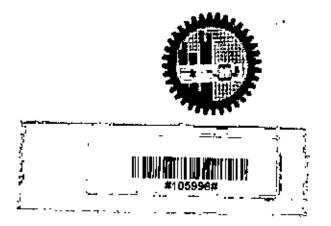
# PROFIT OPTIMIZATION IN GAS TRANSMISSION: CASE OF PURBACHAL PROJECT



### By

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A thesis submitted in partial fulfillment of the requirement for the degree of Master of Advanced Engineering Management



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October, 2008

### CERTIFICATE OF APPROVAL

The thesis titled "Profit Optimization in Gas Transmission: Case of Purbachal Project" submitted by Jannat Fatema, Roll Number - 100508111(p), session October' 2005, has been accepted as satisfactory in partial fulfillment of the requirements for the degree of Master of Advanced Engineering Management on October 25, 2008.

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### ABSTRACT

A lot of effort has been directed for gas network design in this country. The proposed gas network will be considered as part of the existing gas pipeline network. One of the objectives of this project work is to identify the parameters affecting economic viability of the Purbachal project, optimize, in terms of profitability, the gas transmission network and evaluate the economic viability of the "Purbachal project". The main outcome of this project is: an inclusive economic analysis report of the "Purbachal Project" which will investigate the financial viability of the project. In this project work, a financial profile has been built for finding net present value (NPV), benefit cost ratio (BCR) and internal rate of return (IRR) on the basis of 20 year project life. The proposed gas network that includes new aspects of designing may be fruitful for new network designing purpose in our gas distribution sector.

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## LIST OF ABBREVIATIONS

BCR	=	Benefit Cost Ratio
IRR	=	Internal rate of return
РВР	=	Pay-back period.
NPV	=	Net Present Value.
BGSL	=	Bakhrabad Gas Systems limited.
BOGMC	=	Bangladesh oil gas and mineral corporation.
BGFCL	=	Bangladesh Gas Fields Company Limited.
JGTDSL	=	Jalalabad Gas Transmission And Distribution
		Systems Limited.
PGCL	=	Pashchimanchal Gas Company Limited
TGTDCL	=	Titas Gas Transmission And Distribution Company
		Limited.
CAD	=	Computer Aided design.
СР	=	Cathodic Protection
DRS	=	District Regulating Station.
RMS	=	Regulating and Metering Station
TBS	=	Town Bordering Station.
CGS	=	City Gate Station
MMSCFH	-	Million Standard Cubic Feet Per Hour

# CHAPTER - I

### INTRODUCTION



#### 1.1 INTRODUCTION

Natural gas is Bangladesh's only significant source of commercial energy. The Government of Bangladesh estimates that natural gas accounts for 80 percent of the country's commercial energy consumption. Four distribution companies are providing gas supplies to the customers throughout the country; these are Titas Gas T & D Co. Ltd (TGTDCL), Jalalabad Gas T & D Systems Ltd (JGTDSL) Bakhrabad Gas Systems Ltd (BGSL), Pashchimanchal Gas Co. Ltd. (PGCL). Gas consuming sectors of this country are Fertilizer Factories, Power Plants, Industries, Commercial and Domestic etc. A corporate body "Petrobangla" under the Ministry of Petroleum, Energy and Mineral Resources supervise the activities of four separate distribution companies in the country, along with other seven Exploration, Production, Transmission and Mining Companies.

Among the four distribution companies of the country, Titas Gas T & D Co. Ltd. is the pioneer gas company engaged in gas transmission & distribution bussiness. Presently this company is facing difficulties due to the higher "System loss" and "low pressure" of gas in the distribution pipeline network. It is aided by faulty system design, lack of control and monitoring, poor organizational and pay structure of the companies and unplanned growth. The gas distribution Pipeline system of the Company has been built during seventies. With the rapid industrialization, present trend of construction of high rise buildings, the load/demand has increased tremendously, which results inadequate capacity of the present distribution network.

The performance of the proposed gas network, such as efficiency, flow rate, gas regulation, cost and losses etc. vary according to the rating, quality and application of the pipeline. To improve the performance and the quality of the gas network the design of the system should be efficient from the viewpoint of economical and technical aspects.

#### 1.2 BACKGROUND OF THE STUDY

Titas Gas T & D Co. Ltd. (TGTDCL) was formed in November 1964 as a join stock Company (Under the Company's Act 1913) of the central Government of Pakistan the Shell Oil Company, with a view to transmitting and distributing natural gas to the Dhaka city after the discovery of a new gas field called "TITAS" located within the close vicinity of the present Brahmanbaria district of Bangladesh. The authorized capital was Taka 17.8 million only, divided into 17800 shares of Taka 10.00 each.

After the liberation war, certain national priorities were set by the Govt. and significant changes were brought about in the management of development activities. A no. of sector corporations was formed and each of them was entrusted with the operation and management of the units under it. In March 26, 1972 Govt. has formed "Bangladesh Oil, Gas & Mineral Corporation (BOGMC) under the Presidential Executive Order and Titas Gas T & D Co. Ltd. has become an enterprise of BOGMC. Titas Gas T & D Co.Ltd. which was earlier established as a joint stock company with 90 percent share capital of the Govt. of Pakistan naturally vested to the Govt. of the People's Republic of Bangladesh and rest 10 percent share capital of Pakistan Shell Oil Company was transferred to the newly formed Bangladesh Shell Company. During 1975, under the nationalization program, Govt. has brought back 10 percent share of Shell Oil Co. and Titas Gas T & D Co. Ltd. has become a 100 percent Government owned company. Meanwhile, in the year 1974, Bangladesh Oil & Gas Corporation / (Petrobangla) and in the year 1975, Ministry of Energy & Mineral Resources had been formed. TGTDCL has been placed under the administrative control of the newly formed ministry along with Petrobangla and its subsidiary Companies. At present TGTDCL has spread out its network around Dhaka city, greater Dhaka, greater Mymensingh, B-Baria and Tangail district.

On the other hand the population of Dhaka city is increasing at a dreadful rate and the city is expanding rapidly towards Narshingdi, Savar, Gazipur, Jamalpur areas. To resolve the housing problem of Dhaka city dwellers a new project named "Purbachal" has been taken by "RAJUK" to establish a new urban outside Dhaka between Narsigdi and Gazipur

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district. To transmit and distribute gas to the proposed new city new gas network has to be set up and Titas Gas T & D Co. Ltd. (TGTDCL) has been given the responsibility for this job. As TGTDCL is a profit seeking organization it must find out whether the project is profitable for the company or not.

### **1.3 OBJECTIVE OF THE PROJECT**

With the rapid industrialization and population growth, country's natural gas requirement has increased to a great extent. The industrial zones are gradually extending in the direction of Bhaluka (Mymensingh) and Mirzapur (Tangaii). On the other hand, to resolve the growing housing problem of the Dhaka city dwellers, RAJUK is planning to construct a new residential area at the outskirt of Dhaka city, named Purbachal. TGTDCL has to extend its gas distribution network in "Purbachal". Economic evaluation, in terms of profitability, will be essential prior to construction. This research aims at optimizing the gas transmission and distribution network system and analyzing the feasibility of establishing new gas network at Purbachal.

The objectives of this project are:

- a. Identify the parameters affecting economic viability of the Purbachal project.
- b. Optimize, in terms of profitability, the gas transmission and distribution pipeline network system.
- c. Evaluate the economic viability of the "Purbachal Project".

The main outcomes of this project are: a) an inclusive economic analysis report of the "Purbachal Project" which will investigate the financial viability of the project, b) A study for maximizing profit of "Purbachal Project".

### 1.4 METHODOLOGY

The project will follow the steps given below:

- a. Estimate the scope of Purbachal in terms of area and population.
- b. Estimate gas consumption volume.
- c. Find out the financial requirements for infrastructure.
- d. Find out the constraints for economically optimizing the project.
- e. Formulate the Linear Programming model.
- f. Find out the economic parameters using suitable engineering economy technique such as IRR, NPV and Payback Period.

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### CHAPTER-II

### NATURAL GAS: BANGLADESH CONTEXT

#### 2.1 NATURAL GAS RESERVE

Natural gas reserve estimates vary widely for Bangladesh. Oil & Gas Journal (OGJ) reported that Bangladesh had 5 trillion cubic feet (Tcf) of proven natural gas reserves as of January 2006, down significantly from OGJ 's January 2005 estimate of 10.6 Tcf. It is not clear why the large downgrade of Bangladesh's natural gas reserves occurred. In mid-2004, estimates from state-owned Petrobangla put net proven reserves at 15.3 Tcf. Bangladesh's Ministry of Finance estimated in 2004 that the country holds 28.4 Tcf of total gas reserves, of which 20.5 Tcf is recoverable. In June 2001, the U.S. Geological Survey estimated that Bangladesh contains 32.1 Tcf of additional "undiscovered reserves."

While estimates of the country's reserves vary, natural gas is Bangladesh 's only significant source of commercial energy. The government of Bangladesh estimates that uatural gas accounts for 80 percent of the country's commercial energy consumption. In 2004, Bangaldesh produced 463 billion cubic feet (Bcf) of natural gas, up from 429 Bcf in 2003 and more than doubling the 1994 level. Despite increasing production levels, Bangladesh has never been a net exporter of natural gas. Given the uncertain size of the country's uatural gas reserves, the government has been reluctant to export natural gas and has instead focused on meeting current and future domestic energy needs.

#### 2.2 PRODUCTION & EXPLORATION

Natural gas exploration and production is dominated by three state-owned companies, all of which are subsidiaries of Petrobangla. Bangladesh 's largest gas production company, Bangladesh Gas Fields Company Ltd. (BGFCL), operates the Titas, Bakhrabad, Narsingdi, Habigouj, Feni, Begurnganj fields. BGFCL produces roughly half of the country's total natural gas production.

The Sylhet Gas Field Company Ltd. (SGFCL) is Bangladesh's second largest production company, producing 162 MMCFD of natural gas. SGFCL operates.the Sylhet, Kailashtila, Kailashtila, Rashidpur, and Beanibazar gas fields. The third state-owned company involved in natural gas production and exploration is BAPEX, which produces about 58 MMSCFD of natural gas from the Salda and Fenchuganj fields.

To encourage natural gas exploration, the government opened the natural gas sector to foreign investment in 1993, after initiating the First Bidding Round of Production Sharing Contracts. Foreign companies today produce over 6000 MMSCM of natural gas from four gas fields. The leading foreign producer is Chevron, which produces natural gas from the Jalalabad and Moulavibazar and Bibiana fields. The UK's Cairn Energy is the second largest foreign natural gas production company, producing natural gas from Bangladesh's lone offshore gas field at Sangn. Canada's Niko Resources has been involved in disputes with the government after two blowouts that occurred in 2005 at the company's Chattak (formerly known as Tengratila) gas field.

There are several other fields that may prove to hold additional natural gas resources. Petrobangla estimates that the Bibiana field, currently operated by Chevron, may contain as much as 2.4 TCF in recoverable natural gas reserves. Offshore natural gas fields also present large possible reserves, although minimal offshore exploration has occurred to date due to lingering border disputes with India and Myanmar.

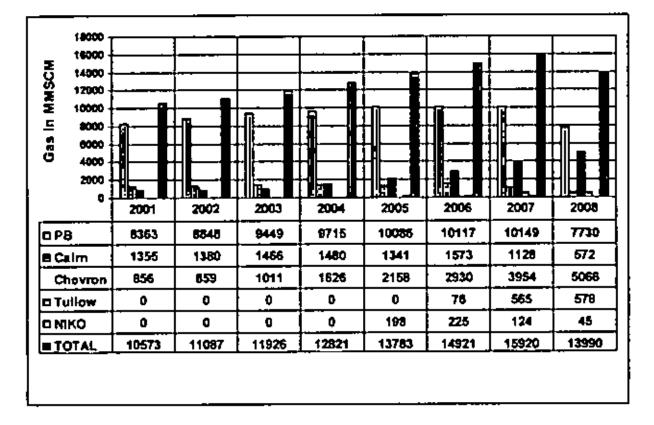


Figure 2.1: Natural Gas Production in Bangladesh (2001-2008)

### 2.3 PIPELINES

### 2.3.1 Domestic

Bangladesh's domestic natural Gas Transmission Pipeline Network is operated by the Gas Transmission Company Ltd. (GTCL), a subsidiary of Petrobangla. The company began with the 194 Km pipeline connecting the Kailashtila gas field to Ashuganj. Later GTCL implemented the 65 Km Ashuganj-Bakhrabad pipeline, which completed the interconnection of the national gas grid. GTCL currently operates 770 Km of transmission pipelines and is the sole natural gas transmission company in Bangladesh.

Most of Bangladesh's pipeline network is concentrated in the more populated and developed eastern zone of the country. In 2000, Bangladesh completed a 33 Km pipeline along the Jamuna River, which separates the eastern and western parts of the country. In 2001, this pipeline was extended to the Baghabari Natural Gas-Fired Power Plant, and a

network of pipelines in the west is now starting to take shape. In June 2006, the Government of Bangladesh and the Asian Development Bank (ADB) signed a \$230 million loan package to improve Bangladesh's natural gas infrastructure, specifically designed to aid economic development in the western part of the country. According to the ADB, the project includes four gas transmission pipelines, measuring 220 miles, which will transport about 360 MMCFD of natural gas to the 15 million people living in west Bangladesh.

#### 2.3.2 International

Since 1997, Bangladesh has been working to reach an agreement with its neighbors for the establishment of a 560-mile pipeline to transport natural gas from Myanmar to India through its territory. The project has not yet been approved, the fate of which will depend upon India and Myanmar accepting trade concessions and other stipulations. So far, India has not accepted the demands of Bangladesh, and GAIL, India's state-owned pipeline operator, completed a feasibility study in June 2006 of an 870-mile pipeline from Myanmar that would circumvent Bangladesh altogether. However, this option would significantly increase transport costs of natural gas from Myanmar, and the pipeline would have to travel through unstable areas in northeastern India.

### CHAPTER-III

### LITERATURE REVIEW

#### 3.1 PAY BACK PERIOD

Evaluating capital investments for additions or modifications to warehouses, for replacement of equipment or for entirely new facilities is a complex activity which involves numerous financial, competitive and other considerations. The financial aspect of capital investments is addressed and it is shown how ten different investment criteria can be brought to bear on the capital investment issue. The ten investment criteria consist of five primary criteria and five secondary criteria. The primary criteria are payback period in years, non-discounted rate of return on investment, internal rate of return, Baldwin rate of return, and benefit cost ratio. All ten criteria are described and suggestions are made when each criterion is appropriate. [1]

In response to a call for more research on the "why" of capital budgeting practices, a survey was sent to the Fortune 500 firms to (1) look at the detailed reasons they used particular capital budgeting techniques, (2) to determine if and why they had changed their emphasis on any of those techniques in the last five or ten years, and (3) to explore the importance of strategic considerations in capital budgeting. Detailed reasons and their rankings are given for the choices of payback, discounted payback, accounting rate of return, internal rate of return, modified internal rate of return, profitability index, net present value, and other miscellaneous techniques. [2]

### 3.2 INTERNAL RATE OF RETURN (IRR)

Examines the problem of multiple solutions in relation to the use of the internal rates of return (IRR) as a decision-making criterion. Attempts to show that positive multiple IRRs occur only in a limited number of cases and in such cases the IRR is not the appropriate measure of return. Argues instead that the true rate of return for such projects is shown to be dependent on the cost of capital. Suggests two methods to deal with this problem: the extended yield method and the return on invested capital method. [3]

Papers by Wyatt (Wyatt, 1984) and Hall (Hall, 1985) have addressed the subject of property performance measurement in this journal, and the topicality of the subject has been ensured by the response to Hager and Lord's paper to the Iustitute of Actuaries (see Editorial, Journal of Valuation, 3: and Brown, 1985). However, the measure employed has not been the subject of detailed analysis, and at various times the time weighted rate of return, the money weighted rate of return, the internal rate of return and others have been suggested as the appropriate measure. It is not even clear whether MWRR and IRR are identical measures. This paper examines alternative measures and demonstrates the difference between MWRR and IRR and makes recommendations of the correct measure. [4]

### 3.3 INTERNAL RATE OF RETURN (IRR) AND NET PRESENT VALUE (NPV)

Despite its shortcomings, the IRR method continues to be a widely employed evaluation technique in capital bndgeting. This paper demonstrates the reasons for its continued popularity. Specifically, the non-requirement of a discount rate is suggested to be an important factor in the choice of IRR over the NPV criterion. A major implication is that managers face a very elusive, or stochastic, discount rate for NPV analysis. Thus, the aversion to NPV may go beyond simple aesthetics. [5]

Methods of capital budgeting have been well established in the finance literature as well as in corporate practice. In general, the discounted cash flow methods (IRR, NPV, PI) are considered to be superior. An investment project is therefore acceptable (at least in financial terms) when its net present value is positive or its internal rate of return is above the specified cut-off rate. In case of capital rationing, we allocate funds and consequently approve projects in descending order of their profitability index to make sure we obtain the maximum present value per dollar invested. [6]

### CHAPTER-IV

### **DETAILS OF PROPOSED AREA (PURBACHAL)**

### 4.1 BACKGROUND

At present TGTDCL has spread out its network around Dhaka Metropolitan city, greater Dhaka Area, greater Mymensingh Area and B-Baria. On the other hand, recently "RAJUK" has initiated a new project named "Purbachal" to establish a new urban areaoutside Dhaka between Narsingdi and Gazipur district. Titas Gas T & D Co. Ltd. (TGTDCL) has been entrusted with the responsibility of setting up new gas network to transmit and distribute gas to the proposed new city.

Dhaka Metropolitan city has now been turned into the busiest & densely populated city. Presently about 120 million people reside permanently in Dhaka city, the capital of Bangladesh for service, business and other purpose. Dhaka is expected to take new shape of a Mega city within 2005. The dwelling places required for this 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 causing damage to the natural scenario of the Metropolitan city.

It is possible to reduce the pressure of population of Dhaka city to a great extent by developing the surrounding area of Dhaka city in a planned way and establishing permanent residential accommodation for these vast population. The proposed new residential town will be established in area between Rupganj Upazila of Narayanganj District and Kaligonj Upazila of Gazipur District. The total area of the project is approximately 6150.00 acres. The project area consists of red soils and not so suitable efforts for agriculture and mixed with low lying and hilly undulated land.

### 4.2 TITAS FRANCHISE AREA (TFA)

TGTDCL has its 20", 16", 12", 8", 6", 4", 3", 2", 1" dia gas network within Dhaka Metropolitan city, Munshigonj, Manikgonj, Narayangonj, Narsingdi, Gazipur, Brahmanbaria, Tangail, Kishoregonj, Mymensingh, Jamalpur, Netrokona, Sherpur. (Figure-4.1)

### 4.3 DESCRIPTION OF PROPOSED AREA

Proposed "Purbachal New Town Project" is situated at a distance of 16 km from zero point of Dhaka between Rupgonj Upazila of Narayangonj District & Kaligonj Upazila of Gazipur District in between River Balu and Sitalakha.

Objectives of the Project are:

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- To reduce the pressure of population in Dhaka city by creating opportunity of residential accommodation of the city dwellers in the vicinity of the city.
- To maintain the balance of environment by proper Urbanization. To create environment friendly and sustainable atmosphere.
- To reduce the existing acute problem of housing.
- To expand civic facilities by urbanization to the near by and surrounding areas gradually.
- Development of new township and to expand economic facilities.
- To mitigate future housing demand.

The project area is divided into thirty sectors. The Purbachal New Town project will connect Dhaka through a six-kilometer eight-lane highway and will house more than 300,000 people. Purbachal land has been divided into four major areas including a residential area of 2,521.92 acres, a commercial area covering 369.59 acres, industrial and institutional areas occupying 123.52 and 129.53 acres, respectively. Rajdhani Unnayan Kartripakkha (Rajuk), the Dhaka City Development Authority, which is in charge of the project, allocated 2,961 plots to non-resident Bangladeshis out of 33,000 in 2003 in an unprecedented move, aiming to inject more foreign currency into the economy. Some parts

of the project site are 20 to 30 feet below normal land level, and the government is filling the area by bringing in soil. Following this, land-leveling and other enabling works will be carried out. The proposed plan of Purbachal New Town is shown in Figure- 4.2.

This will be followed by the construction of a road network, community areas, schools, hospitals, cable network for power supply, gas network for gas supply and a pipeline network to bring water for residents. A network of lakes and parks will complement the landscape.

About 40 per cent of the 33,000 plots have been allocated. The rest will be distributed through a lottery among the applicants who are Bangladeshi citizens. However, according to the commitment; the government gives preference to non-resident Bangladeshis.

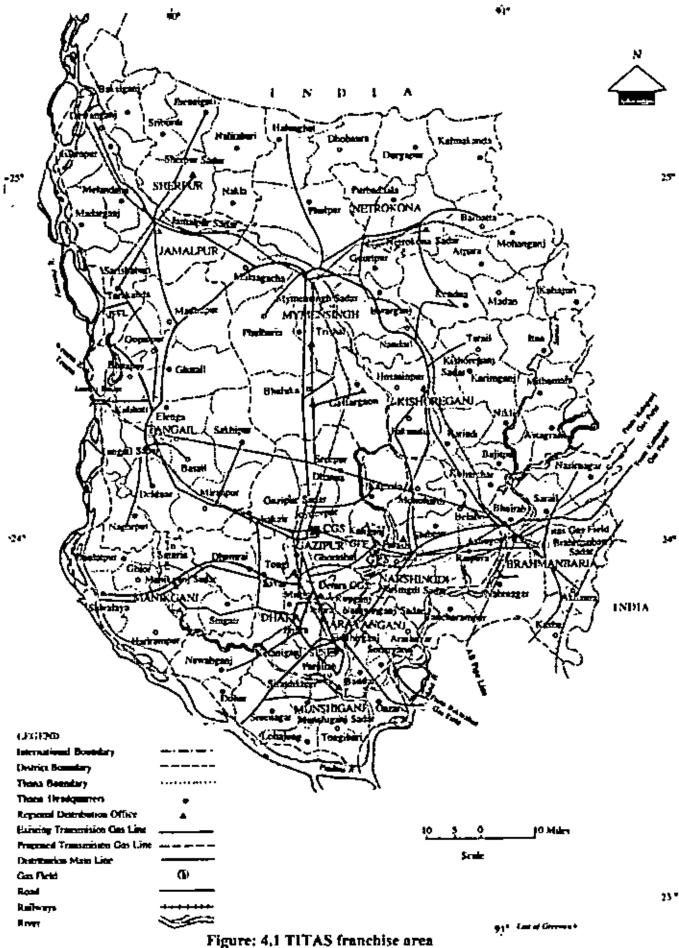
More than 10 million people live in Dhaka, Bangladesh's political and commercial capital. Property developer's say the project will help ease the growing housing problem of Dhaka, one of the most densely inhabited cities in the world. Real estate and construction are among the fastest growing sectors in the country. A number of foreign investors including India's Sahara Group is planning to develop townships in large suburbs of Dhaka and Chittagong because the demand for housing will continue to grow.

### 4.4 DESCRIPTION OF PROPOSED GAS NETWORK

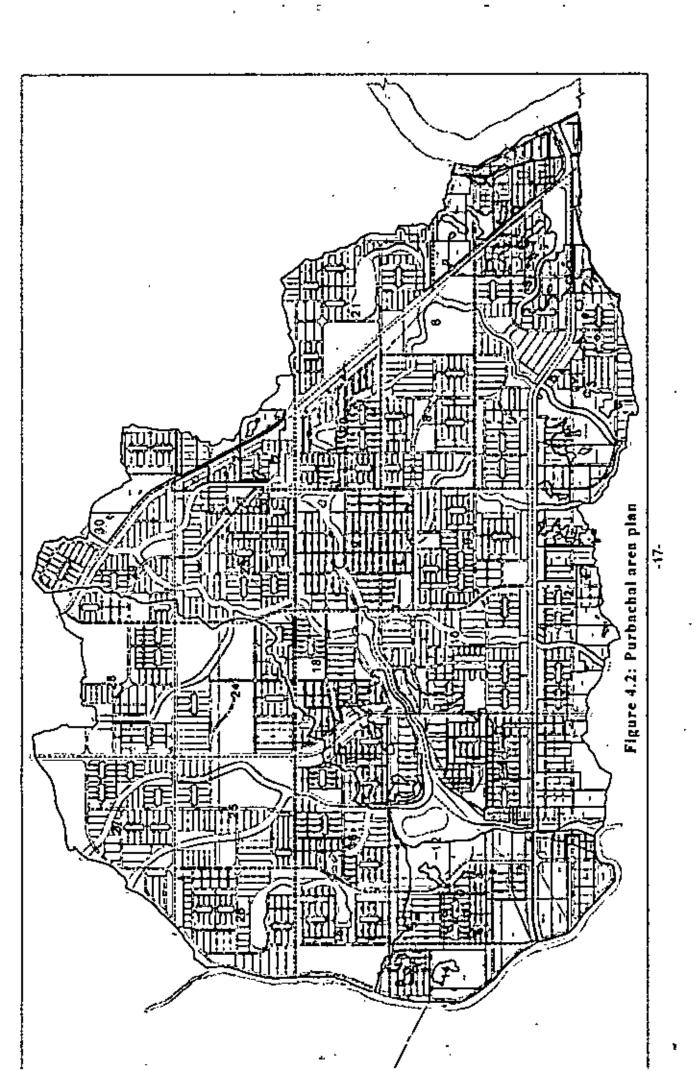
A 20" dia transmission line of 1000 Psig will supply gas to Station -1 which will be the combination of City Gate Station (CGS), Town Bordering Station (TBS), District Regulating Station (DRS). The proposed area for station -1 is Sector - 4. A 300' x 250' land is needed for Station -1. In proposed CGS, the pressure of the pipeline will be will lowered from 1000 psig to 300 psig. The inlet of TBS will be 300 psig and the outlet will be 150 psig. The pressure of the 150 psig pipeline will be brought down to 50 psig through DRS. For proposed TBS and DRS 100" x 150' land is needed. RAJUK has agreed to allocate necessary land/area for proposed Station -2, Station-3, and Station-4 at Sector 13, 23 and 26. These three stations will be the combination of TBS and DRS. The four stations will act as a source to form a rectangle shape gas pipeline network and will be connected to

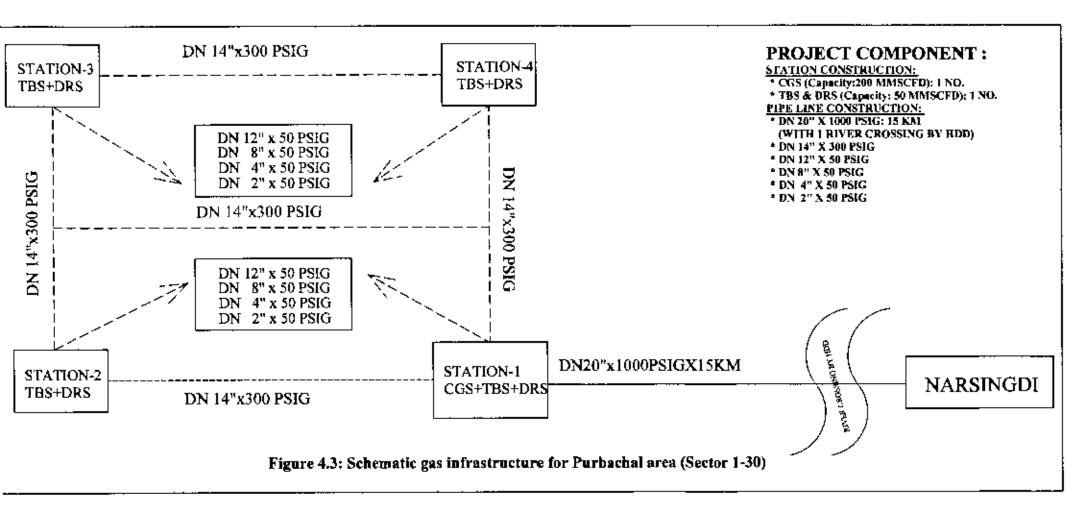
each other by 14"DN x 300 psig Distribution Main line. From the four stations 12", 8", 4", 2" dia gas pipeline network will be constructed to form the backbone of gas supply to the customers of the town. The schematic diagram of proposed gas infrastructure is shown in Figure-4.3.

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### CHAPTER - V

### FINANCIAL EVALUTION CRITERION

### 5.1 INTRODUCTION

The idea of this economic accounting originated with Jules Dupuit, a French engineer whose article in 1848 is still worth reading. The British economist, Alfred Marshall, formulated some of the formal concepts that are at the foundation of CBA (Cost Benefit Analysis). But the practical development of CBA came as a result of the impetus provided by the Federal Navigation Act of 1936. This act required that the U.S. Corps of Engineers carry out projects for the improvement of the waterway system when the total benefits of a project to whomsoever they accrue exceed the costs of that project. Thus, the Corps of Engineers had created systematic methods for measuring such benefits and costs. The engineers of the Corps did this without much, if any, assistance from the economics profession. It wasn't until about twenty years later in the 1950's that economists tried to provide a rigorous, consistent set of methods for measuring benefits and costs and deciding whether a project is worthwhile.

### 5.2 PROFITABILITY ANALYSIS

Soundness of a project from financial standpoint should be checked before going for the construction of the project. Financial analysis of development project deals with review of profitability analysis and cost effectiveness analysis. Profitability analysis will help identify the key variables which influence the project cost and benefit streams.

For long term investment decision making that is for capital budgeting following techniques commonly used :

- i. Pay-Back Period (PBP)
- ii. Net Present Value (NPV)
- iii. Internal Rate of Return (IRR)
- iv. Benefit Cost Ratio (BCR)

The first three profitability indicators i.e. NPV, BCR and IRR takes into account the relative time value of money and benefit flows through the process of discounting.

