pillar	28.74				14.74	14.00	-	10.00
	c) Plot pillar	30.08	-	-			10.00	10.08	30.00
	d) V-shaped drain	100.36	-	-			30.00	40.36	1000.00
	e) Pipe drain (i/c connection to main drain)	3048.27	-	-			1000.00	1048.27	2.00
	f) C I. grouting	10.79	-	-			5.00	3.79	30.00
	g) Inspection pit	124.40	-	-			50.00	44.40	500.00
	h) Masonry surface drain (600 mm dia)	1547.83		-			700.00	347.83	100.00

S L No	Item of work	Total Tk. (Lac)	Year - 1 2000-01	Year -2 2001-02	Year 3 2002-03	Year 4 2003-04	Year 5 2004-05	Year 6 2005-06	Year- 7 2006-07
	i) Lake development	500	-	-		200.00	100.00	100.00	100.00
	j) Walkway /Driveway	297.85	-	-			100.00	97.85	
	k) Construction of 4 Nos bridges	4000.00	-	-			1500.00	1500.00	1000.00
	l) Construction of site office	45.74	-	-		35.74	10.00		
	m) Construction of boundary wall	30.90	-	-			10.00	10.90	10.00
	n) Construction of X-drain	14.49	-	-			5.00	6.49	3.00
	o) Construction of Mosque	198.85	-	-			100.00	98.85	
	p) Construction of primary School	62.16					40.00	22.16	

S.L No	Item of work	Total Tk. (Lac)	Year - 1 2000-01	Year -2 2001-02	Year 3 2002-03	Year 4 2003-04	Year 5 2004-05	Year 6 2005-06	Year- 7 2006-07
	q) Construction of high school	50.11					30.00	20.11	
	r) Construction of 2 nd class officers quarters	145.76					72.88	72.88	
	s) Construction of staff quarter	100.20					60.00	40.20	
	t) WASA	7380.77	-	-	-		2500.00	2500.00	2380.77
	u) DESA	18960.61					6500.00	6500.00	5960.61
	v) Titas gas	3531.00					1500.00	1500.00	531.00
	w) Machineries & equipment	158.45		50.00		50.00	58.45	---	
	x) Arboriculture	100.00					40.00	40.00	20.00
	y) Survey & Planning	50.00				50.00			
	Total - II	55050.51		50.00		350.48	19435.33	18037.32	17177.38

S.L No	Item of work	Total Tk. (Lac)	Year - 1 2000-01	Year -2 2001-02	Year 3 2002-03	Year 4 2003-04	Year 5 2004-05	Year 6 2005-06	Year- 7 2006-07
	Price escalation 5%	5352.11					971.77	1803.73	2576.61
	Sub total - II	60402.62		50.00		350.48	20407.10	19841.05	1975.99
	Total -I&II	202890.59	14804.17	50.00		20745.89	51907.10	40679.52	33553.99
03	Others								
	a) Contingency	505.00	2.00	3.00	5.00	50.00	100.00	245.00	100.00
	b) 7% Overhead charge (as per ecnec decision)								
	c) Implementation of man power (Excluding RAJUK officers staffs)	621.04		100.00	100.00	100.00	105.52	105.52	110.00
	d) Interest during construction (I.D.C)	19555.26	980.42	1083.46	5306.80	4682.29	4895.29	2607.00	
S.L No	Item of work	Total Tk. (Lac)	Year - 1 2000-01	Year -2 2001-02	Year 3 2002-03	Year 4 2003-04	Year 5 2004-05	Year 6 2005-06	Year- 7 2006-07
	Total -III	20681.30	982.42	1186.46	5411.80	4832.29	5355.85	3253.27	241.50
	Price escalation 5%	582.29					255.04	295.75	31.50
	Sub total - III	21263.59	982.42	1186.46	5411.80	4832.29	5355.85	3253.27	241.50
	Total Price escalation 5%	11128.81					2726.81	3993.89	4408.11

Grand total (sub total -I+ sub total -II +sub total -III)	224154.18	15786.59	1236.46	46561.72	25578.18	57262.95	43932.79	33795.49
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As per Revised P.P = Tk 224154.14 lakh

As per Original P.P. 204408.11 lakh

Diff = (+) Tk. 19746.03 lakh

≅ (+) 9.66%

Return:

$$y1 = 5000.00$$

$$y2 = \text{-----}$$

$$y3 = \text{-----}$$

$$y4 = 32297.80$$

$$y5 = 54459.39$$

$$y6 = 68457.45$$

$$y7 = 79191.48$$

$$y8 = 64904.55$$

IDC @10%

Year	Investment	Return	Net Investment	Interest @ 10%
y1 2000-01	14804.17	5000.00	9804.17	980.42
y2 2001-02	9804.17 + 980.42 50.00 = 10834.59	-	10834.59	1083.46
y3 2002-03	10834.59 + 1083.46 + 41149.92 = 53067.97	-	53067.97	5306.80
y4 2003-04	53067.97 + 5306.80 +20745.89 =79120.66	32297.80	46822.86	4682.29
y5 2004-05	46822.86 + 4682.29 + 5 1907.10 = 103412.25	54459.39	48952.86	4895.29
y6 2005-06	48952.86 + 4895.29 + 40679.52 = 94527.67	68457.65	(-) 16960.47	2607.00
y7 2006-07	26070.02 + 2607.00 + 3 3553.99 = 62231.01	79191.48	(-) 81865.02	
y8 2007-08	(-) 16960.47	64904.55		
				19555.26

Investment

$$Y1 = 15786.59 \times 0.82$$

$$= 12945.00$$

$$Y2 = 1236.46 \times 0.82$$

$$= 1013.90$$

3.3 DETAILED ESTIMATE

Figure in lakh

Item no- 1. Land acquisition

(a) 674,7531 Acre. Acquired by L.A case No- 07/2000-2001

Taka already paid to D.C Dhaka Tk. 14804.17

(b) 1333.33 Acre. Acquired by L A case No- 06/2001-2002

Taka already paid to D.C Dhaka Tk 39149.92

Tk. 53954.09

Arbitration 10% Tk. 5395.41

Tk 59349.50

Item no-2 Land Development.

= 2008.083 Acre

Lake area = (-) 150.00 Acre

= 1858.083 Acre × 43560 sqft × 16'-0" (Av)

= 1295009528 cft

= 36670240.06 m³

@ Tk 218.00 /m³ (PWD-Item7 (a))

5% less = Tk. 207.10 As per Tender Tk 75944.06

Item no-3 Road Construction

A. Internal Road 30'-0", 40'-0" & 60'-0":-

Bituminous carpeting road with Feeder Road Specification:

38 mm Thick carpeting, 75mm thick semi-grouting with brick chips; 125 mm thick base (macadam) with brick chips, 175 mm thick Sub-base with khoa and Sand (3:1) guide wall and seal coat

(i) 30'-0" wide road:-

(a) Sector 15 = 40984 rft

(b) Sector 16 = 16885 rft

(c) Sector 17 = 82924 rft.

140793 rft.

(ii) 40'-0" wide road:-

(a) Sector 15 = 24481 rft

(b) Sector 16 = 8505 rft

(c) Sector 17 = 39923 rft

(d) Sector 18 = 13623 rft

$$\frac{86532 \text{ rft}}{227325 \text{ rft} \times 12' - 0''} = 2727900 \text{ sft}$$

(carriage way)

(ii) 60'-0" wide road.-

(a) Sector 15 = 40315 rft

(b) Sector 16 = 11682 rft

(c) Sector 17 = 43407 rft

(d) Sector 18 = 39204 rft

134608 rft **18'-0" = 2422944 sft**

(Carriage way) = 5150844 sft

$$478702.97 \text{ m}^2$$

@ Tk 1265.00 /m³

Tk. 6055.59(in Lakh)

(Analysis attached)

B. 100'-0", & 210'-0" wide road

Bituminous Carpeting road with Highway Specification -

50 mm thick carpeting, 75 mm thick semi-grouting with brick, 175 mm thick base course (macadam) with brick chips, 300 mm thick sub-base with khoa sand (3:1) guidewall seal coat.

