CHAPTER 7

MASTER PLAN FOR PORTABLE STEEL BRIDGE CONSTRUCTION

7.0. MASTER PLAN FOR PORTABLE STEEL BRIDGE CONSTRUCTION

7.1 Procedure for Formulation of Master Plan

Figure 7.1-1 shows the procedure for formulation of master plan for portable steel bridge construction.

The country has been divided into 15 zones (refer to chapter 2). The zones are prioritized and classified into four groups: priorities 1 to 4. On the other hand, the study bridges are screened first. The bridges which pass the screening criteria are called the project bridges. After screening, the project bridges are prioritized and divided into three groups: priorities A to C. Combining zone priority and bridge priority, the project bridges are divided into 12 groups. The combined priority is indicated such as 1A (zone priority 1 and bridge priority A), 1B, 1C and so forth. The implementation program is prepared by priority group.

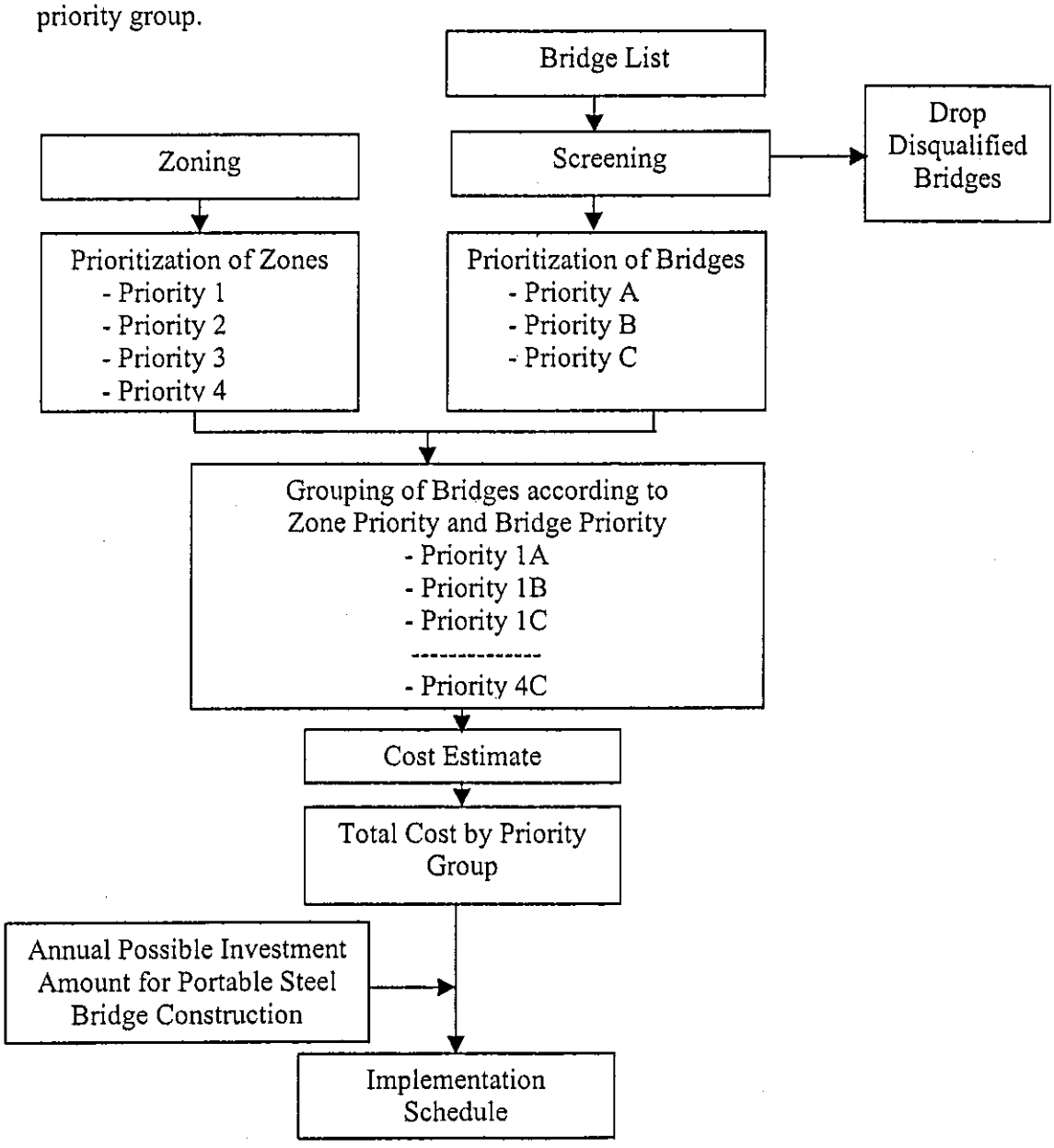


Figure 7.1-1 Procedure for formulation of Master Plan

7.2 Prioritization of Zones

7.2.1 Criteria for Prioritization of Zones

The general objective of the Project for Portable Steel Bridge Construction on Feeder and Rural Roads is to provide stable transport means for passage of people and transportation of local products and subsistence goods in rural areas, and thereby support the socioeconomic development in the related areas. In prioritization of zones, the objectives/effects of the project are summarized as follows:

- Promotion of Economic Development

  Economic growth especially in agricultural sector will be promoted in the following mechanism: (1) reduction in transport cost of agricultural inputs and products, (2) reduction in production cost and increase in farmgate price, (3) rise of farmer's will to produce marketable products, and (4) acceleration of agricultural production.

- Promotion of Social Development

  The quality of life of the rural population will be improved through improved accessibility to work, school, market, hospital, mosque, etc., and stable supply of subsistence goods resulting in stabilization of prices.

- Encouragement of Road Network Improvement

  As well as the construction/reconstruction of bridges is a key component of the road network development, it will encourage the improvement of the connecting/related roads. Thus, the project will make an impact on overall road network development of the area.

- Support of Other Development Projects

  The project, through improvement of the transport efficiency, will support/promote the effects of other development projects.

The indicators for evaluation of priority of zones are selected in relation to the objectives of the project as follows:

1) Economic Development

- Agricultural Sector Share

  Definition : Ratio of GRP in agricultural sector to total GRP

  Evaluation : The zone with higher agricultural sector share is given higher priority, considering the objective of the project viz, promoting the rural development especially in agricultural sector.

- Per Capita GRP

  Definition : Total GRP per person

  Evaluation : Considering that the economically lagging areas need to be propped up, the zone with lower per capita GRP is given higher priority.

- Land Productivity

  Definition : Total GRP per land area

  Evaluation : Likewise with per capita GRP, the zone with lower land productivity is given higher priority. In addition, the lower land productivity areas are considered to have more room for development.

  Unutilized Land Ratio

  Definition : Ratio of area of calturable waste land plus current fallow land to total area of calturable waste land, current fallow land and net cropped area, i.e. the ratio of the land available for agriculture but not utilized.

  Evaluation : This ratio is related to the potential of increasing agricultural products. Therefore, the zone with higher unutilized land ratio is given higher priority.

2) Social Development

Incidence of Poverty

Definition : Percentage of people below the poverty line

Evaluation : To attain the social equity, the zone with higher incidence of poverty is given higher priority.

Public Facility Ratio

Definition : Number of educational facilities and health facilities per population

Evaluation : To obtain the social equity, the zones with lower public facility ratio is given higher priority.

Growth Centre/Bazaar/Hat Ratio

Definition : Number of growth centres/bazaars/hats per population

Evaluation : To obtain the social equity, the zones with lower growth centre/bazaar/ hat ratio is given higher priority.

3) Road Network Improvement

Density of LGED Road per Area and Population

Definition : Total Length of Feeder Roads-B, Rural Roads-1, -2 and –3 divided by square root of land area times population

Evaluation : The zone with higher road density is considered to have higher need of road improvement and therefore given higher priority.

Study Bridges Ratio

Definition : Ratio of number of study bridges to total number of bridges/gaps on Feeder Roads-B, Rural Roads-1, -2 and –3

Evaluation : The study bridges ratio is considered to reflect the degree of bridge construction need, i.e. the ratio of the gaps needing bridge construction to total number of bridges/gaps. From this point of view, the zone with higher study bridges ratio is given higher priority.

4) Support of Other Development Projects

- Effect of supporting development projects

The effect of the project to support/promote other development projects is evaluated as follows:

* Development projects to be used in the evaluation are selected on the following basis:
  - Rural development projects mainly in transport and agricultural sectors are selected.
  - The projects, the main objective of which is to improve Feeder Roads-B/Rural Roads including bridges are excluded.

* One point is given to each selected project and shared between the zones where the project is located.

* The shared points of all selected projects are summed up for each zone and used as an indicator to evaluate the effect of supporting development projects.

The evaluation results of the effect is shown in Table 7.2-1.

Table 7.2-1 Evaluation of Effect to Support/Promote Development Projects

Project	Zone														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Meghna Bridge / Meghna-Gumti Bridge (Japan)	1/2					1/2									
Bangabandhu Bridge (Jamuna Bridge) (JBIC, etc)		2/6	1/6										2/6	1/6	
Second Road Rehabilitation & Maintenance (IDA)				1/6					1/6	1/6			1/6	1/6	1/6
Jamuna Bridge Access Road (JBIC, etc)	2/5	1/5				1/5	1/5								
Five Bridges on Dhaka-Chittagong Highway (Japan)	2/3					1/3									
Third Road Rehabilitation & Maintenance (IDA)	1/8					1/8		2/8					2/8	2/8	
Paksey Bridge (JBIC)				1/5						2/5			2/5		
Southwest Road Network Development Project (ADB, etc)				1/6	1/6				1/6	1/6	1/6	1/6			
Rupsa Bridge (JBIC)									1/1						
Rural Development-II (IDA)	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15
Model Rural Development Project (Japan)						1/1									
Second Rural Infrastructure Development (ADB)									1/2	1/2					
Rural Livelihood (ADB)	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15	1/15
Third Rural Infrastructure Development (ADB, etc)		1/4	2/4												1/4
Northern Rural Infrastructure Development Project (JBIC, etc)		1/3	1/3												1/3
Participatory Rural Development Project (JICA)		1/2	1/2												
Greater Faridpur Infrastructure Development Project (JBIC)				1/2	1/2										
Narayanganj-Narsingdi Irrigation Project (Japan)	1/1														
Rural Poor Cooperative (ADB)													1/2	1/2	
Northeast Minor Irrigation (ADB)			1/4			1/4		2/4							
Small Scale Water Resources Development (ADB, etc)				1/1											
Participatory Livestock Development (ADB, etc)		1/5	1/5										1/5	1/5	1/5
Second Small Scale Water Resources Development (ADB, etc)									1/4	1/4			1/4	1/4	
Mitigation of Arsenic Contamination (JICA)										1/1					
Total Points	2.825	1.950	2.803	2.167	0.800	2.542	0.333	0.883	2.217	2.617	0.300	0.300	2.233	1.667	1.083

Evaluation Criteria

Maximum 100 points each are allocated to four factors: economic development, social development, road network development and support of development projects.

The score of each zone is calculated in accordance with Table 7.2-2.

Table 7.2-2 Evaluation Criteria

Factor	Indicator	Score*	Maximum Score
Economic Development	Agricultural Sector Share	12.5 X/A	25
	Per Capita GRP	12.5 A/X	25
	Land Productivity	12.5 A/X	25
	Unutilized Land Ratio	12.5 X/A	25
Social Development	Incidence of Poverty	25.0 X/A	50
	Public Facility Ratio	12.5 A/X	25
	Growth Center Ratio	12.5 A/X	25
Road Network Development	Road Density (Feeder-B & Rural)	25.0 X/A	50
	Study Bridges Ratio	25.0 X/A	50
Support of Dev't Projects	Effect of Supporting Dev't Projects	50.0 X/A	100

* X = value of indicator of zone, A = national average of indicator
Note: If calculated score exceeds the maximum score, the maximum score is taken.

7.2.2 Prioritization of Zones

Table 7.2-3 shows the results of evaluation by factor and Table 7.2-4 summarizes the evaluation results.

Table 7.2-3 Results of Evaluation by Factor

Factor	Economic Development								
Indicator	Agric. Sector Share		Per Capita GRP		Land Productivity		Unutilized Land Ratio		Total Score
	Indicator	Score	Indicator	Score	Indicator	Score	Indicator	Score	
Zone 1	11.3	4.9	13169	13.3	35.068	4.2	12.1	15.0	37.4
Zone 2	27.8	12.1	14131	12.4	14.238	10.3	5.5	6.8	41.6
Zone 3	33.1	14.4	12299	14.2	11.102	13.2	4.9	6.1	47.9
Zone 4	28.3	12.3	13359	13.1	10.820	13.5	15.2	18.8	57.7
Zone 5	22.3	9.7	14553	12.0	13.728	10.7	15.2	18.8	51.2
Zone 6	26.3	11.4	12998	13.5	14.707	9.9	8.1	10.0	44.8
Zone 7	30.6	13.3	23828	7.4	10.888	13.4	30.6	25.0	59.1
Zone 8	29.1	12.6	13673	12.8	8.575	17.1	18.5	22.9	65.4
Zone 9	33.8	14.7	17340	10.1	8.084	18.1	13.6	16.8	59.7
Zone 10	34.6	15.0	13261	13.2	11.566	12.6	7.6	9.4	50.2
Zone 11	31.7	13.8	14799	11.8	9.575	15.3	14.3	17.7	58.6
Zone 12	35.7	15.5	14333	12.2	8.283	17.7	7.1	8.8	54.2
Zone 13	31.7	13.8	11168	15.7	10.806	13.5	4.6	5.7	48.7
Zone 14	31.3	13.6	12181	14.4	9.882	14.8	4.7	5.8	48.6
Zone 15	35.6	15.5	12148	14.4	10.212	14.3	4.8	5.9	50.1
National Average	**28.8**		**14019**		**11.699**		**10.1**		

Factor	Social Development						
Indicator	Incidence of Poverty		Public Facility Ratio		Growth Center Ratio		Total Score
	Indicator	Score	Indicator	Score	Indicator	Score	
Zone 1	32	18.2	0.402	21.2	0.008	25.0	64.4
Zone 2	52	29.5	0.526	16.2	0.015	14.2	59.9
Zone 3	48	27.3	0.647	13.2	0.017	12.5	53.0
Zone 4	48	27.3	1.347	6.3	0.021	10.1	43.7
Zone 5	48	27.3	1.346	6.3	0.021	10.1	43.7
Zone 6	43	24.4	0.589	14.5	0.014	15.2	54.1
Zone 7	29	16.5	0.635	13.4	0.017	12.5	42.4
Zone 8	42	23.9	0.703	12.1	0.020	10.6	46.6
Zone 9	39	22.2	0.778	10.9	0.020	10.6	43.7
Zone 10	43	24.4	0.658	12.9	0.018	11.8	49.1
Zone 11	48	27.3	0.843	10.1	0.020	10.6	48.0
Zone 12	55	31.3	0.932	9.1	0.022	9.7	50.1
Zone 13	51	29.0	0.674	12.6	0.016	13.3	54.9
Zone 14	44	25.0	0.669	12.7	0.019	11.2	48.9
Zone 15	56	31.8	0.799	10.7	0.018	11.8	54.3
National Average	**44**		**0.681**		**0.017**		

Factor	Road Network Development					Support of Dev't Projects		
Indicator	Road Density		Study Bridges Ratio		Total Score	Effect of Supporting Dev't Projects		Total Score
	Indicator	Score	Indicator	Score		Indicator	Score	
Zone 1	1.373	21.6	1.410	50.0	71.6	2.825	88.3	88.3
Zone 2	1.574	24.8	0.886	35.2	60.0	1.950	60.9	60.9
Zone 3	1.611	25.4	0.215	8.5	33.9	2.083	65.1	65.1
Zone 4	1.601	25.2	0.862	34.3	59.5	2.167	67.7	67.7
Zone 5	1.854	29.2	1.386	50.0	79.2	0.800	25.0	25.0
Zone 6	1.629	25.7	0.551	21.9	47.6	2.542	79.4	79.4
Zone 7	1.307	20.6	0.658	26.2	46.8	0.333	10.4	10.4
Zone 8	1.305	20.6	0.686	27.3	47.9	0.883	27.6	27.6
Zone 9	1.467	23.1	0.696	27.7	50.8	2.217	69.3	69.3
Zone 10	1.838	29.0	0.376	14.9	43.9	2.617	81.8	81.8
Zone 11	1.925	30.3	1.260	50.0	80.3	0.300	9.4	9.4
Zone 12	2.598	41.0	0.544	21.6	62.6	0.300	9.4	9.4
Zone 13	1.487	23.4	0.770	30.6	54.0	2.233	69.8	69.8
Zone 14	1.556	24.5	0.635	25.2	49.7	1.667	52.1	52.1
Zone 15	1.799	28.4	0.436	17.3	45.7	1.083	33.8	33.8
National Average	1.586		0.629			1.600		