### 5.3 PAY BACK PERIOD

The payback period is the expected number of years to recover the original investment.

Payback Period = (number of required completed years) + Amount required / Cash Flow in the year of full recovery of investment

Example:

Year	Cash flow (Project A)	Cash flow (Project B)
0	(5000)	(5000)
1	2500	600
2	2200	1600
3	1300	2500
4	1000	3100

Payback Period (A) = 2+ 300/1300 = 2.23 Years

Payback Period (B) = 3+300/3100 = 3.097 Years

#### 5.4 TIME VALUE OF MONEY

In the economic or financial analysis of a project, the flows of costs and benefits are basically considered over time. Time, therefore, is an important dimension of any investment decision. Time involves sacrifices in the present over future. The normal expectation would be that benefit accruing in the future should be sufficient to compensate for the sacrifice in the present. The techniques of discounting and compounding are the two basic ways of taking the time value concept of money into consideration.

### 5.5 NET PRESENT VALUE (NPV)

### 5.5.1 Concept

NPV is an indicator of how much value an investment or project adds to the value of the firm. With a particular project, if  $C_t$  is a positive value, the project is in the status of discounted cash inflow in the time of t. If  $C_t$  is a negative value, the project is in the status of discounted cash outflow in the time of t. Appropriately risked projects with a positive NPV could be accepted. In financial theory, if there is a choice between two mutually exclusive alternatives, the one yielding the higher NPV should be selected. The following sums up the NPVs in various situations.

### 5.5.2 Decision Rule

If	It means	Then
NPV > 0	the investment would add value to the firm	the project may be accepted
NPV < 0	the investment would subtract value from the firm	the project should be rejected
NPV = 0	the investment would neither gain nor lose value for the firm	We should be indifferent in the decision whether to accept or reject the project. This project ` adds no monetary value. Decision should be based on other criteria.

However, NPV = 0 does not mean that a project is only expected to break even, in the sense of undiscounted profit or loss (earnings). It will show net total positive cash flow and earnings over its life.

Net present value (NPV) is a standard method for the financial appraisal of long-term projects. Used for capital budgeting, and widely throughout economics, it measures the excess or shortfall of cash flows, in present value (PV) terms, once financing charges are net. By definition,

NPV = Present value of net cash flows.

### Formula:

Each cash inflow/outflow is discounted back to its PV. Then they are summed.

The Net Present Value (NPV) of a whole income stream is the sum of these present values of the individual amounts in the income stream. If we still assume that income comes or goes in annual bursts and that the discount rate will be constant in the future, then the NPV has this formula:

### Where,

$$NPV = \sum_{i=0}^{n} \frac{b_{i} - c_{i}}{(1 + r)^{i}}$$

$$NPV = \frac{b_{0} - c_{0}}{(1 + r)^{0}} + \frac{b_{1} - c_{1}}{(1 + r)^{1}} + \frac{b_{2} - c_{2}}{(1 + r)^{2}} + \dots + \frac{b_{n} - c_{n}}{(1 + r)^{n}}$$
(5.1)

 bi = benefits derived from the project in year i.
 ci = Cost (investment, operating and other associated expenses) Incurred by the project in year i.

r = discount rate

I = time period which runs from year zero to year n.

### 5.6 DISCOUNTING

### 5.6.1 Discount Rate

The rate used to discount future cash flows to their present values is a key variable of this process. Many people believe that it is appropriate to use higher discount rates to adjust for risk for riskier projects.

NPV value obtained using variable discount rates (if they are known) with the years of the investment duration better reflects the real situation than that calculated from a constant discount rate for the entire investment duration.

To some extent, the selection of the discount rate is dependent on the use to which it will be put. If the intent is simply to determine whether a project will add value to the company, using the firm's weighted average cost of capital may be appropriate. If trying to decide between alternative investments in order to maximize the value of the firm, the corporate reinvestment rate would probably be a better choice.

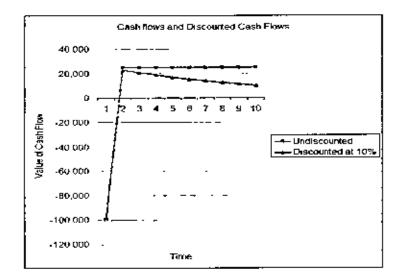


Figure 5.1 Cash flows and discounted cash flows

The discounted present value may be derived through the formula:

$$P_{0} = P_{N} \frac{1}{(1 + r)^{n}}$$
(5.2)

Where,

Pn	Ξ	Present value
Po	=	expected revenue at some future year, N
r	=	discount rate, and
n	-	the discounting period.

#### 5.7 INTERNAL RATE OF RETURN (IRR)

#### 5.7.1 Concept

The internal rate of return (IRR) is a capital budgeting metric used by firms to decide whether they should make investments. It is an indicator of the efficiency of an investment, as opposed to net present value (NPV), which indicates value or magnitude.

The Internal Rate of Return (IRR) is the discount rate that generates a zero net present value for a series of future cash flows i.e. it is the discount rate that equates the present values of project's benefits and costs. IRR does not depend upon externally given social rate of discount. Conversely, what it represents is essentially the average earning power of money used in project over the project life. The commonly nsed formula (approved by Planning Commission, Ministry of Planning) for calculating IRR is:

IRR = S + (N/N+M) x (P-S) (5.3) Where, S = Lower rate of discount at which NPV is (+) P= Higher rate of discount at which NPV is (-)

N=NPV at lower rate of discount rate

M = Absolute NPV at higher rate of discount rate

This essentially means that IRR is the rate of return that makes the sum of present value of future cash flows and the final market value of a project (or an investment) equal its current market value.

The IRR is the annualized effective compounded return rate which can be earned on the invested capital, i.e., the yield on the investment.

A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternative investments (investing in other projects, buying bonds, even putting the money in a bank account). Thus, the IRR should be compared to an alternative cost of capital including an appropriate risk premium.

Mathematically the IRR is defined as any discount rate that results in a net present value of zero of a series of cash flows.

In general, if the IRR is greater than the project's cost of capital, or *hurdle rate*, the project will add value for the company.

#### Method

To find the internal rate of return, find the value(s) of r that satisfies the following equation:

NPV = 
$$C_0 + \sum_{t=1}^{N} \frac{C_t}{(1+r)^t} = 0$$
 (5.4)

Example:

Year	0	1	2	3	4
Cash Flow	-100	+30	+35	+40	+45

NPV = 
$$-100 + \frac{30}{(1+r)^1} + \frac{35}{(1+r)^2} + \frac{40}{(1+r)^3} + \frac{45}{(1+r)^4} = 0 \Rightarrow r \approx 17.09$$

IRR = r,

IRR = 17.09%

.

Net Present Value (NPV) Thus using r = IRR = 17.09%,

$$NPV = -100 + \frac{30}{(1+17.09\%)^1} + \frac{35}{(1+17.09\%)^2} + \frac{40}{(1+17.09\%)^3} + \frac{45}{(1+17.09\%)^4} = 0.00$$

#### 5.7.2 Decision Rule

In cases where one project has a higher initial investment than a second mutually exclusive project, the first project may have a lower IRR (expected return), but a higher NPV (increase in shareholders' wealth) and should thus be accepted over the second project (assuming no capital constraints).

IRR makes no assumptions about the reinvestment of the positive cash flow from a project. As a result, IRR should not be used to compare projects of different duration and with a different overall pattern of cash flows.

The IRR method should not be used in the usual manner for projects that start with an initial positive cash inflow (or in some projects with large negative cash flows at the end), for example where a customer makes a deposit before a specific machine is built, resulting in a single positive cash flow followed by a series of negative cash flows (+ - - -). In this case the usual IRR decision rule needs to be reversed.

If there are multiple sign changes in the series of cash flows, e.g. (-+-+), there may be multiple IRRs for a single project, so that the IRR decision rule may be impossible to implement. Examples of this type of project are strip mines and nuclear power plants, where there is usually a large cash outflow at the end of the project.

Despite a strong academic preference for NPV, surveys indicate that executives prefer IRR over NPV. Apparently, managers find it easier to compare investments of different sizes in terms of percentage rates of return than by dollars of NPV. However, NPV remains the "more accurate" reflection of value to the business. IRR, as a measure of investment

efficiency may give better insights in capital constrained situations. However, when comparing mutually exclusive projects, NPV is the appropriate measure.

#### 5.8 BENEFIT-COST RATIO (BCR)

#### 5.8.1 Concept

A Benefit-Cost Ratio (BCR) is an indicator, used in the formal discipline of cost-benefit analysis, that attempts to summarize the overall value for money of a project or proposal. A BCR is the ratio of the benefits of a project or proposal, expressed in monetary terms, relative to its costs, also expressed in monetary terms. All benefits and costs should be expressed in discounted present values.

In the absence of funding constraints, the best value for money projects is those with the highest net present value. Where there is a budget constraint, the ratio of NPV to the expenditure falling within the constraint should be used. In practice, the ratio of NPV to expenditure is expressed as a BCR. BCRs have been used most extensively in the field of transport cost-benefit appraisals.

The Benefit-Cost Ratio (BCR) is derived by dividing present value benefit (PVB) by present value cost (PVC) i.e. BCR = PVB/PVC. The benefit cost ratio indicates benefit per taka of cost.

#### 5.8.2 Decision Rule

If BCR is more than one, that is discounted present value of the benefits exceeds the discounted present value of the costs, investment in the project is worthwhile. This is equivalent to the condition that the net benefit must be positive. Net Present Value and benefit cost ratio may not provide the same ranking of the projects. In an investment decision, therefore, selection of investment criteria is important. As long as we are concerned with a single project or two or more projects whose costs are the same the NPV criterion is adequate. But in a situation with differing costs, BCR provides a relative measure of worthwhile ness to the project.

Formula:

$$BCR = \frac{\sum_{i=0}^{n} \frac{b_i}{(1+r)i}}{\sum_{i=0}^{n} \frac{c_i}{(1+r)i}} = \frac{PVB}{PVC}$$

Where,

b₁≐	benefit	ts in derived .
$\mathbf{c}_{\iota} =$	Cost ir	r period i.
I =	discou	nt rate
<b>n</b> =	Discou	inting period.
PVB	=	Present value Benefit.
PVC	=	Present value Cost.

If there are more than one mutually exclusive project that have positive net present value then there has to be further analysis. From the set of mutually exclusive projects the one that should be selected is the one with the highest net present value.

The magnitude of the ratio of benefits to costs is to a degree arbitrary because some costs such as operating costs may be deducted from benefits and thus not be included in the cost figure. This is called *netting out* of operating costs. This netting out may be done for some projects and not for others. This manipulation of the benefits and costs will not affect the net benefits but it may change the benefit/cost ratio. However it will not raise the benefit cost ratio which is less than one to above one.

# CHAPTER-VI

# INVESTMENT COST

#### 6.1 INVESTMENT COST SUMMARY

The investment cost of this project is consists of 15 Km Transmission component, 20 Km Distribution Main component, 786 Km Distribution component, Four stations for Regulating and Metering and a River Crossing by Horizontal Directional Drilling (HDD) Method. A cost estimate has been made using the rates of the previous projects undertaken by the Company. The summary of the project costing is shown in Table 6.1.

#### 6.2 TRANSMISSION COMPONENT

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The Transmission component of Purbachal Project consists of 15 km Transmission Pipeline (20" DN x 1000 Psig) and 20 km Distribution Main Pipeline (14" DN x 300 Psig). The 20 Km Transmission pipeline will transmit gas from Narshingdi Valve Station -12 to proposed CGS at Purbachal. On the basis of the experience of the other projects varions elements and costs of the transmission and distribution main component are projected. The costing of Transmission and Distribution Main component is shown in Table 6.2 and the detail calculation of this component is shown in Table 6.3.

#### Table 6.1: Preliminary project costing summary

#### **GROUP- A: STATION CONSTRUCTION**

					(in lakh Taka)
SL. NO.	COMPONENT	QUA	NTITY	UNIT RATE	TOTAL AMOUNT
1	CGS (Capacity: 200 MMSCFD)				
a	Material Cost	1	Nos.	150.00	150.00
Ъ	Construction Cost	1	Nos.	30.00	30.00
2	TBS/DRS (Copacity: 50 MMSCFD Each)				
а	Material Cost	3	Nos.	100.00	300.00
Ь	Construction Cost	3	Nos.	20.00	60.00
		1	OTAL (	GROUP A):	540.00

#### GROUP- B: RIVER CROSSING BY HDD METHOD

SL. NO.	COMPONENT	QUA	NTITY	UNIT RATE	TOTAL AMOUNT
	SHITALAKHAYA RIVER CROSSING Shitalakhaya River Crossing by HDD method (adding 10%				
a	contingency)	1	LOT		482.35
		]	FOTAL (	GROUP B):	482,35

#### GROUP- C: PIPELINE CONSTRUCTION

-

SL. NO.	COMPONENT	QUA	NTITY	UNIT RATE	TOTAL AMOUNT
1	Transmission Pipeline: (20" x 1000 Psig x 15 km)				
	Distribution Main Pipeline: (14" x 300 Psig x 20 km)				
а	Land Acquistion (Katha), 15 km x 20'	23	acres	10.00	230.00
Ь	Land Requistion (Katha), 15 km x 30'	35	acres	3.00	105.00
¢	Road Restoration Charge	12200	sqm,		186.81
d	Material Cost		LOT		4,582.39
e	Construction Cost	35000	М		1,396.48
f	Other Cost		L.S.		15.00
			SUB-TO	TAL (C.I):	6,515.68
<u>;</u> 2	Feeder Main Pipeline: (12" x 50 Psig x 274km)				
	Distribution Pipeline: (8" x 50 Psig x 90 km)			Í	
:	Distribution Pipeline: (4" x 50 Psig x 62 km)				
	Distribution Pipeline: (2" x 50 Psig x 360 km)			[	
æ	Road Restoration Charge	479460	sgm.		4,125.89
	Material Cost		LOT		28,909.34
c	Construction Cost	50000	m	320.00	1,682.15
			SUB-TO	TAL (C.2):	34,717.38
				ROUP - C):	41,233.06
				L (A+B+C):	42,255.41
	4	% Contingency			1,670.92
	· · · · · · · · · · · · · · · · · · ·			D TOTAL:	43,926.33

# Table 6.2: Costing for Transmission and Distribution main component

			in Lakh Taka)
A. PRE CONSTRUCTION EXPENDITURE	Local	Foreign	Toral
1 Land Acquisition	230 00	· · · · ·	230.00
2 Land Requisition	105 00	-	105.00
3. Survey/Design/Drawing etc	10.00	-	10.00
4. IEE/EIA	5.00	-	5.00
SUB - TOTAL (A):	350.00	-	350.00

B. MATERIAL COST	Local	Foreign	Total
1. Line Pipe		1,717.50	1,717.50
2. Valves & Fittings		601.13	601.13
3. Tape & Primer	-	343.50	343.50
4. Station Materials (1 CGS + 3 TBS/DRS)	-	450.00	450.00
5. CP Materials	-	20.00	20.00
6. CD/VAT	1,566.06	-	1,566.06
7. Pre-shipment Inspection		5.32	5.32
8 Landing, Transportation and Storage cost	156 61	-	156.61
9. Miscellaneous Charges Relating to Foreign Procurement	172.27	-	172 27
SUB - TOTAL (B):	1,894.94	3,137.45	5,032.39

C. CONSTRUCTION COST :	Local	Foreign	Total
1 Laying Cost	925.00	-	925.00
2 Welding Cost	104.55	-	104.55
3. Highway/Railway Crossing	10.00	-	10.00
4. Canal/Khal Crossing	20.00	-	20.00
5. TBS/DRS Construction	90.00	-	90 00
6. Civil Construction DRS Foundation, Boundary Wall	77.20	-	77 20
7. CP Construction	20.00	-	20.00
8. Road Restoration	186.81	-	186.81
SUB - TOTAL (C):	1,433.56	-  _	1,433.56
TOTAL (A+B+C) :	3,678.49	3,137.45	6,815.94
Adding 4% Contingency	147.14	125.50	272 64
TOTAL INVESTMENT COST :	3,825.63	3,262.95	7,088.58

# Table 6.3 Detail calculation (Transmission & Distribution main component)

Description	Area/Unit	Unit Price	Lecal	Foreign	Total
1) PRE CONSTRUCTION EXPENDETURE					
Land Acquistion (Katha), 15 km x 20	23 00	10.00	230 00	-	230.
Land Regulation (Katha), 15 km x 20	35,00	3 00	105 00	-	105
Survey/Desten/Drawing etc.	LS		10 00 1	-	10,0
ETA	1.5	LS.	5,00		5
	1.3 1.\$	LS		•	
Sou Investigation	3	Seb-Total=	350.00		350.
2) MATERIALS					
(a) Line Pipe:	Length	Unit Pelce	Local	Foreign	Totai
Local Procurement					
8" DN	0	3,187.00	-		
6" DN	0	2,030,00	-	-	-
4" DN	0	1,267.00	-		
3" DN	0	732 00	-	•	
2" DN	0	518.00	-		-
l DN	0	221 00	-	•	
sub (otal =	0		•	-	
(b)Imported Procurement	Length	Unit Price	Local	Fareign	Total
20" DN	150D0	6,650.00		997 50	997
14" DN	20000	3,600.00	•	720 00	720
12" DN	0	2,800 00	-	-	-
10" DN	Ŭ	1,335.00	•	-	
Fub total -	35000		-	1,717.50	1,711
JCONSTRUCTION :					
1) Pipeline Laying	Length	Unit Price	Lócal	Foreign	Tata
20" DN x 1000 PSIG	15000	3,500 00	525	-	525
14" DN x 300 PSIG	20000	2,000 00	400	-	400
	0	155 79	0	-	
12" DN x 50 P\$16		151 82			
10° DN	- 0		;		
<u> </u>	0	101,66	-	·	
<u>6" DN</u>	0	97.32		-	-
4" DN	0	68 26		-	
3* DN	0	62 07		-	
2" DN	0	47.30	-	<u> </u>	-
1" DN	0	45 47	-	-	-
Sub-Tetal-	0		925.00		
Sub-Tatal-	0 Not	Valt Frice	<u>.925.00</u> Lacal	Loreign	Tetal
S)d-Tetal-		Uali <u>Price</u> 4,000.00		Foreign	Tetal
il ) Pipe Welding 24* DN Casing Pipe	NoL	Uali <u>Price</u> 4,000.00	Lecul	toreign	Tatal 2
Sub-Tutal- il ) Pipe Welding 24* DN Casing Pipe 20" DN x 1000 PSIG	Not. 50 1663	Uali Frice 4,000 00 3,500 00	2 00 58 21		Tatal 2 58.
Sub-Trtal-           24* DN Casing Prot           20" DN x 1000 PSIG           14" DN x 300 PSIG	Not. 50 1663 2217	Uali Frice 4,000.00 3,500.00 2,000.00	Lacal 2 00		Tatal 2 58.
Sub-Trtal-           24* DN Casing Prot           20" DN x 1000 PSIG           14" DN x 300 PSIG           12" DN	Not. 50 1663 2217 0	Ualt Price 4,000.00 3,500.00 2,000.00 315.00	2 00 58 21 44 34		Tutal 2 58. 44
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10* DN	Nos. 50 1663 2217 0 0	Uall Price 4,000.00 3,500.00 2,000.00 315.00 263.48	Tarcal 2 00 58 21 44 34		Tetal 2 58: 44
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10* DN           10* DN           10* DN	Not. 50 1663 2217 0 0 0	Uall Frice 4,000.00 3,500.00 3,500.00 315.00 263.48 237.71	2 00 58 21 44 34		Tetal 2 58: 44
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10* DN	Not. 50 1663 2217 0 0 0	Ualt Price 4,000 00 3,500 00 315 00 263 48 237 71 176 \$6	2 00 58 21 44 34		Tatal 2 58: 44
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10* DN           10* DN           10* DN	Not. 50 1663 2217 0 0 0 0	Uals Price 4,000 00 3,500 00 3,500 00 315 00 263 48 237,71 176 \$6 118 50	2 00 58 21 44 34		Tatal 2 58: 44
Sub-Tutal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10" DN           3* DN           6* DN	Not. 50 1663 2217 0 0 0	Ualt Price 4,000 00 3,500 00 315 00 263 48 237 71 176 \$6	Tacal 2 00 58 21 44 34 - - -		Tatal 2 58. 44
Sub-Tutal-           24* DN Casing Prot           20" DN x 1000 PSIG           14" DN x 300 PSIG           12" DN           10" DN           8" DN           6" DN           4" DN           3" DN	Not. 50 1663 2217 0 0 0 0	Uals Price 4,000 00 3,500 00 3,500 00 315 00 263 48 237,71 176 \$6 118 50	Tacal 2 00 58 21 		Tatal 2 58: 44
Sub-Tutal-           24* DN Casing Prot           20" DN x 1000 PSIG           14" DN x 300 PSIG           12" DN           10" DN           6" DN           6" DN           4" DN           20" DN	Not. 50 1663 2217 0 0 0 0 0 0	Ualt Price 4,000 00 3,500 00 2,600 00 315 00 263 48 233.71 176 \$6 118 \$0 103 92	Tacal 2 00 58 21 		Tetal 2 58. 44
Sub-Tutal-           24* DN Casing Prot           20" DN x 1000 PSIG           14" DN x 300 PSIG           12" DN           10" DN           8" DN           6" DN           4" DN           3" DN	Noa. 50 1663 2217 0_ 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 263 48 231,71 176 \$6 118 50 103 92 86 58 65 49	Lacal           2 00           SB 21           44 34           -		Tixtal 2 58. 44 
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10" DN           3* DN           4* DN           3* DN           3* DN           10" DN	Noa. 50 1663 2217 0_ 0 0 0 0 0 0 0	Ualt Price 4,000 00 3,500 00 2,000 00 263 48 237,71 176 \$6 118 50 103 92 86 58	2 00 58 21 44 34 		Tixtal 2 58. 44 
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10" DN           6* DN           4* DN           3* DN           2* DN           10" DN	Noa. 50 1663 2217 0_ 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 263 48 231,71 176 \$6 118 50 103 92 86 58 65 49	2 00 58 21 44 34 		Texal 2 58. 44 
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10* DN           3* DN           4* DN           3* DN           2* DN           10* DN	Nos. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 315 00 263 48 237,71 176 \$6 118 50 103 92 86 58 65 49 Sub-Total=	2 00 58 21 44 34 		Tetal 2 58. 44 
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10" DN           3* DN           4* DN           3* DN           2* DN           10" DN           4* DN           3* DN           2* DN           1* DN           3* DN           2* DN           1* DN           3* DN           2* DN           1* DN           4) OTHERS           i) Road Breeking & Prov. Reinstatement           Brick psyzög	Nos. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 3,500 00 3,15 00 2,63 48 237,71 176 \$6 118 50 103 92 86 58 65 49 Sub-Total=	2 00 58 21 44 34 		Tatal 2 58 44 
Sub-Tatal-           24* DN Casing Prot           20" DN x 1000 PSIG           14" DN x 300 PSIG           14" DN           10" DN           10" DN           10" DN           3" DN           4" DN           3" DN           2" DN           10" DN           4" DN           3" DN           2" DN           1" DN           4" DN           3" DN           2" DN           1" DN           4) OTHERS           i) Road Breaking & Prov. Rainstatement.           Brick pavoig           Asphalt pavoig	Nos. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 263 48 231,71 176 56 115 50 103 92 86 58 65 49 Sub-Total= 68 34 49,28	Tarcal 2 00 58 21 44 34 		Tatal 2 58 44 
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10" DN           3* DN           4* DN           3* DN           2* DN           10" DN           4* DN           3* DN           2* DN           1* DN           3* DN           2* DN           1* DN           3* DN           2* DN           1* DN           4) OTHERS           i) Road Breeking & Prov. Reinstatement           Brick psyzög	Nos. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 263 48 237,71 176 56 103 92 86 58 65 49 Sub-Total= 68 34 49,28 59,75	Tacal 2 00 58 21 44 34 		Tatal 2 58 44 
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           14* DN           10* DN           10* DN           10* DN           10* DN           10* DN           10* DN           3* DN           2* DN           10* DN           3* DN           2* DN           1* DN           4) OTHERS           1 Read Breaking & Frow Reinstatement           Brock payoris           Aspbalt payoris           CC/RCC	Nos. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 263 48 231,71 176 56 115 50 103 92 86 58 65 49 Sub-Total= 68 34 49,28	Tarcal 2 00 58 21 44 34 		Theal 2 358 44
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10" DN           6* DN           4* DN           3* DN           2* DN           10" DN           4* DN           3* DN           2* DN           1* DN           4) OTHERS           i) Road Bresking & Froy Reinstatement           Brick payong           Asphilt payong           CC/RCC           5) ROAD RESTORATION	Nos. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 315 00 263 48 237,71 176 \$6 118 50 103 92 86 58 95 49 Sub-Total= 68 34 49,28 59,75 Sub-Total=	Tacal 2 00 58 21 44 34 		Tatal 2 58 44 
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10" DN           3" DN           4" DN           3" DN           2* DN           10" DN           4" DN           3" DN           2* DN           1 DN           4" DN           3" DN           2* DN           1 DN           4) OTHERS           i) Road Breaking & Proy Reinstatement           Brick payong           CC/RCU           5) ROAD RESTORATION           Brick Payong	Nos. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 315 00 263 48 237,71 176 \$6 118 50 103 92 86 58 65 49 Sub-Total= 68 34 49,28 Sub-Total= 618 00	Tarcal 2 00 58 21 44 34 		Tatal 2 58 44 
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10" DN           3* DN           4* DN           3* DN           2* DN           10" DN           4* DN           3* DN           2* DN           1* DN           3* DN           2* DN           1* DN           4* DN           3* DN           2* DN           1 DN           4* DN           3* DN           2* DN           1 DN           4* ON           5* DN           5* DN           5* ROAD RESTORATION           Brock Paving           Asphalt Paving	Nos. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 315 00 263 48 237,71 176 \$6 118 50 103 92 86 58 65 49 Sub-Total= 68 34 49,28 59,75 Sub-Total= 618 00 875,00	Tarcal 2 00 58 21 44 34 		Tatal 2 58 44 
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10" DN           3" DN           4" DN           3" DN           2* DN           10" DN           4" DN           3" DN           2* DN           1 DN           4" DN           3" DN           2* DN           1 DN           4) OTHERS           i) Road Breaking & Proy Reinstatement           Brick payong           CC/RCU           5) ROAD RESTORATION           Brick Payong	Nos. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 2,600 00 2,63 48 233,71 176 56 115 00 103 92 86 58 65 49 Sub-Total= 68 34 49,28 59,75 Sub-Total= 618 00 875,00 1,903 00	1 acal 2 00 58 21 44 34 		Tatal 2 58 44 
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           12* DN           10" DN           3* DN           4* DN           3* DN           2* DN           10" DN           4* DN           3* DN           2* DN           1* DN           3* DN           2* DN           1* DN           4* DN           3* DN           2* DN           1 DN           4* DN           3* DN           2* DN           1 DN           3* DN           2* DN           2* DN           3* DN           3* DN           4) OTHERS           1) Road Breaking & Froy, Rainstatement           Brock Paving           Asphalt	Nos. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 2,600 00 2,63 48 237,71 176 56 118 50 103 92 86 58 65 49 Sub-Total= 68 34 49,28 59,75 Sub-Total= 618 00 875,00 1,003 00 65,00	Tarcal 2 00 58 21 44 34 		Tatal 2 358. 444 
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           14* DN           10* DN           10* DN           10* DN           3* DN           4* DN           3* DN           2* DN           10* DN           3* DN           2* DN           10* DN           4* DN           3* DN           2* DN           1 DN           1 * DN           2* DN           1 * DN           2* DN           1 * DN           2* DN           1 * DN           5           Food Breeking & Froy Reinstatement           Brock paying           Asphalt paying           CC/RCC           5           FOAD RESTORATION           Book Paying           Asphalt Paying           CC/RCC           Kurcha	Nos. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 2,600 00 2,63 48 233,71 176 56 115 00 103 92 86 58 65 49 Sub-Total= 68 34 49,28 59,75 Sub-Total= 618 00 875,00 1,903 00	1 acal 2 00 58 21 44 34 		Tatal 2 358. 444 
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           14* DN           10* DN           10* DN           10* DN           3* DN           4* DN           3* DN           2* DN           10* DN           3* DN           2* DN           10* DN           4* DN           3* DN           2* DN           1 DN           1 * DN           2* DN           1 * DN           2* DN           1 * DN           2* DN           1 * DN           5           Food Breeking & Froy Reinstatement           Brock paying           Asphalt paying           CC/RCC           5           FOAD RESTORATION           Book Paying           Asphalt Paying           CC/RCC           Kurcha	Nos. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 2,600 00 2,63 48 237,71 176 56 118 50 103 92 86 58 65 49 Sub-Total= 68 34 49,28 59,75 Sub-Total= 618 00 875,00 1,003 00 65,00	Lacal 2 00 58 21 44 34 		Tatal 2 58 44 
Sub-Tatal-           24* DN Casing Prot           20* DN x 1000 PSIG           14* DN x 300 PSIG           14* DN           10* DN           10* DN           10* DN           3* DN           4* DN           3* DN           2* DN           10* DN           3* DN           2* DN           1* DN           5) Road Bresking & Froy Reinstatement           Brock paying           Asphalt paying           CC/RCC           5) ROAD RESTORATION           Brock Paying           Asphalt Paying           CC/RCC           Kutcha           6) CIVIL CONSTRUCTION	Nos. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 2,600 00 2,63 48 237,71 176 56 118 50 103 92 86 58 65 49 Sub-Total= 68 34 49,28 59,75 Sub-Total= 618 00 875,00 1,003 00 65,00	Tacal 2 00 58 21 44 34 		Tatal 2 58 44 
Sub-Tatal-           24* DN Casing Prot           20" DN x 1000 PSIG           14" DN x 300 PSIG           14" DN x 300 PSIG           14" DN x 300 PSIG           10" DN           10" DN           6" DN           3" DN           4" DN           3" DN           2" DN           10" DN           4" DN           3" DN           2" DN           1" DN           4) OTHERS           i) Road Breaking & Froy, Rainstatement           Brick paying           Asphalt paying           CC/RCC           5) ROAD RESTORATION           Bock Paying           CC/RCC           Kurcha           6) CIVIL CONSTRUCTION           [] TBS/DRS foundation	Noa. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 2,600 00 2,63 48 237,71 176 56 118 50 103 92 86 58 65 49 Sub-Total= 68 34 49,28 59,75 Sub-Total= 618 00 875,00 1,003 00 65,00	Lacal 2 00 58 21 44 34 		Theal 2 358. 444
Sub-Tatal-           24* DN Casing Prot           20" DN x 1000 PSIG           14" DN x 300 PSIG           14" DN x 300 PSIG           12" DN           10" DN           8" DN           6" DN           3" DN           2" DN           10" DN           4" DN           3" DN           2" DN           1" DN           1" DN           4" DN           3" DN           2" DN           1" DN           4) OTHERS           i) Road Breaking & Prov. Reinstatement           Brock pavers           CC/RCC           5) ROAD RESTORATION           Brock Pavers           CC/RCC           Kutcha           6) CIVIL CONSTRUCTION           I) TBS/DRS foundation           ii) Functional/operational bidg	Noa. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 315 00 263 48 237,71 176 56 115 50 103 92 86 58 95 49 Sub-Total= 68 34 49,28 59,75 Sub-Total= 618 00 875,00 1,903 00 65,00 Sub-Total=	Tacal 2 00 58 21 44 34 		Theal 2 358. 444
Sub-Tatal-           24* DN Casing Prot           20" DN x 1000 PSIG           14" DN x 300 PSIG           14" DN x 300 PSIG           12" DN           10" DN           8" DN           6" DN           3" DN           2" DN           10" DN           4" DN           3" DN           2" DN           1" DN           1" DN           4) OTHERS           i) Road Breaking & Prov. Reinstatement           Brick paving           Asphalt paving           CC/RCC           5) ROAD RESTORATION           Brock Paving           Asphalt Paving           CC/RCC           Kutcha           6) CIVIL CONSTRUCTION           i) TBS/DRS foundation           ii) Functional/operational bidg           ui) boundary wall with carb relationing	No	Uali Price 4,000 00 3,500 00 2,600 00 2,600 00 2,63 48 237,71 176 56 115 50 103 92 86 58 65 49 Sub-Total= 68 34 49,28 59,75 Sub-Total= 618 00 875,00 1,003 00 65,00 Sub-Total=	Lacal 2 00 58 21 44 34 		Theal 2 358. 44
Sub-Tatal-           24* DN Casing Prot           20" DN x 1000 PSIG           14" DN x 300 PSIG           14" DN x 300 PSIG           12" DN           10" DN           8" DN           6" DN           3" DN           2" DN           10" DN           4" DN           3" DN           2" DN           1" DN           1" DN           4" DN           3" DN           2" DN           1" DN           4) OTHERS           i) Road Breaking & Prov. Reinstatement           Brock pavers           CC/RCC           5) ROAD RESTORATION           Brock Pavers           CC/RCC           Kutcha           6) CIVIL CONSTRUCTION           I) TBS/DRS foundation           ii) Functional/operational bidg	Noa. 50 1663 2217 0 0 0 0 0 0 0 0 0 0 0 0 0	Uali Price 4,000 00 3,500 00 2,600 00 315 00 263 48 237,71 176 56 115 50 103 92 86 58 95 49 Sub-Total= 68 34 49,28 59,75 Sub-Total= 618 00 875,00 1,903 00 65,00 Sub-Total=	Tacal 2 00 58 21 44 34 		925. Theal 21 58 44 