(a) 100'-0" wide

Sector 15 = 10506 rft

Sector 16 = 10594 rft

Sector 17 = 9605 rft

Sector 18 = 2205 rft

$$32910 \text{ rft} \times 34' - 0'' = 1118949 \text{ sft}$$

(Carriage way)

(b) 210'-0" wide

Sector 15 = 11732 rft

Sector 16 = 8059 rft

Sector 17 = 5506 rft

Sector 18 = 5544 rft

$$30841 \text{ rft} \times 2 \times 34' - 0'' = 2097188 \text{ sft}$$

(Carriage way) = 3216128 sft

$$= 298896.65 \text{ m}^2$$

@ Tk. 1611.00 /m²

Tk. 4815.25

(Analysis attached)

Item no -4. Construction of cross drain

Length of road

300'-0" wide = 140793 rft

400'-0" wide = 86532 rft

600'-0" wide = 134608 rft

1000'-0" wide = 32910 rft

210'-0" wide = 30841 rft

425684 rft × 1% of total length = 4256.84 rft
= 1297.42 m

@ Tk. 1117.00 /m Tk. 14.49
(P.W.D.-140)

Item no -5. Construction of foot path (60'-0", 100'-0" & 210'-0" wide road)

60'-0" wide road = 134608 rft

100'-0" wide road = 32910 rft

210'-0" wide road = 30841 rft

198359 rft
= 2×2m×60456.87 m
= 241827.48 m²

@ Tk.1431.00/m² Tk. 3460.55

(Analysis attached)

Item no -6. Construction of Central Island

210'-0" wide road = 30841 rft × 10'-0" = 308410.00 sft.

= 28662.64 m²

@ Tk. 704.00 /m² Tk. 201.78(lakh)

(Analysis attached)

Item no-7. Construction of R.C.C boundary pillar.

(as per Tender)

Tk 28.74(lakh)

Item no-8. Construction of plot pillar.

Residential = 5678 Nos

High rise = 1503 Nos

Commercial = 550 Nos

Utility service = 80 Nos

Special use plot = 43 Nos

Development store/corner

Shops/clinic, Mosque, kutchha

Bazar = $\frac{500 \text{ Nos}}{(8354 \text{ nos} \times 4) \times 60\%} = 20050 \text{ Nos}$

@ Tk. 150/-/m

Tk. 30.08(lakh)

Item no-9 Construction of v- shaped drain.

60'-0" wide road = 134608 rft

100'-0" wide road = 32910 rft

210'-0" wide road = 30841 rft

198359 rft = 60456.87 m

@ Tk. 166/-/m

Tk. 100.36

Item no-10 Providing 2'-0" dia R.C.c pipe drain.

60'-0" wide road = 134608 rft

100'-0" wide road = 32910 rft

210'-0" wide road = 30841 rft

2×198359 rft

396718 rft = 120913.74 m

@ Tk.2500.00 / m

Tk 3022.84

(R.S.R)

Item no-11 Providing 0'-9" dia R.C.C pipe

for connection to main drain.

$$= \frac{396718' - 0''}{100' - 0''} = 3968 \text{ nos}$$

$$= 3968 \text{ nos} \times 3' - 0'' = 11904 \text{ rft} = 3628.16 \text{ m}$$

@ Tk. 701/-/m

Tk 25.43

(R.S.R)

Item no -12 C.I gating

3968 nos @ Tk. 272/- /no Tk. 10.79

(Analysis attached)

Item no-13. Costruction of inspection pit.

With 100 mm thick R.C C top slab

(With 600m × 600m inside measurement)

= 3968 nos @ Tk 3135.00 each Tk. 124.40

(P.W.D-248/A3)

Item no-14. Construction of Masonary Surface drain 600 mm daphth (av) and 225 mm clear Width at the bottom and 525 mm at the top.

30'-0" wide road = 140793 rft

40'-0" wide road = 86532 rft

227325 rft.x2

= 138570.56 rm.

@ Tk 1117.00 /rm Tk. 1547.83

Item no-15 lake development.

150 00 acre

L S

Tk 500.00(lakh)

Item no-16. Drive way/ Walk way along the lake with bituminous carpeting, brick flat soling, Herring bone bond and brick end edging.

3.5 m×10000.00 m =35,000.00 m²

@ Tk. 851.00 per m² Tk 297.85

PWD L (ii)

Item no -17. Construction of Bridge.

(i) 2 nos width = 200'-0", length = 200'-0"

2×200'-0×200'-0" = 80,000 00 sft

(ii) 2 nos width =100'-0", length = 100'-0"

2×100'-0×100'-0" = 20,000.00 sft

100000.00 sft

=9293 68 m²

(@Avg. 430000.00 /m²) Tk. 4000.00

Item no- 18. Construction of site office, two storied building R.C.C framed structure with four stories foundation (1 no)

$$60'-0" \times 36'-0" = 2160.00 \text{ sft}$$
$$= 200.74 \text{ m}^2 \text{ (Each floor)}$$

Rate per m²

Foundation = 2748.50

Ground floor = 6825.25

1st floor = 6267.50

Lime terracing = 2119.00

Mosaic floor

$$2 \times 1092.50 = \frac{2185.00}{20145.25}$$

- sanitary & water supply (7.50% of bldg. cost i/c cost of foundation)

$$20145.25 \times 7.50\% = 1510.89$$

- cost of electrification (6.5% without foundation cost)

$$6.5\% \text{ of Tk. } 17396.75 = 1130.79/-$$

$$\text{@ Tk } 22786.93/\text{m}^2 \quad \text{Tk. } 45.75$$

(P.W.D)

Item no-19. Construction of Mosque R.C.C framed structure with four storied foundation (2 nos)

$$2 \times 80'-0" \times 62'-0" = 9920.00 \text{ sft}$$
$$= 921.93 \text{ m}^2$$

Rate same as site office @ Tk 21568.45/m² Tk, 198.85

(P.W.D)

Item no- 20 Construction of primary school R.C.C framed structure with four storied foundations. (Two storied 2 nos).

$$2 \times 67'-11" \times 22'-10" = 3101.23 \text{ sft}$$
$$= 288.22 \text{ m}^2$$

$$\text{@ Tk } 21568.48 \text{ p/m}^2 \quad \text{Tk. } 62.16$$

(P.W.D)

Item no -21. Construction of high school R.C.C framed structure with four storied foundations. (Two storied).

$$1 \times 100'-0" \times 25'-0" = 2500.00 \text{ sft}$$
$$= 232.34 \text{ m}^2 \text{ (Each floor)}$$

Rate same as site office @ Tk. 21568.48 /m²

Tk. 50.11

(P.W.D)

Item no-22. Construction of staff quarter (5 storied building- 1No)

(with two flats in each floor for employees).

$$1 \times 1700 \text{ 00 sft} = 158.00 \text{ m}^2$$

$$2 \times (800 \text{ sft} + 50 \text{ sft for stair})$$

Rate per m²

a) Foundation	= 3185.50
b) Extra cost of pile	= 8165 00
c) Ground floor	= 7118.50
d) 1st floor	= 6543.50
e) 2nd floor	= 6704.50
f) 3rd floor	= 6871.25
g) 4th floor	= 7049.50
h) Lime terracing	= 1219.00
i) Mosaic floor	= 5462 50

52319.25

Add. 10% of Bldg cost i/c foundation for
sanitary & water supply = $52319.25 \times 10\% = 5231.92$

Electrification @ 8% of bldg.cost

Without foundation $40968.75 \times 8\% = 3277.50$

Gas

Ground floor- @ 2.5% cost of Ground Floor

$$= 7118.50 \times 2.5\% = 177.96$$

1st Floor to 4th Floor @ 1% cost of

$$1^{\text{st}} \text{ Floor to } 4^{\text{th}} \text{ floor } 27168.75 \times 1\% = 271.68$$

$$\text{@ Tk. } 61278.31/\text{m}^2 \text{ Tk } 96.81(\text{lakh})$$

(P W.D)

(a) Water Reservoir Tank:-

$$1 \times 15'-0'' \times 8'-0'' \times 7'-0'' \times = 840 \text{ cft.}$$

$$= 840 \text{ cft} \times 6.25 \text{ Gallon /cft.}$$

$$= 5250 \text{ 00 Gallon.}$$

$$\text{@ Tk. } 34.50/\text{Gallon.}$$

Tk.- 1.81(lakh)

(P.W.D)

(b) Over Head Tank:-

$$1 \times 10'-0'' \times 8'-0'' \times 5'-0'' \times = 400 \text{ cft.}$$

$$= 400 \text{ cft} \times 6.25 \text{ Gallon/cft}$$

$$= 2500.00 \text{ Gallon.}$$

$$\text{@ Tk. 63.25/Gallon}$$

$$\text{Tk.- 1.58(lakh)}$$

(P.W.D)

$$\text{Tk. 100.20(lakh)}$$

Item no – 23 Construction of 2nd class officer quarter

(5 storied Residential building 1 (One) no. two flats in each floor.)

