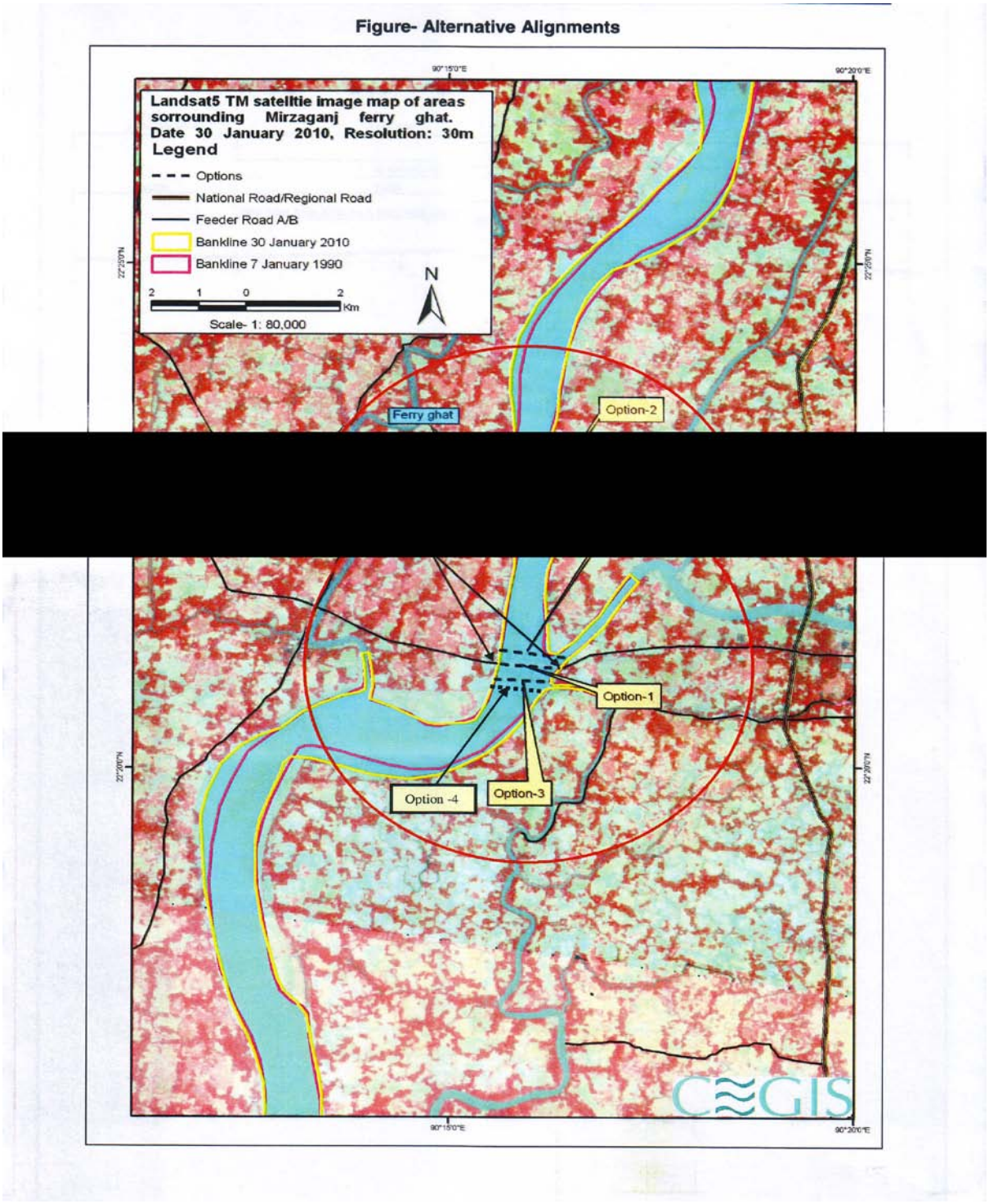
Figure- Alternative Alignments



OUT LINE OF THE PROJECT

❖ Project site	:	Proposed Bridge Site is at17th km on Kachua-Betagi-Patuakhali-Lohalia-KalayaRoad(Z8052).
❖ Bridge	:	Total length of the bridge is 1690m .The Main bridge and Viaduct are as follows; Main Bridge is 1000.0m long consist of segmental pre-stressed post tensioned box girder. Structural forms: 2x50+9x100 =1000.0m Viaduct is 690.0m long consist of pre-stressed I section. Structural forms:11x30+12x30 =690.0m
❖ Approach Road	:	Approx. 500.0m on each side
❖ River Training Work (RTW)	:	River Bank protection works would be 100m upstream and 50m downstream of the bridge centre line on both sides of the river.
❖ Project Cost	:	BDT 6895.48 Million.
❖ Construction Period	:	2014 to 2017 (4 years)
❖ NPV	:	BDT 944.70Million BDT
❖ BCR	:	1.24
❖ EIRR	:	18.03%
❖ Traffic Volume	:	Motorized Traffic 33,976 Veh /day at the Year 2047.
❖ Indirect Benefit	:	Will increase the economic activity, educational activity and overall benefit of the region.