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#### 6.3 DISTRIBUTION COMPONENT

The Distribution component consists of 274 km Feeder Main Pipeline (12" DN x 50 Psig), 90 km Distribution Pipeline (8" DN x 50 Psig), 62 km Distribution Pipeline (4" DN x 50 Psig) and 360 km Distribution Pipeline (2" DN x 50 Psig). The projected costing of Distribution component is shown in Table 6.4, 6.6, 6.8 and the detail calculation of this component is shown in Table 6.5, 6.7 and 6.9. In order to find out the length of different diameter gas pipeline needed for the area, the road length and width have been measured from the detailed Project Plan of Purbachal (Figure 4.2). The length calculation of Sector 1-10 is shown in Table-6.11, Sector 11-20 is shown in Table-6.12, Sector 21-30 is shown in Table-6.13.

# Table 6.4: Costing for distribution component (Sector 1 - 10)

		(i	n Lakh Taka)
A. MATERIAL COST	Local	Foreign	Total
1. Line Pipe	1,630.47	2,044.00	3,674.47
2. Valves & Fittings	.	1,286.06	1,286 06
3. Tape & Primer	.	734.89	734.89
5 CP Materials	-	10 00	10.00
6. Valve Pit Cover	63.73	-	63 73
7 CD/VAT	2,037 48	-	2,037.48
8 Pre-shipment Inspection	-	6 93	6.93
9. Landing, Transportation and Storage cost	203 75	-	203.75
10. Miscellaneous Charges Relating to Poreign Procurement	224 12	-	224.12
SUB - TOTAL (A):	4,159.55	4,081.89	8,241.43

B. CONSTRUCTION COST :	Local	Foreign	Tota!
1. Laying Cost	207.21		207.21
2. Welding Cost	57.65	-	57.65
3. Highway/Railway Crossing	12.37	-	12.37
4, Canal/Khal Crossing	16.30	-	16.30
5. Valve Pit Construction	117.20	-	117.20
6. Breaking & Provisional Reinstatement	115.81	-	115.81
7. CP Construction	10.00	- 1	10.00
SUB - TOTAL (B):	536.54	-	536.54
C. ROAD RESTORATION CHARGE	Local	Foreign	Total
(Payable to Road Owning Agency)	1,254 31	-	1,254.31
SUB - TOTAL (C):	1,254.31	-	1,254.31
TOTAL (A+B+C) :	5,950.40	4,081.89	10,032.28
Adding 4% Contingency:	238.02	163.28	401.29
TOTAL INVESTMENT COST :	6,188.41	4,245.16	10,433.57

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No. of Roads : 657 No. of Valve Pits : 657

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1) MATERIALS					(in Lakh Taka)
(a) Line Piper	Length	(lott Price	Local	Foreige	Total
Local Procurement					
8 DN	26000	3,187 00	828.62	-	828.6
6" DN	0	2,030.00	•	-	•
4" DN	13000	1,267.00	164 73	-	164.7
3" DN	0,	732.00	•		-
2" DN	123000	518 00	637 14		637,14
1" DN	0	221.00	-	· -	-
Sob total =	162000		1,630.47		1,630.43
(b) Imported Procurement	Length	Unit Price	Local	Foreign	Total
24" DN 20" DN	0	8,000.00	-	-	-
14" DN	0	6,650.00 3,600.00	-	-	-
14" DN 12" DN	73000	2,800.00	-	2.044.00	2.044.00
10" DN	73000	1,335.00		2,044.00	2,044.00
Sub tatel =	73000	1,333.00		2,044.00	2,044.00
2)CONSTRUCTION (50 PSIG NETWO			-	2,044.00	45045.U
i) Pipeline Laying	Length	Unit Price	Local	Foreign	Total
20" DN x 1000 PSIG	1.Eugin O	3,500.00	-		-
14" DN x 300 PSIG	0		- i		
		2,000.00	-	•	113.73
12" DN x 50 PSIG	73000	155.79	113.73	-	113.73
10" DN	0	151.82	-		
8" DN	26000	101 66	26 43		26.43
6" DN	0	97,32	-	-	-
4" DN	13000	68.26	8.87		
3" DN	0	62.07	-	-	-
2" DN	123000	47 30	58.18		58.18
t" DN	0	45.47			
Sab-Tota⊫	162000		207.21	<u> </u>	207.21
II ) Pipe Welding	Nos.	Unit Price	Local	Foreign	Totel
24" DN Casing Pipe	0	4,000 00	•		-
20" DN x 1000 PSIG	0	3,500.00		-	-
14" DN x 300 PSIG	0	2,000 00	-		-
12" DN	8091	315 00	25.49	- 1	25.49
10" DN	• 0	263 48	-	-	-
8" DN	2882	237.71	6.85	-	6.85
6" DN	0	176.56	-	-	-
4" DN	441	118 50	1.71	-	1.71
3" DN	0	103,92			-
2" DN	27265	86 58	23.61		23.61
2.00		Sub-Total-	57.65	-	57.65
3) OTHERS					
iii ) Khal, Canal, Culvert Crossing	1630	1,000 00	16 30		16.30
v) Highway Crossing	1000	1,237 00	12 37		12.37
v) River Crossing (2 nos.)	0	20,000 00	-		
·) Valve Pit Construction					-
a) 4"& below	357	13,500.00	48 20	-	48 20
b) above 4"	300	23,000.00	69.00		69.00
vi ) Road Breaking & Prov. Reinstatemen					-
Brick paving	0	68 34			-
Asphalt paving	235000	49 28	115.81		115 81
CC/RCC	235000	59.75			
		39.13	115.81		115.81
·		Sub-Total-	261.67		261.67
) ROAD RESTORATION	2		201201 1		201.07
	0	618.00	· _ I		
Brick Paving	143350	875.00	1,254.31		1,254 31
4 h - h - h		a75.00	1,234,31	-	1,6,74,31
Asphali Paving			-	1	-
CC/RCC	0	1,003.00	-		<u> </u>
	0		I,254.31	- -	1,254.31

#### Table 6.5: Detail calculation (Distribution network sector 1-10)

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# Table 6.6: Costing for distribution component (Sector 11-20)

			(in Lakh Taka)
A. MATERIAL COST	Local	Foreign	Total
1. Line Pipe	1,442 99	1,540.00	2,982.99
2. Valves & Fittings	-	1,044.05	1,044.05
3 Tape & Primer	-	596 60	596.60
5 CP Materials	-	10 00	10.00
6. Valve Pit Cover	46.95	-	46.95
7. CD/VAT	1,595.32		1,595.32
8. Pre-shipment Inspection	-	5 42	5.42
9. Landing, Transportation and Storage cost	159.53	-	159.53
10. Miscellaneous Charges Relating to Foreign Procurement	175,49	-	175.49
SUB - TOTAL (A):	3,420.28	3,196.07	6,616.35

B. CONSTRUCTION COST :	Local	Foreign	Tote]
1. Laying Cost	168 66	-	168.66
2. Welding Cost	45.67	-	45.67
3. Highway/Railway Crossing	12.37	-	12.37
4. Canal/Khal Crossing	14 00	-	14.00
5. Valve Pit Construction	84 34	-	84.34
6. Breaking & Provisional Reinstalement	96.59	.	96.59
7. CP Construction	10.00	-	10.00
SUB - TOTAL (B):	431.63	-	431,63
C. ROAD RESTORATION CHARGE	Local	Foreign	Total
(Pavable to Road Owning Agency)	1,046 15	-	1,046.15
SUB - TOTAL (C):	1,046.15	<u>،</u> د	1,046.15
TOTAL (A+B+C) :	4,898.06	3,196.07	8,094.13
Adding 4% Contingency	195.92	127.84	323.77
TOTAL INVESTMENT COST :	5,093.98	3,323.91	8,417.89

No of Road: 484 No. of Valve pit: 484

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#### Table 6.7 Detail calculation (Distribution network sector 11-20)

(in Lakh Teka)

a) Line Pipe:	Leagth	Unit Price	Local	Foreign	Total
Local Procurement					_
8" DN	18000	3,187,00	573 66		573 66
6" DN	0	2,030.00		-	-
4" DN	31000	1,267 00	392.77	-	392.77
3" DN	0	732.00	•	-	•
2" DN	92000	518.00	476.56	· 1	476 56
1" DN	0	221.00	-	-	-
Sub total =	141000		1,442,99	-	1,442.99
b) Imported Procurement	Length	Paft Price	Local	Foreign	Total
24" DN	0	8,000.00	-	-	-
20" DN	0	6,650.00	-	-	-
14" DN	Û	3,600.00	-		
12" DN	55000	2,800.00	-	1,540.00	1,540.00
10" DN	0	1,335.00	-	-	_
Sub total =	55000			1.540.00	1.540.00

Sub total = 5: 2) CONSTRUCTION (50 PSIG NETWORK):

I) Pipeline Laying	Length	Linit Price	Local	Foreign	Total
20" DN x 1000 PSIG	0	3,500.00	0		
14" DN x 300 PSIG	0.	2,000.00	0	- i	-
12" DN x 50 PSIG	55000	155 79	85.6845		85.68
10" DN	0	15t.82	-	-	-
8" DN	18000	101.66	18.30	-	18 30
6" DN	0	97.32		-	-
4" DN	31000	68,26	21.16	-	21 16
)" DN	0	62.07		-	·
2" 1)N	92000	47 30	43.52	-	43 52
1" DN	0	45 47	-	-	-
Sub-Total=	141000		168.66	_	168,66
II ) Pipe Welding	Nos.	Unit Price	Local	Foreign	Total
24" DN Casing Pipe	0	4,000 00	-	-	-
20" DN x 1000 PSIG	0	3,500.00	-		<u> </u>
14" DN x 300 PSIG	0	2,000.00		-	
12" DN	6096	315.00	19 20		19.20
10* DN	0	263.48	-	÷.,	<u> </u>
8" DN	1995	237 71	4,74	-	4.74
6" DN	0	176 56		-	-
4" DN	3436	118.50	4.07		4,07
3" DN	0	103 92	-	-	
2" DN	20394	86 58 1	17.66		17 66
1" DN	.0	65.49	-		•
		Sub-Total=	45.67	-	45.67
3) OTHERS				_	
III ) Khal, Canal, Culvert Crossing	1400	1,000,00	14.00		14 00
lv) Highway Crossing	1000	1,237.00	12.37		12.37
v) River Crossing (2 nos.)	0	20,000,00	· _		
v ) Valve Pit Construction					
) 4 & below	284	13,500.00	38 34		38.34
b) above 4"	200	23,000.00	46.00	<u> </u>	4 <u>6.00</u>
vi ) Road Breaking & Prov. Reinstatemer	at				
Brick paving	0	68 34	<u> </u>		
Asphalt paving	196000	49.28	96 59		96.59
CC/RCC	0	59.75	-		96.59
			96.59		
4) ROAD RESTORATION	·	(10.00)		<u> </u>	-
Brick Paving	0	618.00	-	·	1,046.15
Asphalt Paving	119560	875 00	1,046 15		1,046.15
CC/ROC	0				
Kutcha	0			<u> </u>	1 046 47
		Sub-Total=	1,046.15		1,046.15

# Table 6.8: Costing for distribution component (Sector: 21 TO 30)

		(	n Lekh Teka)
A. MATERIAL COST	Local	Foreign	Total
1. Line Pipe	2,260.49	3,920.00	6,180.49
2. Valves & Fittings	-	2,163.17	2,163.17
3. Tape & Primer		1,236 10	1,236.10
4. CP Matenals	-	10.00	10.00
5. Valve Pit Cover	15.13	-	15.13
6. CD/VAT	3,664.63	-	3,664.63
	-	12.46	12.46
7 Pre-shipment Inspection 8. Landing, Transportation and Storage cost	366.46	- 1	366.46
9 Miscellaneous Charges Relating to Foreign Procurement	. 403.11	-	403.11
SUB - TOTAL (A):	6,709.83	7,341.73	14,051.56

B. CONSTRUCTION COST :	Local	Foreign	Total
1. Laying Cost	297 61		297.61
2. Welding Cost	78.81	- [	78.81
-	12.37	- 1	12.37
3. Highway/Railway Crossing 4. Canal/Khal Crossing	25.00	-	25.00
5. Valve Pit Construction	121.65	-	121.65
6 Breaking & Provisional Reinstatement	168.54	-	168.54
	10 00	-	10 00
7. CP Construction SUB - TOTAL (B):	713.98	-	713.98
C. ROAD RESTORATION CHARGE	Local	Foreign	Tatal
(Payable to Road Owning Agency)	1,825.43	-	1,825.43
(rayable is Road Owining Agency) SUB - TOTAL (C):	1,825.43	-	1,825.43
	9,249.23	7,341.73	16,590.96
Adding 4% Contingency:	369.97	293.67	663.64
TOTAL INVESTMENT COST :	9,619.20	7,635.40	17,254.60

No. of Roads : 690 No. of Valve Pits : 690

.

# Table 6.9: Detail calculation (Distribution network sector 21-30)

(in Lakh Taka)