$$\text{Area } 2500 \text{ 00 sft} = 232 \text{ 34 m}^2$$

$$\text{(floor + stair) @ Tk. 61278.30/m}^2$$

(P.W.D)

$$\text{Tk.- 142.37(lakh)}$$

(a) Water Reservoir Tank:-

$$1 \times 15'-0'' \times 8'-0'' \times 7'-0'' \times = 840 \text{ cft.}$$

$$= 840 \text{ cft} \times 6.25 \text{ Gallon/ cft}$$

$$= 5250.00 \text{ Gallon.}$$

$$\text{@ Tk 34.50/Gallon}$$

$$\text{Tk.- 1.81(lakh)}$$

(P.W.D)

(b) Over Head Tank:-

$$1 \times 10'-0'' \times 8'-0'' \times 5'-0'' \times = 400 \text{ cft.}$$

$$= 400 \text{ cft} \times 6.25 \text{ Gallon/cft.}$$

$$= 2500.00 \text{ Gallon.}$$

$$\text{@ Tk. 63 25/Gallon.}$$

$$= \text{Tk. 158125 00}$$

$$\text{Tk. 1.58(lakh)}$$

(P.W.D)

$$\text{Tk. 145.76(lakh)}$$

Item no –24 boundary wall with R.C.C frame with Barbed wire fencing

a) Site office (1 no) $= 1 \times 4 \times 100'-0'' = 400 \text{ 00 rft}$

b) Mosque (2 no) $= 2 \times 4 \times 100'-0'' = 800.00 \text{ rft}$

c) Primary School (2 no) $= 2 \times 4 \times 100'-0'' = 800.00 \text{ rft}$

d) High School (1 no) $= 1 \times 2 \times 200'-0'' = 400.00 \text{ rft}$

$$= 1 \times 2 \times 100'-0'' = 200.00 \text{ rft}$$

e) Staff quarter (1 no) $= 1 \times 2 \times 100'-0'' = 200.00 \text{ rft}$

$$= 1 \times 2 \times 50'-0'' = 100.00 \text{ rft}$$

2900.00 rft
= 883.88 rm
@ Tk. 3496.00 /rm **Tk. 30.90(lakh)**

Item no-25. Water supply (WASA).

a) MainLine (18" dia ductile iron pipe)

i) 100' - 0" wide = 32910 rft

ii) 210'-0" wide = 30841 rft

63751 rft = 19430.36 rm

@ Tk. 6240/rm **Tk. 1212.45**

(Rate collected from WASA)

b) Internal line :- (8" dia E class p.v.c pipe)

30' - 0" wide = 191330 rft

40'-0" wide = 86532 rft

60'-0" wide = 170014 rft

447876 rft = 136505.94 rm

@ Tk. 1150/rm **Tk. 1569.82**

(Collected from WASA)

c) Pump House with installation of 20 nos

Submerge pipe @ Tk 35.00 lakh/no **Tk. 700.00**

(Collected from WASA) Tk. 3482.27

d) Sewerage line (2'-0"-3'-0")

30'-0" wide = 191330 rft

40'-0" wide = 86532 rft

60'-0" wide = 170014 rft

100'-0" wide = 32910 rft

210'-0" wide = 30841 rft

511627 rft = 155.94 km

@ Tk. 25.00 lakh/km **Tk. 3898.50**

(Collected from WASA) Tk. 7380.77

Item no -26 Electrification (DESA) Street light Tk. 18960.61

2900.00 rft
= 883.88 rm

@ Tk. 3496.00 /rm **Tk. 30.90(lakh)**

Item no-25. Water supply (WASA).

a) MainLine (18" dia ductile iron pipe)

i) 100' - 0" wide = 32910 rft

ii) 210'-0" wide = 30841 rft

63751 rft = 19430.36 rm

@ Tk. 6240/rm

Tk. 1212.45

(Rate collected from WASA)

b) Internal line :- (8" dia E class p.v.c pipe)

30' - 0" wide = 191330 rft

40'-0" wide = 86532 rft

60'-0" wide = 170014 rft

447876 rft = 136505.94 rm

@ Tk. 1150/rm

Tk. 1569.82

(Collected from WASA)

c) Pump House with installation of 20 nos

Submerge pipe @ Tk. 35.00 lakh/no

Tk. 700.00

(Collected from WASA)

Tk. 3482.27

d) Sewerage line (2'-0"-3'-0")

30'-0" wide = 191330 rft

40'-0" wide = 86532 rft

60'-0" wide = 170014 rft

100'-0" wide = 32910 rft

210'-0" wide = 30841 rft

511627 rft = 155.94 k.m

@ Tk. 25.00 lakh/km **Tk. 3898.50**

(Collected from WASA)

Tk. 7380.77

Item no -26 Electrification (DESA) Street light

Tk. 18960.61

As ENCEC decision

Nil

(c) Implementation Manpower ----- Tk. 621.01

(d) Price escalation Tk. 11128.81

(e) Interest during construction (I.D.C) Tk. 19555.26

Tk. 31810.08

Grand Total

Tk. 224154.18 lakh

Analysis for 10m × 10m = 100.00 m² road pavement work.

(Highway Specification)

01.	Earth work in box cutting up to 300 mm depth. 10m × 10m = 100.00m ²	@ Tk. 10.00/m ² (R&H Item no -6 (b))	Tk. 1000.00
02	Sand filling (FM-0.80). 10m × 10m × 0.15m = 15.00m ³	@ Tk. 395.00/m ³ (R&H Item no -13 (b))	Tk. 5925.00
03	Khoa mixed sand. (3:1) Sub bases 10m × 10m × 0.30m = 30.00m ³	@ Tk. 1605.00/m ³ (R&H Item no -14 (b))	Tk. 48150.00
04	Water bound macadam (Base Course). 10m × 10m × 0.175m = 17.50 m ³	@ Tk. 1977 p/m ³ (R&H Item No -15(a))	Tk. 34597.50
05	Tack coat 1.00 kg/m ² = 10m × 10m = 100.00m ²	@ Tk. 23.00/m ² (R&H Item No -20(a))	Tk. 2300.00
06	75mm thick Semi grouting (with brick chips) = 100 m ²	@ Tk. 250.00/m ² (R&H Item No -17(a))	Tk. 25000.00
07	Tack coat = 0.75 kg/m ² = 10 × 10 = 100.00 m ²	@ Tk. 18.00/m ² (R&H Item No -20(a))	Tk. 1800.00
08	50 mm thick Carpetting = 10 × 10m = 100.00 m ²	@ Tk. 300.00/m ² (R&H Item No -18(a))	Tk. 30000.00
09	Tack Coat = 0.75 kg/m ² = 10m × 10m = 100.00 m ²	@ Tk. 18.00/m ² (R&H Item No -18(a))	Tk. 1800.00
10	Seal coat	@ Tk. 27.00/m ²	Tk. 2700.00

	= 10m × 10m = 100.00m ²	(R&H Item No -20(a))	
11	Guide wall. (a) Earth work 2×10m ×0.30×0.675 = 4.05 m ³ (up to 1.50m depth) (b) Single layer brick soling in foundation. 2×10m ×0.375 = 7.50m ² (c) 10" thick wall. (1.4) 2×10m×0.25×0.475 = 2.373 m ³	@ Tk. 62.00/m ³ PWD-1 (a) @ Tk. 150.00/m ³ PWD-2 (a) @ Tk. 2699.00/m ³ PWD-3 (a)	Tk. 251.10 Tk. 1125.00 Tk. 6410.125
			Tk. 1,61,058.72

Rate per m² = 161058.72/100
= 1610.58

Say Tk. 1611.00

Uttara Residential Model Town (3rd Phase)

analysis for 10m × 10m = 100.00 m² road pavement work.