EXECUTIVE SUMMARY

01) Introduction

Govt. of Bangladesh, through Bangladesh Bridge Authority(BBA) as executing agency contracted JV of SARM Associates Ltd and DPC Group for carrying out Feasibility Study for constructing of bridge at the ferry location at 17 km on Kachua-Betagi-Patuakhali-Lohalia-Kalaya Road (Z8052)

The purpose of the Executive Summary is to highlight the Major findings of various studies and the conclusions and recommendations of the study team.

The Notification of Award for providing Consultancy Services was issued by the Chief Engineer on 28 September 2011. The Consultant has started their work from October 2011.The Consultant submitted the reports as following table;

Types of Report	**Date of submission**
Inception Report	26 October 2011
Interim Report	29 February 2012
Draft Final Report	25 April 2012
Draft Final Report Revised	26 June 2012

02) Project Background

Reasons for the project

Bangladesh is a country with innumerable rivers flowing across its territory. The Padma River is the mightiest of all these and ranks as the fifth largest river in the world in terms of volumetric discharge. The western part of deltaic Bangladesh is physically detached from northern and eastern part including capital city, until a massive bridge is built across the Padma River.
Ferry crossing at ferry locations which are the major tidal stream, considerably hampers road communication particularly during flood season. The proposed bridge at the ferry location will grossly improve the road communication. The bridge will also improve the socio-economic condition and industrial development of the area.

Construction of Bridge At Pairkunja Ferry ghat (R870) on Kocha river

Description of the River

At the ferry ghat the name of the river is “payra” (Payra- Buriswar). The river width at the ferry ghat is about 2 km and the river is a tidal one with a reported tidal variation of +/- 2m. The Payra River originates from Pandab River in Kolskti Union of

Bakerganj upazila of Barisal district. The river flowing down southwards by the side of Lebukhali, meets the Patuakhali river just at the upstream of the ferry ghat and the combined flow moves further down as Pyra river and crosses Amtoli of Barguna. The river is about 90km long. Its recorded depth at Amtoli was 20m in monsoon (in August) and 12.5m in winter(February). It moves further southwards and falls in the bay of Bengals as Burisshawr River.

Importance and justification of the proposed bridge at 17km on Kachua-Betagi-Patuakhali-Lohalia-Kalaya Road (Z8806)

The proposed bridge will give direct and uninterrupted connection with the Mirjaganj and Betagi upazila and the river will provide connectivity with Perojpur district and Khulna region with Patuakhali district after construction of bridge over Kocha River. After the construction of the Padma Bridge the traffic will increase manifold and it will be very difficult for the ferry service for carrying all the transports smoothly and timely.

The ferry service at present is giving connectivity with other places. But at ferry points we have to wait average one and half hour or more. If the bridge is constructed, the commercial vehicles will give more trips and working hour of people will be saved.

At the natural calamity the ferry services disrupts economic and social activities seriously. The Consultant found the construction of the bridge is economically viable. So construction of the bridge at the ferry location is justified

03) Traffic Survey and Forecast

The main objective of traffic survey and analysis is to determine to extent of traffic demand on a road/bridge project. The result of this process will form the basis for traffic forecast and projection on the road/bridge project.

The summery of the study findings starting from traffic survey through traffic projection are follows;

- From traffic projection of total motorized traffic(Table 2.5.4, Volume – 1), it is found that AADT in the year 2047 is 33,976 veh / day (Normal traffic 13,512 nos, Diverted traffic 7,286 nos and generated traffic 11,134 nos) which is less than 35,000 the saturation capacity of two lane Bridge & 2 lane carriage way (Ref: ADB TA# 4821- BAN 2009).

- From traffic projection of total non-motorized traffic (Table 2.5.5, Volume-1 it is found that AADT in terms of PCU / hr. in the year 2047 is 63 PCU / hr. which is far less than 400 PCU / hr, the minimum requirement of provision of NMV lane according to the Roads & Highways Department rules.

- From the traffic survey, it may be concluded that the Bridge with both side approach road is feasible for 2-lane carriage way.

The two lanes cost of bridge is found to be BDT 6895.48 Million whereas the cost of

four lane bridge will be BDT 13572.39 Million.

From above study based on traffic volume and cost of the bridge, it is seen that the construction of four lane bridge is neither justified from traffic point of view nor from construction cost.