Table 7.2-4 Summary of Evaluation Results

	Score				
	Economic Development	Social Development	Road Network Development	Support of Dev't Projects	Total
Zone 1	37.4	64.4	71.6	88.3	261.7
Zone 2	41.6	59.9	60.0	60.9	222.4
Zone 3	47.9	53.0	33.9	65.1	199.9
Zone 4	57.7	43.7	59.5	67.7	228.6
Zone 5	51.2	43.7	79.2	25.0	199.1
Zone 6	44.8	54.1	47.6	79.4	225.9
Zone 7	59.1	42.4	46.8	10.4	158.7
Zone 8	65.4	46.6	47.9	27.6	187.5
Zone 9	59.7	43.7	50.8	69.3	223.5
Zone 10	50.2	49.1	43.9	81.8	225.0
Zone 11	58.6	48.0	80.3	9.4	196.3
Zone 12	54.2	50.1	62.6	9.4	176.3
Zone 13	48.7	54.9	54.0	69.8	227.4
Zone 14	48.6	48.9	49.7	52.1	199.3
Zone 15	50.1	54.3	45.7	33.8	183.9

Priority of Zones

Table 7.2-5 shows the score of each zone in descending order. The zones are prioritized based on Table 7.2-5 and sown in **Figure 7.2-1.**

Table 7.2-5 Summary of Evaluation Results (Descending Order of Score) and Prioritization

Order	Zone	Score	Number of Study Bridges	Priority
1	Zone 1	261.7	124	
2	Zone 4	228.6	32	Priority 1
3	Zone 13	227.4	96	339 bridges
4	Zone 6	225.9	87	
5	Zone 10	225.0	60	
6	Zone 9	223.5	88	Priority 2
7	Zone 2	222.4	81	270 bridges
8	Zone 3	199.9	41	
9	Zone 14	199.3	64	
10	Zone 5	199.1	46	Priority 3
11	Zone 11	196.3	63	257 bridges
12	Zone 8	187.5	84	
13	Zone 15	183.9	114	Priority 4
14	Zone 12	176.3	81	286 bridges
15	Zone 7	158.7	91	

Figure 7.2-1 Priority of Zones

7.3 Screening and Prioritization of Bridges

7.3.1 Criteria for Screening of Bridges

The bridge conforming to any of the following conditions is disqualified for project bridge:

1) Coverage by Other Project
Construction of the bridge has been committed in a certain other project.

2) No Urgent Necessity of Reconstruction
The bridge is presently usable for vehicular traffic in fair condition and therefore its reconstruction is not urgently needed.

3) Inappropriateness of Applying Portable Steel Bridge Type

The construction of the bridge with portable steel bridge type is impracticable. The following bridges fall in this case:

- The bridge with a length of more than 300 meters (the girder erection is difficult).
- The bridge with a length of more than 150 meters on the river with a dry season water depth of more than 1.2 meters (the girder erection is difficult even applying the draw erection method).
- The bridge with a length of less than 10 meters (the other type like box culvert is more suitable for this bridge).

4) Improper Condition of Connecting Road
There is no connecting road passable for vehicles.

The bridges which pass the screening criteria are called the project bridges to be included in the master plan.

7.3.2 Criteria for Prioritization of Bridges

Factors Considered for Prioritization

The evaluation of priority of the project bridges is made from two aspects: engineering factors (necessity/urgency of bridge construction) and socioeconomic factors (effect of bridge construction). The factors to be used in the evaluation are as follows:

1) Engineering Factor

a. Road Class

Whether Feeder Road-B, Rural Road-1, Rural Road-2 or Rural Road-3. The bridge on higher class of road is given higher priority.

b. Existing Bridge

Whether the bridge passable for vehicles is exiting or not. In case there is no existing bridge passable for vehicles, its construction is more urgently needed and therefore higher priority is given.

c. Connecting Road

Condition of the connecting road is categorized into three : paved in good/fair condition, paved in poor condition, and unpaved(earthen). Higher priority is given to the bridge on the road in better condition.

d. Alternative Route

Whether alternative route exists or not, and length of the alternative route in case it exists. Higher priority is given in case of no alternative route because importance of the bridge is higher in such case.

e. Location of Bridge

Location of bridge in relation to arterial road, i.e. where the bridge is located among project bridges along the same route leading to an arterial road, counting from the arterial road. The bridge nearer to arterial road is given higher priority.

2) Socioeconomic Factor

a. Beneficiaries

Population in the influence area. The bridge with more beneficiaries is given higher priority.

b. Traffic Volume

Traffic volume including rickshaw and bullock cart. The number of rickshaws and bullock carts is discounted applying a rate of 0.5, considering their effect in comparison with cars. The bridge with more traffic volume is given higher priority.

c. Pedestrian Volume

Number of pedestrians using the bridge. The bridge with more pedestrians is given higher priority.

d. Public Facilities

Number of public facilities such as school, clinic, bazaar, mosque, government office, etc. accessibility to which is expected to be improved by the bridge construction. Higher priority is given in case there are more such facilities.

e. Bridge Length

From the viewpoint of cost effectiveness, the shorter bridge, because of less cost, is given higher priority.

Procedure for Prioritization

The priority of the project bridges is determined in the following steps:

1) Engineering factors excluding the location of bridge, and socioeconomic factors are evaluated by calculating the scores in accordance with the criteria shown in Table 7.3-1 and 7.3-2 respectively.

2) Based on the engineering and socioeconomic scores, the project bridges are divided into three priority groups: A, B and C, in accordance with the criteria shown in Table 7.3-3.

3) The priorities of the bridges on the same route are adjusted.

   An example is given below:

   There are two bridges (Bridge X and Bridge Y) on the same route leading to an arterial road. Bridge X is nearer to the arterial road but it falls in lower priority group than Bridge Y. In such case, an adjustment is made so that Bridge X and Bridge Y fall in the same priority group.

Criteria for Calculating Engineering Score and Socioeconomic Score

The criteria for calculating the engineering score and socioeconomic score are shown in Table 7.3-1 and 7.3-2 respectively.

Table 7.3-1 Criteria for Calculating Engineering Score

Factor	Condition	Score
a. Road Class	Feeder Road-B Rural Road-1 Rural Road-2 Rural Road-3	20 13 7 0
b. Existing Bridge	No existing bridge passable for vehicles Existing bridge passable for vehicles	40 0
c. Connecting Road	Paved in good/fair condition Paved in poor condition Earthen	30 20 0
d. Alternative Route	No alternative route Alternative route with a length of more than 2 km Alternative route with a length of 2 km or less	10 5 0
e. Location of Bridge	(Considered later as previously mentioned)	
Full Score		**100**

Table 7.3-2 Criteria for Calculating Socioeconomic Score

Factor	Score	Maximum Score
a. Beneficiaries	Score = 0.001*P*Multiplier Where, P: number of beneficiaries (ceiling: 30,000) Multiplier: refer to factor 'e' below	30
b. Vehicular Traffic Volume	Score = 0.1*VV*Multiplier Where, VV: truck+bus+car+rickshaw/2+bullock cart/2 (Ceiling: 200) Multiplier: refer to factor 'e' below	20
c. Pedestrian Volume	Score = 0.01*PV*Multiplier Where, PV: pedestrian volume (ceiling: 2,000) Multiplier: refer to factor 'e' below	20
d. Public Facilities	Score = 1.0*PF*Multiplier Where, PF: total number of public facilities (ceiling: 30) Multiplier: refer to factor 'e' below	30
e. Bridge Length	Multiplier = 1.0 for the bridge with a length of 10m-30m 0.9 for the bridge with a length of 35m-75m 0.7 for the bridge with a length of 80m-125m 0.5 for the bridge with a length of 130m or more Note: multiplier is commonly applied to factors 'a' to 'd' above.	
Full Score		**100**

Criteria for Categorizing into Priority Groups

Figure 7.3-1 shows the distribution of engineering score - socioeconomic score. The average score is as follows:

- average engineering score : 64.0
- average socioeconomic score : 53.3

Considering the average score, the criteria for categorization into priority groups are set as shown in Table 7.3-3.

Table 7.3-3 Criteria for Categorization into Priority Group

Priority Group	Criteria
A	- Engineering score 63 or more, and - Socioeconomic score 53 or more
B	Not meeting the above condition, but - Engineering score 50 or more, and - Socioeconomic score 40 or more
C	Others

The bridges with average or more scores in both engineering and socioeconomic factors are categorized as Priority A.

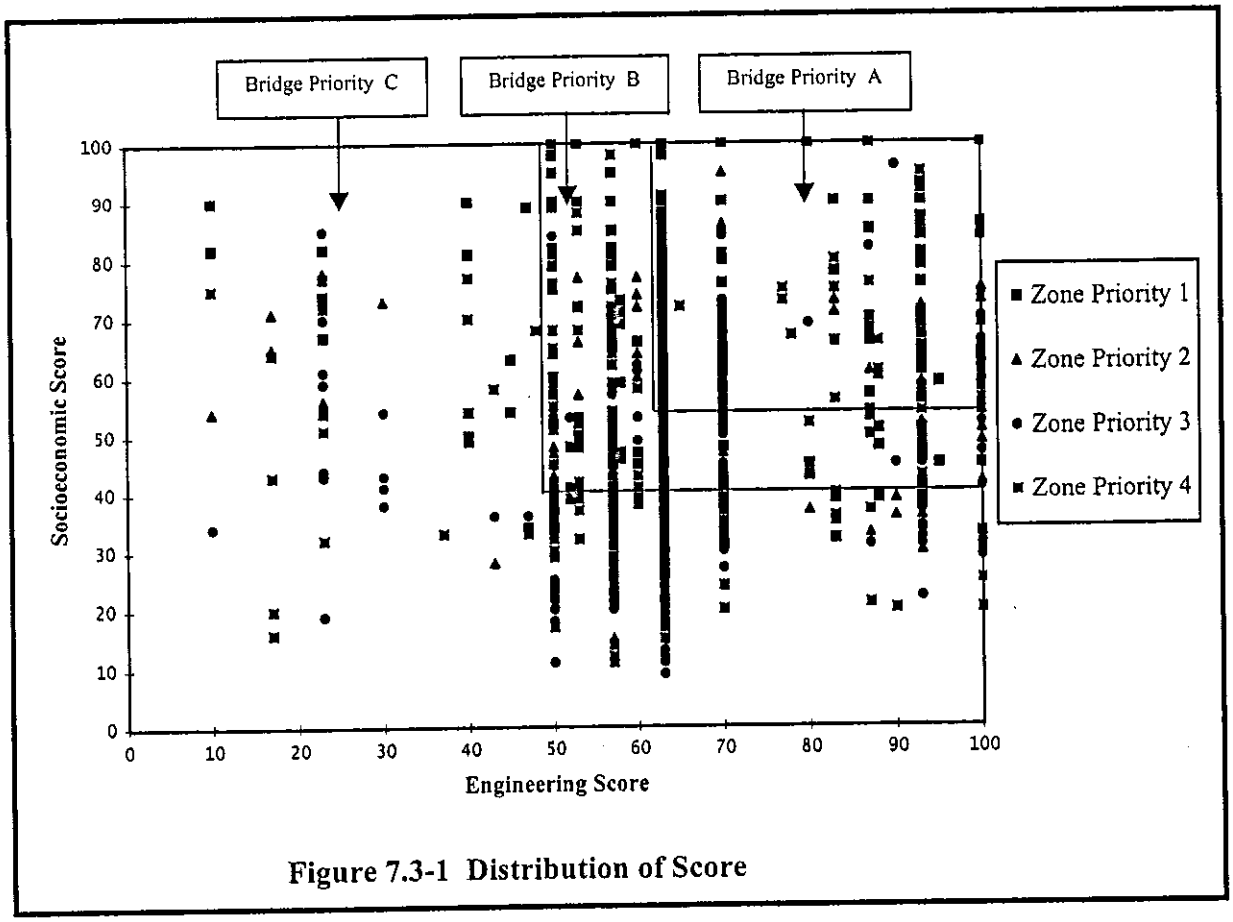


Figure 7.3-1 Distribution of Score

7.3.3 Screening of Bridges

As a result of screening, 54 bridges are disqualified as shown in Table 7.3-4.

Table 7.3-4 Disqualified Bridges

Criteria and Applicable Bridges	Remarks
1) Construction of the bridge is covered by other project.	
- Narshindgi No.14	Project : RTIP
- Chandpur No.6	Project : Agradicare
- Chandpur No.11	Project : Agradicare
- Noakhali No.29	Project : ORET
- Sirajganj No.22	Project : LBC
- Sirajganj No.37	Project : ORET
- Bogra No.37	Project : LBC
2) Reconstruction is not urgently needed.	
- None	
3) Application of portable steel bridge type is inappropriate.	
3-1) Bridge length > 300m	
- Noakhali No.25	L=350m
- Rangamati No.1	L=350m
- Khulna No.30	L=370m
- Satkhira No.7	L=650m
- Narail No.4	L=390m
- Narail No.5	L=600m
- Narail No.6	L=465m
- Bogra No.40	L=350m
3-2) Bridge length > 150m, and dry season water depth > 1.2m	
- Munshiganj No.18	L=300m, D=2.2m
- Manikganj No.29	L=190m, D=2.0m
- Manikganj No.30	L=190m, D=1.8m
- Tangail No.29	L=175m, D=1.9m
- Jamalpur No.31	L=170m, D=2.0m
- Jamalpur No.33	L=170m, D=1.5m
- Jamalpur No.34	L=190m, D=2.5m
- Netrakona No.20	L=180m, D=3.3m
- Shariatpur No.23	L=250m, D=2.3m
- Madaripur No.42	L=160m, D=1.5m
- Chittagong No.104	L=190m, D=1.5m
- Comilla No.10	L=300m, D=2.3m
- Chandpur No.15	L=260m, D=6.5m
- Cox's Bazar No.1	L=300m, D=3.8m
- Rangamati No.14	L=200m, D=1.5m
- Sunamganj No.16	L=175m, D=5.0m
- Sunamganj No.17	L=160m, D=6.0m
- Khulna No.18	L=180m, D=11.4m
- Khulna No.21	L=210m, D=4.2m
- Khulna No.26	L=250m, D=11.4m

Criteria and Applicable Bridges	Remarks
- Khulna No.31	L=160m, D=4.8m
- Khulna No.32	L=205m,D=12.1m
- Barisal No.21	L=250m, D=7.0m
- Naogaon No.16	L=170m,D=1.6m
- Naogaon No.21	L=280m, D=2.0m
- Naogaon No.28	L=180m,D=3.0m
- Nawabganj No.20	L=180m, D=6.2m
- Nawabganj No.21	L=300m, D=4.0m
- Sirajganj No.1	L=200m, D=1.5m
- Sirajganj No.15	L=200m, D=1.5m
- Sirajganj No.16	L=200m, D=1.5m
- Sirajganj No.33	L=200m, D=8.4m
- Pabna No.14	L=180m, D=5.7m
- Pabna No.20	L=200m, D=2.6m
- Bogra No.44	L=300m, D=2.5m
- Bogra No.45	L=270m, D=2.5m
- Bogra No.49	L=200m, D=1.5m
- Thakurgaon No.9	L=200m, D=1.5m
- Lalmonirhat No.4	L=180m, D=1.5m
3-3) Bridge length < 10m	
- None	
4) Connecting road is not in proper condition.	
- None	

Note : L=bridge length, D=dry season water depth

7.3.4 Prioritization of Bridges

Out of 1,152 study bridges, 54 bridges are disqualified. Number of remaining bridges (project bridges) is 1,098. These bridges are evaluated, the results of which are shown in Appendix C including the score of each evaluation item.

Next step is to adjust the priorities of the bridges on the same route leading to an arterial road. The bridges on the same route and adjustment of their priorities are shown in Table 7.3-5.