(Feeder Road Specification)

01.	Earth work in box cutting. up to 300 mm depth. 10m × 10m = 100.00m ²	@ Tk. 10.00/m ² (R&H 6 (b))	Tk. 1000.00
02	Sand filling (FM-0.80). 10m × 10m × 0.15m = 15.00m ³	@ Tk. 395.00/m ³ (R&H Item no -13/d)	Tk. 5925.00
03	Khoa mixed sand. (3:1) Sub bases with sand FM 0.50 10m × 10m × 0.175m = 17.50m ³	@ Tk. 1605.00/m ³ (R&H 14 /b)	Tk. 28087.50
04	Water bound macadam Base coarse with Brick chips 10m × 10m × 0.125m = 12.50 m ³	@ Tk. 1977.00/m ³ (R.& H. 15/a)	Tk. 24712.50
05	Tack coat = 0.75 kg/m ² = 10m × 10m = 100.00 m ²	@ Tk. 23.00/m ³ (R&H. 20/b)	Tk. 2300.00
06	0.75 mm thick semi grouting (with brick chips) = 10m × 10m = 100m ²	@ Tk. 250.00/m ² (R&H. 6/b)	Tk. 25000.00

07	Tack coat = 0.75 kg/m ² = 10×10m = 100.00 m ²	@ Tk. 18.00/m ² (R&H 20/a)	Tk. 1800.00
08	38 mm thick Carpetting = 10×10m = 100.00 m ²	@ Tk. 254.00/m ² (R&H 18/b)	Tk. 25400.00
09	Tack Coat = 7.32 kg/m ² = 10m× 10m = 100.00 m ²	@ Tk. 18.00/m ²	Tk. 1800.00
10	Seal coat = 10m × 10m = 100.00m ²	@ Tk. 27.00/m ² (R&H - 21(a))	Tk. 2700.00
11	Guide wall. (a) Earth work 2×10m ×0.30×0.675 = 4.05 m ³ (b) Single layer brick soling 2×10m ×0.375 = 7.50m ² (c) 10" thick wall. 2×10m× 0.25× 0.475 = 2.375 m ³	@ Tk. 62.00/m ³ (R&H 1/a) @ Tk. 150.00/m ³ (R&H 2/a) @ Tk. 2699.00/m ³ (R&H 3/a)	Tk. 251.10 Tk. 1125.00 Tk. 6410.125
			Tk. 126511.225

Rate per m² = 126511.225/100

= 1265.11

Say Tk. 1265.00

Analysis for 2m×10m = 20.00 sqm Foot path

01.	Earth work in excavation in guide wall. 2×10m×0.50m×1.00m = 10.00m ³	@ Tk. 62.00/m ³ PWD-1 (a)	Tk. 620.00
02.	Single layer brick flat soling 2×10m×0.50m = 10.00m ² 1×10m×1.50m = 15.00 m ² 10+15=25.00m ²	@ Tk. 150.00/m ² (PWD 2(a))	Tk. 3750.00
03	C.C work in base of foot path wall. (1:3:6) 2×10m×0.50m×0.075m = 0.75m ³	@ Tk. 3138.00/m ³ (PWD-3 (a) -I)	Tk. 2353.50

04	1st Class brick work. (1:4) $2 \times 10\text{m} \times 0.375\text{m} \times 0.15\text{m} = 1.125\text{m}^3$ $2 \times 10\text{m} \times 0.25 \times 0.90\text{m} = 4.50\text{m}^3$ $1.125 + 4.5 = 5.625\text{m}^3$	@ Tk 2699.00/m ³ (PWD - 10)	Tk. 15181.88
05.	Sand filling in foot path F. M (0.80-1.50) $= 1 \times 10\text{m} \times 1.50\text{m} \times 0.225\text{m} = 3.375\text{m}^3$	@ Tk. 382.00 /m ³ (PWD-5(a))	Tk. 1289.25
06	4" thick C C (1:2:4) with brick Chips, Sand,Cement. = $1 \times 10\text{m} \times 1.50\text{m} \times 0.10\text{m} = 1.50\text{m}^3$	@ Tk 3612.00 /m ³ (PWD-3 (b) 11)	Tk 5418.00
			Tk. 28612.63

Rate per m² = $28612.63/20$
= 1430.63

Say Tk. 1431.00

Analysis for 10m×3m = 30 m² Central Island.

01	Earth work in box cutting in foundation trenches. $2 \times 0.38\text{m} \times 0.15\text{m} \times 10.00\text{m}$ $= 1.14\text{m}^3$	@ Tk. 62.00/m ³ PWD-1 (a)	Tk. 70.68
02.	250mm brick work with 1st class brick in cement mortar (1:4) etc all complete $2 \times 0.38 \times 0.15\text{m} \times 10.00 = 1.14\text{m}^3$ $2 \times 0.250 \times 0.356 \times 10.00 = 1.78\text{m}^3$ $1.14 + 1.78 = 2.92\text{m}^3$	@ Tk. 2699.00 (PWD-10)	Tk. 7881.08
03	C.C block; No of block = $2 \times 33 = 66$ nos	@ Tk 150.00 per no PWD-2(a)	Tk. 9900.00
04.	Sand filling in central island (F.M.0.80- 1.50) $10.00 \times 2.29 \times 0.30\text{m} = 6.87\text{m}^3$	@ Tk. 382.00 /m ³ PWD - 5(a)	Tk. 2624.34

05.	Tree plantation in/c Supplying, Carrying & Making approved gabion (1'-8" dia & 4'-0" bigha) etc.all complete. No of tree = 10m÷2.5m = 4nos	@ Tk. 160.00 per no	Tk. 640.00
			Tk. 21116.10

Rate per m2 = 21116 10/30,00

= 703.87

Say Tk. 704.00

Uttara 3rd Phase Project

Manpower for the Project.					
Sl. No.	Designation	No.s	Salary as per Scale	Project Duration	Total Amount (in lakh Tk).
01	Superintendent Engr.	01 (One)	11700-13500 11700+(300×3)=Tk. 12600.00 Basic Salary = Tk. 12600.00 House rent 40% = Tk. 5040.00 Medical Allowance=Tk. 300.00 = Tk. 17940.00	72 Month	12.92
02	Project Manager Executive Engr.	02 (Two)	9500.00-10840 9500+(260×3)= Tk Basic salary = Tk 10280.00 House rent 40% = Tk. 4112.00 Medical Allowance = Tk. 300.00 =Tk 14692.00	72 Month	21.16
03	Senior Architect	01 (One)	7200-10840 7200+(260×5)= Tk 8500.00 Basic salary = Tk 8500.00 House rent 45%=Tk 3825.00		

			Medical Allowance = Tk 300.00 - Tk 12625.00	72 Month	9.09
04	Accounts officer /Audit Officer	01 (One)	7200-10840 7200+(260×5)= Tk 8500.00 Basic salary = Tk 8500.00 House rent 40% = Tk 3400.00 Medical Allowance = Tk 300.00 = Tk 12200.00	72 month	8.78
05	Assistant Architect	02 (Two)	4300-7740 4300+(185×5)= Tk 5225.00 Basic = Tk 5225.00 House rent 45% = Tk 2351.25 Medical Allowance = Tk 300.00 = Tk 7876.25	72 month	11.34
06	Staff Officer	01 (One)	4300-7740 4300+(185×5)= Tk 5225.00 Basic Salary = Tk 5225.00 House rent 45% = Tk 2351.25 Medical allowance = Tk 300.00 Consolidated Monthly = Tk 7876 25	72 month	5.67
07	Assistant Engr. Civil-04 (Four) Electrical-01	05 (five)	4300-7740 4300+(185×5)= Tk 5225.00 Basic salary = Tk 5225.00 House rent 45% = Tk 2351.25 Medical Allowance = Tk 300.00 = Tk 7876.25	72 month	28.35
08	Programmer	01 (One)	4300-7740 4300+(185×5)= Tk 5225 00 Basic salary = Tk 5225.00 House rent 40% = Tk 2090.00 Medical Allowance = Tk 300.00 Consolidated monthly		

			= Tk 7615.00	72 month	5.48
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09]	Administrative Officer	3 (Three)	4300-7740 4300+(185×5)= Tk 5225.00 Basic salary = Tk 5225.00 House rent 40% = Tk 2090.25 Medical Allowance = Tk 200.00 Consolidated Monthly = Tk 7515.00	72 month	16.23
10]	Sub Assistant Engr. (GIS & AutoCAD trained)	02 (Two)	3400-6625 3400+(170×5)= Tk 4250.00 Basic salary = Tk 4250.00 House rent 45% = Tk 1912.50 Medical Allowance = Tk 300.00 Consolidated Monthly = Tk 6462.50	72 month	9.31
11]	Sub-Assistant Engr. Civil Engr- 12(Twelve) Electrical Engr.- 2(Two)	14 (Fourteen)	3400-6625 3400+(170×5)= Tk 4250.00 Basic salary = Tk 4250.00 House rent 45% = Tk 1912.50 Medical Allowance = Tk 300.00 Consolidated monthly = Tk 6462.50	72 month	65.14
12]	Kanoon Go	03 (Three)	2100-4315 2100+(120×5)= Tk 2700.00 Basic salary = Tk 2700.00 House Rent 50% = Tk 1350.00 Transportation Cost = Tk 80.00 Medical Allowance =Tk. 300.00 Consolidated monthly = Tk 4430.00	72 month	9.57
13]	Stenographer	01 (One)	2100-4315 2100+(120×5)= Tk 2700.00		