04) HYDROLOGICAL AND MORPHOLOGICAL STUDY

At the ferry ghat the name of the River is "Payra" (Payra – Buriswar). The river width at the ferry ghat is about 2 km and the river is a tidal one with a reported tidal variation of +/- 2m. The "Payra" (Payra – Buriswar) River originates from Pandab River, in Koloshkati Union of Bakerganj Upazilla of Barisal District. The "Payra" (Payra – Buriswar) River flowing down southwards by the side of Lebukhali meets the Patuakhali River (another flow from Patuakhali); just at upstream of the ferry ghat and the combined flow moves further down as Payra River and crosses Amtali of Borguna. The river is about 90 km long. Its catchment area is reported to be 557 sq km. Its recorded depths at Amtoli were 20m in monsoon (in August) and 12.50m in winter (February). It moves further southwards and falls in the Bay of Bengal as Burishwar River. The normal direction of flow is from north to south. The existing ferry ghat is located just below the confluence of the Payra and Patuakhali rivers.

The following data and figures have been collected from field surveys:

- The river is a tidal one.
- High bank to high bank distance of the river along analysis option**:** 1377 m
- Average ground level on Patuakhali side: 1.64 mPWD
- Average ground level on Mirzaganj side: 2.93 mPWD
- RL of the river at bank full stage: 1.64 mPWD
- Cross section area of the river at bank full level: 13,057 m^2
- Length of the proposed main bridge: 1000 m
- Length of the proposed viaduct: 690 m
- Observed lowest bed level of the river: (-) 9.21 m PWD
- Mean High Water Spring at Patuakhali (as per BIWTA Tide Table)
  = 2.907 m in CD = 2.907 – (3.785 – 2.889) = 2.011 mPWD
- Mean Low Water Spring at Patuakhali (as per BIWTA Tide Table)
  = 0.242 m in CD = 0. 242 – (3.785 – 2.889) = (-) 0.654 mPWD

Review and analyses of the prevailing hydrological and morphological environments of the proposed Mirzaganj Bridge area leads to the following conclusions and recommendations:

- Design high water level: 4.05 mPWD
- Design low water level: (-) 0.72 mPWD
- Regime width of the Payra River at bridge site: 736 m

- Anticipated maximum scour level at bridge pier: upto (-) 30.13 mPWD
- Bridge soffit level over navigable portion of the channel: 22.35 mPWD
- Minimum bridge span openings on navigable portion of the channel:76.22 m
- Bridge alignment: On or near morphological analysis option – 1.
- River training and bank protection work:

Observed lowest bed level of the river was at (-) 9.21 m PWD. Anticipated maximum scour level at bridge pier is upto (-) 30.13 mPWD and anticipated maximum scour level at bridge abutment is upto (-) 21.59 mPWD. As such bottom levels of bridge piers and abutments will have to go to a depth deeper than (-) 30.13 mPWD and (-) 21.59 mPWD respectively and the bridge site will require proper river training and bank protection.

River Training work

At the Bridge location site, the width of the river from bank to bank at the centreline of the proposed bridge is about 1377m. The proposed bridge has been designed for a span length of 1690m. Thus from spanning of the bridge, it is evident that the bridge abutment are located at a safe distance from the main river channel. The river will be flowing normally under the bridge and no specific guide bank is required for the bridge.

Length of the river banks to be protected from site inspection and morphological study at the proposed bridge site it is seen that both river bank at the bridge site are stable. However, river bank protection works would be done for a length of about 100 m upstream and 50m downstream of the bridge centreline on both side of the river.

The river banks could be protected by stone pitching or by concrete blocks or by growing vegetative cover. Concrete blocks are costly. For this reason the Consultant suggests stone pitching work for river training work.

5) Bridge Locations Study

This study includes the following broad activities:

This study has been conducted keeping in mind to collect information for river bank stability and/or shifting of river course, if any, in the vicinity of the probable bridge location. Available satellite maps of this area between the years 1990 to 2010, covering a period of 20 years has been collected and analyzed by super impositions of these maps on a single map. In the reconnaissance survey 8 nos. X-sections were taken from 3.0 km upstream and 3.0 km downstream from the existing Pairakunja ferry ghat. After two steps screening of all the section & from hydraulic considerations, the following 4 locations were considered

- Option -1: Along the existing alignment of Pairakunja ferry ghat. The river banks are stable, the side slopes of river bank are mild & no significant bank shifting has occurred during last 20 years. the Option-1 to locate the bridge along the existing roads connecting the existing Z8052 route will involve minimum additional land to be acquired for the bridge approach. In this alignment 1.5 hac land will needed to be acquired, 03 nos of household and 49 temporary structures will be affected. 300m approach road will be required.