24" DN Casing Pipe         50         4,000.00           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000 00           12" DN         15517         315 00           10" DN         0         2,63.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         0         176.56           4" DN         0         176.56           4" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           3) OTHERS         1000         1,237.00           WI Khal, Canal, Culvert Crossing         2500         1,000.00           v) River Crossing (2 nos.)         0         23,000.00           v) Nive Pit Construction	Local 1,306.67	Foreign	Total			
8" DN         41000         3,187.00           6" DN         0, 2,030.00         4" DN         16000         1,267.00           3" DN         0         732.00         0         1,267.00           3" DN         0         732.00         0         145000         518.00           1" DN         0         221.00         0         221.00           bilmported Procurement         Leagth         Uait Price           24" DN         0         8,000.00         0         6,650.00           14" DN         0         3,600.00         12" DN         140000         2,800.00           10" DN         0         1,350.00         0         1,350.00           20" DN x 1000 PSIG         0         3,600.00         12" DN x 300 PSIG         0         2,000.00           12" DN x 1000 PSIG         0         2,000.00         155.79         10" DN         0         151.82           8" DN         16000         151.82         8" DN         0         62.07           2" DN         16000         62.07         2" DN         16000         63.47           9" DN         0         0         52.47         3.500.00         151.82           10 DN	202.72		1			
6" DN         0         2,030 00           4" DN         16000         1,267.00           3" DN         0         732.00           2" DN         145000         518.00           1" DN         0         221.00           Sub total =         202000           24" DN         0         8,000.00           24" DN         0         6,650.00           24" DN         0         6,650.00           14" DN         0         3,600.00           20" DN         0         3,600.00           14" DN         0         3,600.00           20" DN         0         1,335.00           Sub total =         140000         2,800.00           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000.00           12" DN x 50 PSIG         140000         155.79           10" DN         0         151.82           8" DN         41000         191.66           6" DN         0         62.07           2" DN         145000         47.30           1" DN         0         45.47           100         0         52.66      <	202.72		1 205 62			
4" DN         16000         1,267.00           3" DN         0         732.00           2" DN         145000         518.00           1" DN         0         221.00           b)Insported Procurement         Leagth         Uatt Price           24" DN         0         6.8,000.00           20" DN         0         6.650.00           14" DN         0         3,600.00           14" DN         0         3,600.00           14" DN         0         3,600.00           14" DN         0         3,600.00           10" DN         0         1,335.00           20" DN         0         1,335.00           20" DN         140000         1,335.00           20" DN         140000 PSIG         0         3,500.00           12" DN x 50 PSIG         140000         155.79           10" DN         0         151.82         8" DN           10" DN         0         62.07         2" DN           14" DN         16000         68.26           3" DN         0         62.07           2" DN         145000         47.30           1" DN         0         45.47	-		t,306 67			
3" DN       0       732.00         2" DN       145000       518.00         1" DN       0       221.00         Sub total =       202000       20100         (b)Imported Procurement       Leagth       Uatt Price         24" DN       0       8,000.00         20" DN       0       6,650.00         14" DN       0       3,600.00         12" DN       140000       2,800.00         10" DN       0       1,335.00         20" DN × 1000 PSIG       0       3,500.00         12" DN × 300 PSIG       0       2,000.00         12" DN × 300 PSIG       0       2,000.00         14" DN × 300 PSIG       0       2,000.00         12" DN × 300 PSIG       0       2,000.00         12" DN × 300 PSIG       0       9,7.32         4" DN       16000       68,26         3" DN       0       41.000       101,66         6" DN       0       151.82       8" DN       41.000       101,66         6" DN       0       3,500.00       47.30       17.30       17.30         1" DN       0       45.47       300       17.30       100.00       17.51.71	-		202 72			
2" DN       145000       518 00         1" DN       0       221 00         Sub total =       202000         (b)Imported Procurement       Leegth       Uait Price         24" DN       0       8,000.00         20" DN       0       6,650.00         14" DN       0       3,600.00         12" DN       140000       2,800.00         10" DN       0       1,335.00         Sub total =       140000       2,800.00         20" DN × 1000 PSIG       0       3,500.00         14" DN × 300 PSIG       0       2,000.00         12" DN × 50 PSIG       140000       155.79         10" DN       0       151.82         8" DN       41000       101.66         6" DN       0       97.32         145000       47.30       145000         1" DN       0       62.07         2" DN       145000       47.30         1" DN       0       3,400.00         10" DN × 1000 PSIG       0       3,500.00         1" DN       0       42.47         24" DN Cesing Pipe       50       4,000.00         14' DN × 300 PSIG       0       2,00		· · ·	202 12			
1" DN         0         221 00           Sub total ~         202000           (b)Imported Procurement         Leagth         Uatt Price           24" DN         0         6,650.00           14" DN         0         3,600.00           12" DN         0         3,600.00           12" DN         0         3,600.00           12" DN         140000         2,800.00           10" DN         0         1,3500           20" DN         0         3,600.00           20" DN         50 btatal =         140000           20" DN × 1000 PSIG         0         3,500.00           12" DN × 300 PSIG         0         3,500.00           12" DN × 300 PSIG         0         0,2000.00           12" DN × 50 PSIG         140000         101.66           6" DN         0         97.32           4" DN         16000         68.26           3" DN         0         62.07           2" DN         145000         47.30           1" DN         0         45.47           20000         0         145.000           14" DN × 1000 PSIG         0         3,500.00           14" DN <td< td=""><td></td><td></td><td>751,10</td></td<>			751,10			
Sub total -         202000           (b)Imported Procurement         Leagth         Unit Price           24" DN         0         8,000.00           20" DN         0         6,650.00           14" DN         0         3,600.00           12" DN         0         140000           10" DN         0         1,335.00           20" DN         0         1,335.00           20" DN         0         1,335.00           20" DN         140000         2,800.00           20" DN × 1000 PSIG         0         3,500.00           14" DN × 300 PSIG         0         3,500.00           14" DN × 300 PSIG         0         0         151.82           8" DN         0         151.82         8"           8" DN         41000         101.66         6"           6" DN         0         65000         68.26           3" DN         0         45.47         97.32           4" DN         165000         68.26           3" DN         0         45.47           10" DN         0         45.47           10" DN         0         3,500.00           10" DN         0	751.10	<b>_</b>	751.10			
(b) Imported Procurement         Leagth         Uait Price           24" DN         0         8,000.00           20" DN         0         0,650.00           14" DN         0         3,600.00           12" DN         140000         2,800.00           10" DN         0         1,335.00           Seb total =         140000         2,800.00           20" DN          10 Pipeline Laying         Length         Uait Price           20" DN × 1000 PSIG         0         3,500.00         12" DN × 300 PSIG         0         2,000.00           12" DN × 300 PSIG         0         0         151.82         8" DN         0         151.82           8" DN         41000         101.66         6" S,26         3" DN         0         62.07           2" DN         145000         47.30         145000         47.30           1" DN         0         62.07         2" DN         145000         47.30           1" DN         0         45.47         202.000         0         12.47           10 Pipe Welding         Nos.         Unit Price         24" DN Casing Pipe         50         4,000.00           10" DN         0         2,63.48	2,260.49	•	2,260.49			
Z4* DN         0         \$,000.00           20" DN         0         6,650.00           14" DN         0         3,600.00           12" DN         140000         2,800.00           10" DN         0         1,335.00           Sub total =           140000           Z/CONSTRUCTION (50 PSIG NETWORK):           1140000           Z/CONSTRUCTION (50 PSIG NETWORK):           140000           20" DN × 1000 PSIG         0         3,500.00           140000         155.79           10" DN         0         151.82           8" DN         41000         101,66         6" DN         0         97.32           4" DN         6600         68.26         2" DN         145000         47.30           I = DN         0         62.07           2" DN         145000         47.30           I = DN         0         62.07           2" DN         145000         47.30           I = DN         0         62.07           2" DN         145000         0           <	Local	Foreign	Total			
20" DN         0         6,650.00           14" DN         0         3,600.00           12" DN         140000         2,800.00           10" DN         0         1,335.00           Seb total =         140000         2,800.00           20" DN         50 pSIG NETWORK):         1           1) Pipeline Laying         Length         Ualt Price           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000.00           12" DN x 50 PSIG         140000         155.79           10" DN         0         151.82           8" DN         41000         101.66           6" DN         0         62.07           2" DN         165000         68,26           3" DN         0         45.47           DN         0         45.47           Sub-Total         202000           h) Pipe Weldiag         Nos.         Unit Price           24" DN Casing Pipe         50         4,000.00           20" DN         103.200.00         0         263.48           8" DN         0         263.48         237.71           6" DN         0         1774	Lucat	- Corciga				
14" DN         0         3,600,00           12" DN         140000         2,800,00           10" DN         0         1,335,00           2)CONSTRUCTION (50 PSIG NETWORK):         140000         1,335,00           2)CONSTRUCTION (50 PSIG NETWORK):         0         3,500,00           14" DN x 1000 PSIG         0         3,500,00           14" DN x 300 PSIG         0         2,000,00           12" DN x 50 PSIG         140000         155,79           10" DN         0         151,82           8" DN         41000         101,66           6" DN         0         97,32           4" DN         16000         68,26           3" DN         0         62,07           2" DN         145000         47,30           1" DN         0         45,47           DN         16000         68,26           3" DN         0         45,47           DN         145000         47,30           1" DN         0         45,47           10 Pipe Weldiag         Nos.         Unit Price           24" DN Casing Pipe         50         4,000,00           10" DN         0         2,63,48 <tr< td=""><td><u></u></td><td></td><td>-</td></tr<>	<u></u>		-			
12" DN       140000       2,800.00         10" DN       0       1,335.00         Seb total = 140000         2)CONSTRUCTION (50 PSIG NETWORK):         1 140000         2)CONSTRUCTION (50 PSIG NETWORK):         1 140000         2)CONSTRUCTION (50 PSIG       0       3,500.00         14000 PSIG       0       3,500.00         10" DN x 1000 PSIG       0       2,000.00         12" DN x 50 PSIG       140000       155.79       10" DN       0       151.82         8" DN       0       0       151.82       8" DN       0       662.07         2" DN       145000       47.30       0       62.07         2" DN       145000       47.30       1" DN       0       45.47         Sub-Total=       202000         h) Pipe Welding       Nos.       Unit Price         24" DN Casing Pipe       50       4,000.00       2,000.00         24" DN X 1000 PSIG       0       2,600.00       12" DN       15517       315.00         10" DN       0       15517       315.00       0       17.656         4" DN       0	· -	-	-			
10" DN         0         1,335,00           Seb total =         140000           2)CONSTRUCTION (50 PSIG NETWORK):           1) Fipeline Laying         Length         Ualt Price           20" DN x 1000 PSIG         0         2,000.00           14" DN x 300 PSIG         0         2,000.00           12" DN x 50 PSIG         140000         155.79           10" DN         0         151.82           8" DN         41000         101.66           6" DN         0         97.32           4" DN         16000         68.26           3" DN         0         62.07           2" DN         145000         47.30           10" DN         0         45.47           11" DN         0         45.47           90         2000         14*000         103.50           11" DN         0         45.47           24" DN Casing Pipe         50         4,000.00           24" DN Casing Pipe         50         4,000.00           10" DN         0         263.48           10" DN         0         2,000.00           14" DN x 300 PSIG         0         3,500.00           10" Casing Pipe	-	3,920 00	3,920.00			
Seb total =         140000           2)CONSTRUCTION (50 PSIG NETWORK):         1) PipeKine Laying         Length         Ualt Price           20" DN x 1000 PSIG         0         3, 500.00         14" DN x 300 PSIG         0         2,000.00           14" DN x 300 PSIG         0         140000         155.79         10" DN         0         151.82           8" DN         41000         101,66         6" DN         0         97.32           4" DN         16000         68.26         3" DN         0         62.07           2" DN         145000         47.30         1" DN         0         45.47           10" DN         0         45.47         300         45.47           2" DN         145000         47.30         1" DN         0         45.47           10" DN         0         45.45         3.500.00         14" DN × 300 PSIG         0         3,500.00           14" DN × 300 PSIG         0         3,500.00         12" DN         15517         315 00           10" DN         0         176.56         4" DN         0         176.56           4" DN         0         176.56         4" DN         32142         86.58           1" DN	· ·	-	-			
2)CONSTRUCTION (50 PSIG NETWORK):           i) Pipeline Laying         Length         Ualt Price           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000.00           12" DN x 50 PSIG         140000         155.79           10" DN         0         151.82           8" DN         41000         101.66           6" DN         0         97.32           4" DN         16000         68.26           3" DN         0         62.07           2" DN         145000         47.30           1" DN         0         45.47           Sub-Total=         202000         47.30           1" DN         0         45.00.00           24" DN casing Pipe         50         4,000.00           24" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000 00           10" DN         0         263.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         1774         118.50           3" DN         0         103.92           2" DN         32142<	-	3,920.00	3,920,00			
i) Pipeline Laying         Length         Ualt Price           20° DN x 1000 PSIG         0         3,500.00           14° DN x 300 PSIG         0         2,000.00           12° DN x 50 PSIG         140000         155.79           10° DN         0         151.82           8° DN         41000         101.66           6° DN         0         97.32           4° DN         16000         68,26           3° DN         0         62.07           2° DN         145000         47.30           1° DN         0         45.47           Sub-Total=         202000         4.000.00           1° DN         0         45.47           Sub-Total=         202000         101t Price           24° DN Casing Pipe         50         4,000.00           20° DN x 1000 PSIG         0         3,500.00           14° DN x 300 PSIG         0         2,000 00           10° DN         0         263.48           8° DN         4545         237.71           6° DN         0         176.56           4° DN         0         103.92           2° DN         32142         86.58						
20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000.00           12" DN x 50 PSIG         140000         155.79           10" DN         0         151.82           8" DN         0         151.82           8" DN         0         97.32           4" DN         0         97.32           4" DN         0         97.32           4" DN         0         68.26           3" DN         0         62.07           2" DN         145000         47.30           1" DN         0         45.47           202000         0         4.000.00           1" DN         0         4.000.00           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,600 00           12" DN         15517         315 00           10" DN         0         2,63.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         1774         118.50           3" DN         0         103.92           2" DN         32142         86.58     <	Local	Foreign	Total			
14* DN x 300 PSIG       0       2,000.00         12* DN x 50 PSIG       140000       155.79         10* DN       0       151.82         8* DN       41000       101.66         6* DN       0       97.32         4* DN       16000       68.26         3* DN       0       62.07         2* DN       145000       47.30         1* DN       0       45.47         Sub-Total=       202000       0         h) Pipe Welding       Nos.       Unit Price         24* DN Casing Pipe       50       4,000.00         20* DN x 1000 PSIG       0       3,500.00         14* DN x 300 PSIG       0       2,600 00         12* DN       15517       315 00         10* DN       0       2,63.48         8* DN       4545       237.71         6* DN       0       174.418.50         3* DN       0       103.92         2* DN       32142       86.58         1* DN       0       103.92         2* DN       32142       86.58         1* DN       0       20,000.00         x) Biver Crossing (2 nos.)       0       20,000.00<	0	-				
12" DN x 50 PSIG       140000       155.79         10" DN       0       151.82         8" DN       41000       101.66         6" DN       0       97.32         4" DN       16000       68.26         3" DN       0       62.07         2" DN       145000       47.30         1" DN       0       45.47         Sub-Total=       202000       0         h) Pipe Welding       Nos.       Unit Price         24" DN Casing Pipe       50       4,000.00         20" DN x 1000 PSIG       0       3,500.00         14" DN x 300 PSIG       0       263.48         8" DN       15517       315.00         10" DN       0       263.48         8" DN       4545       237.71         6" DN       0       176.56         4" DN       1774       118.50         3" DN       0       103.92         2" DN       32142       86.58         1" DN       0       65.49         30 DTHERS       1000       1,237.00         Will Khai, Canal, Culvert Crossing       2500       1,000.00         b) above 4"       300       23,000	0	-	-			
10" DN         0         151 82           8" DN         41000         101,66           6" DN         0         97,32           4" DN         16000         68,26           3" DN         0         62 07           2" DN         145000         47.30           1" DN         0         45.47           Sub-Total=         202000         0           h) Pipe Welding         Nos.         Unit Price           24" DN Casing Pipe         50         4,000.00           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,600 00           12" DN         15517         315 00           10" DN         0         263.48           8" DN         0         1774           6" DN         0         1774           118.50         0         100.92           2" DN         32142         86.58           1" DN         0         103.92           2" DN         32142         86.58           1" DN         0         20,000.00           10 Highway Crossing         1000         1,237.00           9 OTHERS         1000 <t< td=""><td>218.106</td><td>-</td><td>218.11</td></t<>	218.106	-	218.11			
8" DN         41000         101,66           6" DN         0         97,32           4" DN         16000         68,26           3" DN         0         62.07           2" DN         145000         47.30           1" DN         0         45.47           Sub-Total=         202000         0           1" DN         0         45.47           Sub-Total=         202000         0           24" DN Casing Pipe         50         4,000.00           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000 00           12" DN         15517         315 00           10" DN         0         263.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         1774         118.50           3" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           3) OTHERS         1000         1,237.00           W) Righway Crossing         1000         1,237.00           v) River Pit Coastruction         10 <td></td> <td></td> <td></td>						
6" DN         0         97.32           4" DN         16000         68.26           3" DN         0         62.07           2" DN         145000         47.30           1" DN         0         45.47           Sub-Total= 202000           in ) Pipe Welding         Nos.         Unit Price           24" DN Casing Pipe         50         4,000.00           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000 00           12" DN         15517         315 00           10" DN x 300 PSIG         0         2,000 00           12" DN         15517         315 00           10" DN         0         263.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         1774         118.50           3" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           3) OTHERS         1000         1,237.00           Wil Koat, Canal, Culvert Crossing         2500         1,000 00           Noke PH Coastruction	41 68		41.68			
4" DN         16000         68,26           3" DN         0         62.07           2" DN         145000         47.30           1" DN         0         45.47           Sub-Total=         202000         1           in ) Pipe Welding         Nos.         Unit Price           24" DN Casing Pipe         50         4,000.00           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000 00           12" DN         15517         315 00           10" DN         0         263.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         1774         118.50           3" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           3) OTHERS         1000         1,237.00           Wil Kbal, Canal, Culvert Crossing         2500         1,000.00           v) River Crossing (2 nos.)         0         23,000.00           v) River Pit Construction			-			
3" DN         0         62 07           2" DN         145000         47.30           1" DN         0         45.47           Sub-Total=         202000         1           in ) Pipe Welding         Nos.         Unit Price           24" DN Casing Pipe         50         4,000.00           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000 00           12" DN         15517         315 00           10" DN         0         263.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         1774         118.50           3" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           3) OTHERS         1000         1,237.00           Wi Righway Crossing         1000         1,237.00           v) River Crossing (2 nos.)         0         23,000.00           v) Nive Pit Construction	10 92	-	10.92			
2" DN         145000         47.30           I" DN         0         45.47           Sub-Total=         202000           in ) Pipe Welding         Nos.         Unit Price           24" DN Casing Pipe         50         4,000.00           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000 00           12" DN         15517         315 00           10" DN         0         263.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         0         176.56           4" DN         0         176.56           4" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           3) OTHERS         1000         1,237.00           Wit Krat, Canal, Culvert Crossing         2500         1,000 00           v) River Crossing (2 nos.)         0         20,000.00           v) River Pit Construction	10.92		10.92			
I* DN         0         45.47           Sub-Total=         202000           in ) Pipe Welding         Nos.         Unit Price           24" DN Casing Pipe         50         4,000.00           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000 00           12" DN         15517         315 00           10" DN         0         263.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         0         176.56           4" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           3) OTHERS         1000         1,000 00           with Khal, Canal, Culvert Crossing         2500         1,000 00           with Wer Crossing (2 nos.)         0         23,000.00           w) River Phi Construction	68.59		68 59			
Sub-Total=         202000           h) Pipe Welding         Nos.         Unit Price           24" DN Casing Pipe         50         4,000.00           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000 00           12" DN         15517         315 00           10" DN         0         263.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         0         176.56           4" DN         0         176.56           4" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           3) OTHERS         1000         1,000 00           wirer Crossing         2500         1,000 00           w) River Crossing (2 nos.)         0         20,000.00           v) River Pit Construction	00.09		00 37			
In ) Pipe Welding         Nos.         Unit Price           24" DN Casing Pipe         50         4,000.00           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000.00           12" DN         15517         315.00           10" DN x 300 PSIG         0         2,000.00           10" DN         0         263.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         31774         118.50           3" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           Sub-Totat=         3) OTHERS         300           III) Khat, Canal, Culvert Crossing         2500         1,000.00           v) River Crossing (2 mos.)         0         23,000.00           v) Nive Pit Construction         300         23,000.00           a) 4"& below         390         13,500.00           b) above 4"         300         23,000.00           vI) Road Breaking & Prov. Reinstatement         313,500.00           Brick paving         0         68.34           Aspha	339.29		339.29			
24" DN Casing Pype         50         4,000.00           20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000.00           12" DN         15517         315.00           10" DN         0         263.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         1774         118.50           3" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           3" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           30 DTHERS         300 D1,000.00         1,237.00           v) River Crossing (2 nos.)         0         20,000.00           v) Nive Pit Construction         0         23,000.00           a) 4"& below         390         13,500.00           b) above 4"         300         23,000.00           vi) Road Breaking & Prov. Reinstatement         0         68.34           Asphalt paving         0         58.75	Local	Foreign	Total			
20" DN x 1000 PSIG         0         3,500.00           14" DN x 300 PSIG         0         2,000 00           12" DN         15517         315 00           10" DN         0         263.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         1774         118.50           3" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           3" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           Sub-Total=         30         71,000.00           ty Highway Crossing         1000         1,237.00           v) River Crossing (2 nos.)         0         20,000.00           v) Nive Pit Construction         0         23,000.00           v) V Nive Pit Construction         390         13,500.00           b) above 4"         300         23,000.00           vi) Road Breaking & Prov. Reinstatement         9           Brick paving         0         68.34           Asphalt paving         342000         49.28	2.00	roregn	2 00			
14" DN x 300 PSIG       0       2,000 00         12" DN       15517       315 00         10" DN       0       263.48         8" DN       4545       237.71         6" DN       0       176.56         4" DN       1774       118.50         3" DN       0       103.92         2" DN       32142       86.58         1" DN       0       65.49         3" DN       0       65.49         3" DN       0       65.49         3" DN       0       1.237.00         9 OTHERS       1000       1.237.00         Will Khal, Canal, Culvert Crossing       1000       1.237.00         v) River Crossing (2 nos.)       0       20,000 00         v) River Pit Construction       390       13,500.00         a) 4"& below       390       13,500.00         b) above 4"       300       23,000.00         vi River Aring & Prov. Reinstatement       300       23,000.00         b) above 4"       300       23,000.00         vi Road Breaking & Prov. Reinstatement       342000       49.28         CC/RCC       0       59.75	· · ·		200			
12" DN       15517       315 00         10" DN       0       263.48         8" DN       4545       237.71         6" DN       0       176.56         4" DN       0       176.56         4" DN       0       1774       118.50         3" DN       0       103.92       2" DN       32142       86.58         1" DN       0       65.49       3wb-Total=       30       5wb-Total=         3) OTHERS       1000       1.237.00       1.000 00       1.237.00       1.000 00       1.237.00       1.000 00       1.237.00       20,000 00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       20,000 00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.237.00       1.000 00.00       1.000 00.00       1.237.00       1.000 00.00						
10" DN         0         263.48           8" DN         4545         237.71           6" DN         0         176.56           4" DN         0         1774           18.50         3" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           2" DN         32142         80.58           1" DN         0         65.49           30 OTHERS         3ub-Total=           31 OTHERS         1000         1,237.00           v) River Crossing         1000         1,237.00           v) Niver Pit Coastruction		<u> </u>	40.00			
8" DN       4545       237.71         6" DN       0       176.56         4" DN       1774       118.50         3" DN       0       103.92         2" DN       32142       86.58         1" DN       0       65.49         3" DN       0       65.49         3" DN       0       65.49         30 DTHERS       Sub-Total=         3) OTHERS       1000       1,237.00         with Highway Crossing       1000       1,237.00         v) River Crossing (2 nos.)       0       20,000.00         v) Valve Pit Coastruction	48.88		48 88			
6" DN         0         176.56           4" DN         1774         118.50           3" DN         0         103.92           2" DN         32142         86.58           1" DN         0         65.49           30 OTHERS         Sub-Total=           3) OTHERS         1800         1.237.00           v) River Crossing         1800         1.237.00           v) River Crossing (2 nos.)         0         20,000.00           v) Valve Pit Coastruction	-	<u> </u>	-			
4" DN       1774       118.50         3" DN       0       103.92         2" DN       32142       86.58         1" DN       0       65.49         Sub-Total=         3) OTHERS         III ) Khal, Canal, Culvert Crossing       2500       1,000.00         iv) Highway Crossing       1000       1,237.00         v) River Crossing (2 nos.)       0       20,000.00         v) Neve Pit Construction	10.80		10.80			
3" DN       0       103.92         2" DN       32142       86.58         1" DN       0       65.49         Sub-Total=         3) OTHERS         III ) Khal, Canal, Culvert Crossing       2500       1,000.00         iv) River Crossing (2 nos.)       0       20,000.00         v) River Crossing (2 nos.)       0       20,000.00         v) Valve Pit Construction	-	-	-			
2" DN         32142         86.58           1" DN         0         65.49           3) OTHERS         Sub-Total=           3) OTHERS         1000         1,000 00           in Highway Crossing         1000         1,237.00           v) River Crossing (2 nos.)         0         20,000 00           v) Valve Pit Coastruction         0         23,000.00           a) 4"& below         390         13,500.00           b) above 4"         300         23,000.00           vi) Road Breaking & Prov. Reinstatement         68.34           Brick paving         0         68.34           Asphalt paving         342000         49.28           CC/RCC         0         59.75	2.10	-	2.1 <u>0</u>			
i" DN       0       65.49         Sub-Total=       3) OTHERS         iii ) Khal, Canal, Culvert Crossing       2500       1,000.00         iv) Highway Crossing       1000       1,237.00         v) River Crossing (2 nos.)       0       20,000.00         v) Nuive Pit Construction       0       20,000.00         a) 4"& below       390       13,500.00         b) above 4"       300       23,000.00         vi) Road Breaking & Prov. Reinstatement       68.34         Brick paving       0       68.34         Asphalt paving       342000       49.28         CC/RCC       0       \$9.75	-	-	-			
Sub-Tota⊨           3) OTHERS           III) Khal, Canal, Culvert Crossing           2500           in Highway Crossing           1800           in Highway Crossing           in Highway Crossing           1800           in Highway Crossing	27.83	-	27.83			
3) OTHERS           III.) Khal, Canal, Culvert Crossing         2500         1,000.00           iv) Highway Crossing         1000         1,237.00           v) River Crossing (2 nos.)         0         20,000.00           v) Never Pit Construction		-				
III ) Khal, Canal, Culvert Crossing         2500         1,000.00           iv) Highway Crossing         1000         1,237.00           v) River Crossing (2 nos.)         0         20,000.00           v) Valve Pit Construction	91.61	<u> </u>	91.61			
in ) Highway Crossing         1000         1,237.00           v) River Crossing (2 nos.)         0         20,000.00           v) Valve Pit Construction         0         20,000.00           a) 4"& below         390         13,500.00           b) above 4"         300         23,000.00           vi) Road Breaking & Prov. Reinstatement         0         68.34           Brick paving         0         68.34           Asphalt paving         342000         49.28           CC/ROC         0         \$9.75						
v) River Crossing (2 nos.)         0         20,000 00           v) Valve Pit Construction	25,00	-	25 00			
v) Valve Pit Construction         390         13,500.00           a) 4"& below         390         13,500.00           b) above 4"         300         23,000.00           vl) Road Breaking & Prov. Reinstatement         Brick paving         0         68.34           Asphalt paving         342000         49.28         CC/RCC         0         \$9.75	12 37		12.37			
v) Valve Pit Construction		l	•			
a) 4"& below         390         13,500.00           b) above 4"         300         23,000.00           vl) Road Breaking & Prov. Reinstatement			-			
b) above 4"         300         23,000.00           v1) Road Breaking & Prov. Reinstatement         68.34           Brick paving         0         68.34           Asphalt paving         342000         49.28           CC/ROC         0         59.75	52.65	-	52.65			
vl) Road Breaking & Prov. Reinstatement Brick paving 0 68.34 Asphalt paving 342000 49.28 CC/ROC 0 59.75	69.00	-	69.00			
Brick paving         0         68.34           Asphalt paving         342000         49.28           CC/RCC         0         59.75			-			
Asphalt paving 342000 49.28 CC/ROC 0 59.75	-	-	<u> </u>			
CC/ROC 0 59.75	168.54	-	168.54			
		-				
A) POAD PESTORATION	168.54		168.54			
4) ROAD RESTORATION						
-,						
Brick Paving 0 618.00		<u> </u>	7			
Asphalt Paving 208620 875.00		-	1,825,43			
CC/RCC 0 1,003.00	1.043.43	-	-			
	1,023.43		-			
Kutcha 0 65 00 Sub-Total=	<u>+</u>		1,825,43			

Sector	Width(M)	Length (M)	PipeDia	Design length
	9,07	476 <i>5</i> 2	2	953.04
1	914	3886 82	2	7773 64
	11 55	277 37	4	554 74
	£2 19	367 56	4	735 12
ļ	12 8	277.37	4	554 74
	16.46	953.42	1	1906.84
	18.29	1287 22	8	2574 44
	22.86	1694 21	12	3385 42
	30.48	416.DI	12	\$32,02
	76.2	1684 41	12	3368 82
	91 44	221.62	12	443 24
2	9,14	5418 43	2	10836-86
	9,75	176.58	2	353 l <b>ó</b>
	10.97	199 95	2	399.9
	12 19	955.04	4	1910 08
	15 \$5	499 41	8	998 82
	16,46	955 85	8	1911 7
	22,86	1874 33	12	3748 66
	30.48	569.86	12	1139.72
	45.72	452.78	12	905,56
}	76.2	1874 33	12	3748.66
3	914	6739 73	Ż	13479,46
	12 19	1028.97	4	2057.94
	16 46	1719 27	8	3438 54
	22 56	3355.27	12	6710.54
	30 <b>48</b>	369 38	12	738.76
	76 2	2704 49	12	5408 98
4	9,14	3353.26	2	6706 52
	12 19	779 5	4	1559
	16.48	1134 85	8	2269 7
1	18 29	1465 66	8	2931 32
	21 85	1206 96	12	2413 92
	22 86	242 19	12	484 38
	30.48	528 8	12	1057.6
5	914	<b>8906</b> 62	2	17813 24
	Ü.18	142,69	2	285,38
	11.58	154 15	4	308 3
	14,9	70 74		141 48
	16 46	533 24	8	1056 48
	16 58	332,75	8	665.5
	16 72	16 89	8	33.78
	22 86	1564.31	12	3 28.62
	48 TT	1049.22	12	2098 44

Sector	Width(M)	Length (M)	PipeDia	Design length
6	914	257 3 <b>8</b>	2	514 76
	22.86	949,11	12	1898 22
	48.77	1024.94	- 12	2049 88
7	914	3998,34	2	7996.61
	9,91	187 42	2	374 84
	12.19	798 23	4	1596.46
	16.46	21 <b>0 47</b>	8	2420.94
	19.34	470.52	12	941.04
	22.86	2164 28	12	4328.56
	30.48	479 74	12	959.48
8	914	9267 77	2	18535 54
	12,81	234 72	4	469 44
	16 46	785.07	8	1570.14
	22.86	1871 41	12	3742 82
	30 48	1905,03	12	3810.06
ġ	914	8533.72	2	17067 44
	10 07	257.26	2	514 52
	11 89	392 5	4	785
	12,19	376 74	4	753 48
	12 2	205 44	4	410 21
	L4 03	256 03	8	512.06
	14.54	442 2	8	964 4
	16 48	571,94	8	1143.88
	17.02	382.83	5	765 66
	22.86	1324.57	12	2649,14
	30.48	946 41	12	1892 82
	98.25	72,54	12	145,02
10	914	8271,63	2	16543 26
	9.6	193.08	2	386.16
•	10.06	240 81	2	481.62
	10 08	\$6.46	2	172.92
	10.72	425 76	2	851.52
	10.97	\$30.35	2	1060.7
	11 27	394 83	4	789 66
	12,19	378 62	4	757 24
	14	123.44	4	246,88
	16 46	\$03 33	<u>Б</u>	1006 66
	22,86	2221.72	12	4443 44
	30 48	2134.91	12	4269 82
	36 98	558.94	12	1117.88
	45.72	1038.35	12	2076.7

# Table 6.11 Length of distribution pipeline at Purbachal (Sector 1-10)

SFCTOR: 1-10						
Pipe Dia Length (M) Length (Km						
2"	123101.16	123 10116				
4"	13468 96	13 48896				
8"	26322.34	26,32234				
12'	73941.28	73 94128				
Total Length	136853.74	236.85374				

Sector	Width (M)	Length (M)	Pipe Dia	Design Length
11	9,14	6449 32	2	12898.64
	12 19	709 4	4	1418.8
	13 43	339 24	4	678 48
	16 46	2499.71	8	4999.42
	17 37	812.79	8	[625 <b>58</b>
	20,12	60.95	12	121.9
	22.86	146.6	12	293 2
	45 72	996 84	12	1993 68
	72 2	956 59	12	1913.18
12	9.14	476 98	2	953.96
	22,86	0	12	0
13	914	6549 62	1	13099 24
	117	645 99	4	1291 98
	12 19	738 24	4	1476 48
	16 46	1758 34	8	3516 64
	18 67	286 51	8	573 OZ
	22,86	431.57	12	863,14
	30 48	765 29	12	[530.58
	45,72	510.09	12	1020 18
	91 44	657,89	12	1315 78
14	914	2464 66	2	4929 32
	16 46	575 36	8	1150 72
	L# 29	1408 57	8	2817 14
	22	400 29	12	800.58
	22.86	15641	12	3128 2
15	914	3988.75	2	7977 5
	12 04	129 8	4	379.6
	12.19	107.73	4	21546
	12 35	127 02	4	254 04
	1646	1141,06	- 8	2282.12
	22.86	1162 18	12	2324.36
	30.48	902.94	12	1805,88

Dia	Design Length	Sector	Width (M)	Length (M)	Pipe Dia	Design
	12898.64	16	914	4408 92	2	8917.84
	1418,8		9 45	199 95	2	399,9
	678 48		11.09	302 42	4	604 64
	4999.42		12.19	1020.23	4	2040 46
	[625 <u>58</u>		13 41	371.55	4	743
	121.9		14 63	220 67	5	441,34
	293.2		16 46	357 84	8	715 61
!	1993 68		22 86	1275,07	12	2550.14
2	1913.18		30 48	1426 61	12	2853 22
	953.96	17	9.14	8510 15	2	17020.3
:	0		16 46	339 65	8	679.7
	13099 24		22 86	1332 45	12	2664.9
	1291 98		30,48	316 69	12	633,38
	1476 48		45 72	¢	12	0
	3516 68	18	9,14	6006.67	2	12013.34
	573 OZ		12 17	251.91	4	503.82
2	863,14		12.19	565 11	4	1130.22
2	[530.58		1646	884 26	8	1768 52
2	1020 18		22,86	1945 7	12	3891.4
2	1315 78		30 48	1223 22	12	2446 44
	4929 32		45 72	1055 78	12	2111.56
	1150 72	19	9 23	318,21	2	636 42
	2817 14		9,78	200 88	2	401.76

#### Table 6.12 Length of distribution pipeline at Purbachal (Sector 11-20)

Sector (11-20)							
Pipe Dia	Langth (Km)						
2	92752 82	92,75282					
4	31047,84	31.04784					
8	18952 34	18 95234					
12	\$\$\$\$5.42	55.55542					
Total	198308.42	198.30842					

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	22,86	1945 7	12	3891.4
	30 48	1223 22	12	2446 44
	45 72	1055 78	12	2111.56
. 19	9 23	318.21	2	636 42
	9,78	200 88	2	401.76
	9.83	56 69	2	113 38
	12 11	531.9	4	1063 \$
	12 19	7554 72	4	15109 44
	12 2	298.7	4	597,4
	12 27	324 61	4	649.22
	13 94	967,93	4	1935 66
	22,26	4111.47	12	8222.94
	30.48	3269.56	j2	6539.12
20	9,14	6254 46	2	12508.92
	10 92	491 15	2	982 3
	12.19	477 42	4	954 84
	16.46	951.28	8	1902 56
	22 86	2911 16	12	5922,32
	30 48	1382 68	12	2765,36
	48 77	936.38	12	1872 76

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Sector	Width(M)	Length (M)	PipeDia	Design length
21	901	60 <b>66</b>	2	121 32
	914	8494 75	2	16989 \$
	9 87	304	2	60 8
	10 97	168.39	2	336 78
	12 19	629.29	4	1258 58
	13 19	39,82	- 4	79.64
	16 46	2 <b>609</b> 22	8	5218 44
	16.87	200 33	8	400.66
	18.29	1827 07	8	3654.14
	22.86	774.61	12	1549 22
	30 48	586 86	12	Ĩ 173 72
	48 77	1508,16	12	3016.32
22	9.14	8198 30	2	16396 <b>ó</b>
	10,97	317.85	2	635 7
	12 19	251.78	4	503,56
	12 8	108,25	4	216.5
	16 46	872 76	8	1645.52
	30.48	2176.97	12	4353.94
	45.72	1027 45	12	2054 9
	48,77	1164 18	12	2328 36
23	9 14	9763.48	2	19566 96
	12 19	717,79	- 4	1435,58
	13 41	37 21	4	74 42
1	16.46	1609 22	8	3218 44
	22.86	972.3		1944,6
[	30 45	3777.88	12	7555 76
24	9,14	7710.86	2	15421 72
	16 46	3564.97	8	7129 94
	30.48	2210 75	12	4425.5
	45.72	2097 95	12	4195.9
25	9,14	5240 18	2	10480-36
1	12,04	1523 44	4	3046,88
	16 46	759 93	8	1519 86
	22 86	1427 37	12	2854 74
	30 48	1893.78	12	3787.56
	45.72	1880 5	12	3761

Sector	Width(M)	Length (M)	PipeDia	Design length
26	9,14	8015 25	2	16030.5
	10.34	355 94	2	711.88
	10.82	181 2	2	362.4
	12,19	563 23	4	1126,46
	16 46	2677 <b>89</b>	8	5355 78
	17 25	353.21	8	706.42
	18,29	1124 11	8	2248 22
	30 48	1853 00	t 2	3706
	45.72	422.22	12	844,44
27	9.14	7288 45	2	14576.9
	12 19	968 49	4	1936 98
	16,46	458.04	8	916 08
	18 29	51196	\$	1023.92
	22 86	2126.56	12	4253.12
	45 72	2525 2	12	22707
28	9,14	4667 16	2	9334 32
	945	125 39	2	250 78
	10.79	254 69	2	509.38
	10.97	368.92	2	737,84
	12 04	254,93	4	509,86
	12.19	1808.52	4	3617.04
	13,02	493 15	4	986 3
	15 42	396,92	8	793,84
	16,46	914 08	8	1828 16
	22.86	1328 82	12	2657.64
	30.48	917.5	iż	21225.16
	45 72	2254 16	12	33116
29	9,14	6451	2	12902
	12 19	676 14	Ä	1352.28
	l <b>6 4</b> 6	1731.52	8	3463.04
	22 86	741.13	12	482 26
	30 <b>48</b>	917.5	12	1835
	45 72	1143.6	12	2287 2
30	914	4793,93	2	9587.56
	16.46	1402.6	8	2605,2
	45.72	403 55	12	807.1
	45 77	1463 51	12	2927 02

Sector (21-30)							
Pipe Dia	Length (M)	Length (Km)					
2"	145013.6	145 0136					
4"	16144.08	6 14408					
8"	41927.66	41.92766					
12"	140845 46	140.84546					
Total	343930.8	343,9308					

#### 6.4 STATION

í

Four stations will be built in this project. One of them is City Gate Station (CGS) and three others are Town Border Statiou (TBS)/ District Regulating Station (DRS). A lump sum costing for stations have been anticipated which is shown in Table 6.1.

#### 6.5 RIVER CROSSING

The Transmission Pipeline will cross the Shitalakhaya River which will be done by Horizontal Directional Drilling (HDD) method. The projected costing of River crossing by HDD method is shown in Table 6.10. The rates of the different components are assumed on the basis of the rates incurred in the recent projects accomplished by the Company.