			Basic salary = Tk 2700.00 Basic salary 50% = Tk 1350.00 Medical Allowance = Tk 300.00 Consolidated monthly = Tk 4350.00	72 month	3.13
14	Surveyor	06 (six)	1975-3920 $1975+(105 \times 5) = \text{Tk } 2500.00$ Basic Salary = Tk 2500.00 House rent 50% = Tk 1250.00 Transportation cost = Tk 80.00 Medical Allowance = Tk 300.00 Consolidated Monthly = Tk 4130.00	72 month	17.84
15	Driver	04 (four)	1900-3920 $1900+(105 \times 5) = \text{Tk } 2425.00$ Basic salary = Tk 2425.00 House rent 55% = Tk 1333.75 Transportation = Tk 80.00 Medical Allowance = Tk 300.00 Consolidated Monthly = Tk 4138.75	72 month	19.92
16	Data Entry (Accounts Assistants)-06 Lower Assistant (Stenographer)-40 Karjotodarakkari Man-1(30 persons)	76 (Seventy six)	1875-3605 $1875+(90 \times 5) = \text{Tk } 2325.00$ Basic salary = Tk 2325.00 House rent 50% = Tk 1162.50 Transportation cost = Tk 80.00 Medical Allowance = Tk 300.00 Consolidated Monthly	72	211.63

			= Tk 3867.50		
17	Rekhakar	03 (Three)	1750-3300 1750+(80×5)= Tk 2150.00 Basic salary = Tk 2150.00 House rent 55% = Tk 1182.50 Transportation cost = Tk 80.00 Medical Allowance = Tk 300.00 Washing Allowance = Tk 35.00 Consolidated monthly = Tk 3747.50	72 month	8.09
18	Karjotodarakkari Man-2	07 (Seven)	1560-2695 1560+(60×5)= Tk 1860.00 Basic salary = Tk 1860.00 House rent 55% = Tk 1023.00 Transprotation cost = Tk 80.00 Medical cost = Tk 300.00 Washing Allowance = Tk 35.00 Consolidated Monthly = Tk 3298.00	72 month	16.62
19	M.L.S.S.-06 Messenger-02 Chainman(Joripshathi)-12	20 (Twenty)	1500-2400 1500+(50×5)= Tk 1750.00 Basic salary = Tk 1750.00 House rent 55% = Tk 962.50 Transportation cost = Tk 80.00 Medical Allowance = Tk 300.00 Washing Allowance = Tk 35.00 Consolidated monthly = Tk 3127.50	72	45.04
20	Guard/Labour/Cleane	15	1500-2400		

r/Gardener	(Fifteen)	$1500+(50 \times 5) = \text{Tk } 1750.00$ Basic salary = Tk 1750.00 House rent 55% = Tk 962.50 Transportation = Tk 80.00 Medical Allowance = Tk 300.00 Washing Allowance = Tk 35.00 Consolidated Monthly = Tk 3127.50	72 month	33.78
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Uttara 3rd Phase Project

Total Manpower for the Project					
Sl. No.	Designation	Numbers	Salary as per Scale	Project Duration	Total (in lakh Tk).
Total.163			Total Amount= 551.31		
Bonus,Holiday Sale,Excursion=69.73					
Total Salary=621.04					

Total Manpower for the Project =163 person.

1st Class = 12 persons
2nd Class = 16 persons
3rd Class = 86 persons
4th Class = 49 persons

Total = 163 persons

Uttara 3rd Phase Project

09| Description of Updated Expenditure for the project.

SL No	Name of the Expenditure	Amount of work according to approved P.P	Costing according to approved P.P. (lakh taka)	Quantity of work according to corrected P.P.	Proposed cost according to corrected P.P. (lakh taka)	Difference between approved and corrected cost/expenditure (lakh Taka)			Reason of increasing/decreasing cost
						Less	Increase	New Expenditure	
1.	Land Acquisition	2099.56 (Acre)	50389.44 (1500 Lakh/Acre)	2007.4431 (Acre)	59349.50	-	8960.06	-	Cost increased due to fulfilling the amount of money to the DC's order(Time value of Money).
2.	Land Development	3,84,75,586.50 Cubic Meter	70795.08 (Tk. 184.00 /m3)	3,66,70,240.06 (Tk. 184.00/ m3)	75944.06 (Tk. 218.00/m3)	-	5148.98	-	According to 2003 PWD schedule the rate is Tk.218/m3

3.	Lake Development	150.00 (Acre)	5.00	150.00 (Acre)	500.00	-	495.00	-	Environmental Consideration
4.	Road way	777599.62 sqm	7259.18	777599.62 sqm	10870.82	-	3611.64	-	Due to increase in rate of R&H.
5.	Walkway	-	-	35000 sqm	297.85	-	-	297.85	There was no sanction for walkway in the previous one.
6.	Footpath	241827.48 sqm	3006.88 (Tk.1243.40/sqm)	241827.48 sqm	3460.55 (Tk.1431.00/sqm)	-	453.67	-	Due the increase of rate.

SL No	Name of the Expenditure	Amount of work according to approved P.P	Costing according to approved P.P. (lakh taka)	Quantity of work according to corrected P.P	Proposed cost according to corrected P.P. (lakh taka)	Difference between approved and corrected cost/expenditure (lakh Taka)			Reason of increasing/decreasing cost
7.	Central Island	28662.64 sqm	160.74 (Tk.560.81/sqm)	28662.64 sqm	201.78 (Tk.704/sqm)	-	41.04	-	Due to the increase of the scheduled rate.
8.	V-Drain	60456.87 m	100.36 (Tk 166/m)	60456.87 m	100.36 (Tk.166/m)	-	-	-	
9.	Surface drain 600 mm depth	-	-	138570.56 m	1547.83 (1117.00 /m)	-	-	1547.83	Pukka Drain has been approved instead of Kutcha drain.
10	Kutcha Drain	88509.66 m ³	27.44 (Tk.31/cum)			27.44 (lakh)	-	-	Changed brought in the revised PP.
SL No	Name of the Expenditure	Amount of work according to approved P.P	Costing according to approved P.P. (lakh taka)	Quantity of work according to corrected P.P	Proposed cost according to corrected P.P. (lakh taka)	Difference between approved and corrected cost/expenditure (lakh Taka)			Reason of increasing/decreasing cost

11	Pucca X-Drain	1297.42 m	11.30 (Tk.871.00/c um)	1297.42 m	14.49 (Tk.1117/m)	-	3.19	-	Increased due to the increase in scheduled rate.
12	R.C C Pipe Drain (Dia- 2.0feet)	120913.74 m	8004.49 (Tk.6620.00/ m.)	120913.74 m.	3022.80 (Tk.2500/m)	4981.69	-	-	Pipe dia decreased to 2.0'(feet) from 3.0'(feet).
13	9" dia Pipe	3628.16 m.	25.43 (Tk.701.00/m)	3628.16 m	25.43 (Tk.701.00/m)	-	-	-	
14	C.I. Grouting	3968 Nos	10.79 (Tk.272.00/N os)	3968Nos.	10.79 (Tk.272.00/N os)	-	-	-	

SL No	Name of the Expenditure	Amount of work according to approved P.P	Costing according to approved P.P. (lakh taka)	Quantity of work according to corrected P.P	Proposed cost according to corrected P P. (lakh taka)	Difference between approved and corrected cost/expenditure (lakh Taka)			Reason of increasing/decreasing cost
15.	Inspection Peat	3968 Nos	101.50 (Tk.2558.00/ Nos)	3968 Nos.	124.40 (Tk.3135.00 /Nos.)	-	22.9	-	Due to the increased rate in the PWD/2003 Schedule
16.	Bridge	4 Nos.	1847.35 (@ Tk. 19877.54/ Bridge)	4 Nos of Bridge of 9233 68 sqm	4000.00 (L S.)		2152.65	-	
17.	1(One)Site office	111.52 sqm	17.96 (Tk. 16105.88 /sqm.)	200.74 sqm	45.74 (Tk.22786.93/ sqm)		27.78 Lakh		Due to the increased rate in the PWD/2003 Schedule