- Option -2: The alignment is 150.0m U/S from Pairakunja Ferry ghat, where the river banks are stable the side slopes of river bank is mild & no significant bank shifting has occurred during last 20 years. In this alignment 2.8 hac. land will needed to be acquired and 27 nos. temporary structures will be affected. 400 m approach road will be required.

- Option 3: The alignment is 300m D/S from Pairakunja ferry ghat. Here the river bank is stable and no significant river bank shifting has occurred within 20 years. In this alignment 3.2 hac. land will needed to be acquired, 02 structures will be affected. 970m approach road will be required.

- Option 4: The alignment is 1.50 km D/S from Pairakunja Ferry ghat. Here the river bank is stable and no significant bank shifting occurred in twenty years. In this alignment 4.5 hac land will need to be acquired, 1 nos household and 02 nos structures will be affected. 3.8km approach road will be required.

Therefore, considering the above aspects, the Consultants feel that the Alignment along Option-1 would be the most suitable location for the bridge.

06) Selection of Final Bridge Alignment

The following 4 alternative locations were selected

a) Option -1

Main Bridge 2x50 + 9x100 =1000 m

Viaduct. Mirzagong end:11x30 = 330m

Patuakhali end:12x30 =360m

Total length of the bridge = **1690m**

b) Option-2

Main Bridge 2x50 + 13x100 =1400 m

Viaduct Mirzagong end:10x30 = 300m

Patuakhali end: 10x30 =300m

Total length of the bridge = **2000m**

c) Option-3

Main Bridge 2x50 + 10x100 =1100 m

Viaduct. Mirzagong end:13x30 = 390m

Patuakhali end: 13x30 =390m

Total length of the bridge = **1880m**

d) Option-4

Main Bridge 2x50 + 10x100 =1100 m

Viaduct. Mirzagong end:13x30 = 390m

Patuakhali end: 12x30 =390m

Total length of the bridge = **1850m**

The alternative alignments were then evaluated for technical & financial costs. The final location of the bridge is Option -1.

Comparative study of four Options of the bridge

The Consultant performed detail study and prepared a comparative study of the four alternative options of the proposed bridge for social environmental and economic aspects for final selection. These are shown in the following table

Table: Comparative Study of alternatives

Description	Option -1	Option-2	Option-3	Option-4
Construction Cost (BDT)	5579.29	7154.43	6170.23	6716.58
Project cost (BDT)	6895.48	9466.33	8170.04	8919.56
Length of the approach road	350m	400m	970m	2.9 km
Land Acquisition	1.5 hac.	2.80hac	3.20hac	4.2 hac
Land Acquisition, Resettlement & EMP cost (Million BDT)	3.03	3.46	8.39	32.8
Environmental impact	Less land acquisition will result less environmental	More land acquisition will result in environmental	More land acquisition will result in environmental	More land acquisition will result in environmental

	impact.	impact.	impact.	impact.
Affect on household and structures	03 nos household and 49 nos. temporary structures will be affected	27 nos structure will be affected	2 nos structure will be affected.	1 no. Household and 2 nos structures will be afected
Social impact	Less land acquisition will result in Less impact	More land acquisition will result in social impact	More land acquisition will result in social impact	More land acquisition will result in social impact
NPV (Million BDT)	944.70	-524.9	136.6	-397.3
BCR	1.24	0.902	1.02	0.924
EIRR	18.03%	13.93%	15.46%	14.10%
Ranking	1	Economically not feasible	2	Economically not feasible

The report concludes that the proposed bridge at Option -1 location along the existing Z8052 route would provide the minimum project cost with minimum disturbance to the existing properties and with maximum benefit for the techno-economic evaluation. Therefore, Option-1 location has been suggested by the Consultant for the proposed bridge and approach roads location.

Selection of Structural Configuration

For structural configuration following two alternatives have been studied for the selected alignment

Alternative-1: PSC Box Girder
Main bridge - 9x100m + 2 x 50m in PSC box type = 1000m
Viaduct - 11x30m + 12x 30m in PSC I - Girder type = 690m
Total Length of bridge = 1690m
Total ccost of the bridge: BDT 6895.48

Alternative-2: Extradosed PSC Box Girder
Main bridge - 5x150m + 2 x 75m in Extradosed PSC box type = 900m
Viaduct - 13x30m + 13 x 30m in PSC I - Girder type = 780m
Total Length of bridge = 1680m
Total cost of the bridge: BDT10515.20 Million

The bridge type selected through cost comparison between two options is PSC Box Girder .

07) Geotechnical Investigation for The Structure

Here the soil is grey medium stiff to soft clay of approximately 10.0m thick, 10.0m~20.0m grey soft silt to dense silt with some fine sand and at larger depth below 20.0m & thereafter medium dense fine sand to dense sand have been found.