# Table 6.10 Installation of DN 20" pipeline by HDD method (Shitalakhaya River Site)

#### (b) Length; 600 meters (Approx.)

#### (c) Design Pressure: 1000 PSIG

SL No.	Description of Item	Quantity	Unit Rate	Foreign Currency (USD)	Local Currency (BDT)
Â.Û	Survey, Design and Engineering of HDD,				
A.1	Detail survey of pipeline route, Hydrographic survey, soil survey etc, and preparation of drawing	Lot	1.5	s -	157,000 00
A.2	Preparation of Design, Engineering, Bill of Quantity (BOQ) etc.	Lot	L.S.	\$ 10,000.00	-
Λ3	Preperation of necessary documentation for obtaining of approval	Lot	LS	s -	500,000 00
	from TGTDCL and appropriate concerned agencies.				
3.0	Materials				
Вł	FBE (Fusion Bonded Epoxy) Conted DN 20° x 0.375° W.T (munumum) API SI, X 60, PSL - 2 Line pipe for Raver crossing	600 Meter	\$136.68 Tk 5872.19	\$ 82,008.00	3,523,314 00
В2	segment Heat Shrinkage Sleeve and other consumables for joint coating of DN 20° pipeline	75 No•	S 150 00	\$ 11,250.00	-
<b>В.</b> 3	Other materials (Hot Formed bend, Valves, Planges, Gaskets, B/W	Lot	LS	\$ 17,636.00	758,000 00
	fittings, Coating & Wrapping materials etc.) Hauling and Carrying of material from port to Chittagong port to	Lot	L <b>S</b> .	<b>s</b> -	965,000 00
8.4		1401	1.0.	÷.	
.0	ste Mobilization				
	Mountainou Materials transportation, Site preperation & storage Equipment, Machinaries and Personnel transportation.	Lot	LS	\$ 20,000.00	1,200,000 00
).0	Welding and Testing				
זס	Welding of Epoxy costed pipe, Radiography (100%), Installation of protective coating (Heat Shrink Sleeves) at welded Joints	75 Nos	2,961.00	s -	222,075 00
D2	Radiography (100%)	75 Nos.	5,000 00		375,000.00
EG	Installation of protective coating (Heat Shrink Sleeves) at welded Joints	75 Nos.	1,000 00		75,000 00
<u>.</u> .0	Drilling, Reaming, Pulling and Placement of Pipe.				
E1	Drilling, rearning, pulling and placement of pipe The cost includes rent of rig with P O L for required days, import fee, transportation of ng, handling of drill pipe, ventonite, cost of ventonite etc and all other required materials not mentioned. The work has to be completed successfully as per Bangladesh Gas & Mineral Safety Rules, approved drawing, design and direction of Engineer - in -	Lat	LS	\$ 284,000 00 )	3,400,000 00
	Installation of valves at both ends & Tie-in			ĺ	
F.1	Installation of above ground valve at both side of the river (According to indicative drawing) including construction of valve foundation, fabrication etc. complete in all respect as per Bangladesh Gas & Mineral Safety Rules, approved drawing and	Lat	LS.	\$ -	562,000 00
F.2	The in of the newly layed pipeline on over bed with existing line at both side of over. The stem includes DN 20° pipe laying, welding,	Lot	∟s	s -	697,000,00
	pneumatic testing, commissioning etc.				
	Hydrostatic testing of pipeline Hydrostatic testing, fabrication of temporary pig launcher &	Lot	L.S.	s -	423,000 00
G.I	Hydrostetic testing, thoucation of temporary big matches &	1.01	140.	-	
	installed by HDD method. The Contractor has to supply requisite			-	
	no, of pigs (Minimum 2 brush,4 cup, 2 foam)				
10	Site Cleanup & Ventonite disposal				
8.0	She Creating of vertoning asposit	Lori	LS	<b>s</b> -	150,000.00
H.1	Complete Cleaning of site by taking every effort to avoid damage to	Lan	11.5		
10	the environment. Demobilization of Contractor's personnel, equipment etc.				
гı,	Demobilization of Contractor's perionnel, equipment etc.	Lot	LS	\$ 20,000.00	100,000.00
			Sum:	\$ 444,894.00	13,107,319.00
					1,310,738.90
			Contingency:	\$ 44,489,40	1
			Grand Total:	\$ 489,383.40	14,418,127.90
	Total (Foreign Carres				48,234,520.84

# **CHAPTER-VII**

# FINANCIAL ANALYSIS

#### 7.1 COMPANY FINANCED PROJECTS (CFP)

In this system full expense of the project is borne by the company which includes material cost, construction cost and other expenses. For financial analysis purpose it is assumed that full load (load applied by customer) will be consumed from the very first year.

#### 7.2 COST SHARING PROJECTS

In this system 80% of the material cost is borne by the Company. And the customer has to bear 20% of total material cost and 100% construction cost and road restoration cost. For financial analysis purposes following assumptions are considered:

- At the very first year (trial run period) customer will consume 50% of the full load (load applied by customer).
- b) At the 2<sup>nd</sup> year customer will consume 70% of the full load (load applied by customer).
- c) From third year (for greater Dhaka and Chittagong area) 8% increase on load consumed of previous year and for other area 5% increase on load consumed of previous year. This growth rate will prevail up to the year it reached to the full load (load applied by customer).
- d) The extension of pipeline network will be considered profitable if the Net Pay Back Period is 10 years or less than 10 years.

#### 7.3 SENSITIVITY ANALYSIS

Probable number of customers has been calculated in Table: 7.1 assuming 237878 domestic customers, 1234 commercial customers, 45 Industries, 1 Power station and 594 MW Captive Power consumption by domestic customers. Sensitivity Analysis has been done for various cases which are described in the next pages.

#### Situation 1:

For this case the project is considered to be fully financed by Company (TGTDCL). The possible numbers of customers of different categories are assumed with the help of following two sources:

Category wise plot allocation data by RAJUK: Revised Purbachal plan, 2005) No of units & No of flat/plot are calculated as per thumb rule used by Marketing Division Titas Gas T&D Co. Ltd.

In the project plan provided by RAJUK there is provision for three industrial parks. It has been assumed that there will be at least 15 medium scale industries per industrial park. For captive power consumption only Captive Gas Generator load is considered. The following assumptions are considered for captive load Calculation:

- For Residential plot Category 3& 4:
  2.7 KW x Customer No considering only light & fan will be connected with generator.
- For Residential Category 5:
  3.2 KW x Customer No considering light, fan & AC will be connected with generator.
- For Residential Category 6:
   4.8 KW x Customer No considering light, fan & AC, oven will be connected with generator.
- For Residential Category 7
   6.5 KW x Customer No considering light fa

6.5 KW x Customer No considering light, fan & AC, oven, water heater etc. will be connected with generator.

The appliances are considered on the basis of financial capacity of the owner of the plots of the different category. A power plant of capacity of 10 Mega watts is considering the area and no of people of the proposed new town. The number of customer of different categories assumed considering the above conditions are shown in Table: 7.1.

### Table 7.1 No of customer

Residential	No of Plots	Unit	Flat/Plot	No of Domestic Customer	Captive Power (KW)	Total Captive Power (MW)
Category 1 (3 katha)	10078	1	4	40312		594
Category 2 (3 Katha)	3575	1	4	14300		1
Category 3 (5 Katha)	10875	2	10	108750	293625	
Category 4 (5 Katha)	220	2	10	2200	5940	
Category 5 (7.5 Katha)	2621	3	12	31452	100646.4	
Category 6 (10 Katha)	1997	4	20	39940	191712	
Category 7 (High Rise)	8	4	48	384	2496	
Category 8 (Low Income)	9	4	60	540		
Total no of Domestic customer				237878		
Administrative	551					
Commercial	1234			1234		
Research & Institute	30					
Social Infrastructure(mosque, community centre)	268		-			
Urban Utility Facilities (Bus station, filling station ctc.)	518					
Urban Utility Facilitics(Housing blocks)	103					
Physical Infrastructure(School, college etc)	96					
Plaza	119		i			
Neighborhood play lot	135					
Neighborhood play lot (Housing)	34	ŀ				
Sports	5					
Industrial Park	3		15	45		
Power Station (10 MW)	1			1		

Investment cost for the project is estimated in the Chapter VI. As for this situation the project is considered to be fully financed by Company the investment cost for the project is the grand total calculated in the Table 6.1 in Chapter – VI which is also shown in the Table-7.2 of this Chapter. In order to calculate the profit earning from the customers of the different categories the price of the gas is considered as fixed by the Govt. for Distribution Company that is shown in Table 7.3: Distribution Company's Margin.

Domestic	Tk. 0.740/CM.
Commercial	Tk.1.75/CM.
Industrial	Tk. 0.97/CM.
Captive	Tk, 0.606/CM.
Power station	Tk. 0.24/CM.

Table 7.2: Distribution Company's Margin :

To calculate annual value of output average Daily Demand has been considered as per load survey of existing customers and consumption pattern set by the Company.

The following assumptions are made in order to calculate the consumptions by customers of different category:

Consumption Pattern for Domestic Customer :

1046 Cubic Meter gas will be consumed by a Customer per year for a double gas burner.

Consumption Pattern for Commercial Customer:

Small tea stalls, restaurants etc. are considered as the commercial customers. It is assumed that 150 cubic feet gas will be consumed by a commercial customer per hour. The consumption patterns for different category customer are fixed by the Company. Following that pattern total amount of gas consumed by commercial customer is calculated using procedure shown below:

(150 cubic feet per hour x 12hour/day x 30 day/month x12 month/year x 0. 8/35.3147) Cubic Meter/year

0.8 is the diversity factor considered to encounter the fluctuations resulted from pressure and temperature factors, 35.3147 Cubic feet equals one Cubic Meter.

Consumption Pattern for Industrial Customer:

(7500 cubic feet per hour x 12hour/day x 26day/month x12 month/year x 0.8/35.3147) Cubic Meter/year

For a medium scale industry generally 7500 cubic feet gas is required per hour.

Consumption Pattern for Captive Power:

[(Mega watt required x 1000) KW x12 cubic feet x 8 hour/day x 30day/month x 12 month/year x 0.8/35.3147] Cubic Meter/year

As per thumb rule12 Cubic feet gas is needed to Generate 1 KW Power that's why total KW required for captive consumption is multiplied by 12.

Consumption Pattern for Power Station: (10MW x 1000 x12 cubic feet x 24 hours/day x 30 days/month x12 month /year x 0.8/35.3147) Cubic Meter/year

Annual Value of output for this case has been calculated in the column annual output of Table 7.4 by multiplying the consumption for different category customer (as discussed above) and the Distribution Company's margin shown in Table 7.3. Applying total benefit data that is derived from Table 7.4 and investment cost from Table 7.1 NPV, BCR and IRR have been calculated for this case in Table 7.5. Operating cost is considered to be 2.5% of investment cost as per thumb rule. The discount rate is considered as 15% that has been fixed by Government of Bangladesh for this kind of economic analysis. The Rate of Return is shown in the Figure: 7.1.

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# Table 7.3 Project costing summary (Company Financed)

#### GROUP- A: Station Construction

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SI.	Component	Qua	Quantity		Total amount (in
			_	rate	Lakh Taka)
1	CGS (Capacity: 200 MMSCFD)				
a	Material Cost	1	Nos.	150.00	150.00
b	Construction Cost	1	Nos.	30.00	30.00
2	TBS/DRS (Capacity: 50 MMSCFD)				
a	Material Cost	3	Nos.	100.00	300.00
b	Construction Cost	3	Nos.	20.00	60.00
	Total (GROUP A):				540.00

GRC Sl.	OUP- B: River Crossing by HDD Method Component	Quantity	Unit rate	Total amount (in Lakh Taka)
1 a	Shitalakhaya River Crossing Shitalakhaya river crossing by HDD method (adding 10% contingency)	LOT	-	482.35
╞───		Total (C	ROUP B):	482.35

<u>\$1.</u>	DUP- C: Pipeline Construction Component	Quan	tity	Unit rate	Total amount (in Lakh Taka)
l	Transmission Pipeline: (20" x 1000 Psig x 15 km)				
	Distribution Main Pipeline: (14" x 300 Psig x 20 km)				
a	Land Acquistion (Katha), 15 km x 20'	23	acres	10.00	230.00
b	Land Requistion (Katha), 15 km x 30'	35	acres	3.00	105.00
c	Road Restoration Charge	12200	sqm.		186.81
ď	Material Cost		LOT		4,582.39
ē.	Construction Cost	35000	M		1,396.48
f	Other Cost		L.S.		15.00
		· · · · · · · · · · · · · · · · · · ·	Sub-To	tal (C.1):	6,515.68
	Feeder Main Pipeline: (12" x 50 Psig x 274km)				
1	Distribution Pipeline: (8" x 50 Psig x 90 km)				
	Distribution Pipeline: (4" x 50 Psig x 62 km)				
	Distribution Pipeline: (2" x 50 Psig x 360 km)				
a	Road Restoration Charge	479460	sqm.		4,125.89
ь	Material Cost		LOT		28,909.34
с	Construction Cost	50000	m	320.00	1,682.15
			Sub-Te	otal <u>(C.2):</u>	34,717.38
_		Te	otal (GRC	$OUP - \underline{C}$ .	41,233.06
			Total (	(A+B+C):	42,255.41
	4% Cont.	ingency (e:	xcluding	Group B)	1,670.92
			Gra	and Total:	43,926.33

#### Table 7.4 Annual value of output (Situation J)

YEAR	<b></b> -	N	o. of Casta					Comun	tion (CM)	•		Anowal out put					Total Repetit
	înd.	Power Station	Сарбіч	Com.	Dorn.	Ind. i	Pewer Station	Captive	Саль	Dom	Total	Ind	Fower Station	Ըսր	Сот.	Dom.	(lekh taka)
2008-09																	<b>İ</b>
2	45	<u> </u>	<u> </u>	1 234	237,878	28,624,906.91	23,487,103 10	935,569,606 99	12,114,428 27	248,820,388,00	1,254,616,433 27	277 66	56.37	5,669 55	317.00	1,141,27	8,161.85
3	45	1		1,234	237,878	28,624,906 91	23,427,103.10	935,569,606 99	18,114,428 27	245,820,368.00	1,254,616,433 27	277.66	56.37	5,669 55	317,00	1,841 27	0,161 85
. 4	45	1	1	1,214	237,278	28,624,906 91	23,437,103,10	935,569,606.99	18,114,428.27	246,820,368.00	1,254,616,433 27	277 66	56 37	5,669 55	317.00	1,841 27	8,161 85
- 5	45	1	1	1,234	237,878	28 624 906.91	23,487,103.10	935,569,606 99	18,114,428,27	248,820,348.00	1,254,616,433.27	277.66	16 37	5,669 15	317 00	1,841 27	8,161 85
6	45	l 1	i l	1,234	237,878	28,624,906 91	23,487,103 10	935,569,606 99	18,114,428.27	248,820,338.00	1,254,616,433.27	277 66	56 37	5,569 55	317.00	1,841 27	8,161.85
7	45	· ·		1,234	237,871	28,624,906.91	23,487,103 10	935,569,606 99	16,114,428,27	243,820,388.00	1,254,616,433,27	277 66	56,37	5,669.55	417.00	1,841 27	8,161 <u>85</u>
- 8	45	1 1	1	1,234	237,878	28,624,906 91	23,487,103 10	935,569,606 99	18 114 428 27	248,820,388.00	1,254,616,433 27	277 66	56,37	5,669.55	317.00	1,841 27	\$,161 <u>.85</u>
9	45	1	1	1,234	237,878	28,624,906 91	23 487,103 10	935,569,606,99	18,114,428,27	248,820,388.00	1,254,616,433,27	277.66	56 37	5,669 55	317.00	1,841 27	8,161,85
10	45	1	1	1,234	237,275	28,624,906.91	23,487,103.10	935,569,606 99	18,114,428.27	248,820,388.00	1,254,616,43 <u>3 27</u>	277.66	56 77	5,669 55	317.00	1,41 27	<u>8,161 85</u>
11	45	1	<u> </u>	1 234	237,878	28,62 <u>4,906 91</u>	23,487,103 10	935,569,606 99	18,114,420 27	248,820,388.00	1,254,616,433.27	277.66	56 77	5,669 55	317.00	£,841.27	<u> </u>
12	45	1	ļi	1,234	237,876	28,624,906 91	23,487,103 10	935,569,606 99	18,114,428 27	248,820,326 00	1,254,616,433 27	277.66	16 17	5,669.55	317.00	1,841 27	8,161 85
19	45	1	1	1,234	237,878	28,624,996 91	23,487,103.10	935,569,606 99	18,114,428 27	248,820,388.00	1,254,616,433 27	277 66	56 37	5,669 55	317.00	1,841.27	
14	45	1	1	1,234	237,878	28,624,906 91	23,487,103 10	975,569,606 99	18,114,428 27	248,820,384,00	1,254,616,433 27	277 66	\$6.37	5,669.55	317.00	1,841 27	8,161 85
15	45	l	1	1,234	237,878	28,624,906.91	23,487,103 10	935,569,606.99_	18,114,428,27	248,820,388.00	1,254,616,433 27	277 66	56 37	5,669.55	317.00	1,841 27	8,161 \$5
16	- 45	۱. ۱	1	<u>1,234</u>	237,878	28,624,906.91	23,487,103.10	935,569,606.99	18,114,428,27	248,820,388.00	1,254,616,433 27	277.66	56.37	5,669.55	317.00	1,841.27	8,161.65
17	45	· ·	_!	1,234	237,878	28,624,906 <u>91</u>	23,487,103 10	935,569,606 99	18,114,428,27	248,820,388.00	1,254,616,433 27	277 66	56.37	5,669.55	317.00	1,841.27	<u>8,161,85</u>
18	45	] ]	1	1,234	237,878	28,624,906 91	23,417,103 10	935,569,606 99	18,114,428 27	248,820,388.00	1,254,616,433.27	277 66	56.37	5,669.55	317.00	1,641 27	\$,161.85
19	45	1	1	1,214	237,878	28,624,906 91	23,487,30 <u>9 10</u>	935,569,606 99	18,114,428.27	248,820,388.00	1,254,616,433 27	277.66	56 77	5,669.55	31700	1,841 27	8,161.85
20	45	L	1	1,234	237,878	28,624,906.91	23,487,103 10	931,569,606 99	16,114,428.27	242,820,388.00	1,254,616,433 27	277.66	56 37	5,669.55	317.00	1,841 37	<u> </u>
21	45		1	1,234	237,878	28,624 906 91	23,4 <u>87,103</u> 10	935,569,606.99	18,114,428 27	248,820,382.00	1,254,616,433 27	277 65	56 37	S,669 SS	317:00	1,841,27	0,161 85

#### Note:

Average Deily Demand has been considered as per load narvey of emating & probable Customers. 12 Cft gas is needed to Generate 1 KW Power

#### Assessment from a

Consumption Pattern for Demertic Contener : 1046 CM/Customer/Yr

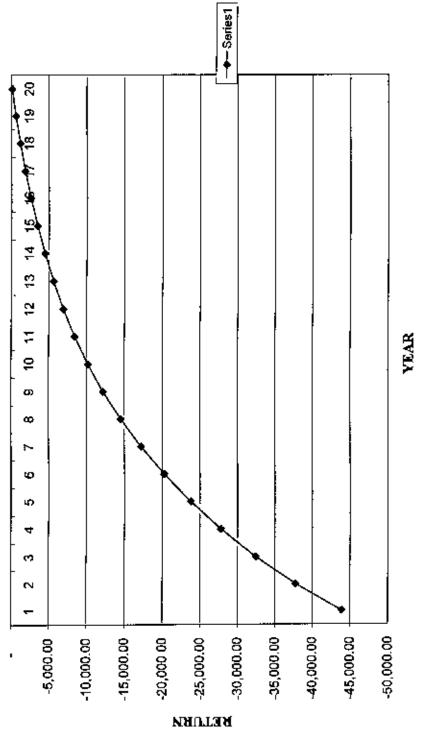
Constantion Pattern for CommercialConteners (100 oft/in x 12h/day x 30day/masth x12 monthlyr x 0.0/35.3147)/CM/yr Cess megden: Pattern for TechnicialConteners(7000 oft/in x 12h/day x 30day/month x12 monthlyr x 0.0/35.3147)/CM/yr Constantion Pattern for Capitre Parter (MW x 1000 x12 oft x 8 kolday x 30day/month x12 monthlyr x 0.0/35.3147)/CM/yr Constantion Pattern for Parter Station: (10MW x 1000 x12 oft x 24 holday x 30day/month x12 monthlyr x 0.0/35.3147)/CM/yr

(î	
IRR, (Situation	
NPV &	
sla of BCR ,	
sancial analy	
Table 7.5 Fin	

(ICH SKU ISKR)	Discounted Net Discounted Net Benefit (Amunal) Benefit (Cumulative)	43.926.33	(37,783,99)	(32.442.82)	(27,798 33)	(23,759,64)	(20.247.74)	(16 661.21)	(14.538.41)	(12,229,28)	(10.223 34)	(8,475 30)	(6,957.01)	(5,636 76)	(4,488,71)	(3,490.41)	(2,622,32)	(1,867 46)	(1,211.06)	(640.28)	(36,511)	287 64	
	Disconnted Net Benefit (Amuual) B	43,926 33	6,142 34	5,341 17	4,644 49	4,038.69	3,51190	3,053 83	2,655.50	2,309 13	2,007,94	1,746 O4	1,518,29	1.320 25	1,148.05	OF 866	868.09	754 86	656,40	ST0 T8	496,33	431 59	
	Discounted Beacfi		7,097.26	6,171,53	5,366.55	4,666.56	4,057.88	3,528 60	3,068.34	2,668.13	2,320,10	2,017.49	1,754.33	1,525 51	1,326.53	1,153 51	1,003 04	872.22	758 45	659 52	573 49	498 69	51,087.73
	Disconated Cost	43,926330	954.922	79E 0E8	722 058	627 876	545.980	474 765	412 839	358 991	312 165	271449	236,042	205 254	178,482	155 202	134 957	117 355	102 048	<b>BS 737</b>	77.162	67 098	50,800.08
	Discount Factor GISM	0000001	0 869565	0.756144	0 657516 1	0 571753	0 497177	0.432328	0 375937	0 326902	0.284262	0.247185	0 214943	0 186907	0 162528	0 141329	0 122894	0 106865	0 092926	0.080805	0.070265	0.061100	<b></b>
	Nrt Benefil	(43,926 33)	7,063.69	7,063.69	7,063 69	7,063.69	7,063.69	7,063 69	2,003 69	7,063 69	7,063 69	69 E90'1	7,063.69	7,063 69	7,063 69	7,063 69	7,063 69	2,063 69 -	7,063 69 1	7,063.69	7,063 69	7,063 69	
	Total Beacfit		8,161.85	8,161,85	8,161.85	8,161.85	\$,161,35	8,161,85	8,161.85	8,161,85	\$,161 851	8,161.85	8,161.85	8,161.85	8,161,85	8,161.85	8,161,85	8,161.85	8,161.85	8,161.85	8,161 85	8,161 85	
	Total Cost	43,926.33	1,098 16	1,098,16	1,098.16	1,098.16	1,098,16	1,098,16	1,098 16	1,098 16	1,098 16	1,098 16	1,098,16	1,098 16	1,098,16	1,098.16	1,098 16	1,098 16	1,098.16	1,098.16	1,098.16	1,098.16	
	Operating Con(2.5%)	•	1,098.16	1,09816	1,098 16	1,098,16	1,093.16	1,09816	1,098,16	1,098.16	1.098 16	1,098,16	1,098.16	1,098.16	1,098.16	1,098.16	1,098.16	1,098.161	1,098.16	1,098.16	1,093,16	1,098.16	
	Investment Cost	43,926 33	'	•	- -	'	•	•		'	•	'	•	'	'	-	'	' '	'	'		•	
	YEAR	2008-09	2	•	-	٩٦	\$	F-	×	4	9	11	1	E1 -	14	15	16	17	8	2	2	21	

BCR (F) : 1.01 NPV @15% : 287.65 LAKH TAKA IRR : 14.94%

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The financial analysis for Situation 1 results in following conclusion:

NPV	=	287.65 Lakh Taka
BCR	=	1.01
IRR	=	14.94%
Pay Back Period	=	Over 20 Years

For this case, NPV > 0 and Benefit Cost Ratio that is benefit per taka cost is slightly greater than 1 which indicates that the project is marginally profitable. But Internal Rate of Return for this case is below 15% and the Pay Back Period is over 20 years which is not acceptable.

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#### Situation 2:

For this case the cost of the project is considered to be shared by RAJUK and TGTDCL, which means that 80% of the material cost will be born by TGTDCL and 20% of the material cost will be borne by RAJUK. Investment cost for TGTDCL for Cost Sharing Project is shown in Table 7.6. The annual value of output calculation is based on the primary assumption on probable number of customer calculated in Table: 7.1. Annual Value of output has been calculated according to the rules of cost sharing project. Following are the rules for load calculation for cost sharing project.

- a. At the very first year (trial run period) customer will consume 50% of the full load (load applied by customer).
- b. At the 2<sup>nd</sup> year customer will consume 70% of the full load (load applied by customer).
- c. From third year (for greater Dhaka and Chittagong area) 8% increase on load consumed of previous year and for other area 5% increase on load consumed of previous year. This growth rate will prevail up to the year it reached to the full load (load applied by customer).
- d. The extension of pipeline network will be considered profitable if the Net Pay Back Period is 10 years or less than 10 years.

Applying the above conditions probable load consumption has been calculated in the Table 7.7. Total benefit has been calculated by multiplying the possible consumption with Distribution Company's Margin which is shown in Table 7.3. Applying total benefit data that is derived from Table 7.7 financial analysis for NPV, BCR and IRR is done in Table 7.8. Operating cost is considered to be 2.5% of investment cost as per thumb rule. The discount rate is considered as 15% that has been fixed by Government of Bangladesh for this kind of economic analysis. The Rate of Return is shown in the Figure: 7.2.

#### Table7.6: Investment cost for cost sharing project

SI. No.	Component	Qua	ntity	Unit rate	Total amount (in Lakh taka)
1 a	CGS (Capacity: 200 MMSCFD) Material Cost	1	Nos.	150.00	150.00
2 a	TBS/DRS (Capacity: 50 MMSCFD) Material Cost	3	Nos.	100.00	300.00
		То	tal (GRO	OUP A):	450.00

#### GROUP- A: Station Construction

#### GROUP- B: River Crossing by HDD Method

SL No.	Component	Quantity	Unit rate	Total amount (in Lakh taka)
1 a	Shitalakhaya River Crossing Shitalakhaya river crossing by HDD method (adding 10% contingency)	LO	г	482.35
		Total (G	ROUP B):	482.35

#### **GROUP- C: Pipeline Construction**

Sl. No.	Component	Quai	ıtity	Unit rate	Total amount (in Lakh taka)
1	Transmission Pipeline: (20" x 1000 Psig x 15 km)				
	Distribution Main Pipeline: (14" x 300 Psig x 20 km)				
8	Land Acquistion (Katha), 15 km x 20'	23	acres	10.00	230.00
ь	Land Requistion (Katha), 15 km x 30'	35	acres	3.00	105.00
с	Road Restoration Charge	12200	sqm.	:	186.81
d	Material Cost		LOT		4,582.39
		8	ub-Tote	ıl <u>(C.1)</u> :	5,104.20
2	Feeder Main Pipeline: (12" x 50 Psig x 274km)				
	Distribution Pipeline: (8" x 50 Psig x 90 km)				
	Distribution Pipeline: (4" x 50 Psig x 62 km)				
	Distribution Pipeline: (2" x 50 Psig x 360 km)				
a	Material Cost		LOT		28,909.34
		2	Sub-Tote	il (C.2):	28,909.34
		Tota	(GROU	<u> (77 - C):</u>	34,013.54
		7	Total (A	+B+C):	34,945.89
	4% Continger				1,378.54
. —				d Total:	36,324.43
		80%	of Gran	d Total:	29,059.54

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	-													
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[=	1	211/112	23,414,906.91	23,417,161,161,162	M 101 105 5C4	11,114,421,27	00131-00131-00	1.234,007,444 17	277.64	11 M	5,040,5	11704	10.001	L320.19
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Table 7.7: Annual value of output ( Situation 2)

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Average Dedy Demand has here considered as per load survey of existing & probable Createner. 12 Cft per is second to Generale 1 XW Power

# : Hydensy

Commission Instant for Departic Continuer 1: 1046 CMC attack for

Consumption Peterns for CommercialConteners (150 cf.terx 12m/day x 30day/month x12 monthly x 0 k35.3)47) CN/yr Communities Patterns for IndentitalCastomer: (730) effin v 12n/dry × 2645/march x12 month/n x 0 2053147) CM/n

Concemption Pattern for Ceptive Press; (AOV × 1000 ×12 cft × 1 hitley × 3045/fmonth ×12 monthlyr × 0 12/5.3147)CM/yr

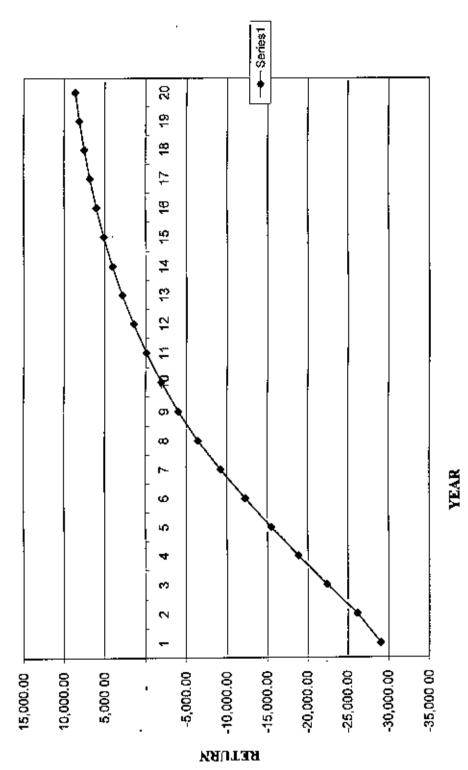
Consumption functors for Power Stations (10MW x 1000 x12 cft x 24 britissy x Mitprisonits x12 monthly x 0 M33.3147) Ch4yr

Benefit (A mund)	(Cumbletive)	-	Curr 2 4				Cuer															
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Total Benefit		•	1,062.09																			
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Operating Cost(2.5%)			726,49	726.49	726 49 726 49	726.49 726.49 726.49	726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49	726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49 726.49
Investment Cost	AO GED EL	4C.8C0.82		+c.xcn/x7	+cr.kcn'k/7	+c-kcn/k7	4C-KC0/K7	6C:K01/47	•CrKc0'47	•CrK00'47	•CrKc0/47	6C7K00 <sup>4</sup> X7	6C7K00/X7	6C7K00/X7	6C7K00/X7	6C7K00/X7						
VEAR b	1 50000		2	╽┝	<del>╽┝╇</del> ╸	<u>┥</u> ┝╄╸┟						<del>╏┍╡</del> ╏┼┼╊┿┼╂╴	<del>╏┝╇</del> ╏┼┼┣┿┼╏┼	<del>╏┝╇</del> ╏┼┼╊┿┽╏┼┦╸	<u>┨┝╇</u> ┫╎╎┣┿┥╢╎╿┿	<del>╏┝╇╏╎╎┣┿</del> ╎╏╎╄┿┽	<del>╏┝╇┇╎╎┣┿┥╏╎╄┿┥╎</del>	<del>╏┝╇╏╎╎┣┿╎╏╎┦┿╹╎╵</del>	<del>╏┝╄╸╏╎╎┣┿╵╏╎┞┿┑╎╎╵</del>	<del>╏┝╇╸╏╎╎┣┿╵╏╎┞┿┑╎╎╎╄</del> ╸	<del>┃ ┃ ┃    </del>	<del>╏┍╕┛╎╎┣┿╎┦╎┡┿┑</del> ┼

LAKH TAKA

UCR (F) : 1.27 NeV (2)5% : 9069.26 URR : 19.54%

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The financial analysis for situation 2 results in following conclusion:

NPV	=	9096.26 Lakh Taka
BCR	=	1.27
IRR	=	19.54%
Pay Back Period	-	12 Years (Appx.)