SL No	Name of the Expenditure	Amount of work according to approved P.P	Costing according to approved P.P. (lakh taka)	Quantity of work according to corrected P.P	Proposed cost according to corrected P.P. (lakh taka)	Difference between approved and corrected cost/expenditure (lakh Taka)			Reason of increasing/decreasing cost
18	2.0 Nos.Mosques	921.93 sqm	148.48(@ Tk.16105.88 /sqm)	921.93 sqm	198.85(@ Tk.2156.45 /sqm)	-	50.37	-	Due to the increased rate in the PWD/2003 Schedule
19	2.0 Nos. Primary School	288.22 sqm	22.29 (Tk. 7734.25/sqm)	288.22 sqm	62.16 (Tk. 2156.48 /sqm)	-	39.87	-	Due to the increased rate in the PWD/2003 Schedule
20	2 Storey High school Building	232.34 sqm	34.42 (Tk 16105.88 /sqm)	232.34 sqm	50.11 (Tk.21568.48/ sqm)	-	15.69	-	Due to the increased rate in the PWD/2003 Schedule
21	1 Staff Quarter (Each floor with 2 units)	158 sqm	53.62 (Tk. 33935.80 /sqm)	158 sqm	100.20		46.58		Due to the increased rate in the PWD/2003 Schedule

SL No	Name of the Expenditure	Amount of work according to approved P.P	Costing according to approved P.P. (lakh taka)	Quantity of work according to corrected P.P	Proposed cost according to corrected P.P. (lakh taka)	Difference between approved and corrected cost/expenditure (lakh Taka)			Reason of increasing/decreasing cost
22.	Boundary Wall(R.C.C.)	883.88 m	24.93 (Tk.2820.00 /m)	883.88 m	30.90 (Tk. 3496/m)	-	5.97	-	Due to the increased rate in the PWD/2003 Schedule
23.	2 nd Class Officer's Quarter			232.34 sqm	145.76	-	-	145.76	Increased due to including the item in the revised PP.
24	Boundary Pillar	206 Nos.	6.57 (Tk.3188.00/ Nos.)		28.74	-	22.17	-	
25.	Plot Piller	20050 Nos.	3.41 (Tk. 17.00 /Pillar)	20050 Nos.	30.08 (Tk. 150.00 /Pillar)	-	26.67	-	Increased due to use of RCC pillar instead of Bamboo.
26.	Electrification		18960.61		18960.61	-	-	-	
27.	Water Supply		7180.77		7380.77	-	200.00	-	

SL No	Name of the Expenditure	Amount of work according to approved P.P	Costing according to approved P.P. (lakh taka)	Quantity of work according to corrected P.P	Proposed cost according to corrected P.P. (lakh taka)	Difference between approved and corrected cost/expenditure (lakh Taka)			Reason of increasing/decreasing cost
28	Titas Gas		3531.00		3531.00	-	-	-	
29.	Vehicle & Instrument	Jeep-1 Nos. Pick Up-1 Nos. Motor Cycle-4 Nos.	80.27	Jeep-4 Nos Pick Up-2 Nos. Microbus-1 Nos Motor Car-1 Nos Staff Bus-1 Nos Motor Cycle-12 Nos.	158.45	-	78.18	-	Due to the increment in the number of transport vehicles.
30.	Forestration		3.00 (Consolidated)		100.00 (Consolidated)	-	97.00	-	Due to increase in the Govt. Activities to preserve the forest.
31.	Survey & Planning	-	-	-	50.00			50.00	Was not included in the approved PP.

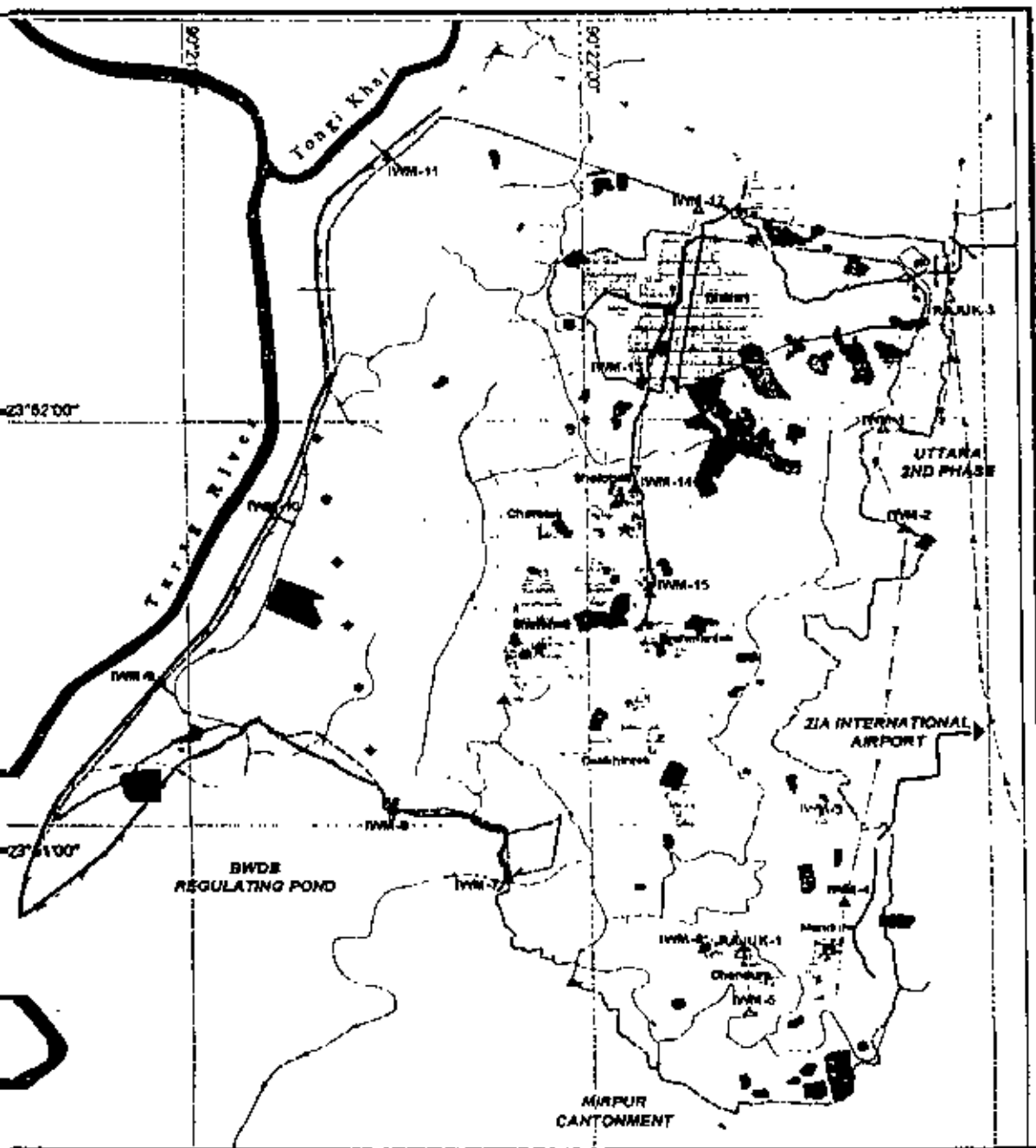
SL No	Name of the Expenditure	Amount of work according to approved P.P	Costing according to approved P.P. (lakh taka)	Quantity of work according to corrected P.P	Proposed cost according to corrected P.P. (lakh taka)	Difference between approved and corrected cost/expenditure (lakh Taka)			Reason of increasing/decreasing cost
32.	Other Expenditure								
	(A) Contingency		103.00		505.00		402.00		
	(B) Overhead								Overhead omitted due to ECNEC decision.
	(C) Labour		87.12		621.04		533.92		
	(D) Increased price		5566.58		12981.62		7415.04		
	(E) I.D.C.		26839.10		6129.33	20709.77			
		Total	204408.11		210581.06	25718.90	29650.73	2041.44	