08) Design Approach and Technical Standards

The Consultants preliminary designs are in accordance with international standards and procedures but are largely based on Roads and Highways Departments (RHD) standards for design of Bridges and geometric design standard. The principal international standards adopted are;

a) For approach roads and bridge alignment:-Guide lines for Design of Flexible Pavement, and Pavement Design Guide followed by Roads and Highways Department (RHD),Latest revision of AASHTO (1993), guide for Design of Pavement structure, presently in use in Bangladesh.

b) For the bridge: AASHTO latest revision applicable in use in Bangladesh on Standard Specifications for Highway Bridges.

c) For Material standard: AASHTO latest revision in use in Bangladesh.

09) Findings and Sum-up

The consultant has conducted the following surveys and investigation;

a) Extensive reconnaissance survey by the team members to select the possible locations of the bridge and associated approach roads/ link roads to existing roads.

b) River Crossing Traffic Survey to assess the Normal Traffic and their mode of crossing, over the proposed bridge.

c) Preliminary Social, Resettlement and Environmental impact study at the selected 3 possible bridge locations and approach roads.

d) Topographic Survey at the selected bridge location.

e) Hydrographic survey at the selected bridge location.

f) Geotechnical Investigations along the selected bridge and approach road alignment, and

g) Morphological (satellite imagery) studies over the last 20 year in the vicinity of the proposed bridge to assess the river bank shifting and requirement for bank protection work

In addition to the above Hydrological studies have been carried out including the study for Navigational clearance requirement.

10) Environmental Impact Assessments

Potential Adverse Impact

Among the physical negative environmental impact mainly on air quality may appear during construction of the bridge. During post –construction operational phase, the negative impacts on air quality will come from vehicle exhaust emission pollutants. As a result air will be deteriorated. The impacts on noise level may be increased during the time of construction. The impacts on biological environment will appear in cutting of some trees and plants on both side of the approach roads of the bridge. As a result roadside erosion and some negative impacts on ecology may be approved. Erosion may be appearing on both bank side earth work of the river during construction of the bridge. Some drainage congestion may arrive on the approach roadside of the bridges during construction phase. Some land acquisition and resettlement wii be required. Navigation may be disrupted. Fish habitat may be affected. Quality of water may be affected.

Mitigation measures

Increase channel capacity to handle big barges and water crafts. Providing adequate Flood passage structures for fish migration and careful alignment of the bridge without disturbing fish habitat and fishing. Limiting works to dry Season. Carefully planning navigation bypass. Restoring and Rehabilitation navigation Channel for safe transport and storing construction materials. Spraying water to reduce dust hazards and limited use of machinery to reduce noise. Proper monitoring of soil erosion, navigation, chemical storage and use; site inspection, condition of construction camp, surface water quality, measurement of DO, BOD,SS. FECEL coli forms, drinking water quality, inspection of brick, bitumen & cement facilities as per methods/ procedures recommended by department of environment, checking noise and vibration and inspection of health and safety.

Positive Impact

In the long run the project will replace ferry services. Improve regional hydrology by cross drainage structures. Reduce dust pollution and improve water quality by bituminization of the pavement. Facilitate and improve access to markets for income generation. Allow easy movement of motorized and other traffic. Improve aesthetic quality of the region. Agricultural development will occur. Better access to growth center markets.

Environmental Management Plan

Environmental Management Plan (EMP) is suggested to avoid any adverse impact during construction of the bridge and operation maintenance phases and it will ensure environmental provisions and management for the bridge. The EMP cost will include river bank erosion on the approaches of the bridge, drainage congestion, air quality, noise level, removal of trees and plantation, water quality, land loss/ acquisition, homestead loss, agricultural and commercial loss, health and sanitation, traffic management and congestion. The EMP cost will be approximately 3% of the cost of the bridge.

- On critical review of the potential environmental impacts, the specific mitigation and monitoring measures proposed and the benefits described, the project will not lead to any long term irreversible adverse impact on the adjacent environmental quality and resources.

- Most of the potential impacts are short-term and minor in nature. The anticipated adverse effects could be greatly controlled / minimized or eliminated through adoption of suggested mitigation measures and implementation of the Environmental Management Plan.

- Considering the civil engineering requirements from environmental advantage point of view, the current location and functional route of the project is acceptable.

11) Operation & Maintenance:

In order to ensure long time durability and services of the bridge operation and maintenance of different components of main bridge, viaducts, services and other ancillary structures of the bridge will be an essential activity. These will include routine inspections at weekly or monthly basis, general inspection after two year's time and principal inspection after every five year's time.

However, the Construction Company with due agreement and concurrence of supervision consultant and Manufacturer's specifications will prepare necessary Operation and Maintenance manual for the main bridge and Viaducts and connections, supports, services, and other ancillary structures . The qualified Operation and Maintenance Operator will follow the detail manuals in operation and maintenance work

12) Economic Evaluation

Comparison of costs and benefits.