Table 7.3-5 Bridges on the Same Route and Adjustment of their priorities (1/3)

District	Road ID	Bridges on the Same Route in the order from Arterial Road (Serial Numbers)		Adjustment
		( ) : Priority before Adjustment	( ) : Priority after Adjustment	
Gazipur	333863025	17 (C) 18 (B)	17 (B) 18 (B)	Re-evaluate applying the average score of 17 and 18
Gazipur	333323008	29 (C) 25 (C)	Same as before	No adjustment
Narayanganj	367063025	13 (B) 14 (B) 15 (A)	13 (A) 14 (A) 15 (A)	Re-evaluate applying the average score of 13, 14 and 15
Munshiganj	359565046	3 (C) 4(C) 5(C)	Same as before	No adjustment
Munshiganj	359243003	9 (A) 14 (A) 15(C) 16 (A) 17 (A) 19 (A)	9 (A) 14 (A) 15(B) 16 (B) 17 (B) 19 (B)	9-14 : No adjustment 15-19 : Re-evaluate applying average score
Munshiganj	359243007	10 (A) 12(B)	Same as before	No adjustment
Munshiganj	359244007	13 (B) 11(A)	13 (B) 11(B)	Re-evaluate applying the average score of 13 and 11
Munshiganj	359743009	37 (A) 35 (A)	Same as before	No adjustment
Manikganj	356823025	1 (A) 3 (B)	Same as before	No adjustment
Manikganj	356702004	25 (B) 21 (C) 22 (B)	25 (B) 21 (B) 22 (B)	25 : No adjustment 21,22 : Re-evaluate applying average score
Manikganj	356102002	36 (A) 37 (A) 38 (A) 39 (A)	Same as before	No adjustment
Manikganj	356102003	42 (C) 43 (B)	42 (B) 43 (B)	Re-evaluate applying the average score of 42 and 43
Manikganj	356104021	47 (C) 48 (C)	Same as before	No adjustment
Manikganj	356283025	59 (A) 50 (A)	Same as before	No adjustment
Manikganj	356223009	63 (A) 64 (B)	Same as before	No adjustment
Sherpur	389884053	7 (C) 6 (C)	Same as before	No adjustment
Gopalganj	345583008	19 (A) 20 (A)	Same as before	No adjustment
Gopalganj	345514046	28 (C) 29 (B)	28 (B) 29 (B)	Re-evaluate applying the average score of 28 and 29
Jamalpur	339292004	26 (A) 25 (A)	Same as before	No adjustment
Jamalpur	339292001	28 (A) 27 (A)	Same as before	No adjustment
Shariatpur	386695007	4 (C) 5 (C)	Same as before	No adjustment
Shariatpur	386654022	47 (C) 46 (C)	Same as before	No adjustment
Madaripur	354545030	2 (C) 3(C)	Same as before	No adjustment
Madaripur	unidentified	24 (C) 23(C)	Same as before	No adjustment
Madaripur	unidentified	26 (C) 25(C)	Same as before	No adjustment
Madaripur	unidentified	28 (C) 30(C) 31 (C) 29(C)	Same as before	No adjustment
Chittagong	415333024	92 (B) 93 (B)	Same as before	No adjustment
Chittagong	415333033	94 (A) 95 (B)	Same as before	No adjustment
Chandpur	413013002	2 (A) 3 ((A) 4 (A) 5 (A)	Same as before	No adjustment
Cox's Bazar	422663010	5 (A) 6 (B)	Same as before	No adjustment
Cox's Bazar	422943005	10 (C) 11 (C)	Same as before	No adjustment

Table 7.3-5 Bridges on the Same Route and Adjustment of their priorities (2/3)

District	Road ID	Bridges on the Same Route in the order from Arterial Road (Serial Numbers)		Adjustment
		( ) : Priority before Adjustment	( ) : Priority after Adjustment	
Cox's Bazar	422493004	17 (C) 18 (C)	Same as before	No adjustment
Rangamati	484872002	2 (C) 3 (C)	Same as before	No adjustment
Rangamati	484072003	6 (C) 7 (C) 8 (C)	Same as before	No adjustment
Rangamati	484583007	15 (C) 16 (B) 17 (C)	15 (C) 16 (C) 17 (C)	15, 16: Re-evaluate applying the average score of 15 and 16 17 : No adjustment
Bandarban	403142002	9 (A) 10 (A)	Same as before	No adjustment
Sylhet	691413003	9 (B) 10 (B)	Same as before	No adjustment
Sylhet	691204001	19 (B) 20 (B)	Same as before	No adjustment
Sylhet	691533004	25 (A) 24 (A)	Same as before	No adjustment
Sylhet	691943018	47 (A) 46 (A) 45 (A)	Same as before	No adjustment
Sunamganj	690892009	3 (A) 11 (A)	Same as before	No adjustment
Sunamganj	690332002	33 (B) 32 (B)	Same as before	No adjustment
Sunamganj	690502003	39 (A) 40 (A)	Same as before	No adjustment
Sunamganj	690922001	44 (A) 47 (B)	Same as before	No adjustment
Sunamganj	690182004	52 (A) 53 (A)	Same as before	No adjustment
Sunamganj	690922005/ 690924002	48 (A) 49 (A) 50 (B)	Same as before	No adjustment
Habiganj	636112002	19 (A) 20 (A)	Same as before	No adjustment
Bagerhat	201602001	29 (B) 30 (B)	Same as before	No adjustment
Bagerhat	201602003	39 (A) 41 (B) 42 (B) 43 (B)	Same as before	No adjustment
Bagerhat	201142004	53 (B) 51 (B)	Same as before	No adjustment
Bagerhat	201382002	59 (A) 60 (A)	Same as before	No adjustment
Bagerhat	201582004	67 (C) 66 (C) 65 (C)	Same as before	No adjustment
Bagerhat	201583008	69 (B) 70 (C) 68 (C)	Same as before	No adjustment
Bagerhat	201772004	75 (A) 74(A)	Same as before	No adjustment
Bagerhat	237073008	77 (B) 78 (B)	Same as before	No adjustment
Bagerhat	201772003	79 (A) 76 (B)	Same as before	No adjustment
Jhenaidah	244715089	13 (B) 12 (B)	Same as before	No adjustment
Magura	255953017	7 (A) 8 (C)	Same as before	No adjustment
Kushtia	250794046	4 (C) 2 (B)	4 (B) 2 (B)	Re-evaluate applying the average score of 4 and 2
Chuadanga	218073003	7 (C) 9 (C)	Same as before	No adjustment
Barisal	506012002	12 (B) 10 (C) 16 (C) 17 (C) 18 (C)	Same as before	No adjustment
Barisal	506942009	23 (B) 24 (B) 25 (B) 22 (B)	Same as before	No adjustment
Barisal	unidentified	42 (C) 43 (C) 44 (C)	Same as before	No adjustment
Barisal	506103014	59 (C) 58 (C)	Same as before	No adjustment
Barisal	506103016	70 (C) 71 (C)	Same as before	No adjustment
Barisal	506102001	100 (C) 97 (C) 92 (C) 93 (C) 94 (B) 99 (C) 103 (C)	100 (C) 97 (C) 92 (C) 93 (C) 94 (C) 99 (C) 103 (C)	100-94: Re-evaluate applying the average score 99, 103: No adjustment

Table 7.3-5 Bridges on the Same Route and Adjustment of their priorities (3/3)

District	Road ID	Bridges on the Same Route in the order from Arterial Road (Serial Numbers)		Adjustment
		( ) : Priority before Adjustment	( ) : Priority after Adjustment	
Barisal	506103018	104 (B) 105 (C)	Same as before	No adjustment
Barisal	506103028	106 (C) 102 (C) 101 (C)	Same as before	No adjustment
Barisal	506692002	111 (A) 110 (A)	Same as before	No adjustment
Barisal	506693014	113 (A) 112 (A)	Same as before	No adjustment
Pirojpur	579034034	17 (A) 13 (A)	Same as before	No adjustment
Jhalakathi	542732001	27 (B) 33 (C) 34 (C) 29 (B)	27 (B) 33 (C) 34 (C) 29 (C)	27 : No adjustment 33-29: Re-evaluate applying the average score
Jhalakathi	542733022	28 (C) 35 (B)	28 (C) 35 (C)	Re-evaluate applying the average score of 28 and 35
Barguna	504282005	3 (A) 2 (A) 1 (A)	Same as before	No adjustment
Barguna	504853011	25 (A) 26 (B)	Same as before	No adjustment
Gaibandha	132303104	26 (B) 27 (B)	Same as before	No adjustment
Nawabganj	170564017	30 (C) 31 (C)	Same as before	No adjustment
Sirajganj	188783003	5 (A) 6 (A)	Same as before	No adjustment
Sirajganj	188893003	17 (A) 18 (A)	Same as before	No adjustment
Sirajganj	188943074	21 (A) 28 (A)	Same as before	No adjustment
Pabna	176333005	16 (B) 17 (C)	Same as before	No adjustment
Bogra	110883006	16 (A) 15 (A) 13 (B)	Same as before	No adjustment
Bogra	110273082	50 (A) 51 (A)	Same as before	No adjustment
Joypurhat	138133001	16 (B) 17 (A)	16 (A) 17 (A)	Re-evaluate applying the average score of 16 and 17

Number of bridges, total length, total cost of each priority group are summarized in Table 7.3-6, 7.3-7 and 7.3-8 respectively

Table 7.3-6 Number of Bridges by Priority Group

		Bridge Priority			
		A	B	C	Total
Zone Priority	1	(1A) 147	(1B) 123	(1C) 46	316
	2	(2A) 79	(2B) 91	(2C) 85	255
	3	(3A) 69	(3B) 67	(3C) 111	247
	4	(4A) 85	(4B) 80	(4C) 115	280
	Total	**380**	**361**	**357**	**1,098**

Table 7.3-7 Total Length of Bridges by Priority Group (m)

		Bridge Priority			
		A	B	C	Total
Zone Priority	1	(1A) 7,585	(1B) 6,805	(1C) 3,060	17,450
	2	(2A) 4,280	(2B) 5,080	(2C) 5,455	14,815
	3	(3A) 3,755	(3B) 4,240	(3C) 4,140	12,135
	4	(4A) 3,845	(4B) 4,655	(4C) 5,815	14,315
	Total	**19,465**	**20,780**	**18,470**	**58,715**

Table 7.3-8 Total Cost of Bridges by Priority Group (crore taka)

		Bridge Priority			
		A	B	C	Total
Zone Priority	1	(1A) 302.3	(1B) 269.5	(1C) 120.1	691.9
	2	(2A) 165.0	(2B) 195.9	(2C) 208.4	569.3
	3	(3A) 145.0	(3B) 162.8	(3C) 165.8	473.6
	4	(4A) 150.6	(4B) 176.6	(4C) 223.9	551.1
	Total	**762.9**	**804.8**	**718.2**	**2,285.9**

Table 7.3-9 shows the number of bridges by range of length and by priority group.

Table 7.3-9 Number of Bridges by Range of Length

Priority Group	Bridge Length							
	10-30m (1-span)	35-75m (3-span)	80-125m (5-span)	125-150m (6-span)	155-200m (7/8-span)	205-250m (9/10-span)	255-300m (11/12-span)	Total
1A	46	77	24	-	-	-	-	147
1B	41	55	18	8	1	-	-	123
1C	11	19	9	4	3	-	-	46
1A+1B+1C	98	151	51	12	4	-	-	316
2A	21	44	14	-	-	-	-	79
2B	30	41	16	2	2	-	-	91
2C	27	31	18	5	4	-	-	85
2A+2B+2C	78	116	48	7	6	-	-	255
3A	14	42	13	-	-	-	-	69
3B	19	20	25	3	-	-	-	67
3C	74	22	10	3	1	1	-	111
3A+3B+3C	107	84	48	6	1	1	-	247
4A	29	49	7	-	-	-	-	85
4B	22	39	18	-	-	1	-	80
4C	53	41	16	-	4	-	1	115
4A+4B+4C	104	129	41	-	4	1	1	280
1A+2A+3A+4A	110	212	58	-	-	-	-	380
1B+2B+3B+4B	112	155	77	13	3	1	-	361
1C+2C+3C+3C	165	113	53	12	12	1	1	357
Grand Total	387	480	188	25	15	2	1	1098

7.4 Cost Estimate

7.4.1 Span Arrangement

Principles of span arrangement is as follows:

1) For standardization of superstructure, applicable spans shall be 10m, 15m, 20m, 25m and 30m (see Table 7.4-1). All bridges are composed of these spans.

2) 2-span and 4-span shall not be applied in order not to locate a pier at the center of the river. In case of 6 or more-span, however, even number of spans is allowed.

3) Application of 10m-span and 30m-span is limited to special cases because the former is uneconomical and the latter is difficult to be erected due to heavier weight of a member.

4) Number of spans shall be minimum for the economical reason.

In accordance with the above principles, the span arrangement is made as shown in Table 7.4-2.

Table 7.4-1 Standard Spans

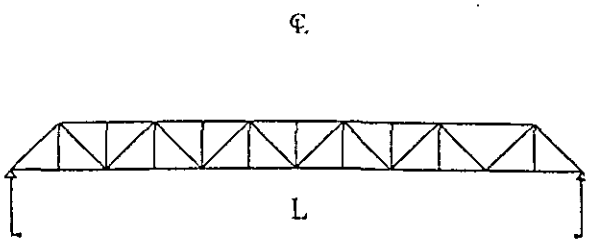
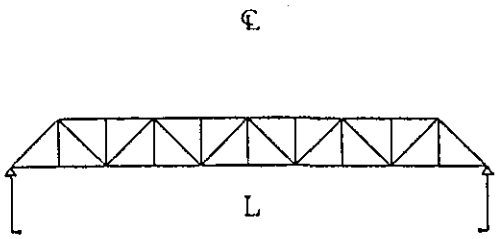
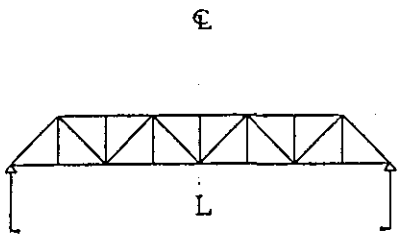
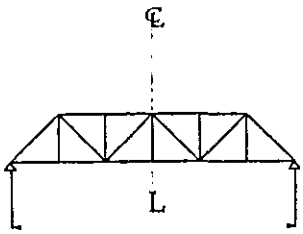
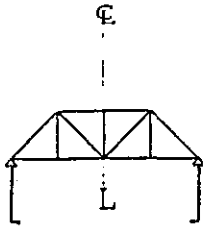
Span Length	Side View
L = 30 m	 L = 12 x 2.438m = 29.256m
L = 25 m	 L = 10 x 2.438m = 24.380m
L = 20 m	 L = 8 x 2.438m = 19.504m
L = 15 m	 L = 6 x 2.438m = 14.628m
L = 10 m	 L = 4 x 2.438m = 9.752m

Table 7.4-2 Span Arrangement

Range of Bridge Length	Bridge Length	Span Arrangement
10 – 30m (1-span)	10m	10m
	15m	15m
	20m	20m
	25m	25m
	30m	30m
35 – 75m (3-span)	35m	10m+15m+10m
	40m	10m+20m+10m
	45m	15m+15m+15m
	50m	15m+20m+15m
	55m	15m+25m+15m
	60m	20m+20m+20m
	65m	20m+25m+20m
	70m	25m+25m+20m
	75m	25m+25m+25m
80 – 125m (5-span)	80m	15m+15m+20m+15m+15m
	85m	15m+15m+25m+15m+15m
	90m	15m+20m+20m+20m+15m
	95m	20m+20m+20m+20m+15m
	100m	20m+20m+20m+20m+20m
	105m	20m+20m+25m+20m+20m
	110m	20m+25m+25m+20m+20m
	115m	20m+25m+25m+25m+20m
	120m	25m+25m+25m+25m+20m
	125m	25m+25m+25m+25m+25m
130m or more - 6 or more-span with combination of 20m and 25m-spans - minimum number of spans (example) 270m bridge : 1) 10x25m+1x20m (11-span) : applied 2) 6x25m+6x20m(12-span) : not applied		

7.4.2 Unit Cost

Standard type of abutment, pier and superstructure are shown in **Figure 7.4-1, 7.4-2 and 7.4-3** respectively.

Unit costs are shown in Table 7.4-3.

Table 7.4-3 Unit Costs

Item		Unit	Cost (Tk.)	Remarks	Breakdown
Abutment	4.5m or less in height	2 numbers	2,630,420	Including 20m approach road on both sides and riverbank protection	Table 7.4-4
	4.5 to 6.5m in height	2 numbers	2,950,075		Table 7.4-5
	6.5 to 9.0m in height	2 numbers	3,405,470		Table 7.4-6
Additional approach road		meter	4,644	Where required	Table 7.4-7
Pier	6.0m or less in height	1 number	929,075		Table 7.4-8
	6.0 to 10.0m in height	1 number	1,388,460		Table 7.4-9
	10.0 to 15.0m in height	1 number	1,903,085		Table 7.4-10
Superstructure		meter	299,300	Including custom duty and erection	Table 7.4-11

The breakdown of each unit cost is shown in Tables 7.4-4 through 7.4-11.