= (+) 3.02%

Annexure-II

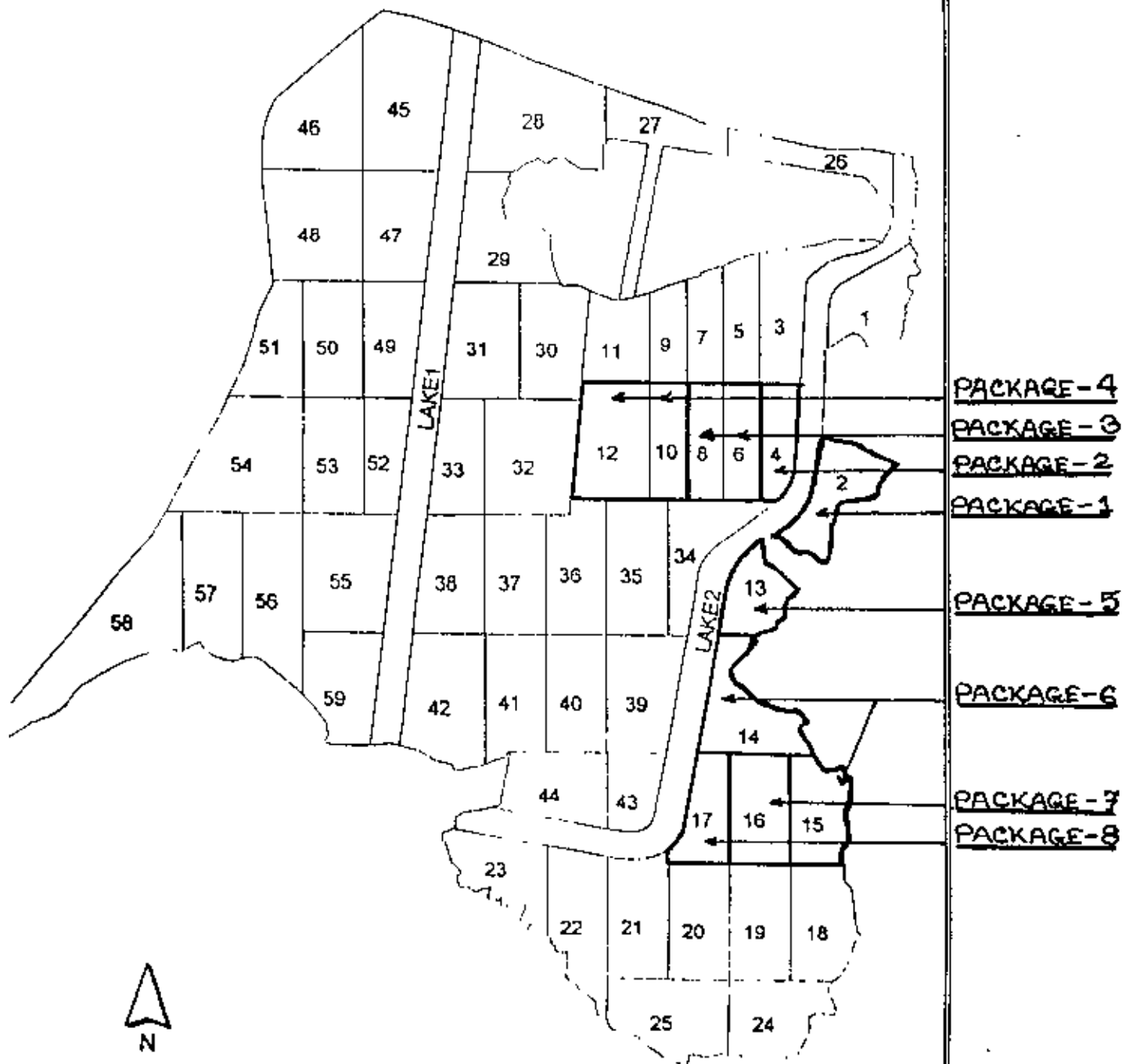
RAJDHANI UNNAYAN KARTRIPAKKHA

GPS BASED ADVANCE TOPOGRAPHIC SURVEY AND MAPPING OF UTTARA RESIDENTIAL MODEL TOWN (3RD PHASE)



Prepared By JWA.

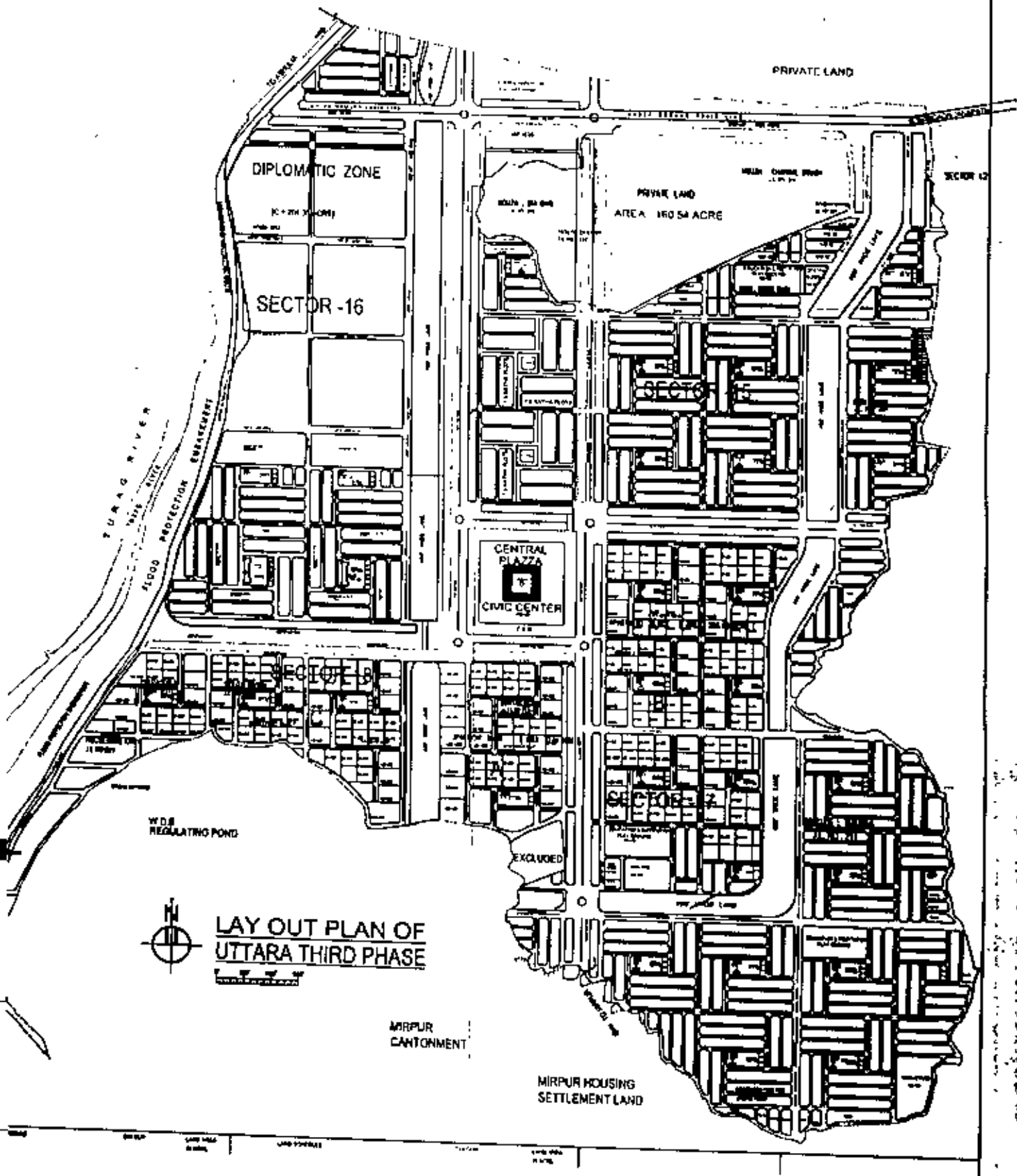
Zones of Uttara Residential Model Town (3rd Phase)