To arrive at the conclusion of economic appraisal of the project, it is necessary to compare the costs and benefits and find out Net Present Value (NPV) Benefit – Cost Ratio (BCR), and the Internal Rate of Return (IRR).

The costs and benefits were discounted initially at 15 percent (as prescribed by the Planning Commission) and based on the result, were further discounted at 10 percent to arrive at IRR. The following table provided the summary position of the economic analysis:

Sensitivity Analysis: Cost and Benefits of the project are based on estimates and projection. In reality it may vary with actual costs and available benefits. To test the worthiness of the project, it is considered that sensitivity analysis is carried out taking into account three alternative situations.

(i) With 10% increase in cost stream ;
(ii) With 10% decrease in benefit stream;
(iii) With combined effect of (i) and (ii)

The results of Sensitivity Analysis as per alternatives (i) (ii) and (iii). above are presented in the following table.

ECONOMIC ANALYSIS: NPV, BCR & IRR BASE CASE and Sensitivity Analysis

SI No.	Economic Evaluation	NPV (Million Taka) 15%	BCR	IRR (%)
01.	Base Case	944.70	1.24	18.03
02.	Benefit (10% reduced)	459.80	1.11	16.69
03.	Cost (10% increased)	554.30	1.12	16.82
04.	Combined effect of benefit 10% reduced and cost 10% increased	69.40	1.01	15.26

The economic indicators for design options on the selected alignment justify the economic viability of the project.

13) Project Cost

The project Cost includes the following components of cost:

1. Total Construction Cost;
2. Engineering Cost
3. Land Acquisition, Resettlement
4. Administrative Cost;
5. Physical Contingencies.
6. Price Contingency
7. VAT,TAX And Duties.

The table below shows the cost of the components of the Project Cost:

Total Project Cost (Payra Kunja Bridge, Option - 1)

Sl No.	Description	Amount in Million BDT	Remarks
1	Construction Cost		
	a) Bridge	BDT 5365.47	
	b) Approach Road	BDT 35.00	
	c) River Bank Protection Work	BDT 178.82	
	Total Construction Cost	BDT 5579.29	
2	Engineering Cost		
	a) Detailed design	BDT 139.48	2.5% of Sl No. 01
	b) Construction Supervision	BDT 195.27	3.5% of Sl No. 01
3	Land Acquisition, Resettlement and EMP.	BDT 3.03	
4	Administration Cost	BDT 33.78	10% of Sl No. 02 & 03
5	Physical Contingencies	BDT 557.93	10%-15% of Sl No. 01
6	Price Contingencies	BDT 129.44	2%-5% of Sl No. 01, 02 and 05
7	VAT, TAX and DUTIES	BDT 257.26	14.5% for importation @ 30% of Sl No. 01 & 02
Total Project Cost		**BDT 6895.48**	

14) Conclusion from the Study

14.1 Structural Configuration

From the hydraulic (including navigational clearance requirement), topographical and Geotechnical studies and the acceptable (3.5%) longitudinal grade, the total length of the proposed bridge has come to 1690m, Comprising of the main bridge over the main river channel followed by viaduct on either bank covering the flood plain.

The main bridge has been suggested in **Alternative-1** comprising of post-tensioned pre-stressed concrete Single Box Girder (PSC Box Girder) continuous with segmental cantilever construction with span of 100m. The viaduct portions comprise of pre-stress Girder of span 30 m. The total length of option-1 being 1690m comprises of (9x100+2x50+23x30)m.

14.2 Foundation Type Consideration

The foundation type of 100m span option-1, PSC box type bridge is quite common in Bangladesh with large diameter (1200mm) cast-in-situ RCC bored piles and that of viaduct span being with 1000mm diameter Cast-in-situ bored piles.

14.3 Social and Resettlement Impact Consideration

The proposed bridge alignment at option-1 location through the existing Z8052 causes least disturbance to the existing settlement and is the least cost solution.

.

14.4 Environmental Consideration

On critical review of the potential environmental impacts, the specific mitigative and monitoring measures proposed and the benefits to be derived, the project at the proposed Option-1 location will not lend to any long term irreversible adverse impact on the adjacent environmental quality and resources.