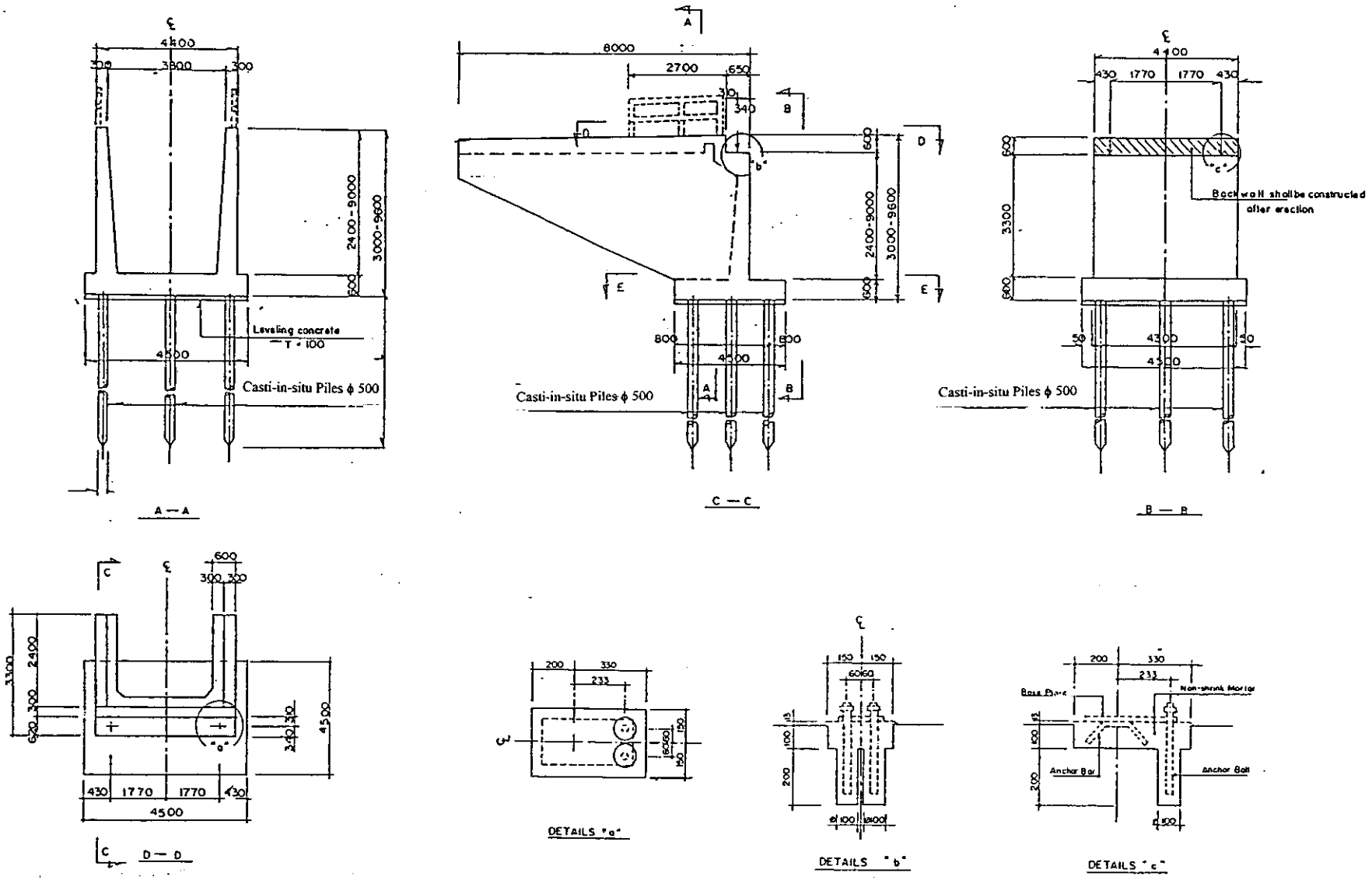


Figure 7.4-1 Standard Abutment

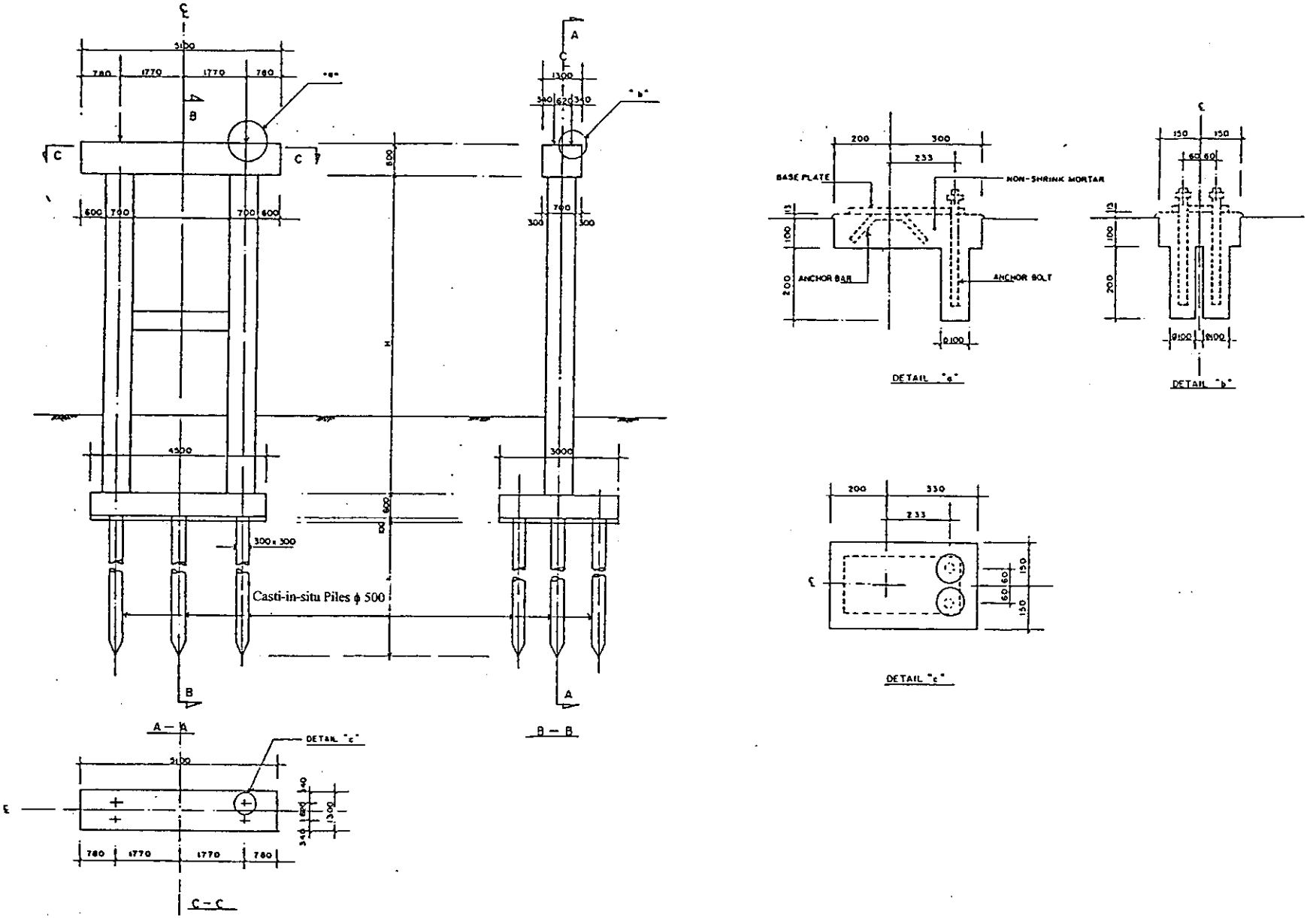


Figure 7.4-2 Standard Pier

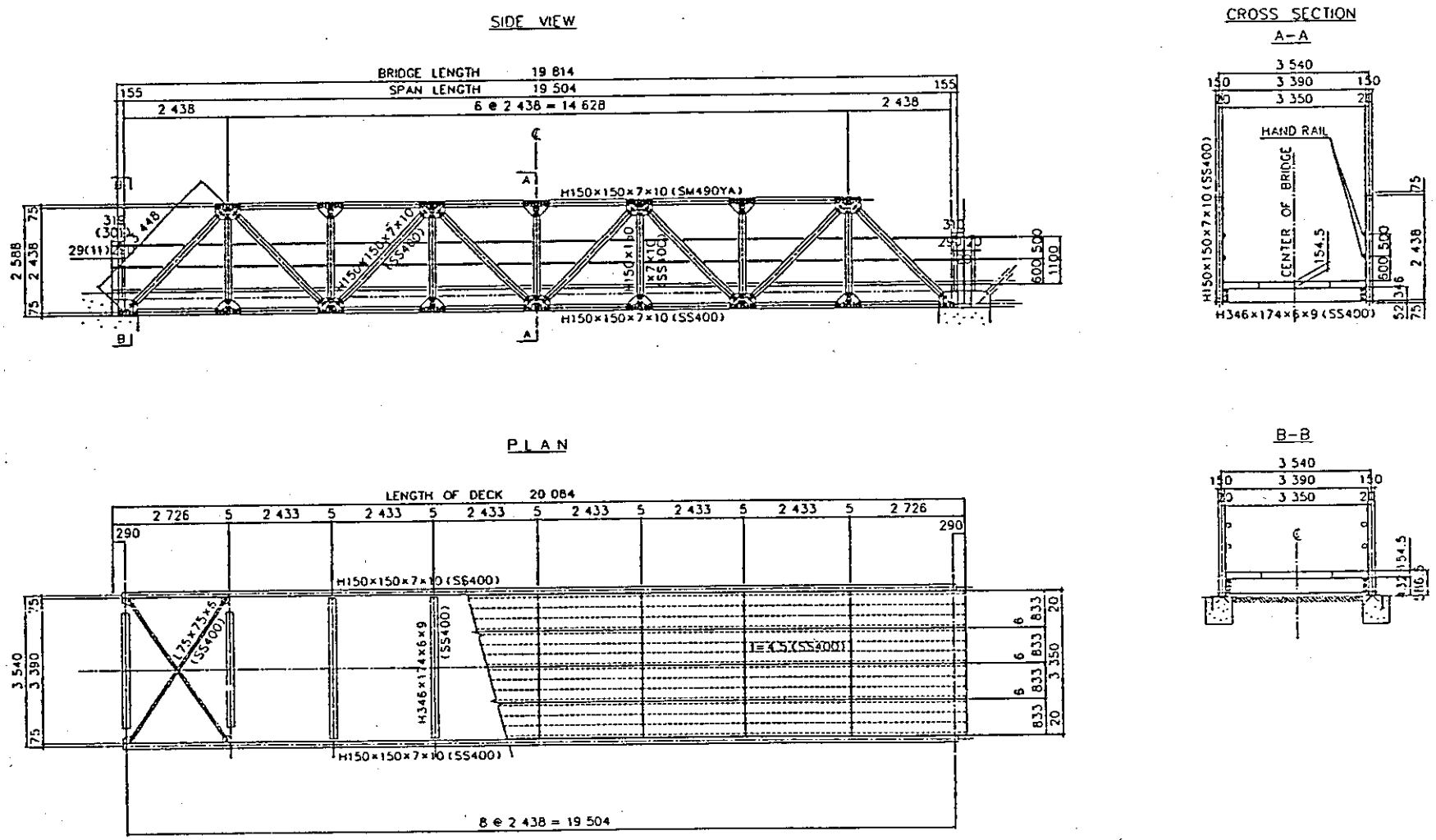


Figure 7.4-3 Standard Superstructure (20m Span)

Table 7.4-4 Cost of Abutment (4.5m or less in height) including Approach Road (20m on both sides) and Riverbank Protection (for 2 numbers)

Serial No.	Description of items	Unit	Quantity	Rate	Total amount Tk.
1	Diversion Bridge	LS			50000.00
2	Excavation	Cum	800	25.47	20376.00
3	Back filling with selected earth (F.M. not less than 0.80)	Cum	270	290.00	78300.00
4	Boring (Pile dia 500 ϕ 20m long each) 12 Nos pile for each abutment	m	480	219.20	105216.00
5	Single layer brick flat soling	Sqm	44	115.92	5100.48
6	Cement concrete work in foundation Grade-15	Cum	3.63	2874.67	10435.05
7	Reinforced cement concrete for pile (Grade-20)	Cum	102	5149.66	525265.32
8	Reinforced cement concrete for abutment with pile cap, Grade-20	Cum	80	5149.66	411972.80
9	M.S. Deformed bar (Grade 40)	kg	30000	26.45	793500.00
10	Static load test of cast in situ pile	No	1	35000.00	35000.00
11	Approach filling (Each end 20m Length)	Cum	2450	41.94	102753.00
12	Improved sub-grade (150mm thickness)	Cum	24	262.00	6288.00
13	Single layer flat soling	Sqm	140	115.92	16228.80
14	Herring bone	Sqm	140	196.84	27557.60
15	Brick on end edging	m	80	40.00	3200.00
16	Turfing	Sqm	360	7.64	2750.40
17	Nosing	kg	100	42.79	4279.00
18	Bank protection work	LS			50000.00
				Sub total =	**2248222.45**
	Contractor's Profit	10% of Sub total			224822.25
	Vat	7% of Sub total			157375.57
				Grant Total =	**2630420.27**

Table 7.4-5 Cost of Abutment (4.5m to 6.5m in height) including Approach Road (20m on both sides) and Riverbank Protection (for 2 numbers)

Serial No.	Description of items	Unit	Quantity	Rate	Total amount Tk.
1	Diversion Bridge	LS			50000.00
2	Excavation	Cum	924	25.47	23534.28
3	Back filling with selected earth (F.M. not less than 0.80)	Cum	300	290.00	87000.00
4	Boring(Pile dia 500ϕ) 20m long (Each) 14 Nos pile for each abutment	m	560	219.20	122752.00
5	Single layer brick flat soling	Sqm	50	115.92	5796.00
6	Cement concrete work in foundation Grade-15	Cum	4	2874.67	11498.68
7	Reinforced cement concrete for pile (Grade -20)	Cum	120	5149.66	617959.20
8	Reinforced cement concrete for abutment with pile cap, Grade-20	Cum	90	5149.66	463469.40
9	M.S. Deformed bar (Grade 40)	kg	33700	26.45	891365.00
10	Static load test of cast in situ pile	No	1	35000.00	35000.00
11	Approach filling (Each end 20m Length)	Cum	2450	41.94	102753.00
12	Improved subgrade (150mm thickness)	Cum	24	262.00	6288.00
13	Single layer flat soling	Sqm	140	115.92	16228.80
14	Herring bone	Sqm	140	196.84	27557.60
15	Brick on end edging	m	80	40.00	3200.00
16	Turfing	Sqm	360	7.64	2750.40
17	Nosing	kg	100	42.79	4279.00
18	Bank protection work	LS			50000.00
				SubTotal=	**2521431.36**
	Contractor's Profit	10% of Sub total			252143.14
	Vat	7% of Sub total			176500.20
				Grant Total=	**2950074.69**

Table 7.4-6 Cost of Abutment (6.5m to 9.0m in height) including Approach Road (20m on both sides) and Riverbank Protection (for 2 numbers)

Serial No.	Description of items	Unit	Quantity	Rate	Total amount Tk.
1	Diversion Bridge	LS			50000.00
2	Excavation	Cum	1008	25.47	25673.76
3	Back filling with selected earth (F.M. not less than 0.80)	Cum	350	290.00	101500.00
4	Boring(Pile dia 500ϕ) 20m long (Each) 18 Nos pile for each abutment	m	720	219.20	157824.00
5	Single layer brick flat soling	Sqm	55	115.92	6375.60
6	Cement concrete work in foundation Grade-15	Cum	5.2	2874.67	14948.28
7	Reinforced cement concrete for pile (Grade -20)	Cum	155	5149.66	798197.30
8	Reinforced cement concrete for abutment with pile cap ,Grade-20	Cum	110	5149.66	566462.60
9	M.S. Deformed bar (Grade 40)	kg	35600	26.45	941620.00
10	Static load test of cast in situ pile	No	1	35000.00	35000.00
11	Approach filling (Each end 20m Length)	Cum	2450	41.94	102753.00
12	Improved subgrade (150mm thickness)	Cum	24	262.00	6288.00
13	Single layer flat soling	Sqm	140	115.92	16228.80
14	Herring bone	Sqm	140	196.84	27557.60
15	Brick on end edging	m	80	40.00	3200.00
16	Turfing	Sqm	360	7.64	2750.40
17	Nosing	kg	100	42.79	4279.00
18	Bank protection work	LS			50000.00
				SubTotal=	**2910658.34**
	Contractor's Profit	10% of Sub total			291065.83
	Vat	7% of Sub total			203746.08
				Grant Total=	**3405470.26**

Table 7.4-7 Cost of Approach Road per meter (Additional Length where required)