For this case, NPV > 0 and Benefit Cost Ratio that is benefit per taka cost is greater than 1 which indicates that the project is profitable. Internal Rate of Return for this case is over 15% and the Pay Back Period is 12 years. Moreover NPV is much higher than case 1. So this case is a better option.

Similar analysis has been done for 14 other situations which are as follows:

- 1. For Company financed project 5% decrease in consumption of gas volume from the primary assumption on probable number of customer (Table 7.1). Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return for this situation is shown in Appendix A.
- For Company financed project 5% increase in consumption of gas volume from the primary assumption on probable number of customer. Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return for this situation is shown in Appendix B.
- 3. For Company financed project 5% increase on the present rate of gas for customer of various categories. Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return for this situation is shown in Appendix C.
- 4. For Company financed project 10% increase on the present rate of gas for customer of various categories. Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return for this situation is shown in Appendix D.
- 5. For Company financed project 20% increase on the present rate of gas for customer of various categories. Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return for this situation is shown in Appendix E.

- 6. For Company financed project 25% increase on the present rate of gas for customer of various categories. Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return is shown in Appendix F.
- For Company financed project 30% increase on the present rate of gas for customer of various categories. Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return is shown in Appendix G.
- 8. For cost sharing project 5% decrease in consumption of gas volume from the primary assumption on probable number of customer (Table 7.1). Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return is shown in Appendix H:
- 9. For cost sharing project 5% increase in consumption of gas volume from the primary assumption on probable number of customer (Table 7.1). Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return is shown in Appendix H.
- 10. For cost sharing project 5% increase on the present rate of gas for customer of various categories. Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return is shown in Appendix I.
- 11. For cost sharing project 10% increase on the present rate of gas for customer of various categories. Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return is shown in Appendix J.
- 12. For cost sharing project 20% increase on the present rate of gas for customer of various categories. Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return is shown in Appendix L.
- 13. For cost sharing project 25% increase on the present rate of gas for customer of various categories. Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return for this situation is shown in Appendix M.
- 14. For cost sharing project 30% increase on the present rate of gas for customer of various categories. Annual value of output calculation, financial analysis for NPV, BCR and IRR and Rate of return for this situation is shown in Appendix N.

### CHAPTER -- VIII

### CRITICAL PATH SCHEDULING

#### 8.1 PROJECT MANAGEMENT

A project may be defined as a series of related jobs usually directed toward some major output and requiring a significant period of time to perform. Project management can be defined as planning, directing, and controlling resources (people, equipment, and material) to meet the technical, cost and time constraints of the project.

A project starts out as a statement of work (SOW). The SOW may be written description of the objectives to be achieved, with a brief statement of the work to be done and a proposed schedule specifying the start and completion dates. It could also contain performance measures in terms of budget and completion steps (milestones) and the written reports to be supplied.

A task is a further subdivision of a project. It is usually not longer than several months in duration and is performed by one group or organization. A subtask may be used if needed to further subdivide the project into more meaningful pieces.

#### 8.2 CRITICAL PATH SCHEDULING

Critical path scheduling refers to a set of graphic techniques used in planning and controlling projects. In any project, the three factors of concern are time, cost and resource availability. Critical path techniques have been developed to deal with each of these, individually and in combination.

PERT (Program Evaluation and Review Technique) and CPM (Critical Path Method), the two best known critical path scheduling techniques, were both developed in the late 1950s. PERT was developed under the sponsorship of the U.S. Navy Special Projects office in 1958 as a management tool for scheduling and controlling the Polaris missile project. CPM was developed in 1957 by J.E. Kelly of Remington-Rand and M.R. Walker of Du Pont to aid in scheduling maintenance shutdowns of chemical process plants.

Critical Path scheduling techniques display a project in graphic form and relate its component tasks in a way that focuses attention on those crucial to the project's completion. For critical path scheduling techniques to be most applicable, a project must have the following three characteristics:

- a) It must have well-defined jobs or tasks whose completion marks the end of the project.
- b) The jobs or tasks are independent; they may be started, stopped and conducted separately within a given sequence.
- c) The jobs or tasks are ordered; they must follow each other in a given sequence.

The basic forms of PERT and CPM focus on finding the longest time-consuming path through a network of tasks as a basis for planning and controlling a project. Both PERT and CPM use nodes and arrows for display. Originally, the basic differences between PERT and CPM was that PERT used the arrow to represent an activity and CPM used the node. The other original difference was that PERT used three estimates – optimistic, pessimistic and best-of an activity's required time, whereas CPM used just the best estimate. This distinction reflects PERT's origin in scheduling advanced projects that are characterized by uncertainty and CPM's origin in the scheduling of the fairly routine activity of plant maintenance. As years past passed, these two features no longer distinguished PERT from CPM. This is because CPM users started to use three time estimates and PERT users often placed activities on the nodes.

We believe the activity on the node is much easier to follow logically than the activity on the arrow. The three time estimates are used to measure the probability, the probability of completion times. Therefore, in this chapter we use the activity on the node and either a single estimate for activity time or three time estimates, depending on our objective.

In a sense, both techniques owe their development to their widely used predecessor, the Gantt Chart. While the Gantt Charts able to relate activities to time in a usable fashion for very small projects, the interrelationship of activities, when displayed in this form, becomes extreme difficult to visualize and to work with for projects with more than 25 or

30 activities. Also, the Gantt chart provides no direct procedure for determining the critical path, which despite its theoretical shortcomings, is of great practical value.

### 8.3 GANTT CHART

A Gantt chart is a bar chart showing both the amount of time involved and the sequence in which activities can be performed. The independent activities can be done simultaneously. All other activities must be done in the sequence from top to bottom.

#### 8.4 PURBACHAL PROJECT GANTT CHART

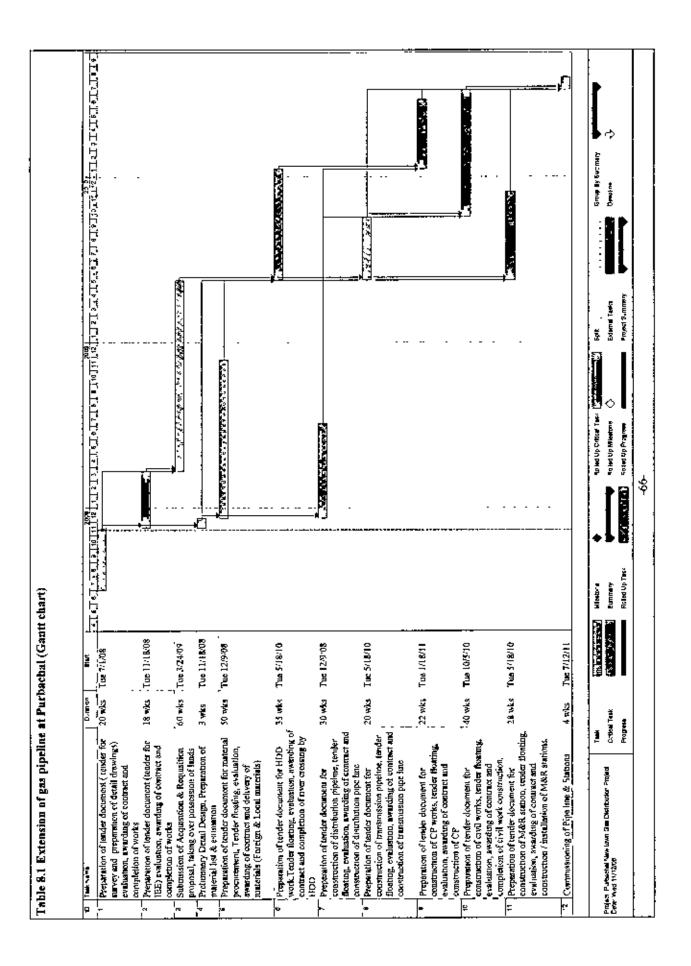
A Gantt chart of Purbachal project has been constructed showing both the amount of time involved and the sequence in which these activities can be performed. The Purbachal Project includes the following tasks:

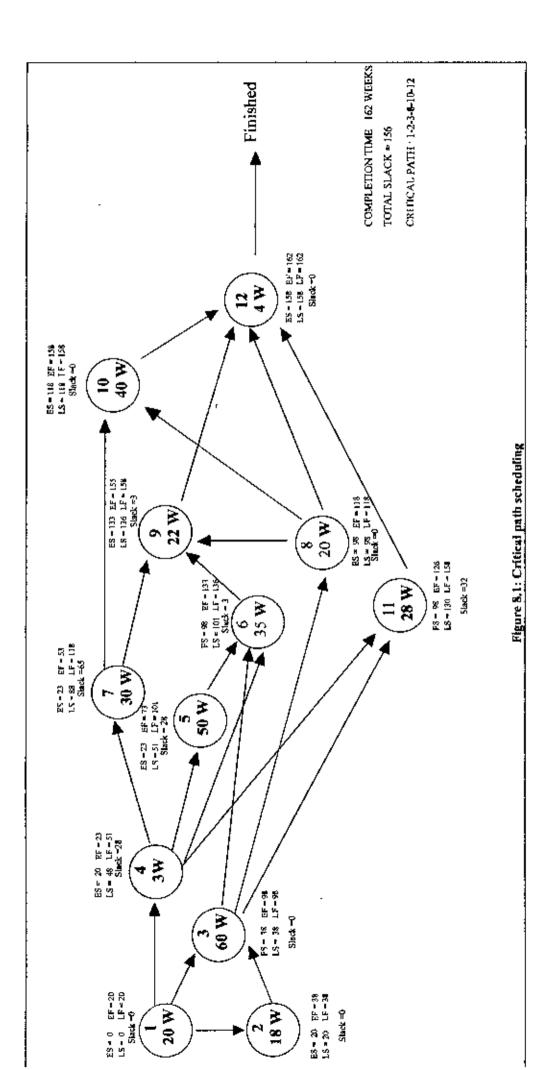
- 1. Preparation of tender document (tender for survey and preparation of detail drawings) evaluation, awarding of contract and completion of works.
- 2. Preparation of tender document (tender for IEE), evaluation, awarding of contract and completion of works. Task 1 is the predecessor of task 2.
- 3. Submission of Acquisition & Requisition proposal to the concerned authority, taking over possession of lands. Task 1 & 2 is the predecessor of task 3.
- 4. Preliminary Detail Design, Preparation of material list & estimation. Task 1 is the predecessor of task 4.
- 5. Preparation of tender document for material procurement, Tender floating, evaluation, award of contract and delivery of materials (Foreign & Local materials). Task 4 is the predecessor of task 5.
- 6. Preparation of tender document for River crossing by HDD method, tender floating,
  evaluation, awarding of contract and completion of river crossing by HDD. Task 3,4 & 5 is the predecessor of task 6.
- Preparation of tender document for construction of transmission pipeline, tender floating, evaluation, award of contract and construction of transmission pipe line. Task 4 is the predecessor of task 7.

- Preparation of tender document for construction of distribution pipeline, tender floating, evaluation, award of contract and construction of distribution pipe line. Task 3 is the predecessor of task 8.
- 9. Preparation of tender document for construction of CP works, tender floating, evaluation, award of contract and construction of CP. Task 6, 7 & 8 is the predecessor of task 9.
- 10. Preparation of tender document for construction of civil works, tender floating, evaluation, award of contract and completion of civil work construction. Task 7 & 8 is the predecessor of task 10.
- 11. Preparation of tender document for construction of M&R station, tender floating, evaluation, award of contract and construction / installation of M&R stations. Task 3 & 4 is the predecessor of task 11.
- Commissioning of Pipe line & Stations. Task 8, 9, 10 & 11 is the predecessor of task
   12.

#### 8.5 PURBACHAL NETWORK DIAGRAM

A network diagram has been constructed showing the critical path is shown. From network diagram it is apparent that 1-2-3-8-10-12 is the critical path.







### CHAPTER – IX

### CONCLUSIONS AND RECOMMENDATIONS

#### 9.1 CONCLUSIONS

Financial analysis has been done for two different situations: i) for company financed projects and ii) for cost sharing projects. Different technical evaluation such as NPV, BCR, IRR and EIA etc. are formulated to analyze the profitability and feasibility of the project. The findings are:

- a) The total cost of project is 43926.33 lakh taka and total gas demand in next 20 years at Purbachal Project area would be 1254 MMCMD.
- b) If the project is Company Financed the NPV is 287.65 Lakh Taka, IRR is around 15% and BCR of 1.01 indicate that the project is feasible. Net Pay Back Period is over 20 years if the project is financed by Company.
- c) If the project is done by Cost Sharing, the NPV is 9096.26, IRR is around 19.54% and BCR is 1.27 which also indicates that the project is feasible. Net Pay Back Period is 12 years. This case is a better option over case 1.
- d) If the project is Company Financed and the gas price is increased by 30% over the present rate, the NPV is 13484.80 IRR is around 20.17% and BCR is 1.27 which also indicates that the project is feasible. Net Pay Back Period is 11 years. Although BCR is same for both cases but NPV for this case is higher than case 2.
- e) If the project is done by Cost Sharing and the gas price is increased by 30% over the present rate, the NPV is 20812.44, IRR is 24.96%, BCR is 1.62 and Net Pay Back Period is 8 years. This case shows the best result.
- f) Implementation of the project will create investment opportunities for setting up new industries specially garments, textile, Electronic, Computer based industries to this area because of the proximity of the capital city.

#### 9.2 RECOMMENDATIONS

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- a) Skillful and effective maintenance and monitoring system should be adapted to provide smooth network operation.
- b) To cope up with the growing demand for housing sustainable expansion of the Dhaka city is essential. The planning authority of the city bears the responsibility to device an optimum equilibrium design for the city considering the demand for development and long term sustainability of urban areas.

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### APPENDIX

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## APPENDIX A: SITUATION-3

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## Table A-1 Annual value of output

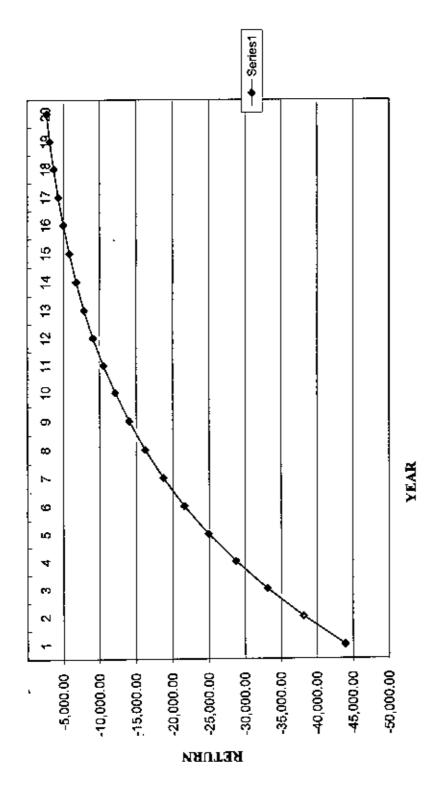
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### APPENDIX B: SITUATION-4

## Table B-1 Ansual value of output

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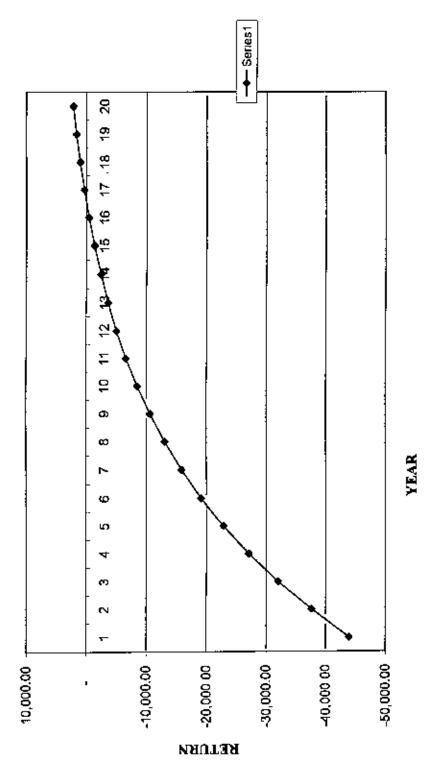
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LAKII TAKA

BCR (F) : NPV @15% : .IRR :





### APPRINDLY C: SITUATION-5

## Table C-1 Annual value of output

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### Table C-2 Financial analysis of BCR , NPV & IRR

Discounted Ne Benefit (Cumulative)	Disconnted Net Benefit (Annual)	Discounted Denefit	Discounted Cost	Discount Factor @15%	Net Depefit	total Heatlit	Total Cost	Operating Cost (2.5%)	lavestment Cost		YEAR
-43,926	-43,926 33	-	43,926 330	1 000000	(43,926 33)	-	43,926 33	-	43,926 33	1	2008-09
(37,783.)	6,142 34	7,097.26	954 922	0 869565	7,063 69	8,161.85	1,098 16	<b>1,098</b> 16		2	
(32,134)	5,649.74	6,480 11	830.367	0 756144	7,471.78	8,569 94	1,098 16	1,098 16		3	
(27,221)	4,912 81	5,634.87	722 058	0.657516	7,471.78	8,569 94	1,098.16	1,098.16		4	
(22,949	4,272 01	4,899 89	627.876	0 571753	7,471 78	8,569 94	1,098,16	1,098.16	-	5	
(19,234)	3,714 80	4,260 78	545 980	0.497177	7,471,78	8,569.94	1,09 <u>8 16</u>	1,098 16		6	
(16,004	3,230 26	3,705 03	474 765	0 432328	7,471 78	8,569.94	1,098 16	1,098 16	-	7	-
(13,195	2,808 92	3,221,76	412 839	0.375937	7,471 78	8,569 94	1,098 16	1,098 16		8	
(10,752	2,442,54	2,801 53	358.991	0 326902	7,471 78	8,569 94	1,098,16	1,098.16		9	
(8,628	2,123 94	2,436,11	312,165	0.284262	7,471.78	8,569 94	1,098,16	1,098 16	-	10	
(6,782	1,846 91	2,118.36	271 449	0 247185	7,471.78	8,569.94	1,098 16	1,098 16	-	11	
(5,176	1,606 01	1,842.05	236 042	0 214943	7,471 78	8,569.94	1,098 16	1,098.16	-	12	
(3,779	1,396.53	1,601 78	205 254	0 186907	7,471 78	8,569 94	1,098 16	1,098.16	-	13	
(2,565	1,214 37	1,392 86	178.482	0 162528	7,471 78	8,569 94	1,098.16	1,098.16	-	14	
(1,509	1,055.98	i,211 18	155 202	0 141329	7,471.78	8,569.94	1,098.16	1,098 16	-	15	
(590	918 24	1,053,19	L34 957	0.122894	7,471.78	8,569 94	1,098.16	1,098 16		16	
207	798.47	915 83	117.355	0 106865	7,471 78	8,569.94	1,098 16	1,098 16	-	17	
901	694 32	796 37	102 048	0 092926	7,471.78	8,569.94	1,098 <u>16</u>	1,098.16	-	18	
	603 76	<b>692</b> 49	88 737	0.080805	7,471,78	8,569.94	1,098.16	1,098.16	-	19	
2,030	525 00	602.17	77 162	0 070265	7,471,78	8,569 94	1,098 16	1,098 16		20	
2,487	456 53	523.62	67 098	0 061100	7,471.78	8,569 94	1,098.16	1,098 16		21	
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BCR (F) : L0	5
NPV @15% : 248	7.16 LAKH TAKA
IR.R : 16.9	01%

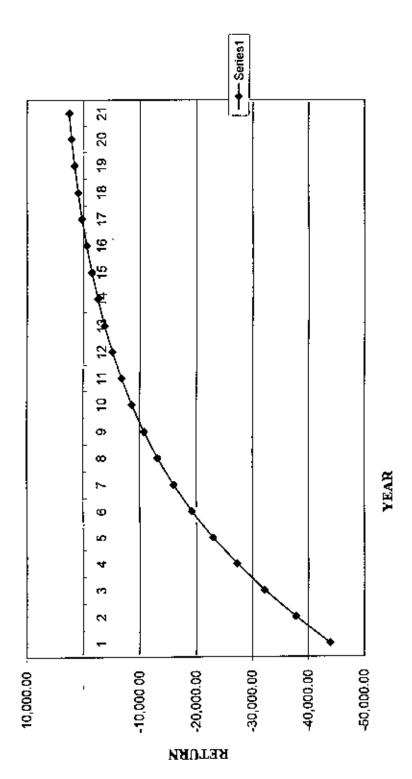


Figure C-1 : RATE OF RETURN

## APPENDLX D: SITUATION-6

# Table D-1 Annual value of output

Marrier         Control         Data         Marrier         Mar	N.K.					-			(A)							Ę		tur huh
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	l l	L	-															
1         1	-	-	-	-	124	117.111	PROCESSION IN	21,411,103,16	TI JANACIA	TUPATI	SUCRUM CO	11000281121	mur	1	12 mm 2	112.0	<b>RIM</b>	1111
9         1         1         124         21,77         244,004         71,471         71,14,017         244,004         71,244         244,004         71,244         244,004         71,244         244,004         71,147,101         244,004         71,147,101         244,004	-	=	-	+	Translation of the second seco	21,175	Transfer	er ter ter te	THE ADA THE	mount	PUNNING	INACCULAT	20.00	A D	11121	11.76	2015-0	1971.01
q         1         1         1.24         27.27         7.63.000         20.27         70.1         20	Ŀ	=	-	1-	12	21,474	MANANA	n an m ta	Ca 107 445 514	ana un	20.000 mg	TO BE CALLED IN CL	20	45	ILMAN	241.70	2013 4	LTTL M
	-	F	╞╴			- LEGAL	7.61.01	H CH CH CH	The state of the s	212/11/1	MINIMUM	1.00.01.02.1	14 64	ų A	LENN-	2.14	2021	5
(a)         (b)         (c)         (c) <td>•</td> <td>÷</td> <td></td> <td> </td> <td>144</td> <td>11),IT</td> <td>TARAPAT</td> <td>H.GLUDG</td> <td>IN SUPPORT OF</td> <td>1111-122</td> <td>permon</td> <td>121222121</td> <td>1.12</td> <td>5</td> <td>11202</td> <td>N FM</td> <td>A COL</td> <td>444</td>	•	÷			144	11),IT	TARAPAT	H.GLUDG	IN SUPPORT OF	1111-122	permon	121222121	1.12	5	11202	N FM	A COL	444
43     1     1     124     7147     7147     244,647 <t< th=""><td>-</td><td>÷</td><td>-</td><td></td><td>1224</td><td>112.02</td><td>R PARTY I</td><td>A Church Ch</td><td>14 THE WE ISA</td><td>THEFT</td><td>24 (29)20.00</td><td>212221120</td><td>1112</td><td>111</td><td>LENU .</td><td>71.75</td><td>10754</td><td>10200</td></t<>	-	÷	-		1224	112.02	R PARTY I	A Church Ch	14 THE WE ISA	THEFT	24 (29)20.00	212221120	1112	111	LENU .	71.75	10754	10200
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61     1     1     1.24     212.11     3.65,00.41     7.67,10.14     91,500.01     265,11	•	ŧ	-	-	1421	ב הבועב	LEADER	Methodal	a subaction	1 armini	P. B. P.	THEFT	1.14	-	15 101	R RX	101-	1414
Q     I     I     J <td>2</td> <td>÷</td> <td>-</td> <td></td> <td>122.1</td> <td>11211</td> <td>2425.544</td> <td><b>M.417.1M H</b></td> <td>The second</td> <td>1111 CLOSED</td> <td>ALCOURT OF</td> <td>110020201021</td> <td>17 502</td> <td>19.91</td> <td><b>LEN</b></td> <td>ALM.</td> <td>1414</td> <td>177105</td>	2	÷	-		122.1	11211	2425.544	<b>M.417.1M H</b>	The second	1111 CLOSED	ALCOURT OF	110020201021	17 502	19.91	<b>LEN</b>	ALM.	1414	177105
(1)         (1)         (2)         (7)         (3)         (7)         (3)         (7)         (3)         (7)         (3) <td>=</td> <td>10</td> <td></td> <td></td> <td><b>I MAL</b></td> <td>212,071</td> <td>TARK TA</td> <td>N.C. D. P. D. N. D. /td> <td>44 YUR WE YIA</td> <td>IN ISSUE</td> <td>PS,FTURG</td> <td>1291.17.1921</td> <td>1100</td> <td>69</td> <td>1000</td> <td>N H</td> <td>1121</td> <td>1211.0</td>	=	10			<b>I MAL</b>	212,071	TARK TA	N.C. D. P. D. N. D.	44 YUR WE YIA	IN ISSUE	PS,FTURG	1291.17.1921	1100	69	1000	N H	1121	1211.0
1     1     1     121     271,873     20,473,161     70,596,657     11,10,473,7     20,473,173     20,116,191,7     20,111,7       1     1     1     1,21     21,373     70,400,664     70,461,61,6     70,506,657     10,110,433,7     20,111,7     20,111,7     20,111,1     201,41     20,41 <t< th=""><td></td><td>¢</td><td>1</td><td>F</td><td>124</td><td>125.22</td><td>1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1</td><td>21 eri 101 le</td><td>TI MAN T</td><td>11111111</td><td>In conversion</td><td>21 40 40 1021</td><td>17162</td><td>111</td><td></td><td></td><td>1914</td><td>(TH SH</td></t<>		¢	1	F	124	125.22	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	21 eri 101 le	TI MAN T	11111111	In conversion	21 40 40 1021	17162	111			1914	(TH SH
0         1         1         1.24         211,873         7.45,00.0         7.5,00.0	\$	\$	-	-	1211	TTA IC	REALE	atmann.	#15.9F.405 #	TERMIN	DECENT	12021121		Į,	1100	R H	2014	1911.0
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1     1 <td>-</td> <td>Ę</td> <td>-</td> <td>1</td> <td>ואינו</td> <td>71177</td> <td>TANK T</td> <td>21-22-22-22</td> <td>110000</td> <td>TIME</td> <td>20.00.00.00</td> <td>THEFT</td> <td>1.10</td> <td>H S</td> <td>11111</td> <td>211</td> <td>102</td> <td>ц Ц Ц Ц</td>	-	Ę	-	1	ואינו	71177	TANK T	21-22-22-22	110000	TIME	20.00.00.00	THEFT	1.10	H S	11111	211	102	ц Ц Ц Ц
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0         1         1         124         20107         201076         201077         201077         2010777         2010777         2010777         2010         2010777         2010         2010777         2010	1	\$	-	-	12.1	112.121	1.42.20	narana	The second s	TAR DE LA CARA		1101121121	Ĩ		<b>ICHAN</b>	E.EX	1.122	10 TEL
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	2	ŧ		1	1,274	zirri -	TANKAN	21.411.141.14	the fear way like	151142721	(WILLING)	11411111111	Ş		(NAS)	r.	1 1 1 1	C III
	*	÷	-		124	mum	7121201	71,417,101,10	#1 101 107 107 112	10114212	SALENT OF	11000011020	17.00		1 MW	*	4 100 I	10001
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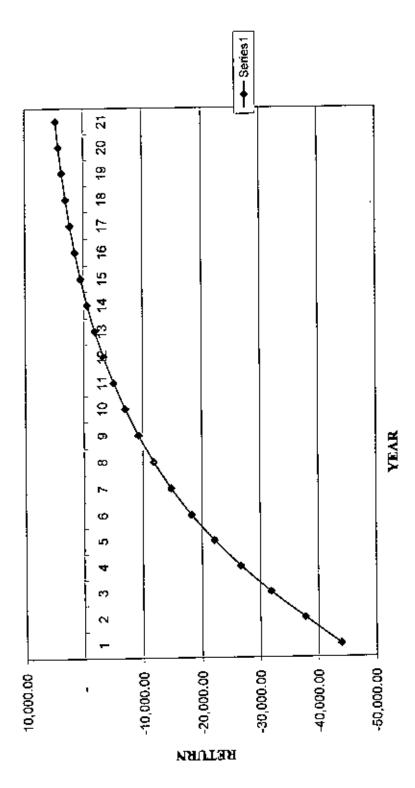
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<u>(In Lakh Taka)</u>											
Disconnted Ne Benefit (Camulative)	Discounted Net Benefit (Annual)	Discounted Benefit	Discounted Cost	Discount Pactor @15%	Net Depelit	Total Benefit	Fotal Cost	Operating Cont(15%)	Lovertment Cost		YEAR
-43,926.3	-43,926 33		43,926 330	1 000000	(43,926,33)	-	43,926 33		43,926 33	1	2008-09
(37,783 §	6,142,34	7,097 26	954 922	0.869565	7,063 69	\$,161 85	1,098 16	1,098 16		2	
(31,825 (	5,958 33	6,788 70	830 367	0 756144	7,879 89	8,978 05	1,095.16	1,098 16	- -	3	
(26,644,5	5,181.15	<b>5,903</b> 21	722 058	0 657516	7,879 89	8,978.05	1,09816	1,098.16	-	4	
(22,1391	4,505.35	5,133 23	627 876	0,571753	7,879 89	8,978.05	1,098 16	1,098 16	· .	5	
(18,221.4	3,917 70	4,463 68	545 98D	0 497177	7,879 89	8,978 05	1,098,16	1,098,16	_	6	
(14,814)	3,406 70	3,881 46	474,765	0 432328	7,879 89	8,978,05	1,098.16	1,098 16 1		7	
(11,852 -	2,962 34	3,375.18	412.339	0 375937	7,879 89	8,978 05	1,098 t <b>6</b>	1,098.16		8	
(9,276	2,575.95	2,934 94	358 991	0 32 <b>690</b> 2	7,879 89	8,978.05	1,098,16	1,092,16	-	9	
(7,036,	2,239 95	2,552 12	312 165	0 2 <b>8426</b> 2	7,879 89	<b>\$,978</b> 05	1,098 16	1,098 16	_	10	
(5,088,	1,947.79	2,219 24	271,449	0 247185	7,879 89	8,978.05	1,098.16	1,098 16		11	
(3,395	1,693.73	1,929.77	236 042	0 214943	7,879 89	8,978,05	1,09816	1,098.16		12	
(1,922.	L,472 81	1,678.06	205.254	0.186907	7,879 89	8,978 05	1,098-16	1,098 16		13	
(641.	1,280,70	1,459 18	178 482	0 162528	7,879,89	<b>8,978</b> 05	1,098 16	1,098.16		14	
472	1,113.66	1,268 86	155 202	0 141329	7,879 89	4,978.05	1,098.16	1,098,16		1.5	
1,440	968.39	1,103,35	134 957	0.122894	7,879 59	6,978 05	1,098.16	1,098.16	_	16	
2,282	\$42.08	959.44	117.355	0.106865	7,879 89	8,978 05	1,09816	1,098 16		17	
3,014,	732.25	834 29	102.04\$	0 092926	7,879 89	8,97# 05	1,098 16	1,098 16		18	
3,651.	636 73	725 47	88 737	0 080805	7,879,89	8,978 05	1,09816	1,098-16		19	
4,205	553 68	<b>6</b> 30 <b>M</b>	77,162	0 070265	7,879 89	B,978 05	1,098.16	1,098.16		Z0	
4,636	481,46	548 56	67 098	0 061100	7,879 89	8,978 05	1,098 16	1,09816		21	
		55,486.84	50,800 08								