14.5 Economic Justification

The economic analysis carried out for the proposed Bridge for 30 years evaluation period shows that from the point of view of all the economic parameters considered the project is economically viable and the investment is highly justified.
The NPV of the bridge at 15% discount rate is placed Tk 944.70 million
The EIRR of the project at about 18.03% is above the 15% accounting rate of return considered for taking investment decision in Bangladesh. The benefit cost ratio is about 1.24

15 Recommendations of the Study

The recommendations of the study for the proposed Payrakunja Bridge are as follows:
a) The bridge for the options-1 is found to be feasible from technical and economic consideration and may be taken up for construction.

b) The most suitable foundations of the piers in the waterway are found to be large diameter (1200mm for the 100m span PSC Box Girder) RCC cast-in-situ bored piles with permanent steel casing and that of the viaduct portion in 1000mm diameter RCC cast-in-situ bored piles with temporary casing.

c) The bridge may not be effective for traffic flow without the minimum improvement of the Z8052 road starting from National Highway N8 at
Patuakhali upto Kachua.

Summary of Costs of Different Options At a Glance

Paira Bridge	Total Project Cost for 2 Lane Bridge (Mill BD)	Total Project Cost for 4 Lane Bridge (Mill BD)	Total Project Cost of Extra-dosed for 2 Lane Bridge (Mill BD)
Option – 1	6,895.48	13,572.39	10,515.20
Option – 2	9,466.33	17,532.82	-
Option – 3	8,170.04	14,977.89	-
Option – 4	8,919.56	15,794.65	

SUMMARY OF COST OF TWO LANE BRIDGE

Total Project Cost (Paira Bridge, Option - 1)

Sl No.	Description	Amount in Million BDT	Remarks
1	Construction Cost		
	a) Bridge	BDT 5,365.47	
	b) Approach Road	BDT 35.00	
	c) River Bank Protection Work	BDT 178.82	
	Total Construction Cost	BDT 5,579.29	
2	Engineering Cost		
	a) Detailed design	BDT 139.48	2.5% of Sl No. 01
	b) Construction Supervision	BDT 195.28	3.5% of Sl No. 01
3	Land Acquisition, Resettlement and EMP.	BDT 3.03	
4	Administration Cost	BDT 33.78	10% of Sl No. 02 & 03
5	Physical Contingencies	BDT 836.89	15% of Sl No. 01
6	Price Contingencies	BDT 337.55	5% of Sl No. 01, 02 and 05
7	VAT, TAX and DUTIES	BDT 257.26	14.5% for importation @ 30% of Sl No. 01 & 02
Total Project Cost		**BDT 6,895.48**	

Total Project Cost (Paira Bridge, Option - 2)

Sl No.	Description	Amount in Million BDT	Remarks
1	Construction Cost		
	a) Bridge	BDT 6,935.61	
	b) Approach Road	BDT 40.00	
	c) River Bank Protection Work	BDT 178.82	
	Total Construction Cost	BDT 7,154.43	
2	Engineering Cost		
	a) Detailed design	BDT 178.86	2.5% of Sl No. 01
	b) Construction Supervision	BDT 250.41	3.5% of Sl No. 01
3	Land Acquisition, Resettlement and EMP.	BDT 3.46	
4	Administration Cost	BDT 43.27	10% of Sl No. 02 & 03
5	Physical Contingencies	BDT 1,073.16	15% of Sl No. 01
6	Price Contingencies	BDT 432.84	5% of Sl No. 01, 02 and 05
7	VAT, TAX and DUTIES	BDT 329.89	14.5% for importation @ 30% of Sl No. 01 & 02
Total Project Cost		**BDT 9,466.33**	

Total Project Cost (Paira Bridge, Option - 3)

Sl No.	Description	Amount in Million BDT	Remarks
1	Construction Cost		
	a) Bridge	BDT 5,894.41	
	b) Approach Road	BDT 97.00	
	c) River Bank Protection Work	BDT 178.82	
	Total Construction Cost	BDT 6,170.23	
2	Engineering Cost		
	a) Detailed design	BDT 154.26	2.5% of Sl No. 01
	b) Construction Supervision	BDT 215.96	3.5% of Sl No. 01
3	Land Acquisition, Resettlement and EMP.	BDT 8.39	
4	Administration Cost	BDT 37.86	10% of Sl No. 02 & 03
5	Physical Contingencies	BDT 925.53	15% of Sl No. 01
6	Price Contingencies	BDT 373.30	5% of Sl No. 01, 02 and 05
7	VAT, TAX and DUTIES	BDT 284.51	14.5% for importation @ 30% of Sl No. 01 & 02
Total Project Cost		**BDT 8,170.04**	

Total Project Cost (Paira Bridge, Option - 4)