Serial No.	Description of items	Unit	Quantity	Rate	Total amount Tk.
1	Approach filling (For 1.0 m Length)	Cum	61.25	41.94	2568.83
2	Improved subgrade (150mm thickness)	Cum	0.6	262.00	157.20
3	Single layer flat soling	Sqm	3.5	115.92	405.72
4	Herring bone	Sqm	3.5	196.84	688.94
5	Brick on end edging	m	2	40.00	80.00
6	Turfing	Sqm	9	7.64	68.76
	Total cost for 1.0 m			Sub total =	3969.45
	Contractor's profit			10% of sub total	396.94
	Vat			7% of sub total	277.86
				Grant total =	**4644.25**

Table 7.4-8 Cost of Pier (6m or less in height)

Serial No.	Description of items	Unit	Quantity	Rate	Total amount Tk.
1	Excavation	Cum	250	25.47	6367.50
2	Boring(Pile dia 500 ϕ 20m long each) 9 Nos pile for each pier	m	180	219.20	39456.00
3	Single layer brick flat soling	Sqm	18.5	115.92	2144.52
4	Cement concrete work in foundation Grade-15	Cum	1.5	2874.67	4312.00
5	Reinforced cement concrete for pile (Grade -20)	Cum	31	5149.66	159639.46
6	Reinforced cement concrete pile cap,Tie, pier & pier cap (Grade -20)	Cum	25	5149.66	128741.50
7	M.S. Deformed bar (Grade 40)	kg	10000	26.45	264500.00
8	Static load test of cast in situ pile	No	1	35000.00	35000.00
9	Artificial island	LS		72920.00	72920.00
10	Steel casing	m	54	1500.00	81000.00
				Sub Total =	**794080.99**
	Contractor's Profit	10% of Sub total			79408.10
	Vat	7% of Sub total			55585.67
				Grant Total =	929074.75

Table 7.4-9 Cost of Pier (6-10m in height)

Serial No.	Description of items	Unit	Quantity	Rate	Total amount Tk.
1	Excavation	Cum	250	25.47	6367.50
2	Boring(Pile dia 500 ϕ 20m long each) 12 Nos pile for each pier	m	240	219.20	52608.00
3	Single layer brick flat soling	Sqm	22	115.92	2550.24
4	Cement concrete work in foundation Grade-15	Cum	2	2874.67	5749.34
5	Reinforced cement concrete for pile (Grade -20)	Cum	51	5149.66	262632.66
6	Reinforced cement concrete pile cap, Tie, pier & pier cap (Grade -20)	Cum	36	5149.66	185387.76
7	M.S. Deformed bar (Grade 40)	kg	16000	26.45	423200.00
8	Static load test of cast in situ pile	No	1	35000	35000.00
9	Artificial island	LS		105220	105220.00
10	Steel casing	m	72	1500	108000.00
				Sub Total =	**1186715.50**
	Contractor's Profit	10% of Sub total			118671.55
	Vat	7% of Sub total			83070.09
				Grant Total =	**1388460.00**

Table 7.4-10 Cost of Pier (10.0m to 15.0m in height)

Serial No.	Description of items	Unit	Quantity	Rate	Total amount Tk.
1	Excavation	Cum	0	25.47	0.00
2	Boring (Pile dia 500ϕ) 20m long (Each) 18 Nos pile for each pier	m	360	219.20	78912.00
3	Single layer brick flat soling	Sqm	0	115.92	0.00
4	Cement concrete work in foundation Grade-15	Cum	0	2874.67	0.00
5	Reinforced cement concrete for pile (Grade -20)	Cum	85	5149.66	437721.10
6	Reinforced cement concrete pile cap,Tie, pier & pier cap (Grade -20)	Cum	50	5149.66	257483.00
7	M.S. Deformed bar (Grade 40)	kg	20802.75	26.45	550232.74
8	Static load test of cast in situ pile	No	1	35000.00	35000.00
9	Artificial island	LS		105220.00	105220.00
10	Steel casing	m	108	1500.00	162000.00
				Sub Total=	**1626568.84**
	Contractor's Profit	10% of Sub total			162656.88
	Vat	7% of Sub total			113859.82
				Grant Total=	**1903085.54**

Table 7.4-11 Cost of Superstructure including Erection

Serial No.	Description of items	Unit	Total amount Tk.
1	Material cost	R. M.	170000
2	Carrying, Custom duty & Vat	R. M.	123000
		Sub-Total =	**293000**
3	Erection cost including transport	R. M.	**6300**
		Total =	**299300**

7.4.3 Cost Estimate

The cost of each project bridge is estimated as shown in Appendix D.
Total cost by priority group is shown in Table 7.3-8.

7.5 Implementation Schedule

An implementation schedule is prepared taking into consideration the following:

- Bridges in each priority group form a package. Accordingly, the project is composed of 12 packages.
- Since the possible investment amount for the project is estimated to be 170 to 200 crore taka per year (see Chapter 5), each package is scheduled such that the annual fund requirement is within the possible investment amount..

Table 7.5-1 shows the proposed implementation schedule.

Table 7.5-1 Implementation Schedule

Priority Group	No. of Bridges	Total Length (m)	Total Cost (crore)	Implementation Schedule												
				2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
1A	147	7,585	302.3	170.0	132.3											
1B	123	6,805	269.5				120.0	149.5								
1C	46	3,060	120.1							80.1	40.0					
2A	79	4,280	165.0		55.0	110.0										
2B	91	5,080	195.9						98.0	97.9						
2C	85	5,455	208.4									52.1	104.2	52.1		
3A	69	3,755	145.0			72.5	72.5									
3B	67	4,240	162.8								108.5	54.3				
3C	111	4,140	165.8										41.5	82.8	41.5	
4A	85	3,845	150.6					50.2	100.4							
4B	80	4,655	176.6								44.2	88.2	44.2			
4C	115	5,815	223.9											56.0	111.9	56.0
Total	**1,098**	**58,715**	**2,285.9**													
Annual Fund Requirement				**170.0**	**187.3**	**182.5**	**192.5**	**199.7**	**198.4**	**178.0**	**192.7**	**194.6**	**189.9**	**190.9**	**153.4**	**56.0**

CHAPTER 8

BRIDGES IN PRIORITY ZONES

8.0 BRIDGES IN PRIORITY ZONES

Zones have been prioritized and divided into 4 (four) groups i.e. priority 1, 2, 3 and 4 consisting of 339, 270, 257 and 286 bridges respectively.

The study bridges in Zone Priority-1 (Zone numbers 1, 4, 6 and 13) consisting of 18 districts are selected for bridge site survey to collect the detailed data of each bridge.

8.1 Bridge Site Survey

8.1.1 Survey Method

The bridge site survey was conducted by five teams. Each team was composed of the following four members:

- Bridge Engineer (Team Leader)
- Highway Engineer
- Junior Engineer
- Socio-economic Researcher

The works in the bridge site survey are composed of the following three:

1) Data collection

The following data are collected:
- Condition of the existing bridge
- River condition
- Approach road condition
- Information of influence area
- Expected traffic volume including pedestrians
- Bridge site condition
- Information on environmental issues
- Proposed bridge

Survey methods applied are as follows:

- Visual observations
- Measurement of length, width and height by measuring tape and distance measuring device (LYTE SPEED 500, measuring range 500-999m, accuracy ± 1.0m)
- Hearing from local residents and engineers from LGED local offices

The measured/observed/collected data are entered in the BRIDGE SITE SURVEY SHEET shown in Table 8.1-1.

2) Sketch of the project site showing the river/khal, approach road, location of the proposed bridge, important features in the vicinity of the proposed bridge, proposed realignment of approach road if any, etc.

3) Taking bridge site photographs from four directions i.e. from left bank, from right bank, from upstream and from down stream.

The site survey was conducted during the full monsoon period (from July to August 2002) when the whole country was under flood situation. The survey teams had difficulty to reach the project sites many of which were not accessible by car, but in return the valuable data during the flood season could be obtained.

8.1.2 Results of Survey

The bridge site survey data are presented in Appendix E in Volume IV. The bridge site photographs and sketches are presented in Volume VI.

TABLE 8.1-1 BRIDGE SITE SURVEY SHEET

Survey Date (2002), Surveyor ( )

Identification	District ( ), Thana ( ), Serial Number ( ), Bridge Code ( )
	Bridge Name ( )
	Road ID ( ), Road Class (FRA / FRB / R1 / R2 / R3), Chainage ( )
Condition of Existing Bridge	Existing or not (Existing / Not Existing)
	Bridge Length (m)
	Bridge Width (m), Carriageway Width (m)
	Superstructure Type (RC / Steel Girder / Steel Truss / Bailey / Timber / Bamboo / Other)
	Substructure Type : Abutment (RC Reversed T Type / RC Pile-bent / Masonry / Wooden / Other)
	Pier (RC Column / RC Pile-bent / Masonry / Wooden / Other)
	Usage of Bridge (All Vehicles / Light Vehicles Only / Pedestrians Only)
	Condition (Fair / Weak / Damaged / Collapsed)
	Present Navigation Clearance Height(m)
River Condition	Bank to Bank Width (m)
	Highest Flood Water Width (m), Highest Flood Water Depth (m)
	Normal Flood Water Width (m), Normal Flood Water Depth (m)
	Dry Season Water Width (m), Dry Season Water Depth (m)
	Tidal Fluctuation (No / Yes, m)
	Water Velocity (Fast / Medium / Slow)
	Angle of Bridge to Direction of Stream (degree)
	Ferry Service(Yes / No)
	Required Navigation Clearance Height (m), Type of River Traffic ( )
	Condition of Bank (Sound / Eroded / Heavily Eroded), Condition of Riverbed (Sound / Scoured / Heavily Scored)
Approach Road	Total Road Width (m), Carriageway Width (m)
	Embankment Height (m)
	Surface Type (CC / BC / WBM / HBB / BFS / Earthen / Other), Surface Condition (Good / Fair / Bad / Very Bad)
	Whether there is alternative route or not (Yes / No), If yes, detour length (km)
Influence Area	Population (,000)
	Main Industry (Agriculture / Fishery / Forestry / Manufacturing / Commercial / Other)
	Major Agricultural Products (Rice / Wheat / Jute / Fruits / Vegetables / Sugarcane/ Other)
	No. of Public Facilities (schools, Clinics, Bazaars, Mosques, Gov't Offices, Others)
Traffic Volume	Passenger Car ( ), Pick-up/Truck ( ), Bus ( ), Motorcycle ( )
	Rickshaw ( ), Autorickshaw ( ), Bullock Cart( ), Pedestrian ( )
Bridge Site Condition	Landuse (Farm / Forest / Residence / Meadow / Swamp / Waste Land / Other)
	Topography (Flat / Swampy / Hilly)
	Necessity of Realignment of Approach Road (Yes / No) Note: If yes, show it in the bridge site sketch.
Environmental Issue	Necessary Land to be Additionally Acquired (No / Yes, approximately sq.meters)
	Number of Houses to be Relocated ( )
	Necessity of Removal of Obstruction Other Than Houses ( )
Proposed Bridge	Bridge Length (m), Span Arrangement ( )
	Abutment Height(m), Pier Height(m)
Remarks	

8.2 Implementation Plan

8.2.1 List of Project Bridges

The list of the project bridges by priority group (1A, 1B and 1C) are shown in Table 8.2-1.

TABLE 8.2-1 LIST OF BRIDGES BY PRIORITY GROUP (1/11)
PRIORITY 1A

District	Sl. No.	Bridge Code	Upazila	Name/Location	Chainage	Bridge Length (m)	Cost (Million Tk.)
Dhaka	2	01-01-02	Karanigonj	Bridge on Ghoshbari - Golam Bazar Dighirpar Road at Shovada UP.	1+500	30	12.07
	5	01-02-01	Nawabgonj	Bridge on Solia - Patiljap Bangla Bazar Road.	4+200	30	11.93
	10	01-02-06	Nawabgonj	Bridge on Shikaripara - Shangkardia Road over Isamoti River.	2+100	80	32.54
	11	01-02-07	Nawabgonj	Bridge on Bakter Nagar - Baruakhali Road over Isamoti River.	0+000	60	23.96
	15	01-03-01	Uttara	Bridge on Teromouk - Godaraghat Road.	0+800	100	40.76
	16	01-03-02	Uttara	Bridge over Chinoti Khal at Uttar Khan UP.	0+300	60	26.01
	18	01-04-02	Dhohar	Bridge over PS - Lata Khula Road over Shahbkhali River.	0+250	75	28.31
	19	01-04-03	Dhohar	Kartikpur - Baburdanga Road over Isamoti River at Ekrasi Bazar.	3+610	60	23.82
	23	01-04-07	Dhohar	Bridge on Kartikpur - Moinitghat Road over Narisha Khal near Kazim Pescar House.	0+230	40	16.74
	24	01-04-08	Dhohar	Bridge on Jaypara RHD to Bilashpur Ferryghat Road.	0+650	50	20.84
	25	01-05-01	Savar	Bridge on Nikrail - Chakulia Road at Bonogaon UP.	6+600	30	13.00
	28	01-06-03	Dhamrai	Bridge on Mohishasi - Kusura Sreepur Road over Banshi River.	1+660	35	15.22
	31	01-06-N1	Dhamrai	Bridge on Joypura RHD to Jalsing over Gaji Khali Khal at Jalsing.	2+500	50	20.65
Narayanganj	2	03-01-N1	Sadar	Bridge on Simrail Paper Mill Road over DND canal at Simrail.	0+000	40	17.38
	3	03-01-N2	Sadar	Bridge on DND Siddhirganj Road via Monowara Jute Mill over Mojumder Canal.	1+100	30	11.61
	12	03-03-01	Bandar	Bridge on Madanganj RHD - Thana Head Quarter Road.	0+400	30	11.61
	13	03-03-02	Bandar	Bridge on Upazila H/Q - Sabdi Bazar Road on Nishong Khal.	4+275	60	23.37
	14	03-03-03	Bandar	Bridge on Upazila H/Q - Sabdi Bazar Road over Norpadi Khal.	4+580	20	8.62
	15	03-03-04	Bandar	Bridge on Upazila H/Q - Sabdi Bazar Road at near Sabdi Bazar.	5+470	30	11.61
	16	03-04-01	Rupgonj	Bridge on Majina - Nawra Road on Nimartak Khal.	3+400	30	11.93
Munshiganj	6	04-01-N5	Sadar	Bridge over Rajat Rekha Khal on Anandapur to Noyadha Road.	3+000	50	20.37
	8	04-02-02	Gazaria	Bridge over Joistotala Khal on Bhaverchar BRAC Office to Kalipura Road.	3+500	30	11.61
	9	04-02-03	Gazaria	Bridge on Kazipara to Ashrafdi Road over Nozipur Khal.	3+650	25	10.11
	10	04-02-N1	Gazaria	Bridge on Bhatirchar to Baghaikandi Road over Bhatirchar Khal.	8+000	45	17.96
	14	04-02-N5	Gazaria	Bridge on Kapara to Ashrafdi Road over Nozipur Khal at Nozipur.	3+450	10	5.62
	31	04-05-02	Shirajdhikhan	Bridge on Nimtala Bus Stand to Shakhernagar GC Road over Isamoti river at Shakhernagar GC.	7+970	80	32.75
	35	04-05-N1	Shirajdhikhan	Bridge on Kuchiamura to Sirajdikhan Road over Patharghata Khal.	1+200	20	8.62
	36	04-05-N2	Shirajdhikhan	Bridge on Sirajdikhan to Shaperchar Road over Kamalpur Khal.	0+000	30	11.93
	37	04-05-N3	Shirajdhikhan	Bridge on Kuchiamura to Sirajdikhan Road over Ghoramara Khal.	0+900	25	10.11
	38	04-06-01	Lohajong	Bridge on Kalma to Vatnisher Road over Vatnisher Khal.	3+300	35	15.88