BCR (5): 1.	69	
NPV @15% : 44	\$86.76	LAKH TAKA
IRR: I	6.65%	





APPENDIX 6: SITUATION-7

Table E-1: Annual value of output

Model         Terretory         Description         Description         Control           11         1	TEAR		1000	Į				Certral	(12) مىلىچىدىنى				Į	فللمسار لأعلمهم وترجيعهم	ļ		
44 MORPHREYLA         ANCONYLEY         LANONYLEY         LANONYLEY <thlanonyley< th=""></thlanonyley<>	1			8	1	1	Tere Build		£	Į	1.1	Ţ	ļļ	ŧ	Ł	1	
(1)         (1) <th>-</th> <th></th> <th></th> <th></th> <th>_</th> <th></th>	-				_												
1         1         1.234         213,673         76,54,00,473         23,477,161,49         79,347,604,47         73,477,161,49         79,347,604,49           1         1         1         1         1         1,214         279,473         76,43,404,93         20,477,161,49         79,347,604,49           1         1         1         1         1,214         279,477         76,43,904         76,477,161,18         79,546,664           1         1         1         1,214         279,477         76,43,904         76,471,161,18         79,546,664           1         1         1         1         1,214         279,477         76,43,904         76,417,161,18         79,546,664           1         1         1         1         1,214         277,77         76,43,904         79,417,161,18         79,546,664           1         1         1         1         1,214         27,77         76,43,904         79,479,664         79,470,664           1         1         1         1,214         27,777         76,43,904         79,479,664         79,479,664           1         1         1         1         1,214         27,7764         79,479,141         79,496,664 <t< td=""><td>7</td><td>-</td><td></td><td>1214</td><td>227.FTE</td><td>TI CALMAN I</td><td>1101.01.01.0</td><td>44 909 496 FG</td><td>1111-111</td><td>NUCLUUM</td><td>TINGETTICE</td><td>*</td><td>15.45</td><td>5600 C</td><td>313 00</td><td>1,61,27</td><td>6161 by</td></t<>	7	-		1214	227.FTE	TI CALMAN I	1101.01.01.0	44 909 496 FG	1111-111	NUCLUUM	TINGETTICE	*	15.45	5600 C	313 00	1,61,27	6161 by
9         1         1         20 <td>Ŷ</td> <td>-</td> <td></td> <td>1,274.</td> <td></td> <td>H 100 100 H</td> <td>H.M.M.LL</td> <td>715 JPP 404 17</td> <td>THE PARTY</td> <td>21(0)110</td> <td>000000000</td> <td>61 CG</td> <td>55</td> <td>4,000,44</td> <td>200-44</td> <td>1200.0</td> <td>2,74,23</td>	Ŷ	-		1,274.		H 100 100 H	H.M.M.LL	715 JPP 404 17	THE PARTY	21(0)110	000000000	61 CG	55	4,000,44	200-44	1200.0	2,74,23
41         1         1214         213.07         76.63, 766.01         73.471, 101.0         73.472, 766.01         73.471, 101.0         73.472, 766.01         73.347, 766.01	1		-	121		11421,991 1	R. mar.	44 100 475 514	14 14 421 21	341,429,755 00	12112220121	ווונ	17.64	44 101 4	310 44	2,00,0	1.74 2
(1)     1     (1)     1     (1)     1     (1)     1     (1)     1     (1)     1     (1)     (	Ē		-	121		TAAN MALAN	WOR'D'G	115 X11 406 41	11114202	REPARTS	21.002.021.115.1	11 600	5.4	5 MD.44	20.40	(( 107.5	1.14.1
(1)     1     1     1214     277.07     75.43.00.60     71.417.101.10     77.43.00.60       (2)     1     1     1     1     1     1214     277.07     75.43.00.60     75.477.101.10     75.467.00       (3)     1     1     1     1     1     1     1     1     75.457.00       (4)     1     1     1     1     1     1     1     1     75.457.00       (4)     1     1     1     1     1     1     1     1     75.457.00       (4)     1     1     1     1     1     1     1     1     75.457.00       (4)     1     1     1     1     1     1     1     74.457.00     75.457.00       (4)     1     1     1     1     1     1     1     74.457.00     75.457.00       (4)     1     1     1     1     1     1     1     1       (4)     1     1     1     1     1     1     1       (4)     1     1     1     1     1     1     1       (4)     1     1     1     1     1     1     1       (4)	÷		-	HC21		71,624,206.91	13.417.103.10	711 SALAR 104	14114472	14,00,00	11 000 201121	17.14	67 er.	4,00,44	20040	2,00.3	179420
13         1	5		-	1,234		The part was we	1 10 101 11 11	44 909 107 1 CA	11,114,413 77	141,00,00	12012220121	11 EL	67.9	44 001 4	31 ME	0.002	1742
45     1     1     1.204     27.1670     76.63.061     27.477.0511	-			1224		11 202 202 202	2,40,00.10	113 449 449 444	15,14,29,20	NUCCURA	11.000,000,000,000,00	11,115	67.44	5 m 4	90 00C	2,000,13	1.11.1
(1)     (1) <td>\$</td> <td></td> <td></td> <td>101</td> <td></td> <td>TARGET BAL</td> <td>11 CH CH CH CH</td> <td>11.000 CM</td> <td>111111111</td> <td>10,000,000</td> <td>1.00000.0001</td> <td>233.69</td> <td>67.64</td> <td>A ION A</td> <td>èr mi</td> <td>(( 10( 7)</td> <td>H MAR</td>	\$			101		TARGET BAL	11 CH CH CH CH	11.000 CM	111111111	10,000,000	1.00000.0001	233.69	67.64	A ION A	èr mi	(( 10( 7)	H MAR
41     1     1     1214     773,673     73,44,006.51     73,677,161.16     93,566,645       42     1     1     1     1,214     237,877     76,456,651     73,471.161.16     93,566,645       42     1     1     1,214     237,877     76,456,661     73,471.161.16     93,566,645       42     1     1     1,214     237,877     76,456,661     73,471,161.16     93,566,647       42     1     1     1,214     277,877     76,456,661     73,477,161.16     93,566,664       42     1     1     1,214     277,871     76,456,661     73,477,161.16     93,566,664       43     1     1,214     277,871     76,456,661     73,477,161.16     93,566,664       43     1     1     1,214     277,871     76,456,674     93,566,664       43     1     1     1,214     277,871     76,456,674     93,566,644       43     1     1     1,214     27,471     76,47,944     93,566,644       44     1     1     1,214     27,471     76,47,944     93,566,644       44     1     1     1,214     27,471     76,47,944     93,566,644       41     1     1     1,214	÷	1		HUT		71,424,404,41	23,477,503.71	43 AN (A4 44	IN REAL PARTY	24,12,010	TI BELEVILLE	131.14	17.44	1 44 (MI) 44	3 m + +	(1,001,5	1,741,21
11         1         121         211.271         214.276.11         214.27	7		-	121		1030671502	นแลน	41 YOF 417 YES	11.114.47% 27	2469.00.00	121122201221	73.47	6344	A WO AA		10002	H MAY
1     1 <td>=</td> <td>_</td> <td>1</td> <td>HZI-</td> <td></td> <td>1144244412</td> <td>11.00.00</td> <td>19,445,44</td> <td>20071151</td> <td>244Million</td> <td>1,00,51,10,1</td> <td>111,111</td> <td>62 H</td> <td></td> <td>14.44</td> <td>2,000,0</td> <td>1.11.2</td>	=	_	1	HZI-		1144244412	11.00.00	19,445,44	20071151	244Million	1,00,51,10,1	111,111	62 H		14.44	2,000,0	1.11.2
1         1	5		-	1224		Table Party of the	9.01,71,01	AL NOT WE CLA	111421111	ALAM HI OF	21,011,021,021	21,15	14:5	6 tt +		1204.11	12 421
43         1         1         271         71.07 (2004)         23.477 (2014)         73.566 (2014)           43         1	Ŷ	-				71.624.994.91	1.01.01.01	11 SOL 10 10	111141111	242,00,00	1,211,279,12	73.19	14 (S	14 GaV	<b></b>	2,709.33	174.2
42         1         1         121         271/27         76.4.204.01         27.471/47.14         77.471/40.44           43         1				Har		14 103 1 103 12	21,451,65,15		14114111	741,173,115 01	TI BLE BE THE T	21.15	110	6, 00) 44	) W 40	CF LACT	124421
41         1 <th1< th="">         1         <th1< th=""> <th1< th=""></th1<></th1<></th1<>	-		-	121		Transal I	21.40.101.10	14 YOU 475 YOU	11,214,472,771	244,029,213,014	1,215,272,021	10,003	11 14	AW1.44		100.00	1.74.22
4) 1 1 1 224 277 25424 24 21 25424 25 25424 25 25424 25 25424 25 25524 25524 25524 255252 255252 25524 25525252 255252 255252 255252 255252 255252 25525252 25525252 25525252 25525252 2552525252525252525252525252525252525252	-			HZT		10 100 100 12	H LEN VIE (Z		I CHANNEL	SILCED INC.	110000201021	11 (((	1713	6, 207, 44	14.42	Li int t	12.002.0
1 124 21/21 71.00 M 1 10.00 M 1 10.00 M 10 10 10 10 10 10 10 10 10 10 10 10 10			-	R N		75424.994	H-101,101,11		15,14,476.27	Concession of	11000001001	11.11	1919	# GrV	a an an a'	120021	LTN II
	5			HAT		14 100 110 12	11, (17, 107, 14		11114111	201120.010	THEFT	N LLC	56	6,003.44	10.40	TS WATE	12.112.0
4 1 1 1 1 121 221 221 221 221 221 221 22	÷	-		141		14 905 NO 12	13,417,197,19		TIME	246000	1.155-01.102.1	1111	11	4 101 4	310-04	1,001,1	12421
ment namen manuel manuel	_	1		121		71424,206 91	19.09.09.01			201200110	[1,99,091,192,1	[ <del>1</del> 11.111	66	á, lich 44	94 48 L	10007	TT HILL

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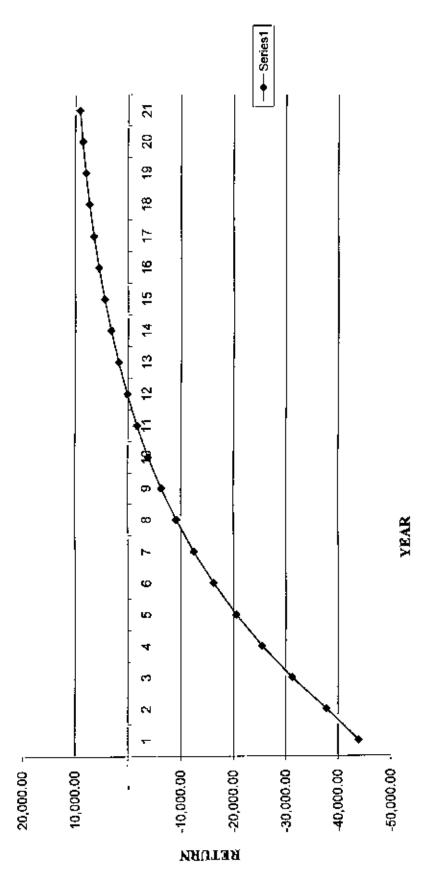
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Table E-	ä	Financial an	Table E-2: Financial analysis of BCR , NPV & IRR	۲, NPV & I	IRR					
VEAB		Tovestment Cost	Operating Cost(2.5%)	Total Cost	Total Bearfit	Net Benefil	Discount Factor @15%	Total Cost Total Benefit Net Benefit Discount Factor Discounted Cast @15%	Discounted Benefit	E A
2008-09		43,926 33		43,926,33		(43,926.33)	1 00000	43,926 330	•	
	2		1,098 16	1,095 16		8,161 85 7,063 69	0 869565	954.922	7,097 26	
	<b>m</b>	•	1.098.16	1.098.16	9.794.22	8.696.06	0 756144	830 367	7,405 84	

<sup>-85-</sup>

LAIGHTAXA

BCR (F): 1.18 NPV @15%: 9083.13 DRA: \_\_\_\_\_\_16.56%



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### APPENDIX P: SITUATION-B

# Table F-I: Annual value of output

		Ĩ		ſ					والمستعملات وزرانا				ł	American States (Second	F		The Bark
·	1		ł	ļ	1	1		i dente La constante La constan	Ę	1	Tate	1	H	E	Ş	1	(min hit)
2010-010	-																
-	45	1	-	1421	The second se	144244	n.m.m.m	11 200 PM (14	TUNANT	24140 MIG	121222121	77.64	11.14	I AMA J	110	1412	1111
	5			1221	mm	HANAN	11414141	P1,500,000 10	TREAM	MUNUK	1100221424	1021	ž	1.11	ñ	2,191,5	HERR
•	\$	-		124	n,a	74.694 1194	D.450.00 H	TIL SHARE AN	(LINCER)	anna an	1. PRIEZZALI	21.15	T R		R L	2.21.2	NZUN
-	6	╞	-	121	21,51	TANKIN .	HURDIN C	AN 107/105/514	10 Million 20	2413,440	THERE	N7CM	¥ R	1,004.94	11		RUMAN
•	54	1	-	124	mm	101001000	น แนะเห	The statement of	IN LASS IN	24, FULLER DO	1,000,001,000,0	97.00	24	1 miles	242		
-	÷	-	-	141	TITATIC .	nerent	N 101,101,15	THE REAL PROPERTY OF	THEFT	000000	121.07.02.0	99.00	12	지	E E	2712	11,000,11
-	÷	-	F	1204	ZPATE I	1424242	21.47.ML	11.55.414	11 IL	THIM HIGH	TENCRUIT	MICH		T.ONL M.	1211	21912	_
•	6	-	-		L CLUX	21,524,004,91	n.en.m.n.	PLOR MAN	TREAM	PUDDING	1000201001	<b>NIM</b>	1 1 1	TONE	212	_	1.112.21
*	F	-			27,02	ZURNEN	2.47.19.19	PT JAR ANA PA	14 my livi	The state of	120125-0212	1010	1 R		ũ H	1.12	L HUTLIN
	÷	-	1	124	mm	The State of the	Return	TIME THE		(O MINES IN C	10020312023	MIN	T.R.	7 CH M			
	4	ļ	-	ц.	1112	7444945	IL COLUMN	11.11.11.11	A PARTE	E BURNERS	121,12,13,12	N IN	194		E	2012	<u>n man</u>
11	5		-	1.24	70.00	7421-014	14100.00-02	THAT IS	INDERING -	WHURPY	1.000,021,020	212	A A	M NO.	2	101	N MUN
	5	-	I.	144	11.11	2421212	M. PH. Th. C.	The second second	1111Am2	THE REAL	121221021		*	104	Ë	1 141	
1	11		F	121	mm	HANAL	nama	The second s	124591.1	ALIGNED AN	11000211021	<b>W</b> UK	R R		22	2.121	N.M.N.
	1 64	1	-	21	TT II	THE REAL PROPERTY IN	nanana.	HI010614	111144227	Nucasu:	THEFT	XIX	Ŧ	1 72464	2	1 100	THE REAL PROPERTY IN CONTRACT OF CONTRACT.
5	1.0	ļ	-	124	Filt	71.654,004 11	HUHUH	The second	TREFAIL	Printing	TRACENTET	E H H				2 H T	20 B B B
ŧſ	45	. l.	-	121	27.671	100000	242201	TULBER OF M	THEFT	PACKATING PAC	1201202000	10.01		TONS -	1 112		U LOCH
£	6	-	Ξ	147	TICH	1210200012	14 UK UP 12	A NUMBER	121222121	39.55.070	120125-21162-1	5	ł			2001	E HA
k	10		F	1421	1002	144444	Terrar Bar	111 MA (114	141552	Saucens:	12012520121	N10	F	H H42	HW II		HURLIN
2	117	-	-	1,214		H NO POPUL	31.417 HD H	THE REAL PROPERTY OF	101000	STATE OF	120.02010		ł				

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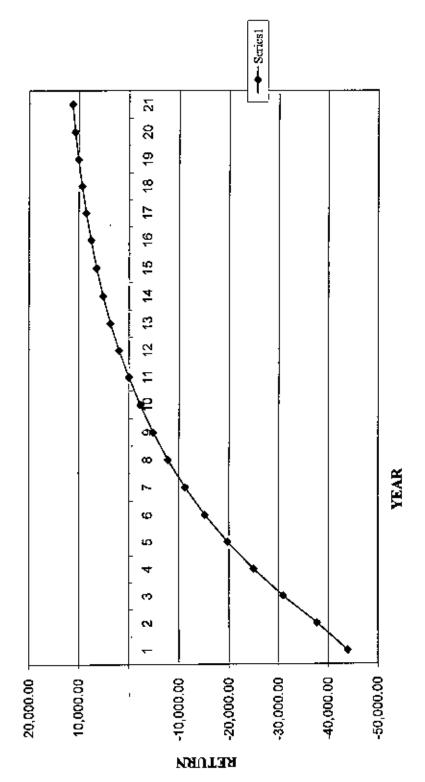
YEAR	[avestment Cost	Operating Cost(2.5%)	Total Cost	Total Benefit	Net Benefit	Discount Mactor ©15%	Disconated Cost	Discounted Benefit	Discounted Net Benefit (Annual)	(In Lakh Take) Discounted Net Benefit
2008-09	1 43,926.33		43,926 33		(65,926,33)	1 000000	43,926,330		-(3,926.33	(Lumietve)
	2 -	91 860'I	1,098.16	8,161.85	7,063,69	0.869565	954,922	7,097.26	6,142.34	(37,783,99)
	3	1,098.16	1,098.16	10,202 32	9,104,16	0.756144	190,367	7,714 42	6,884 06	(30,899,93)
		1,098.16	1,098,16	10,202 32	9,104,16	0 657516	722 058	6' 208 19	5,986,13	(24,913 80)
		1,098.16	1,09X,16	10,202.32	9,104.16	0 571753	627 876	5,833 21	5,205,33	(19,708 47)
	•	1,098,16	91'860'1	10,202,32	9,104.16	0 497 177	545 980	5,072,36	4,526 38	(15,182.09)
-	7	1,02616	1,098.16	10,202 32	9,104.16	0.432328	474 765	4,410,75	3,935.98	(11,246.11)
	8	1,098,16	1,098.16	10,202 32	9,104,16	0 375937	412 839	3,835 43	3,422.59	(7,823 52)
		1,098 16	1,098.16	10,202 32	9,104 16	0.326902	358 991	91 SEE'E	2,976.17	(4,847.35)
	10	1,098,16	1,098.16	10,202 32	9,104.16	0.284262	312 165	£1'006'Z	2,587.97	(2,259 38)
		1,098.16	1,098 16	10,202.32	9,104,16	0,247185	271.449	2,521 86	2,250.41	(8 97)
	12 -	1,098.16	1,098,16	10,202 32	9,104,16	0 214943	236.042	2,192.92	919 956 <sup>°</sup> L	1,947.91
		1,098.16	1,098.16	10,202,32	9,104,16	0 186907	201.254	68 906'1	E9 104'1	3,649,54
	14 -	1,098-16	1,098.16	10,202.32	9,104,16	0 162528	178 462	1,658.16	89'641'1	5,129.22
	15 .	1,098 16	1,098.16	10,202 32	9, 104 16	0 [4]329	155 202	1,441.88	1,286.68	6,415.90
	16	1,098.16	91 860'1	10,202 32	9,104.16	0 122894	134 957	1,253.80	1,118.65	7,534.75
	. 17	1,098 16	1,098.16	10,202 32	9,10416	0.106865	117 355	1,090.27	972.92	8,507 67
	1	1,098 16	1,098.16	10,202 32	9,10416	0.092926	102 048	948.06	846.01	9,353 68
	-	91 860'1	1,098 16	10,202 32	9,104,16	0.050805	88,737	824.40	335 66	10,089 34
	20 -	1,093.16	1,093 16	10,202.32	9,104,16	0.070265	77 162	716.87	639,70	10,729 04
	21	1,098.16	1,098,16	10,202.32	9,104,16	0011900	67 098	623 36	556 26	11,285.30
							50,800.04	62,085 38		
				BCR (P) : NPV @15% : IRR :	1,23 11,285,30 11,285,30	LAKIJ TAKA				
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Figure F-1: RATE OF RETURN

### APPENDIX C: SITUATION.

# Table G-1: Annual value of output

Ĩ			5.01.02	MEN 1	Nin I	<b>14 619 61</b>	men 1	P.S.P. I	Memory	M.C.M. 41	IL MON	19,010,41	Method 1	HARAL	Hafter.	M.C.M.	R.0241	Multin 1	<b>B.FR</b> 1.	MOTAL.	MENAL	nen l
1	<b>—</b>	-	1	141	115	[28]	[ 26	199	143	141	- [30	145	[ 14	اهر	143	141	145	183		191		
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ł	8		21709	412.14	12.15	11.11	11.14	स राः	4116	411.19	81 T.I.F	1110	412.19	91214	412.14	1111	1111	12.11	11.12	1111	1114	12.70
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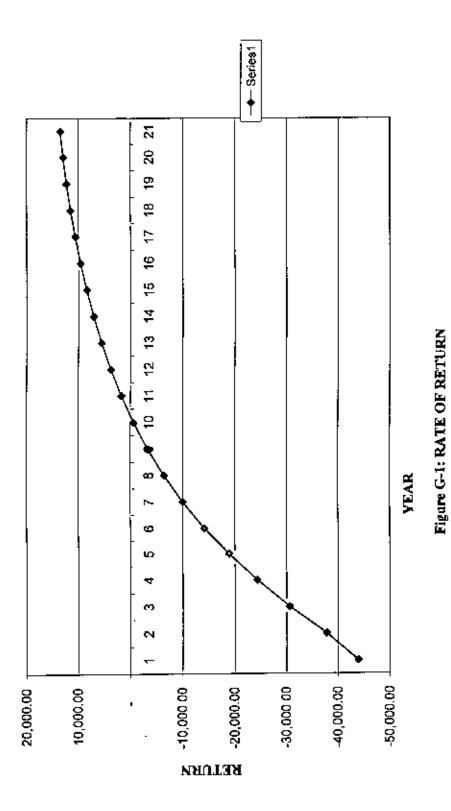
Discounted Net Benefit (Currentative)	43,926 33	(66,687,78)	(30,591.36)	(24,336 90)	(13,898 24)	(14,168.97)	(10,056 56)	(6,480 55)	(3,370.98)	(667.01)	1,684 28	3,728.87	5,506.78	7,052.79	8,397.15	9,566 15	10,582.68	11,466.62	12,235.26	12,903 64	13,484 84	
Discounted Net Benefit (Annual)	43,926 33	6,142 34	7,192.63	6,254,46	5,438 66	4,729.27	4,112.41	3,576.01	3,109.57	2,703,97	2,351 29	2,044 59	16 121'1	1,546,01	1,344.36	1,169.00	1,016.53	883 94	768 64	668 33	581 20	
Discounted Benefit	•	7,097,26	8,023 00	6,976 51	6,066 53	5,275 25	4,587 18	3,988 85	3,468 56	3,016 14	2,622.73	2,280 63	1,983.16	1,724.49	1,499.56	1,303.96	1,133.85	985.98	857 37	745,54	648 30	64,284 88
Discounted Cont	43,926,330	954,922	830,367	722 058	627 B76	545 980	474 765	412 839	358.991	312.165	271 449	236.042	205.254	178 482	155 202	134 957	117 355	102 048	88,737	77,162	67 098	50,500.03
Discount Factor @15%	1 00000	0 869565	0,756144	0 657516	0 571753	0 497177	0 432328	154275.0	0 326902	0.284262	0.247185	0.214943	0 186907	0.162528	0.141329	0 122894	0 106865	0 092926	0 080805	0 070265	0.061100	
Net Beachi	(43,926.33)	7,063 69	9,512.25	9,512.25	9,512.25	9,512,25	9,512,25	9,512,25	9,512 25	9,512.25	9,512.25	9,512.25	9,512,25	9,512,25	9,512,25	9,512,25	9,512,25	9,512 25	9,512 25	9,512,25	9,512.25	
Total Benefit	•	8,161.85	10,610 41	10,610.41	10,61041	10,61041	10,610 41	10,610 41	10,610-41	10,610.41	10,610,41	10,610 41	10,610 41	10,610 41	10,610 41	10,61041	10,610 41	10,630.41	10,610.41	10,610 41	10,61041	
Tolzi Cost	43,926 33	91 860'1	1,098 16	1,098 16	1,098.16	1,098.16	1,098,16	1,098.16	1,098.16	1,098 16	1,098 16	1,098,16	1,098 16	1,098.16	1,091.16	1,098.16	1,098.16	1,098,16	1,098.16	1,098 16	1,098.66	
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Table G-2: I

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RCR (F): 1.27 NPV @15%: 13494.80 LKK: 20.17%





## APPENDIX H: SITUATION-10

# Table H-i Annual value of eutput

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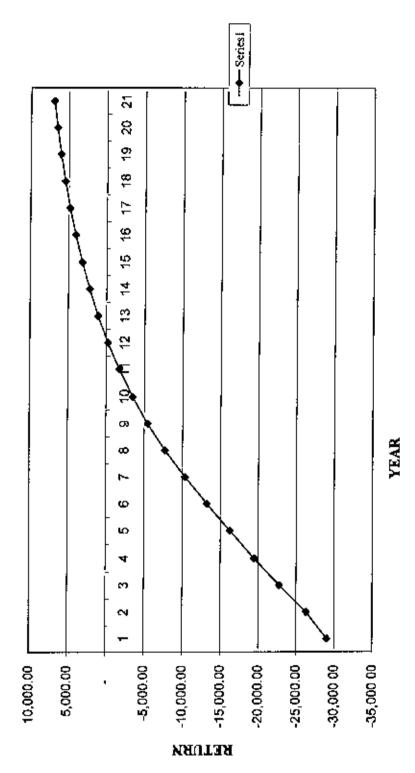
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### Table H-2: Financial analysis of BCR , NPV & IRR