Sl No.	Description	Amount in Million BDT	Remarks
1	Construction Cost		
	a) Bridge	BDT 5,982.20	
	b) Approach Road	BDT 555.56	
	c) River Bank Protection Work	BDT 178.82	
	Total Construction Cost	BDT 6,716.58	
2	Engineering Cost		
	a) Detailed design	BDT 167.91	2.5% of Sl No. 01
	b) Construction Supervision	BDT 235.08	3.5% of Sl No. 01
3	Land Acquisition, Resettlement and EMP.	BDT 32.86	0
4	Administration Cost	BDT 43.59	10% of Sl No. 02 & 03
5	Physical Contingencies	BDT 1,007.49	15% of Sl No. 01
6	Price Contingencies	BDT 406.35	5% of Sl No. 01, 02 and 05
7	VAT, TAX and DUTIES	BDT 309.70	14.5% for importation @ 30% of Sl No. 01 & 02
Total Project Cost		**BDT 8,919.56**	

SUMMARY OF COST OF FOUR LANE BRIDGE

Total Project Cost (Paira Bridge, Option - 1)

Sl No.	Description	Amount in Million BDT	Remarks
1	Construction Cost		
	a) Bridge	BDT 10,045.48	
	b) Approach Road	BDT 35.00	
	c) River Bank Protection Work	BDT 178.82	
	Total Construction Cost	BDT 10,259.30	
2	Engineering Cost		
	a) Detailed design	BDT 256.48	2.5% of Sl No. 01
	b) Construction Supervision	BDT 359.08	3.5% of Sl No. 01
3	Land Acquisition, Resettlement and EMP.	BDT 3.03	
4	Administration Cost	BDT 61.86	10% of Sl No. 02 & 03
5	Physical Contingencies	BDT 1,538.90	15% of Sl No. 01
6	Price Contingencies	BDT 620.69	5% of Sl No. 01, 02 and 05
7	VAT, TAX and DUTIES	BDT 473.06	14.5% for importation @ 30% of Sl No. 01 & 02
Total Project Cost		**BDT 13,572.39**	

Total Project Cost (Paira Bridge, Option - 2)

Sl No.	Description	Amount in Million BDT	Remarks
1	Construction Cost		
	a) Bridge	BDT 13,034.53	
	b) Approach Road	BDT 40.00	
	c) River Bank Protection Work	BDT 178.82	
	Total Construction Cost	BDT 13,253.35	
2	Engineering Cost		
	a) Detailed design	BDT 331.33	2.5% of Sl No. 01
	b) Construction Supervision	BDT 463.87	3.5% of Sl No. 01
3	Land Acquisition, Resettlement and EMP.	BDT 3.46	
4	Administration Cost	BDT 79.87	10% of Sl No. 02 & 03
5	Physical Contingencies	BDT 1,988.00	15% of Sl No. 01
6	Price Contingencies	BDT 801.83	5% of Sl No. 01, 02 and 05
7	VAT, TAX and DUTIES	BDT 611.11	14.5% for importation @ 30% of Sl No. 01 & 02
Total Project Cost		**BDT 17,532.82**	

Total Project Cost (Paira Bridge, Option - 3)

Sl No.	Description	Amount in Million BDT	Remarks
1	Construction Cost		
	a) Bridge	BDT 11,041.70	
	b) Approach Road	BDT 97.00	
	c) River Bank Protection Work	BDT 178.82	
	Total Construction Cost	BDT 11,317.52	
2	Engineering Cost		
	a) Detailed design	BDT 282.94	2.5% of Sl No. 01
	b) Construction Supervision	BDT 396.11	3.5% of Sl No. 01
3	Land Acquisition, Resettlement and EMP.	BDT 8.39	
4	Administration Cost	BDT 68.74	10% of Sl No. 02 & 03
5	Physical Contingencies	BDT 1,697.63	15% of Sl No. 01
6	Price Contingencies	BDT 684.71	5% of Sl No. 01, 02 and 05
7	VAT, TAX and DUTIES	BDT 521.85	14.5% for importation @ 30% of Sl No. 01 & 02
Total Project Cost		**BDT 14,977.89**	

Total Project Cost (Paira Bridge, Option - 4)

Sl No.	Description	Amount in Million BDT	Remarks
1	Construction Cost		
	a) Bridge	BDT 11,180.25	
	b) Approach Road	BDT 555.56	
	c) River Bank Protection Work	BDT 178.82	
	Total Construction Cost	BDT 11,914.63	
2	Engineering Cost		
	a) Detailed design	BDT 297.87	2.5% of Sl No. 01
	b) Construction Supervision	BDT 417.01	3.5% of Sl No. 01
3	Land Acquisition, Resettlement and EMP.	BDT 32.86	
4	Administration Cost	BDT 74.77	10% of Sl No. 02 & 03
5	Physical Contingencies	BDT 1,787.19	15% of Sl No. 01
6	Price Contingencies	BDT 720.84	5% of Sl No. 01, 02 and 05
7	VAT, TAX and DUTIES	BDT 549.38	14.5% for importation @ 30% of Sl No. 01 & 02
Total Project Cost		**BDT 15,794.55**	