TABLE 8.2-1 LIST OF BRIDGES BY PRIORITY GROUP (2/11) PRIORITY 1A

District	Sl. No.	Bridge Code	Upazila	Name/Location	Chainage	Bridge Length (m)	Cost (Million Tk.)
Manikganj	1	05-01-01	Singhair	Bridge on Dalla FRA - Chandhar Bazar Road.	0+600	50	20.37
	5	05-01-05	Singhair	Bridge on Maniknagar GC - Sirajpur GC Road.	2+400	60	23.37
	26	05-03-06	Saturia	Bridge on Kakdhapara - Goarpara Road on old Dhaleshwari River.	4+200	70	26.36
	28	05-03-N1	Saturia	Bridge on Dulla RHD - Mokdimpara Guccagram Road.	0+950	30	11.93
	36	05-04-04	Doulatpur	Bridge on Daulatpur - Bachamara Road at Jointa.	2+650	50	19.45
	37	05-04-05	Doulatpur	Bridge on Daulatpur - Bachamara Road at Jointa.	3+089	30	11.61
	38	05-04-06	Doulatpur	Bridge on Daulatpur - Bachamara Road at Bonna.	3+352	50	19.45
	39	05-04-07	Doulatpur	Bridge on Daulatpur - Bachamara Road at Bonna.	3+913	40	16.46
	50	05-05-01	Harirampur	Bridge on Intajpur - Basta Road.	3+750	50	20.37
	55	05-05-N2	Harirampur	Bridge on Andharmanik to Nayarhat Road near Nayarhat GC over Kokorhati Khal.	7+780	30	11.61
	58	05-05-N5	Harirampur	Bridge on Bhadiakhola - Machain Bazar Road over Jogotbar Khal.	0+920	30	11.61
	59	05-05-N6	Harirampur	Bridge on Basta FRB - Intajganj Road.	3+250	25	10.11
	61	05-06-02	Gheor	Bridge on Baratia - Uthuli Road over Goaljan Khal.	2+370	30	11.61
	62	05-06-N1	Gheor	Bridge on Gheor - Jabra Road on Jabra Khal.	7+882	30	11.93
	63	05-06-N2	Gheor	Bridge on Baniajuri - Kaltahat Road over Gangdubi River.	4+580	50	20.37
	65	05-06-N4	Gheor	Bridge on Gheor - Tille via Singjura Bazar Road over Kalganga River.	4+910	80	32.45
	67	05-06-N6	Gheor	Bridge on Pecherkanda Bazar - Singiuri/Charbinapara Road over old Dhaleshari River.	0+050	70	26.68
Rajbari	8	11-02-02	Baliakandi	Bridge on Khalkula - Magchmi Ferryghat Road over Chandana River.	3+250	50	20.37
	10	11-02-N1	Baliakandi	Bridge on Thakur Nowapara to Rajdharpur Road over Chandana river at Sonapur.	0+830	55	22.19
	12	11-03-01	Pangsha	Bridge on Machpara (Gopalpur RHD) to Bonogram Hat Road over Sirajpur Haor near Kulimohar High School.	5+520	125	45.60
Gopalganj	9	12-02-N1	Kasiani	Bridge on Bhatiapara to Tagarbandh Road over Barasia River near Bhatiapara GC.	0+000	55	22.37
	10	12-02-N2	Kasiani	Bridge on Kumaria to Dighorghati Road near Kumaria Bazar over Kumar River.	0+000	50	21.16
	12	12-03-02	Muksadpur	Bridge on Kotrakandi to Jolirpar Road at West Lokondor Bazar.	2+360	50	20.69
	13	12-03-03	Muksadpur	Bridge on Bhatra to Sreepur Takerhat Road near Sreepur Bazar at bazar Asrayan Prokolpa.	2+830	55	21.87
	16	12-03-06	Muksadpur	Bridge on Bonogram to Bamondanga Road over Krisnapur Khal.	7+900	40	17.38
	19	12-03-N1	Muksadpur	Bridge on Khanderpara to Baliakandi Road near Khandarpara GC.	0+000	40	17.70
	20	12-03-N2	Muksadpur	Bridge on Khanderpara to Baliakandi Road over Tangrokota to Ujani Khal at Khorot Village.	2+050	50	21.16
	25	12-04-N1	Tongipara	Bridge on Thanaparishod to Malikermath Road ove Sreeramkandi Khal.	7+550	20	8.62
Faridpur	6	16-01-N2	Sadar	Bridge on Char Komlapur Bridge to Bakunda GC Road over Branch Canal of Kumar River near House of Mr Sadek.	3+050	25	10.11
	29	16-06-01	Bangha	Bridge on Kala Mredha GC to Dolkhundi Road over Kala Mredha Khal.	0+000	25	10.11
	32	16-07-02	Sadarpur	Bridge on Krisnapur to Charvadrason Thana Border Road over Krisnapur Khal.	0+000	25	10.85
	33	16-07-N1	Sadarpur	Bridge on Baburchar to Chandrapara Road over Khalasidangi Khal.	1+950	20	8.94

TABLE 8.2-1 LIST OF BRIDGES BY PRIORITY GROUP (3/11) PRIORITY 1A

District	Sl. No.	Bridge Code	Upazila	Name/Location	Chainage	Bridge Length (m)	Cost (Million Tk.)
Comilla	9	19-02-09	Laksham	Bridge on Monoharganj to Santir Bazar Road.	0+000	50	20.37
	21	19-03-12	Dautkandi	Bridge on Zahanpur Road over Gomoti River.	3+140	75	28.17
	28	19-04-05	Brahmanpara	Bridge on Barani RHD to Madhabpur Bazar Road over Bongshibabur Khal.	1+585	30	11.84
	29	19-04-06	Brahmanpara	Bridge on Dhanadoul RHD to Sener Bazar Road over Gongur River.	4+399	30	11.93
	33	19-05-03	Muradnagar	Bridge on Noagaon to Pachkitta Road over Harpakhna Khal.	3+122	35	16.80
	36	19-05-06	Muradnagar	Bridge on Chapitala to Moheshpur Road over Buri River.	3+900	30	12.38
	41	19-07-02	Nangalkot	Bridge over Dakatia River on East Bampara to Janglepur Road.	5+100	110	41.11
	42	19-08-01	Burichong	Bridge on Burichong to Kabila Road over Gomoti River.	0+000	120	44.42
	50	19-10-02	Homna	Bridge on Dulalpur to Ram Krishnopur Bazar Road over Titas River.	0+000	110	41.25
B-Baria	27	20-05-01	Nabinagar	Bridge on Mohalla Launch Ghat to Mohesh Road over Chander Khal.	2+363	60	23.68
	31	20-05-05	Nabinagar	Bridge on Bottali to Bitghar Road over Radhanagar Khal.	3+660	75	28.17
Chandpur	2	21-01-N1	Sadar	Bridge on Kanudasdi to Bardia Road.	0+520	20	8.94
	3	21-01-N2	Sadar	Bridge on Kanudasdi to Bardia Road.	1+670	30	12.02
	4	21-01-N3	Sadar	Bridge on Kanudasdi to Bardia Road.	2+591	30	11.61
	5	21-01-N4	Sadar	Bridge on Kanudasdi to Bardia Road.	3+531	20	8.62
	18	21-03-04	Matlab	Bridge on Narayanpur to Aliara Road over Boajuri Khal near Narayanpur Bazar.	0+243	40	17.38
	19	21-03-05	Matlab	Bridge on Baburhat Pannai Road to Bakila Narayanpur Road.	3+165	15	7.12
	34	21-04-N1	Kachua	Bridge on Batapukuria to Nindapur Road over Betera Khal.	6+680	25	10.11
	37	21-04-N4	Kachua	Bridge on Thana Complex to Chandpur Road at Kalo Chowgram.	4+470	20	8.62
	41	21-05-02	Faridgonj	Bridge on Gazipur to Harina Road on Dakatia River.	0+000	100	38.43
Feni	17	22-02-10	Porshuram	Bridge on Subar Bazar to Rajeshpur Bazar Road over Paglirkoot Chara Khal.	6+350	20	8.62
	18	22-03-01	Dagonbhuiya	Bridge on Daganbhuiyan to Razapur Road over Feni - Chowmuhani Khal.	3+850	60	23.37
	21	22-04-01	Sonagazi	Bridge on Sonapur Vorer Bazar Road via Kamandar Hat and Amir Uddin Munshir Hat Road.	4+115	25	10.11
	26	22-05-05	Chagalnaiya	Bridge on Nizpanua - Madugram Road over Natigozi Khal.	1+400	20	8.62
	27	22-05-06	Chagalnaiya	Bridge on Mohamaya School Road over Muhuri Khal.	1+720	100	38.11
	28	22-05-07	Chagalnaiya	Bridge on South Satara DC Road up to Union Connecting Road on Mohuri River.	1+500	80	32.13
Noakhali	6	23-01-06	Sadar	Bridge on Oderhat Bazar to Chowdhury Hat via Sofiganj Bazar over Pora Khali Khal.	2+000	50	19.45
	8	23-02-02	Begumgonj	Bridge on Batua to Fazilpur Road over Chowmuhani - Laxmipur Khal.	0+000	25	10.11
	10	23-02-04	Begumgonj	Bridge on Amanatpur to Tofader Road over Chowmuhani - Laxmipur Khal.	0+600	50	19.45
	11	23-02-05	Begumgonj	Bridge on Amanullahpur UP to Abirampur Road Miahjan Thikadar Road over Chowmuhani - Laxmipur Khal.	0+000	40	16.46
	12	23-02-06	Begumgonj	Bridge on Mujahidpur to Pournbibi Road over Noakhali Khal.	2+500	50	20.37
	16	23-02-10	Begumgonj	Bridge on Khandurbag to Amishapara Road over Sonapur Khal.	6+000	20	8.62
	28	23-05-01	Hatiya	Bridge on Tamorudi Village Road over Katakhali Khal.	0+500	75	27.85

TABLE 8.2-1 LIST OF BRIDGES BY PRIORITY GROUP (4/11) PRIORITY 1A

District	Sl. No.	Bridge Code	Upazila	Name/Location	Chainage	Bridge Length (m)	Cost (Million Tk.)
Laxmipur	10	24-02-01	Raipur	Bridge on Charkachica to Kazirchar Road over Dead Dakatia River.	5+950	80	32.45
	11	24-03-01	Ramgonj	Bridge on Noapara Hotatia - Domnadi - Paniala Road over Noagaon - Paniala Khal.	5+640	20	8.62
Natore	12	52-02-01	Gurudashpur	Bridge on Gurudaspur to Par Gurudaspur Road over Nandakuza River.	0+350	105	40.52
	13	52-03-01	Shingra	Bridge on Singra Bus Stand Komal UP Baliaban Ghat Road near Patkol Ghat.	2+850	90	35.90
	15	52-03-N1	Shingra	Bridge on Bandar Amtali to Chowmohani Hat Road at Majgati Ghat over Godai River.	3+400	50	20.37
	17	52-04-02	Baroigram	Bridge on Koyan RHD to Loxmikol Bazar over Mora Boral River.	8+250	50	19.77
	23	52-05-01	Lalpur	Bridge on Kadamcilam Hat to Kadamcilam UP Road over Khalisadanga River.	2+250	65	25.42
Sirajganj	2	55-01-02	Sadar	Bridge on Panchasaratia RHD to Randunibari Bazar Road.	2+010	65	24.86
	3	55-01-03	Sadar	Bridge on Sirajganj - Bogra - Alampur Road over Daibanga Khal.	1+070	25	10.11
	5	55-01-N1	Sadar	Bridge on Pipulbari to Bhatpeary Hat Road at Aminpur Village.	2+500	30	11.61
	6	55-01-N2	Sadar	Bridge on Pipulbaria RHD to Bhatpeary Hat Road at Degreepara over Isamati River.	3+700	40	17.38
	7	55-02-01	Chowhali	Bridge on Thana Sadar to Patrail Road over Khaspukuria Khal at Khaspukuria.	6+250	60	22.45
	8	55-02-02	Chowhali	Bridge on Thana Sadar to Muradpur Shalo Ghat Road near at Sadar Bazar.	0+000	65	24.86
	14	55-04-02	Belkuchi	Bridge on Jiduri to Chowbaria Ghat Road over Hura Sagar River.	5+400	120	44.10
	17	55-06-01	Tarash	Bridge on Tarash to Kundail Road over Nimaichara Khal.	6+550	50	20.37
	18	55-06-02	Tarash	Bridge on Tarash to Kundail Road over Kushabari Khal.	9+700	80	32.45
	19	55-06-03	Tarash	Bridge on Tarash Naogaon FRB Road over Naogaon River.	10+330	60	23.37
	21	55-07-02	Ullapara	Bridge on Boalia RHD to Chowbilahat Road over Jhobjubia River.	1+120	30	11.61
	23	55-07-04	Ullapara	Bridge on Barahor UP Office to Dhunchi Ghat Road over Dhunchi Khal.	4+700	60	22.45
	25	55-07-06	Ullapara	Bridge on Pukurpar to Koyra Hat Road over Koyra Khal.	6+000	50	20.37
	26	55-07-07	Ullapara	Bridge on Boalia Bazar to Olipur Hat Road over Muktahar River.	2+300	60	23.37
	27	55-07-08	Ullapara	Bridge on Ullapara to Kaliganj FRB Road over Baroia Khal.	0+650	60	23.37
	28	55-07-09	Ullapara	Bridge on Boalia GC to Angaru Hat Road over Telkupi Khal (Jhabjobia Khal).	2+150	60	23.37
	29	55-07-10	Ullapara	Bridge on Raninagar to Amdanga Road over Sarasmati River.	3+050	40	17.38
	31	55-07-12	Ullapara	Bridge on Solop Station Hat to Ghatina Ghat Road over Shajahanpur Canal.	2+900	25	10.11
	32	55-07-13	Ullapara	Bridge on Boalia RHD to Chowbila Hat Road over Jhabjobia River.	3+950	50	20.69
	34	55-07-N2	Ullapara	Bridge on Raninagar RHD to Amdanga Road over Amdanga Khal.	4+040	40	16.46
	35	55-07-N3	Ullapara	Bridge on Panchila RHD to Hatikamrul UP Office Road over Sarasmati River.	3+200	50	20.37
	36	55-08-01	Kazipur	Bridge on Sonamukhi to Hazrahati via Vanudanga Road over Isamati River.	3+350	100	40.49
Pabna	12	56-02-10	Chatmohor	Bridge on Chatmohar Janata Bank to Mirzapur Road over the Boral River at Nur Nagar Ghat.	4+195	90	35.86
	13	56-03-01	Faridpur	Bridge on B-Nagar to Damra Hat Road over Ruknai River at Mridha Para Ferry Ghat.	1+350	80	32.45
	33	56-08-N1	Atgoria	Bridge on Uttara Chalk RHD to Goruri Hat Road over Ratnai River at Goruri Hat GC.	6+125	95	37.39

TABLE 8.2-1 LIST OF BRIDGES BY PRIORITY GROUP (5/11) PRIORITY 1A

District	Sl. No.	Bridge Code	Upazila	Name/Location	Chainage	Bridge Length (m)	Cost (Million Tk.)
Bogra	2	57-01-02	Sadar	Bridge on Dublagari Hat - Rongila Ghat Road at Rongila Ghat over Mohishaban Khal.	7+250	60	23.37
	4	57-01-04	Sadar	Bridge on Beerbari Hat to Ardia Bazar Road over Burivita Khal.	10+250	60	23.37
	6	57-01-06	Sadar	Bridge on Azizul Haq College - Sothibari Hat Road over Karotoa River.	0+350	60	23.37
	8	57-01-N1	Sadar	Bridge on Vatkandi - Uddirgola Road over Korotoa River.	0+200	80	32.13
	9	57-01-N2	Sadar	Bridge on Gakul - Cobarka - Lahirpara Road via Telihari Road (over Natgari Canal).	1+150	40	17.38
	15	57-02-N3	Sherpur	Bridge on Ulipur - Zhanjor Road at Sholagari.	5+750	45	18.88
	16	57-02-N4	Sherpur	Bridge on Ulipur - Zhanjor Road.	6+150	35	15.88
	17	57-02-N5	Sherpur	Bridge on Garidaho Highway - Korotoa Bannighat Road over Korotoa River.	0+420	100	38.11
	26	57-03-N2	Gabtoli	Bridge on Nepaltoli UP Office - Sukanpukur Road over Shukdoha River at Fazlurdoho.	2+950	60	23.37
	27	57-03-N3	Gabtoli	Bridge on Toronihat - Kalaihatta Road over Vomradaha Khal.	3+750	90	35.12
	38	57-05-01	Sonatola	Bridge on Koromja - Shukhanpukur Road over Bagdah Khal.	0+500	75	28.17
	41	57-05-04	Sonatola	Bridge on Hatkormja - Dulurchar Road over Sukda Khal.	1+600	70	26.36
	48	57-07-01	Dhunat	Bridge on Sonahata - Baghbari GCCR via Bererbari Gram over Nandiar Para Khal.	0+867	40	17.38
	50	57-07-N2	Dhunat	Bridge on Joyshing Ghat - Bagbari FRA Road over Balua Khal.	2+160	55	22.19
	51	57-07-N3	Dhunat	Bridge on Joyshing Ghat - Baghari FRA Road.	2+500	35	15.88
	52	57-07-N4	Dhunat	Bridge on Math Para FRA - Jhanjor Ghat Road over Dublagari Khal.	0+500	50	20.69
	54	57-07-N6	Dhunat	Bridge on Bishwanari Gacha FRB - Dighalkandi Hat Road over Foringhata Khal.	0+880	70	26.36
	57	57-08-N2	Shibgonj	Bridge on Shibganj - Mokamtola Road at Aurjunpur Ghat over Korotoa River.	0+500	75	27.85
	59	57-09-02	Dupchanchia	Bridge on Panchpir - Talora - Altafnagar Road over Nagor River.	5+000	65	24.86
	60	57-10-01	Adamdighi	Bridge on Durgapur - Chapapur Road over Nagor River at Khundogram UP Bagichapara.	1+800	85	33.62
Total	**147 number of bridges**					**7585**	**3022.73**