0 500 1000 Meters

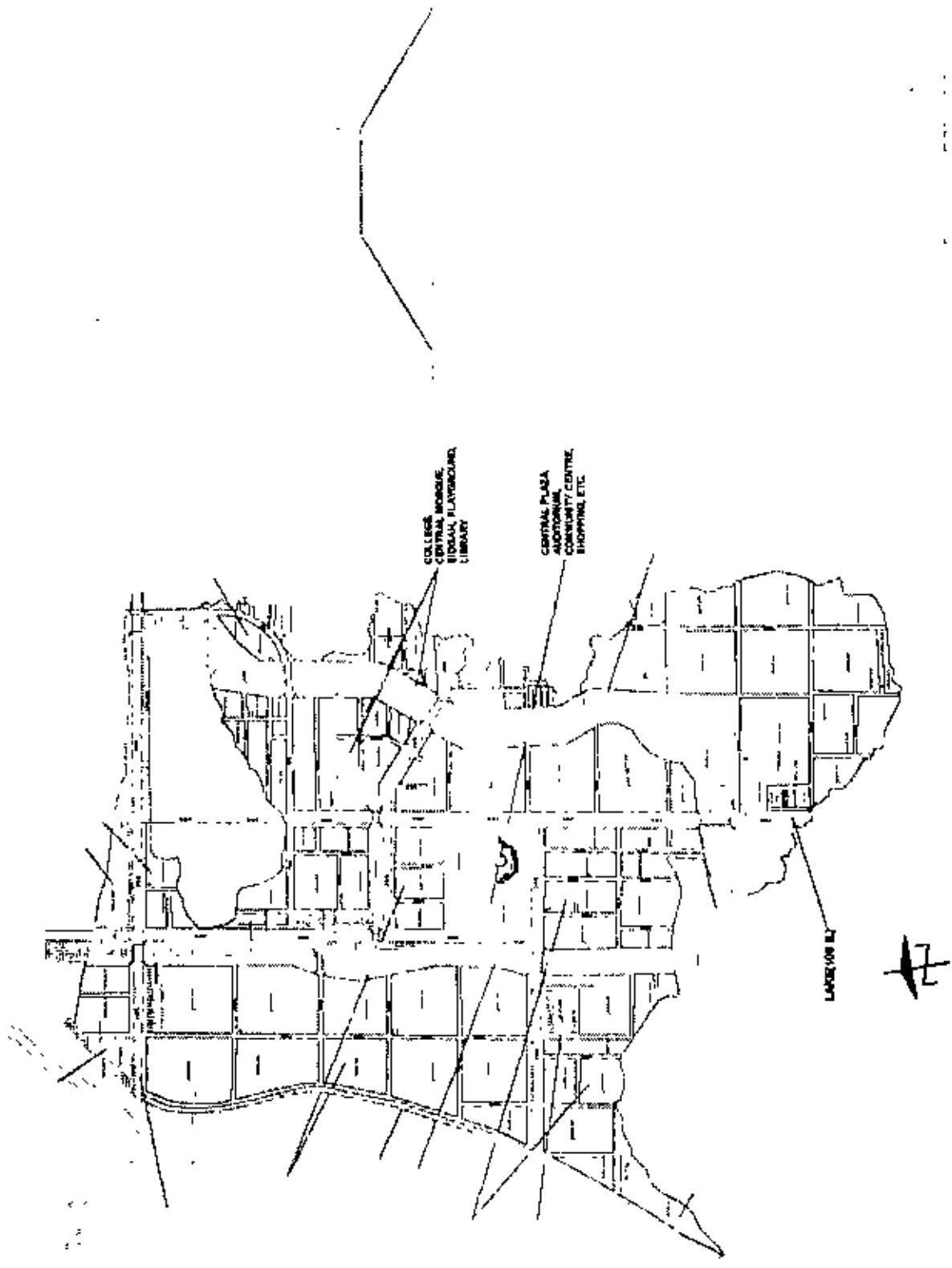
UTTARA MODEL TOWN [THIRD PHASE]

LAND DEVELOPMENT PROJECT OF RAJUK, BANGLADESH



Prepared by RAJUK.

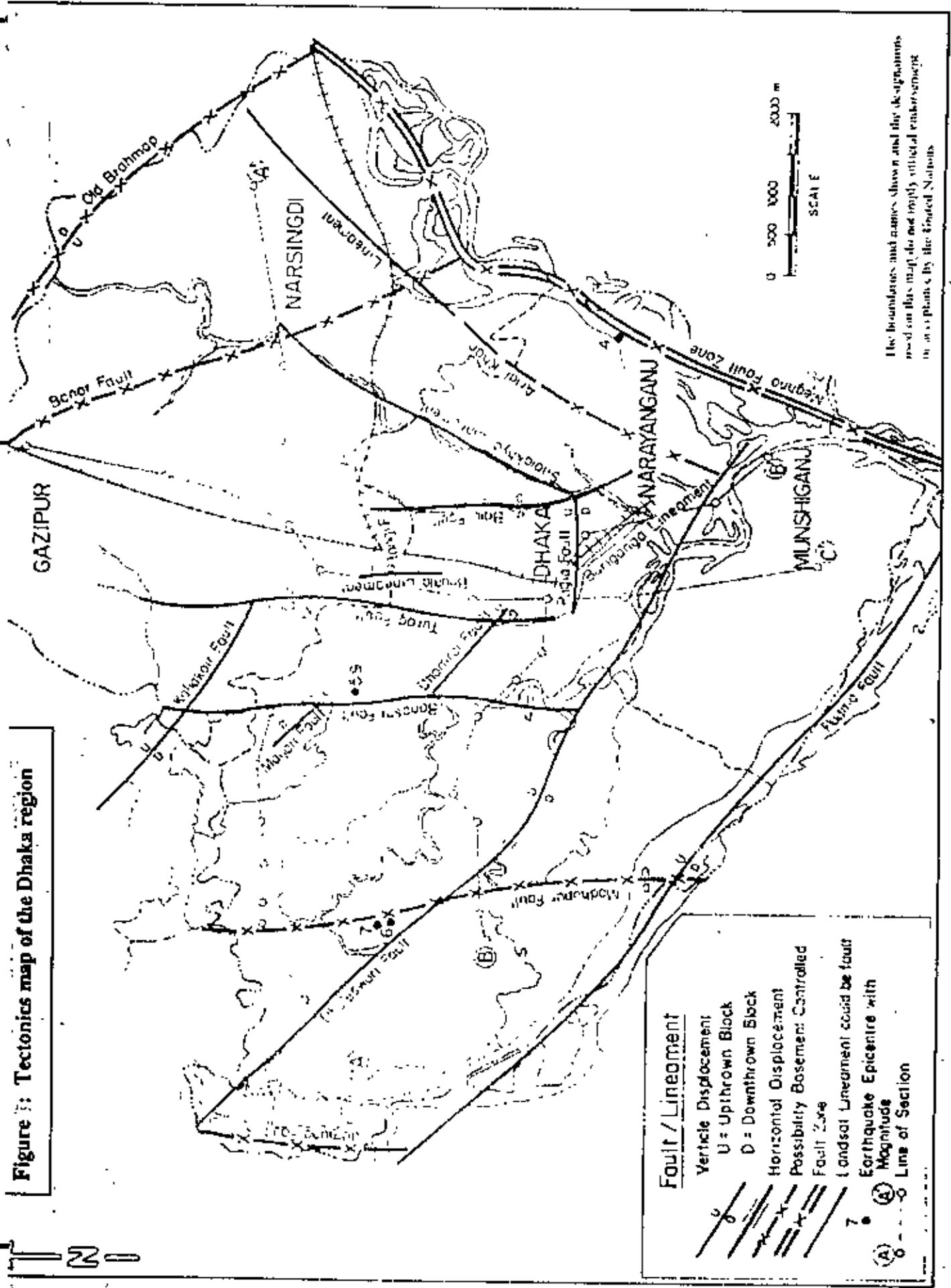
Prepared by BUET,



BUET



Figure 1: Tectonics map of the Dhaka region



REFERENCES

- [1] Islam,E.M.“Problems in New Settlements in Dhaka with Special Reference to Uttara Satellite Town”-MPhil,University of Newcastle upon Tyne(Oct,1987).
- [2] Schedule of Rates for Civil Works ,10th Edition (Revised),Public Works Department ,August,2004.
- [3] Development Proposal for Uttara Residential Model Town (3rd Phase) Project.,BRTC,BUET.,December,2005.
- [4] “Estimating and Costing in Civil Engineering “-B.N.Dutta.
- [5] Cost Accounting –Jawharlal ,2nd Edition ,1996,Tata McGraw Hill.
- [6] Management Accounting –Khan & Jenny.
- [7] Cost Accounting –Jawharlal ,2nd Edition ,1996,Tata McGraw Hill.
- [8] P.P. of Uttara Residential Model Town (3rd Phase)-Project Digest.
- [9] Topographic Survey and Mapping for Uttara Model Town 3rd Phase.(Final Report).-IWM