Discounted Net Benefit (Cumplative)	Discounded Net Benefit (Annual)	Discounted Benefit	Discounted Cost	Discount Factor @15%	Net Benefit	Total Benefit	Total Cost	Operating Cost(2,5%)	favestment Cost		YEAR
-29,059.5	-29,059 54	•	29,059 540	1 000000	(29,059 54)	-	29,059,54	_	29,059.54	l	2008-09
(26,335 6	2,723 92	3,355 65	631,730	0 869565	3,132,51	3,859 00	726.49	726 49		2	
(22,799.8	3,535 80	4,085,14	549.331 ;	0.756144	4,676 10	\$,402,59	726,49	726 49		3	
(19,441 0	3,358,79	3,836 47	477 679	0 657516	5,108.30	5,834 79	726.49	726 49		4	
(16,253 4	3,187 57	3,602 94	415.373	0.571753	\$,\$75.08	6,301 57	726 49	726 49		5	
(13,231.0	3,022 45	3,383 64	361,194	0 497177	6,079 22	6,805 71	726 49	726 49	-	6	
(10,367.4	2,863.60	3,177 68	314 0 <b>82</b>	0.432328	6,623,68	7,350 17	726 49	726 49	-	7	
(7,739.0	2,628 36	2,901 47	273.114	0 375937	6,991,49	7,717 98	726 49	726.49		B	
(5,453.5	2,285 53	2,523 02	237 491	0 326902	6,991 49	7,717,98	726,49	726 49	<u> </u>	9	
(3,466 1	1,987 41	2,193 93	205 514	0 284262	6,991 49	7,717,98	726 49	726 49		. LD	
(1,737.9	1,728 19	1,907 77	179 577	0 247[85	6,991 49	7,717.98	726 49	726 49		н	
(235 1	1,502,77	1,658 93	156,154	0 214943	6,991 49	7,717.98	<b>72</b> 6 49	726 49	-	12	
1,071 6	1,306 76	1,442 54	135 786	0 186907	6,991.49	7,717.98	726 49	726.49		13	
2,207,9	1,136.31	1,254,39	118 075	0 162528	6,991 49	7,717.98	726 49	726 49		14	
3,196.0	988.10	1,090 77	102 674	0 141329	6,991.49	7,717,98	726 49	726 49		15	
4,055 2	859 21	948 49	89 281	0 1 <b>22</b> 894	6,991.49	7,717.98	726.49	726,49	-	16	
4,802 3	747.15	824.78	77 636	0 106865	6,991.49	7,717,98	726,49	726.49		17	
5,452.0	649.69	717 20	67.510	0 092926	6,991 49	7,717.98	726 49	726 49		18	
6,017.0	564.95	623 65	58 704	0 080805	6,991 49	7,717,98	726,49	726.49	-	19	
6,508 2	491.26	542 30	51 047	0 070265	6,991 49	7,717 98	726 49	726 49		20	
6,935 4	427.18	471 57	44 389	0.061100	6,991 49	7,717,98	726,49	726 49	-	21	
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IRR :	18-61 %	
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APPENDIX I: SITUATION-II

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Table I-1: Annual value of output

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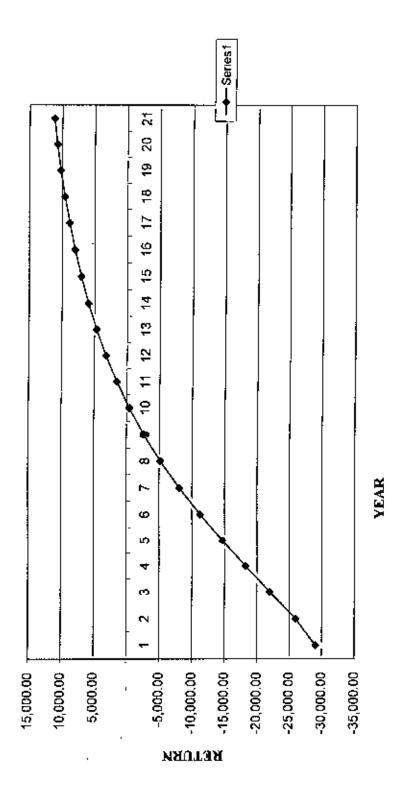
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Table I-2: Financial analysis of BCR, NPV & IRR

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BCR (P) : 1 NPV @15% : 1 IRR : 2





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#### APPENDIX J: SITUATION-12

# Table J-1: Assaul value of output

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Discounted Net Benefit (Cumulative)	-29,059 54	(26,159 02)	(02 261 20)	(18,430,56)	(14,863.72)	(11,485.10)	(8,287.01)	(5,353 23)	(2,802.12)	(583.76)	1,345,25	3,022.65	4,481.26	5,749 61	6,852.53	7,811.58	8,645.54	9,370 73	10,001.32	10,549 66	11,026,48	
	29,059,54	2,900.52	3,965 82	3,762 64	3,566.84	3,378 62	3,198.09	2,933.78	2,551.11	2,218.36	1,929.01	1.677.40	1,458.61	1,268.35	1,102 92	50 656	833 96	725,19	630.59	548.34	476 52	
Disconnted Net Benefit (Annual)													-						_	-		
Disconted Beacfit	•	3,532 25	4,51515	4,240.31	3,982 21	3,739 81	3,512 17	3,206 89	2,788.60	2,424 87	2,109.59	1,833.55	1,594 39	1,386 43	1,205 59	1,045 33	09116	792,70	689 30	66 665	521 21	44,633 34
Discounted Cost	29,059,540	631,730	102 695	417 679	415 373	361 194	314 082	114 ETS	237 491	206 514	179 577	156 154	135 786	520 B11	102 674	89 281	77 635	67 510	S8,704	51 047	44 389	33,606.83
Discount Pactor GISM	000000000000000000000000000000000000000	0 869565	0.756144	0.657516	0 571753	0 497177	0,432328	0,375937	0 326902	0 284262	0 247385	0 214943	0 186907	0,162528	0,141329	0,122894	0,106865	0.092926	0 0\$0205	0 070265	0.061100	
Net Boaefit	(29,059 54)	3,335.60	5,244 79	5,722 50	6,238.42	6,795.60	76.795,7	1,803.91	16 E03,7	16 £03'6	7,803.91	7,803.91	16,203,7	16 503 1	1,803.91	7,803.91	16'803'61	1,803,91	7,803 91	7,803.91	7,803.91	
Total Benefit	•	4,062.09	5,971 28	6,445 99	6,964.91	7,522.09	8,123 86	\$,530.40	8,530.40	8,530 40	8,530.40	8,530.40	8,530,40	8,530 40	8,530.40	8,53040	\$,530.40	01-'055'8	8,530.40	8,530.40	8,530.40	
Total Cost	29,059 54	726.49	726.49	726 49	726,49	726,49	726,49	726 49	726 49	726.49	726.49	726 49	726,49	726 49	726.49	726 49	726 49	726 49	726 49	726 49	726.49	
Operating Cos(2.5%)	•	726 49	726 49	72649	726.49	726 49	726 49	726 49	726 49	776 49	726 49	726 49	726 49	726 49	726 49	726 49	726.49	726 49	726.49	726,49	726 49	
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YEAR	2008-09																					

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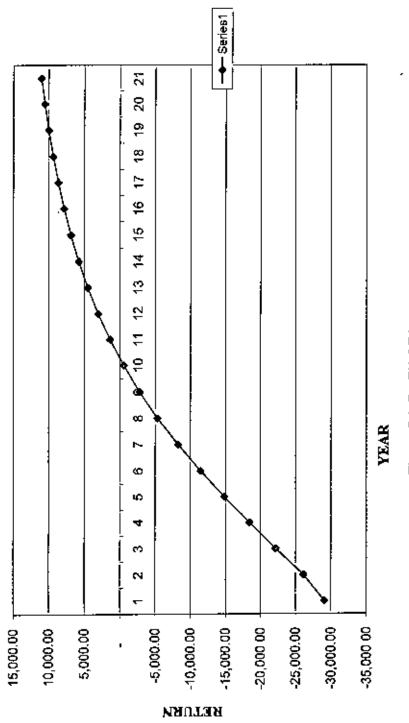
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LAKE TAKA

BCR (F) : 1.13 NPV @15% : 1102646 BRR : 20.61%





#### APPENDIX K: SITUATION-L

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# Table K-1; Aquesi value of ontput

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		_														
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Table K-2: Financial analysis of BCR , NPV & IRR	

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8,592 46	1,160 33	1,263.00	102.674	0.141329	8,21013	R 936 62	726,49	726,49	'	13
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(26,159.02)	25,909-52	3,532.25	631,730	0 \$69565	3,335,60	4,062,09	72649	726 49		2
-29,059.54	-29,059 54		29,059.540	1 000000	(29,059 54)	'	29,039.54		59,059,54	2008-09 1
Discounted Net Beacût (C'umyintîre)	Discounted Net Benefit (Annual)	Discounted Benefit	Discounted Cost	Discount Factor 215%	Net Beacht	Totel Bracfit	Total Cost	Operating Con(2.3%)	Envertment Cost	YEAR
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BCR (T) :	NEV OLSV :	IRR :	

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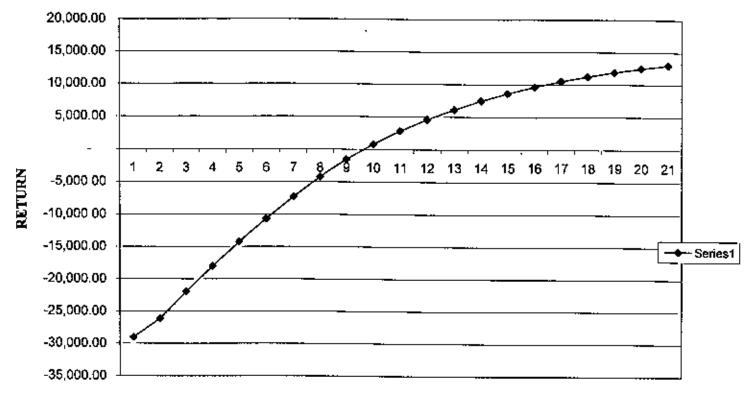




Figure K-1: RATE OF RETURN

#### APPRNDLY LA SITUATION-14

## Table 1,-1; Annual value of cotput

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+	-	-	H	13944	144-71	HURNALI	H CH H CH	1.72.10.1	TURNER	472607487425	61G	101	104		12 Mill	Xan
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726,49         9,749,02         9,022,33         9           726,49         726,49         726,49         726,49         9,749,02         9,022,33         9           726,49         726,49         726,49         9,749,02         9,022,33         9 </td <td>0.756144 549 331</td> <td>331 5,16017</td> <td>4,610 54</td> <td>(21,548,18)</td>	0.756144 549 331	331 5,16017	4,610 54	(21,548,18)
726.40         726.40         726.40         7,959.89         7,233.40           726.49         726.49         8,596.68         7,870.19           726.49         726.49         9,284.40         8,557.91           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53 <td>0.657516 477</td> <td>477 679 4,846.06</td> <td>4,368.39</td> <td>(11,179.79)</td>	0.657516 477	477 679 4,846.06	4,368.39	(11,179.79)
726 49         726 49         726 49         726 49         726 49         726 49         726 49         9,749 02         9,50.19           726 49         726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         <	0.571753 415	415 373 4,551.09	4,135 72	(E3,044 07)
T26 49         9,749 02         9,022 33           726 49         726 49         726 49         9,749 02         9,022 33         9,022 33           726 49         726 49         9,749 02         9,022 33         9,022 33           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         9,749 02	0,492177 361	361.194 4,274.07	3,912.85	(9,131,19)
726 49         726 49         726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53         9,739 02         9,022 53           726 49         726 49         9,749 02         9,022 53         9,739 02         9,022 53           726 49         726 49         9,749 02         9,022 53         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53         9,022 53         9,022 53         9,022 53           726 49         726 49         9,749 02	0 432328 314	314 082 4,013,91	3,699.82	(5,431.37)
126 49         726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53 <td>E12 TE92TE 0</td> <td>273 114 3,665 02</td> <td>3,391 90</td> <td>(74 660/3)</td>	E12 TE92TE 0	273 114 3,665 02	3,391 90	(74 660/3)
726 49         726 49         726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53	D. 326902	237 491 3,186 97	2,949.48	910.01
726 49         726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53         9,725 53           726 49         726 49         9,749 02         9,022 53         9,726 53           726 49         726 49         9,749 02         9,022 53         9,726 53           726 49         726 49         9,749 02         9,022 53         9,726 53           726 49         726 49         9,749 02         9,022 53         9,726 53           726 49         726 49         9,749 02         9,022 53         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53         9,725 53         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53         9,749 02         9,022 53         9,725 53           726 49         726 49         9,749 02         9,022 53         9,725 53         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53         9,022 53         9,022 53         9,022 53         9,022 53	0 284262 205	206.514 2,771.28	2,564.76	3,474,77
726 49         726 49         726 49         9,149.02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         726 49         9,749 02         9,022 53           726 49         9,749 02         9,022 53         9,022 53	0.247185 179	179 577 2,409 81	2,230 23	5,705 00
T26.49         726.49         9,749.02         9,022.55           726.49         726.49         9,749.02         9,022.55           726.49         726.49         9,749.02         9,022.55           726.49         726.49         9,749.02         9,022.55           726.49         726.49         9,749.02         9,022.55           726.49         726.49         9,749.02         9,022.55           726.49         726.49         9,749.02         9,022.55           726.49         726.49         9,749.02         9,022.55           726.49         726.49         9,749.02         9,022.55           726.49         726.49         9,749.02         9,022.55           726.49         726.49         9,749.02         9,022.55           726.49         726.49         9,749.02         9,022.55           726.49         726.49         9,749.02         9,022.55           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         9,749.02         9,022.53           726.49	0 214943 156	156 154 2,095 48	EE 6E6'I	7,644.33
T26.49         T26.49         T26.49         T26.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53         9,022.53           726.49         726.49         9,749.02         9,022.53         9,022.53           726.49         726.49         9,749.02         9,022.53         9,022.53           726.49         726.49         9,749.02         9,022.53         9,022.53           726.49         726.49         9,749.02         9,022.53         9,022.53           726.49         726.49         9,749.02         9,022.53         9,022.53           726.49         726.49         9,749.02         9,022.53         9,022.53           726.49         726.49         9,749.02         9,022.53         9,022.53           726.49         726.49         9,749.02         9,022.53         9,022.53           726.49         726.49         9,749.02         9,022.53         9,022.53           726.49         9,749.02         9,022.53         9,022.53         9,022.53	0 126907 135	135 786 1,422,16	1,686.37	9,330,70
726 49         726 49         726 49         9,749,02         9,022 53           726,49         726,49         9,749,02         9,022 53           726,49         726,49         9,749,02         9,022 53           726,49         726,49         9,749,02         9,022 53           726,49         726,49         9,749,02         9,022 53           726,49         726,49         9,749,02         9,022 53           726,49         726,49         9,749,02         9,022 53           726,49         726,49         9,749,02         9,022 53           726,49         726,49         9,749,02         9,022,53           726,49         726,49         9,749,02         9,022,53           726,49         726,49         9,749,02         9,022,53           726,49         726,49         9,749,02         9,022,53	0 16252N 118	13 075 1,584 49	1,466 41	10,797.11
726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53           726.49         726.49         9,749.02         9,022.53	0 141329 102	102 674 1.377 K2	1,275,15	12,072,26
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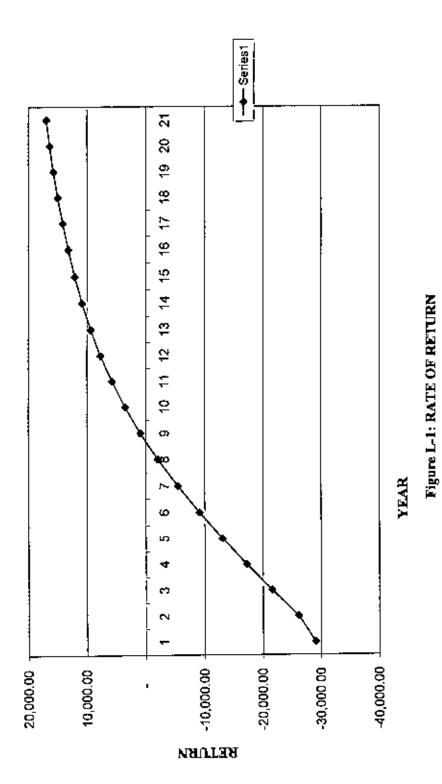
Table L-2: Financial analysis of BCR, NPV & IRR

BCR (F) : 1.50 NeV @15% : 16898.02 LAKH TAKA IRR : 23.21%

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## APPENDIX M: SITUATION-IS

# Table M-1: Annual value of output

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(8,346,56)	4,090.96	4,452.16	361.194	0497177	8,275.35	8,954,87	726 49	72649		9
(12,437,52)	4,325,34	4,740,71	415.373	0 571753	7,565 05	4,291 S4	726,49	726 49		~
(16,762 86)	4,570.31	5,047.99	477 679	0.657516	6,950.88	7,677 37	726 49	726 49		
(21,333,17)	4,825 85	5,375,18	549,331	0.756144	6,382,18	7,108.67	726.49	726 49		'n
(26,159 02)	2,906 52	3,532,25	631 730	0 869565	3,335.60	4,062.09	726.49	726.49	'	2
15'6SD'6Z-	-29,059,54		29,059,540	1 00000	(19,059,54)	•	29,059 54	'	29,059.54	2008-09
Discounted Net Benefit (Cambridve)	Decent (Annual)	Disconned Benefit	Discounted Cast	Discount Pactor @15%	Net Benefit	Tolal Heneût	Total Cost	Operating Cost(2.5%)	Investment Cost	VEAR
(इन्हार प्रवृष्ट) वा)										

Table M-2: Financial analysis of BCR , NPV & IRR

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JAKII TAKA

BCR (P): 1.56 NEV @15%: 11065.26 JRR: 24.12%

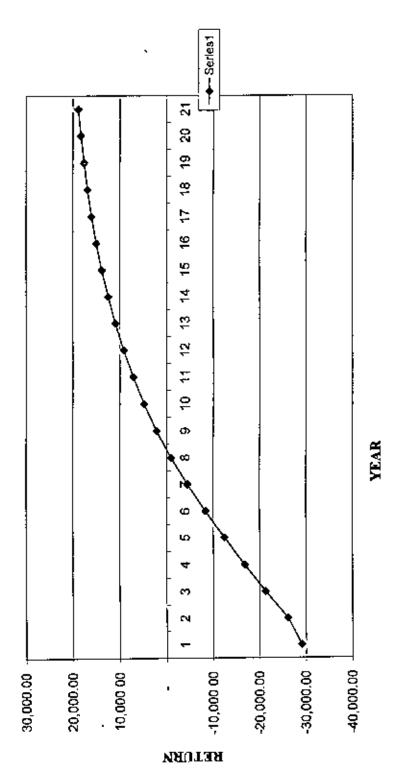


Figure M-1: RATE OF RETURN

#### APPENDIX N: SITUATION-16

# TableN-1: Assual value of output

Matrix         Control         Control <th< th=""><th>Ĭ</th><th></th><th>14 Contract of the local data</th><th></th><th></th><th></th><th></th><th>Conserved and a second</th><th>Consequence (Chil)</th><th></th><th></th><th></th><th>   </th><th>a Take of a</th><th>1</th><th></th><th></th></th<>	Ĭ		14 Contract of the local data					Conserved and a second	Consequence (Chil)					a Take of a	1		
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41         1         1,324         31,021         31,046 (113,014)         10,34,014         10,34,014         10,34,017         177.1	-	: ;;	-	Hat	Tuand	M M3/110 M	11 524 444 51	the part and the	12 cloces 14	TTL (11, 746 40	In the function	22.67	<b>H</b> (16	1.1.1	1002	T IN	
01         1         124         1141         211         127 <th127< th=""> <th127< th=""> <th127< th=""></th127<></th127<></th127<>	┛	=		121	_	71.448.679.61	IT PROVES	TT POST OF	T INCHASU	32,772,042,441	45 15 15 15 15 15 15 15 15 15 15 15 15 15	11 TH	1.4	AUN		Ē	
0         1         124         1104         7104         7104         710         7104 <td>-</td> <td>-</td> <td>_</td> <td>12</td> <td></td> <td>P H C L</td> <td>REALER</td> <td>Thursday.</td> <td>A MANANA</td> <td>10105.00.00</td> <td>ALC: NO ALC: N</td> <td>2.7</td> <td>52</td> <td></td> <td>,</td> <td></td> <td></td>	-	-	_	12		P H C L	REALER	Thursday.	A MANANA	10105.00.00	ALC: NO ALC: N	2.7	52		,		
05         1         1.24         124 <th124< th="">         124         <th124< th=""></th124<></th124<>		- - -		H	_	TIMANA	书册的大	101011010	1 CLUST	NALIZARI	1011114441	400	4	A E	r î	X 5907	W(III
1         1         124         2003         704500         3004         3004         3004         3004         3104         3004         3104				-	_{	46 102 102 12	MUNITER IN	CI GIFER MAN	1721.097	Dilitaria di	14765-20141	MIN	<b>7 4 7</b>	11.10.	ŦĔ	1-22-1	11 HAR
1         1	┥	-		đ	┛	LINKIN	N CH UP 12	A NUMBER OF	15,114,275.27	Per Per State	TENTRAL	1	111	1.171.12	12.14	6111	10 IIO
1         1         1         1         1         1         24         21         24         21         24         21	•	=			ᆜ	TANANA	2 AT M H	200000	RELEASE	2417027200	TLAN, MILLER		122	1.111.1		-	H SH IS
1         1         120         2001         3-44-601         2-41/41         713-400         123-600         713-71         713-61	=	\$		1		TRANK	20.417.07.01	** FUT #****	111111111	20.79.79	LENGTH MALLE	101	127		12.14	5111	10 H C
01         1         124         20161         763 (41)         2413616         71,11(43.27)         24176(56117         267,06417         266         711         718         <	=	5		늰		100000	141111	4 10 10 10	19.11.47.27	MANA	TI MANANAN (	10.04	μ.μ.	1,110,11	H	5 12	12 IN IN
c1         1         120         21.01         7.448.601         2.67.6114         91.466.601         2.47.652         2.44.65	=	Ţ	-	Ŧ		TOWERS -	2.47.04 In F	111, 200, CT 4	1511-512	PALITY AND A	LENGTHMUT	10 AN	22	11417	12.19		R.M.
(1)         (1)         (2) <td>-</td> <td><del>5</del></td> <td></td> <td>칠</td> <td></td> <td>The second</td> <td>2000</td> <td>TTANAL IN</td> <td>REFIN</td> <td>10122-072-01</td> <td>1 MAN AN AL</td> <td>1</td> <td>44</td> <td>1.111.1</td> <td>412 NB</td> <td>114.00</td> <td>14,141</td>	-	<del>5</del>		칠		The second	2000	TTANAL IN	REFIN	10122-072-01	1 MAN AN AL	1	44	1.111.1	412 NB	114.00	14,141
-1         1         12*         20.41         7.63,0054         3.67,016         71,0,532         3.11,0,532         3.12,02330         1.25,025,041         71         7.76,1         716,1<	╡	Ş		4		1242520	2.47.11.15	A SAMPLE	Transfer I	PLEASE AND A	LINE THE LE	194	12.0	1 54 MTC 2	412.14	N. H. C.	TAPAL 43
01         1         124         71.041         76.90 (24)         2.45.1         71.042         2.41.0         11.0         12.0         71.041         2.1.74         61.0         2.04.0         2.04.0         12.0         71.041 <th< td=""><td>÷</td><td>=</td><td></td><td>4</td><td>1</td><td>HUNGH</td><td>N CO IN CO</td><td>NAME AND ADDRESS OF AD</td><td>TURNIN</td><td>MILLEN</td><td>11 225 619 449 411</td><td>792</td><td>. n.n.</td><td>1,000,00</td><td>12.19</td><td>1146</td><td>14,001 41</td></th<>	÷	=		4	1	HUNGH	N CO IN CO	NAME AND ADDRESS OF AD	TURNIN	MILLEN	11 225 619 449 411	792	. n.n.	1,000,00	12.19	1146	14,001 41
01         1         1.24         20.27         7.27         2.47         2.1         2.47         2.47         2.47         2.44	=	न	-	ž		T STATE	H LH LL C	and the second s	111152021	1000000000	THE REAL PROPERTY OF	1	цци	1244	61 215 61 215	1144	14/14/14
1         1         224         21437         21437         21437         21437         21437         21437         21447 <td>=</td> <td>-</td> <td>-</td> <td>1</td> <td></td> <td>14 100 100 11</td> <td>A (01.720.17</td> <td>PILEN AND</td> <td>Trusting</td> <td>20179390</td> <td>1 224 074 644 17</td> <td>t a</td> <td></td> <td>1.104</td> <td>11 I I</td> <td>5 4 2</td> <td>1+ 1+7H</td>	=	-	-	1		14 100 100 11	A (01.720.17	PILEN AND	Trusting	20179390	1 224 074 644 17	t a		1.104	11 I I	5 4 2	1+ 1+7H
13 1 1 1 224 20.00 204 20.00 20.00 20.00 20.00 20.00 11.00 204 20.00 204 204 204 204 204 204 204 204 204 2		न		1	_	TANKE .	10000	E-WWW	Transier	MIGNARY	Internation	Ť	11.11	2275.01	191244		1914) 1914
1 1 1 124 2102 244441 21414 114414 114441 1144411 245745 1154217 2457441 1246754417 245 712 2544 712 2544 2344 11 1 1 224 2102 244541 2445444 2545441 11549544 11144411 24574521 1246754417 24574417 2444	ł	<u>च</u>		1	_[	H to North	21.4FLHB 19	FILMMAN P	<b>TATINATION</b>	manarda	T HANNAN T	1	7.2	7.77.41	I MILIO	542	14141
<u>44. 1. 1. 1. 20. 20. 20. 20. 1. 20. 20. 1. 20. 20. 1. 20. 20. 20. 20. 20. 20. 20. 20. 20. 20</u>	2	ŧ		ž	1	1.1.1.1.1	H WHIME	The second se	TRANIN	70.705950	TI MAN AND ALL	100	11.21	7,279,42	41 X IV	13444	(+ 14 W
	ž	\$		#1	- 1		PL40,00 H	115,549,600 m	111149111	[manuter ]	11.140.0000001	T SX	שנע 	7.7843	417 H	144	NUM1 61

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#### Table N-2: Financial analysis BCR , NPV & IRR

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YEAR		Lovestment Cost	Operating Cost(2.5%)	Total Cost	Tatal Benefit -	Net Benefit	Discount Factor @15%	Discounted Cost	Discounted Benefit	Discounted Net Benefit (Annual)	<u>(In Lakh Taka)</u> Disconated Net Benefit (Cumulative)
2008-09		29,059 54		29,059,54	-	(29,059.54)	1.000000	29,059 540	-	-29,059 54	-29,059 54
	2	-	726 49	726 49	4,062.09	3,335 60	D \$69565	631 730	3,532 25	2,900 52	(26,159 02)
	3		726 49	726,49	7,393 01	6,666 52	0.756144	549 331	5,590 18	5,040 85	(21,11817)
	4	-	726 49	726 49	7,984 46	7,257 97	0.657516	477 679	5,249 91	4,772 23	(16,345,94
	5		726 49	726 49	8,623 21	7,896 72	0.571753	415 373	4,930 35	4,514 97	(11,830.97
	6		726 49	726 49	9,313.06	8,586,57	0.497177	361 194	4,630 24	4,269 05	(7,56) 92
	7		726 49	726.49	10,055 12	9,331,63	0 432328	314 082	4,348,41	4,034 32	(3,527.60
	8		726 49	726.49	10,561 45	9,834,96	0 375937	273 1 14	3,970,44	3,697 33	169 73
	9		726 49	726 49	10,561 45	9,834,96	0 326902	237 491	3,452 56	3,215 07	3,384 80
	10	-	726 49	726 49	10,\$61,45	9,834 96	0 284262	206 514	3,002 22	2,795 71	6,180,51
	11	-	726 49	726 49	10,561,45	9,834 96	0 247185	179 577	2,610 63	2,431 05	8,611.56
	12	_	726.49	726 49	10,561 45	9,834 96	0 214943	156 154	2,270 11	2,113 96	10,725 52
	13	. •	726 49	726 49	10,561 45	9,834.96	0 186907	135 786	1,974 01	1,838 22	12,563 74
	14		726 49	726 49	10,561.45	9,834 96	0 162528	118 075	1,716 53	1,598 46	14,162.20
	Ł5		726 49	726 49	10,561.45	9,834.96	0 141329	102 674	1,492.64	1,389 97	15,552 17
	16		726 49	726 49	10,561 45	9,834,96	0 122894	89 281	1,297,94	1,208 66	16,760 83
	17		726 49	726 49	10,561 45	9,834.96	0 106865	77,636	1,128 65	1,051 01	17,811 84
	15		726 49	726 49	10,561 45	9,834 96	0 092926	67,510	981 43	913 92	18,725 76
	19	-	726 49	726.49	10,561 45	9,834 96	0.08080.0	58.704	853.42	794 71	19,520 47
	20		726 49	726 49	10,561,45	9,834 96	0 070265	51.047	742.10	691.05	20,211 52
	21		726 49	726 49	10,561.45	9,834 96	0 061100	44 389	645.30	600 92	20,812.44

33,606,88 54,419.32

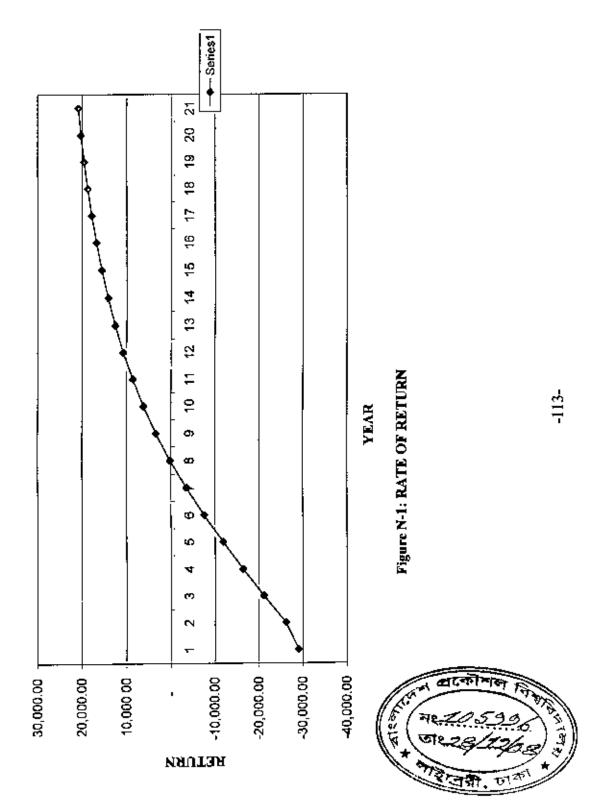
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BCR (F):	1.62	
NPV @15% :	20812.44	<b>TAKII TAKA</b>
IRR :	14.96%	

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