TABLE 8.2-1 LIST OF BRIDGES BY PRIORITY GROUP (6/11) PRIORITY 1B

District	Sl. No.	Bridge Code	Upazila	Name/Location	Chainage	Bridge Length (m)	Cost (Million Tk.)
Dhaka	1	01-01-01	Karanigonj	Bridge over Singa Khal on Kathaltali - Nayagaon Road at Kathaltali	1+000	25	10.58
	3	01-01-03	Karanigonj	Bridge on Jinjira Bus Station-Charail Hazibari Road at Jinjira UP.	0+550	30	12.07
	17	01-04-01	Dhohar	Bridge over Jaypara - Islampur Bowbazar Road at Chargata over Shahabkhali Khal.al	0+800	50	20.83
	32	01-06-N2	Dhamrai	Bridge on Joypura - Sonartak Road at Sonartak.	4+000	70	27.14
Narayanganj	1	03-01-01	Sadar	Bridge on Digreerchar - Mirkadim via Alirtek GCCR Road over Alirtek Khal.	2+250	115	42.60
	4	03-01-N3	Sadar	Bridge on Volayel RHD-GCCR Road via Nabinagar over Kashipur Khal.	0+800	30	11.61
	6	03-02-01	Araihagar	Bridge over Jangalia Khal at Ucirpur UP.	1+800	90	35.44
	7	03-02-02	Araihagar	Bridge over Pakundia over Brammaputra River.	0+000	60	22.45
	10	03-02-05	Araihagar	Bridge on Road form Bishnondi UP - Shadasadi UP at near Gopaldi Bazar.	10+240	140	51.79
Munshiganj	2	04-01-N1	Sadar	Bridge over Adhara Khal on Chardumuria to Adhara Bangla Bazar Road.	1+500	30	11.93
	11	04-02-N2	Gazaria	Bridge on Bhatirchar to Bhaghaikandi Road over Mirergaon Khal.	7+000	35	15.88
	12	04-02-N3	Gazaria	Bridge on Bhatirchar to Bhaghaikandi Road over Mirergaon Khal.	0+800	50	20.37
	13	04-02-N4	Gazaria	Bridge over Baghaikandi Khal on Bhatirchar to Baghaikandi Road.	0+500	45	19.20
	15	04-02-N6	Gazaria	Bridge on Kazipara to Asrafdil Road over Ismanirchar Khal.	0+100	15	7.12
	16	04-02-N7	Gazaria	Bridge on Kazipara to Ashrafdi Road over Ismanir Khal.	3+350	25	10.11
	17	04-02-N8	Gazaria	Bridge on Kazipara to Ashrafdi Road over Nazirchar Khal.	3+726	20	8.62
	19	04-02-N10	Gazaria	Bridge on Kazipara to Ashrafdi Road over Gadarbari Khal at Hossaindi.	4+920	30	11.61
	23	04-03-04	Tongibari	Bridge on Gheor - Hargazpur Road at Makimpur over old Dhaleshwari River.	0+000	20	8.62
	24	04-03-05	Tongibari	Bridge on Rongmaher to Nyanandah Road over Rangmaher Khal at Rongmaher.	0+750	20	8.62
	25	04-03-N1	Tongibari	Bridge on Borolia to Sonarong Kazla Bridge over to Tongibari Khal.	0+400	40	17.38
	27	04-03-N3	Tongibari	Bridge on Tongibari Betka GCCR to Sakuntala RHD over Autshahir Khal.	0+050	15	7.12
	28	04-04-01	Sreenagar	Bridge on Baraikhali Hat Road near West side of Matbarbari at Baraikhali Village.	2+200	35	15.88
	32	04-05-03	Shirajdhikhan	Bridge on Khalpar to Chitrakot Road over Isamoti River at Kamalpur.	2+500	95	36.94
	33	04-05-04	Shirajdhikhan	Bridge on Khalpar to Chitrakot Road over Isamoti River at Razanagar Ghat.	0+000	95	36.62
Manikganj	3	05-01-03	Singhair	Bridge on Dalla FRA to Chandhar Bazar Road over Dhallah Canal.	2+600	60	23.37
	6	05-01-06	Singhair	Bridge on Charigram GC to Balukonda Bazar via Dakshin Charigram Bazar Road over Shambukhali Khal.	1+200	40	17.57
	7	05-01-07	Singhair	Bridge on Baldhara Bazar to Golaidanga Bazar Road over Nurani-ganga Khal.	2+100	50	20.37
	8	05-01-08	Singhair	Bridge on Garadia FRB - Bangla Bazar Road at Kallakoir.	3+900	40	17.38
	10	05-01-N2	Singhair	Bridge on Vhoumdakhin to Bhatirchar Road via Nayabari over old Dhaleshari River.	3+590	80	32.13
	20	05-02-N2	Shibalay	Bridge on Shibrampur - Rupsha Road.	2+982	20	8.94
	21	05-03-01	Saturia	Bridge on Daragram GC - Bangladesh Hat GC Road at Choto Gheor.	2+000	90	35.12
	22	05-03-02	Saturia	Bridge on Daragram GC to Bangladesh Hat GC at Charmatta over old Dhaleshari Khal.	5+800	40	17.38
	23	05-03-03	Saturia	Bridge on Gheor - Hargazpur Road at Makimpur over old Dhaleshwari River.	7+200	80	32.45

TABLE 8.2-1 LIST OF BRIDGES BY PRIORITY GROUP (7/11) PRIORITY 1B

District	Sl. No.	Bridge Code	Upazila	Name/Location	Chainage	Bridge Length (m)	Cost (Million Tk.)
Manikganj (Continued)	25	05-03-05	Saturia	Bridge on Daragram GC to Bangladesh Hat Road over Gazi Khali River.	0+500	90	35.44
	34	05-04-02	Doulatpur	Bridge on Daulatpur - Jafarganj Road.	8+440	100	38.43
	35	05-04-03	Doulatpur	Bridge on Daulatpur Upazila H/Q - Abudanga Riverghat Road.	0+456	90	35.44
	40	05-04-08	Doulatpur	Bridge on Gheor - Ulial Road at Bhabanipur.	1+030	50	20.37
	42	05-04-10	Doulatpur	Bridge on Narchi - Shamganj Road at Khalsi Bazar.	5+250	60	23.68
	43	05-04-11	Doulatpur	Bridge on Narchi - Samganj Road at Borojola.	6+520	50	19.45
	44	05-04-12	Doulatpur	Bridge on Daulatpur - Kaliahat Road.	3+420	40	17.38
	51	05-05-02	Harirampur	Bridge on Jhitka - Machain Road.	0+675	60	23.37
	54	05-05-N1	Harirampur	Bridge on Bhadiakhola - Baila Road over Isamati River.	3+450	60	23.37
	56	05-05-N3	Harirampur	Bridge on Jhitka to Sapair Road over Ichamoti River .	4+750	60	23.37
	57	05-05-N4	Harirampur	Bridge on Jatrapur to Kanthapara Road over Mazibari Khal.	0+330	15	7.12
	64	05-06-N3	Gheor	Bridge on Baniajuri - Kaltahat Road over Gangdubi River (Branch).	6+670	50	20.37
	69	05-07-02	Sadar	Bridge on Joyra - Dautia Hat Road over Joyra Khal.	0+000	75	27.85
	73	05-07-N1	Sadar	Bridge on Atigram - Khas Naraikuli Bazar Road over Atigram Khal.	0+800	50	20.37
	74	05-07-N2	Sadar	Bridge on Banpari Hat - Chakulia Bazar Raod over Ban-Pari Khal.	0+800	30	11.61
Narsingdi	3	06-02-01	Raipura	Bridge on Dhaka - Sylhet RHD to Ramnagar Road over Branch of Brahmaputra River (Dead River) at Mushapur	0+446	80	32.13
Rajbari	11	11-02-N2	Baliakandi	Bridge on Ghee Komola to Morabila Road over Chattra River at Ghee Komola.	0+960	50	20.77
Gopalganj	7	12-02-06	Kasiani	Bridge on Haliara to Rahuthra Bazar Road at Rahuthra Bazar over Ramdia to Vannabari Khal.	2+460	50	20.94
	21	12-03-N3	Muksadpur	Bridge on Ragdi RHD to Uttar Molladi Road near Molladi Bazar.	2+350	45	19.20
	26	12-04-N2	Tongipara	Bridge on Lebutala to Dumuria Road over Varani Khal.	3+000	35	16.85
	28	12-05-02	Kotalipara	Bridge on Tupuria RHD to Jamalia Road over Quasla Senergati Khal near House of Mr Jamal.	0+650	20	8.62
	29	12-05-03	Kotalipara	Bridge on Tupuria RHD to Jamulia Road over Dorar-Jamalia Khal near House of Mr Aziz Chairman.	1+060	25	10.11
Faridpur	5	16-01-N1	Sadar	Bridge on Bilnalia to Loskorkandi Primary School Road over Bilshokonia Khal.	0+450	25	10.11
	7	16-01-N3	Sadar	Bridge on Ishan Gopalpur to Ambikarpara Road over Bhoboneswar River.	0+500	65	23.94
	8	16-01-N4	Sadar	Bridge on Gopalpur to Char Chandpur Road over Chandpur Khal.	0+500	35	14.96
	10	16-01-N6	Sadar	Bridge on Uttar Bilmamudpur to Sadipur Road near Primary School over Mandartola Khal.	1+000	40	16.46
	16	16-02-05	Boalmari	Bridge on Joypasha to Surjok Bazar Road over Joypasha Khal near Bandapasha Primary School.	4+200	50	20.37
	28	16-05-02	Charvadrason	Bridge on Charvadrason to Haziganj Road via Moulavirchar Bazar over Shorbondla.	6+620	70	26.05
Comilla	26	19-04-03	Brahmanpara	Bridge on Bramanpara to Dulaepur Bazar Road over Torti River.	3+252	25	10.43
	27	19-04-04	Brahmanpara	Bridge on Bordusia RHD to Dulalpur Bazar Road over Balina Bara Khal.	4+287	25	10.43
	30	19-04-07	Brahmanpara	Bridge on Chanda Bazar to Charadrari Road over Shalda River.	2+460	50	20.37
	47	19-09-02	Dabidar	Bridge over Barro Alampur Ferry Ghat to Fatehabad Bazar Road.	0+000	120	44.42
	48	19-09-N1	Dabidar	Bridge on Khalilpur to Shibpur Newmarket Road.	0+000	150	55.24
	51	19-10-N1	Homna	Bridge on Kararkandi to Kalmina to Ganiarchar Bazar Road over Titas River.	4+500	80	32.45

TABLE 8.2-1 LIST OF BRIDGES BY PRIORITY GROUP (8/11)
PRIORITY 1B

District	Sl. No.	Bridge Code	Upazila	Name/Location	Chainage	Bridge Length (m)	Cost (Million Tk.)
B-Baria	25	20-04-N2	Bancharampur	Bridge on Bancharampur to Mirpur (Salimabad) Road over Titas River.	0+150	130	49.26
	26	20-04-N3	Bancharampur	Bridge on Joynagar to Jibanganj Road over Titas River.	9+313	90	35.44
Chandpur	12	21-02-N2	Hazigonj	Bridge on Haziganj to Gandavapur Ferryghat Road.	1+500	120	44.10
	13	21-02-N3	Hazigonj	Bridge on Barkori Ferryghat to Belchow Road.	4+950	30	11.61
	14	21-02-N4	Hazigonj	Bridge on Kaiyarpool to Uttali Ferryghat Road.	4+880	140	51.47
	21	21-03-07	Matlab	Bridge on Raymunnesa College Road.	0+000	25	10.11
	25	21-04-04	Kachua	Bridge on the South Site of Shangkarpur Ohab Mollar Bari Road.	0+250	15	7.12
	26	21-04-05	Kachua	Bridge on Paiakhal to Charotbhanga Road over Malchoa Eidgaon Sauth Khal.	0+125	25	10.11
	30	21-04-09	Kachua	Bridge on Kachua Paranpur - Baibay Road on West side of Chandrapur Majumder Bari.	5+593	20	8.62
	32	21-04-11	Kachua	Bridge on Razapur Muragaon Road at West side of Shakuragram.	1+432	15	7.12
	33	21-04-12	Kachua	Bridge on Asharacpur to Rampura Road over Southwest side of Bairagi Bari.	1+200	15	7.12
	35	21-04-N2	Kachua	Bridge on Karaiya to Koa Road at East side of Karaiya Govt. Primary School.	4+435	25	10.11
	38	21-04-N5	Kachua	Bridge on Sachar to Durgapur to Bitara Road at East side of Sachar Bazar.	0+100	30	11.61
	39	21-04-N6	Kachua	Bridge on Monshorpur - Darihayat Para Road South side of Karim's House.	0+487	15	7.12
	40	21-05-01	Faridgonj	Bridge on Kalir Bazar to Rampur Bazar Road.	5+200	140	51.47
	44	21-06-03	Shahrasti	Bridge on Surshai to Gulpura Road over Shail Khali Khal.	3+900	20	8.62
Feni	1	22-01-01	Sadar	Bridge on Laxmipur Panua Ghat Road over Sutsuti Dhanagazi Khal.	2+500	20	8.94
	3	22-01-03	Sadar	Bridge on Kachua to Panuaghat Road over Katchua Kha.	0+800	25	10.43
	7	22-01-07	Sadar	Bridge on Darmapur to Mohazer Colony Road over Kumra Chara Khal.	1+500	20	8.62
	8	22-02-01	Porshuram	Bridge on Kamua to Jamua Road over Chilonia River.	1+050	40	17.38
	11	22-02-04	Porshuram	Bridge on East Shaheb Nagar to West Shaheb Nagar - Subar Bazar Road over Chilonia River.	2+400	50	20.37
	13	22-02-06	Porshuram	Bridge on Subar Bazar to Moheshpuskurini Road over Chilonia River.	1+450	60	23.68
	16	22-02-09	Porshuram	Bridge on Chittulia to Danikunda Road over Jala Khal.	1+100	30	11.61
	23	22-05-02	Chagalnaiya	Bridge on Hazi Abdul Malek Road over East Devpur Khal.	0+200	10	5.62
Noakhali	1	23-01-01	Sadar	Bridge on Puraton Hospital Road over Noakhali Khal.	1+000	60	23.37
	13	23-02-07	Begumgonj	Bridge on Kadamrasul House Road adjacent to Chowmohani - Chaterplaya Road over Chowmohani -	0+000	25	10.11
	14	23-02-08	Begumgonj	Bridge on Kutubpur to Mir Ahmodpur Road over Abdullahpur Khal.	1+700	15	7.12
	17	23-02-11	Begumgonj	Bridge on Rajgonj to Chomuhani Road over Noakhali Khal.	1+200	50	20.37
	21	23-03-04	Chatkhil	Bridge on West of Badolcoat Road near at Tobdar House.	0+900	15	7.12
	23	23-03-06	Chatkhil	Bridge on Badolcoat to Razzakpur Road near Lokman Head Master House over Hasnabad Khal.	0+000	25	10.11
	24	23-04-01	Companigonj	Bridge on Charkolmi to Gangcil Road over Noakhali Khal.	3+000	155	57.35
	27	23-04-04	Companigonj	Bridge on Chowdhury Hat to Mehrunnesa Road over Chotto Feni River (Moragonga Bridge).	4+000	150	54.47

TABLE 8.2-1 LIST OF BRIDGES BY PRIORITY GROUP (9/11)
PRIORITY 1B

District	Sl. No.	Bridge Code	Upazila	Name/Location	Chainage	Bridge Length (m)	Cost (Million Tk.)
Laxmipur	2	24-01-02	Sadar	Bridge on Uttar Chanrapur to Dakhin Chanrapur Road over Rahamatkhali Khal.	2+500	40	18.08
Natore	3	52-01-03	Sadar	Bridge over Earpur Khal under Khazura UP.	0+850	65	24.86
	14	52-03-02	Shingra	Bridge on Chowgram to Khidrabaria Road over Zia Khal.	3+200	50	20.92
	18	52-04-N1	Baroigram	Bridge on Chandai to Shatail Road over Chikani River.	4+750	60	24.20
	19	52-04-N2	Baroigram	Bridge on Digholkati to Chulkati Road over Mora Boral River.	1+800	50	21.30
	20	52-04-N3	Baroigram	Bridge on Gharmati to Par Gopalpur Road over Khalishadanga Khal near Gohmati River.	1+900	120	43.09
	21	52-04-N4	Baroigram	Bridge on Majgaon to Chowsadanga Road over Mora Boral River.	2+250	50	19.45
Sirajganj	11	55-03-02	Kamarkhanda	Bridge on Paiksha Bazar to Bagbari Road over Betnali Khal.	1+655	45	19.11
	13	55-04-01	Belkuchi	Bridge on Kollanpur GCCR to Shaguna Hat Road over Hura Sagar River at Mobupur Village.	1+380	100	38.11
Pabna	16	56-03-04	Faridpur	Bridge on Par Faridpur to Allahabad Hat Road over Boral River at Bilbokri Ghat.	1+500	90	38.94
	23	56-06-01	Shathia	Bridge on Chalkmodhupur to Khidirgram Road over Chalkmodhupur BWDB Khal near Chalkmodupur Reg.	3+150	75	29.25
Bogra	13	57-02-N1	Sherpur	Bridge on Ulipur - Zhanjor Road over Bangali River.	8+750	150	57.36
	14	57-02-N2	Sherpur	Bridge on Mirzapur - Shaghat Road over Fuljori River.	8+400	150	57.04
	25	57-03-N1	Gabtoli	Bridge on Toronihat - Ramchandrapur Road over WDB Khal near Sonamoua.	1+750	60	23.68
	30	57-03-N6	Gabtoli	Bridge on Hapania - Sagatoa Road.	2+210	30	11.61
	31	57-03-N7	Gabtoli	Bridge on Kutamohani - Maliandanaga R1 Road.	0+010	45	18.88
	33	57-03-N9	Gabtoli	Bridge on Shubedbazar - Toronihat R1 Road at Kalamabed.	2+250	30	12.07
	34	57-03-N10	Gabtoli	Bridge on Kadamtali - Sukanpukur R2 Road at Moninhathi.	7+450	50	19.45
	39	57-05-02	Sonatola	Bridge on Baluahat - Sonatola Road over Monidaha Khal under Kamarpara Gram.	1+500	50	20.37
	46	57-06-N3	Shariakandi	Bridge on Shariakandi - Chandanbasha GC Road - Ghagumari Primary School Road over Ghugumari Khal.	0+100	50	20.37
	47	57-06-N4	Shariakandi	Bridge on South Sukanpukur - North Suknapukur Road over Nizbolail Khal.	0+200	70	26.68
	56	57-08-N1	Shibgonj	Bridge on Dhawagir - Rahbal (Boalimari) Road at Milkypur Ghat over Korotoa River.	1+600	70	25.44
	58	57-09-01	Dupchanchia	Bridge on Dhabhat - Shibganj Road over Nungola Khal.	4+800	40	16.46
	61	57-10-N1	Adamdighi	Bridge on Tarta - Chowmatha Road over Nagor River.	0+560	60	23.37
Total	**123 number of bridges**					**6805**	**2694.48**

TABLE 8.2-1 LIST OF BRIDGES BY PRIORITY GROUP (10/11)
PRIORITY 1C

District	Sl. No.	Bridge Code	Upazila	Name/Location	Chainage	Bridge Length (m)	Cost (Million Tk.)
Dhaka	26	01-06-01	Dhamrai	Bridge on Badigha - Oaylal Road.	0+000	30	11.61
	30	01-06-05	Dhamrai	Bridge on Balia - Chowhat Bazar Road over Bonxi River.	0+050	140	54.37
Narayanganj	5	03-01-N4	Sadar	Bridge on Dhaka Munshiganj - Narshingpur Road over Kasimpur Khal.	0+000	30	11.61
	9	03-02-04	Araihagar	Bridge on Road from Khakunda UP - Bishnondi UP over Dayakanda River.	1+020	90	35.44
	11	03-02-06	Araihagar	Bridge on Jaunguli Bazar - Shanti Bazar Road on Jaunguli Khal.	0+200	80	32.45
Munshiganj	3	04-01-N2	Sadar	Bridge on Chardumuria to Adhara Bangla Bazar Road, Silai UP.	2+500	30	11.61
	4	04-01-N3	Sadar	Bridge on Chardumuria to Adhara Bangla Bazar Road, Silai UP.	3+000	40	17.38
	5	04-01-N4	Sadar	Bridge on Chardumuria to Adhara Bangla Bazar Road, Silai UP.	4+000	50	20.37
	26	04-03-N2	Tongibari	Bridge on Borolia to Tongibari Belly Bridge over Borolia Bashbari Khal.	0+150	20	8.62
Manikganj	2	05-01-02	Singhair	Bumdhkkin Kucha-Autaila Road	0+000	40	17.38
	9	05-01-N1	Singhair	Bridge on Talebpur UP Office - Mozlishpur road over Dualeshari River.	4+320	90	35.12
	13	05-02-03	Shibalay	Bridge on Rupsha - Maluchi Road over Isamati River.	7+503	80	32.13
	27	05-03-07	Saturia	Bridge on Daragram GC to Jolshuka Road over Delua Khal.	3+100	20	8.94
	46	05-04-N1	Doulatpur	Bridge on Narchi - Bishompur - Bordhoman Kandi Road via Binodpur near House of Nironjon.	0+550	60	23.68
	47	05-04-N2	Doulatpur	Bridge on Jhakurkandi - Khalase via Bonogram Road.	0+000	60	23.37
	48	05-04-N3	Doulatpur	Bridge on Jhakurkandi - Khalase via Bonogram Road.	4+700	50	20.37
	49	05-04-N4	Doulatpur	Bridge on Borojola - Rowha Road near Par Rowha.	1+400	60	23.68
	53	05-05-04	Harirampur	Bridge on Jhitka - Mahadebpur Road over South Gorai Khal.	1+560	50	19.45
	66	05-06-N5	Gheor	Bridge on Gagandui Govt Primary School/ Baniajuri Beribadth via Gangdull Majibari Road over Banjan Khal.	4+500	40	17.38
	70	05-07-03	Sadar	Bridge on Katigram GC - Baira GC Hat Road over old Dhaleshari River.	5+100	160	58.85
	72	05-07-05	Sadar	Bridge on Golondo - Chhoto Gheor Road over Borongakhola Khal.	1+650	50	20.37
	75	05-07-N3	Sadar	Bridge on Manikganj Bangladesh Hat - Tille Hat Road over Dhaleshari River.	1+700	75	28.17
Narsingdi	11	06-03-01	Balabo	Bridge on Ibrahimpur - Charabad Road over Arial Khan River.	9+400	130	48.80
	19	06-06-01	Shibpur	Bridge on Gabtali - Trimohoni Bazar Road over Kaira River.	9+320	30	11.61
Rajbari	13	11-04-01	Ghoyalondo	Bridge on Dudukhan Para to Shahaj Uddin Madbar Para Road over Bariband Khal under Uzanchar UP.	0+740	65	25.64
Faridpur	9	16-01-N5	Sadar	Bridge on Ambikapur US AID Bridge to Tapakhali Goaland Road (FRB) over Charkisnopur Khal.	2+200	30	11.61
	11	16-01-N7	Sadar	Bridge on Maskandi RHD to Norosingdia over Village Road.	0+850	30	11.61
	27	16-05-01	Charvadrason	Bridge on Charvadrason to Faridpur Road over Lohartek Khal.	0+450	70	25.44
	31	16-07-01	Sadarpur	Bridge on Katakhali to Karirhat Road over Bhubeneshor River.	0+000	80	30.62
Comilla	39	19-06-03	Chowddogram	Bridge on Protabpur to Dorbes Bazar Road over Dhakatia River.	6+700	45	17.96
B-Baria	24	20-04-N1	Bancharampur	Bridge on Madhyanagar to Bishnurampur Road over Titas River.	4+250	130	48.80
	37	20-07-01	Akhaura	Bridge on Dhar-Khar Bus Stand to Rutimulokgram Road over Hatina Khal.	6+180	160	59.17

TABLE 8.2-1 LIST OF BRIDGES BY PRIORITY GROUP (11/11) PRIORITY 1C

District	Sl. No.	Bridge Code	Upazila	Name/Location	Chainage	Bridge Length (m)	Cost (Million Tk.)
Feni	4	22-01-04	Sadar	Bridge on Shahpur School Road over Kamua Khal.	0+500	15	7.12
	5	22-01-05	Sadar	Bridge on Laxmipur to Bhuiya Road over Katachara Khal.	0+500	10	5.62
Noakhali	15	23-02-09	Begumgonj	Bridge on Chandragonj to Atayarpur Road over Chayani Khal.	0+000	15	7.12
Laxmipur	7	24-01-07	Sadar	Bridge on Nayamatpur to DC road over Rahamatkhali Khal.	0+150	35	15.24
Natore	22	52-04-N5	Baroigram	Bridge on Dausin to Darikhoir Road over Khalishadanga River.	0+500	60	23.97
Sirajganj	9	55-02-03	Chowhali	Bridge on Thana Sadar to Mirkutia UP Office Road over Zotpara Khal at Zotpara.	2+750	50	19.45
Pabna	2	56-01-02	Sadar	Bridge on Bajitpur to Chandpur via Charghospur Road over the Betra River.	3+000	100	38.11
	3	56-02-01	Chatmohor	Bridge on Chatmohar to Haripur Road via Dhulauri over Mora Boral River near Haripur UP.	6+895	80	30.29
	5	56-02-03	Chatmohor	Bridge on Mizapur to Khandobaria Road at Khandbaria Ferry Ghat.	4+200	160	62.26
	15	56-03-03	Faridpur	Bridge on BL Bari to Purindapur Road over Gumani River at Haria Bari Ghat.	3+000	150	57.73
	17	56-03-05	Faridpur	Bridge on Faridpur to Allahabad Road over the Boral River at Shishutola Ghat.	2+500	90	37.50
Bogra	28	57-03-N4	Gabtoli	Bridge on Naruamala - Amtalipara Road over Isamati River.	1+850	90	35.12
	32	57-03-N8	Gabtoli	Bridge on Mohishaban - Sonakania R1 Road.	1+210	40	17.38
	53	57-07-N5	Dhunat	Bridge on Mothurapur - Gopalnagar Road.	2+580	50	20.37
Total	**46 number of bridges**					**3060**	**1200.89**

8.2.2 Number of Bridges, Bridge Length and Cost

The number of bridges, total bridge length and total cost by priority group (1A, 1B and 1C) are summarized in Table 8.2-2.

Table 8.2-2 Number of Bridges, Bridge Length & Cost

Zone	District	Number of Bridges				Total Bridge Length (m)				Total Cost (1000tk)			
		1A	1B	1C	Total	1A	1B	1C	Total	1A	1B	1C	Total
Zone-1	DHAKA	13	4	2	19	700	175	170	1045	285864	70624	65977	422465
	NARAYANGANJ	7	5	3	15	240	435	200	875	96116	163895	79498	339509
	MUNSHIGANJ	10	15	4	29	350	570	140	1060	144965	236006	57976	438947
	MANIKGANJ	17	24	13	54	775	1380	835	2990	305741	552322	328899	1186962
	NARSINGDI	0	1	2	3	0	80	160	240	0	32128	60410	92538
	Zone 1 Total	**47**	**49**	**24**	**120**	**2065**	**2640**	**1505**	**6210**	**832686**	**1054975**	**592760**	**2480421**
Zone-4	RAJBARI	3	1	1	5	230	50	65	345	88157	20767	25637	134561
	GOPALGANJ	8	5	0	13	360	175	0	535	150941	75720	0	226661
	FARIDPUR	4	6	4	14	95	285	210	590	40013	111906	79274	231193
	Zone 4 Total	**15**	**12**	**5**	**32**	**685**	**510**	**275**	**1470**	**279111**	**208393**	**104911**	**592415**
Zone-6	COMILLA	9	6	1	16	590	450	45	1085	228272	173349	17957	419578
	B.BARIA	2	2	2	6	135	220	290	645	51859	84698	107970	244527
	CHANDPUR	9	14	0	23	300	635	0	935	122845	246319	0	369164
	FENI	6	8	2	16	305	255	25	585	120952	106653	12743	240348
	NOAKHALI	7	8	1	16	310	495	15	820	122325	190024	7120	319469
	LAKSHMIPUR	2	1	1	4	100	40	35	175	41064	18076	15243	74383
	Zone 6 Total	**35**	**39**	**7**	**81**	**1740**	**2095**	**410**	**4245**	**687317**	**819119**	**161033**	**1667469**
Zone-13	NATORE	5	6	1	12	360	395	60	815	141985	153830	23969	319784
	SIRAJGANJ	22	2	1	25	1220	145	50	1415	481589	57222	19454	558265
	PABNA	3	2	5	10	265	165	580	1010	105700	68187	225893	399780
	BOGRA	20	13	3	36	1250	855	180	2285	494335	332788	72872	899995
	Zone13 Total	**50**	**23**	**10**	**83**	**3095**	**1560**	**870**	**5525**	**1223609**	**612027**	**342188**	**2177824**
Total		**147**	**123**	**46**	**316**	**7585**	**6805**	**3060**	**17450**	**3022723**	**2694514**	**1200892**	**6918129**

8.2.3 Land Acquisition and Relocation Requirements

Total land to be acquired and total number of houses to be relocated are shown in Table 8.2-3.

Table 8.2-3 Land Acquisition and Relocation Requirements

Zone	District	Total Land to be Acquired (m^2)				Number of Houses to be Relocated			
		1A	1B	1C	Total	1A	1B	1C	Total
Zone-1	DHAKA	0	0	0	0	0	0	0	0
	NARAYANGANJ	0	0	0	0	0	0	0	0
	MUNSHIGANJ	0	0	0	0	0	0	0	0
	MANIKGANJ	0	400	0	400	0	2	1	3
	NARSINGDI	0	0	0	0	0	0	0	0
	Zone 1 Total	**0**	**400**	**0**	**400**	**0**	**2**	**1**	**3**
Zone-4	RAJBARI	0	850	0	850	0	0	0	0
	GOPALGANJ	3610	1932	0	5542	1	0	0	1
	FARIDPUR	90	1320	680	2090	0	0	0	0
	Zone 4 Total	**3700**	**4102**	**680**	**8482**	**1**	**0**	**0**	**1**
Zone-6	COMILLA	3800	0	0	3800	0	7	0	7
	B.BARIA	0	0	0	0	0	0	0	0
	CHANDPUR	0	0	0	0	0	0	0	0
	FENI	0	0	0	0	0	0	0	0
	NOAKHALI	0	0	0	0	0	0	0	0
	LAKSHMIPUR	0	0	0	0	0	0	0	0
	Zone 6 Total	**3800**	**0**	**0**	**3800**	**0**	**7**	**0**	**7**
Zone-13	NATORE	2480	3560	1300	7340	10	0	1	11
	SIRAJGANJ	0	50	0	50	1	0	0	1
	PABNA	900	6100	800	7800	2	10	0	12
	BOGRA	0	0	0	0	0	0	0	0
	Zone13 Total	**3380**	**9710**	**2100**	**15190**	**13**	**10**	**1**	**24**
	Total	**10880**	**14212**	**2780**	**27872**	**14**	**19**	**2**	**35**

8.2.4 Implementation Schedule

The overall implementation schedule is shown in Table 7.5-1.

Table 8.2-4 shows the proposed implementation schedule of priority 1A, 1B, and 1C bridges.

Table 8.2-4 Implementation Schedule of Priority 1A, 1B and 1C Bridges

Zone Number	Priority Group	No. of Bridges	Total Length (m)	Total Cost (crore)	Implementation Schedule												
					2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Zone-1	1A	47	2,065	83.3	46.9	36.4											
	1B	49	2,640	105.5				47.0	58.5								
	1C	24	1,505	59.3							39.6	19.7					
Zone-4	1A	15	685	27.9	15.7	12.2											
	1B	12	510	20.9				9.3	11.6								
	1C	5	275	10.5							7.0	3.5					
Zone-6	1A	35	1,740	68.7	38.6	30.1											
	1B	39	2,095	81.9				36.5	45.4								
	1C	7	410	16.1							10.7	5.4					
Zone-13	1A	50	3,095	122.4	68.8	53.6											
	1B	23	1,560	61.2				27.2	34.0								
	1C	10	870	34.2							22.8	11.4					
Total		**316**	**17,450**	**691.9**													
Annual Fund Requirement					**170.0**	**132.3**		**120.0**	**149.5**		**80.1**	**40.0**					

8.3 Assessment of Project Effects

8.3.1 General

In terms of employment, the economy of Bangladesh depends predominantly on agricultural sector. This sector employs more than 68% of the labour force. Despite of the poverty, there is a highly active cash economy in rural Bangladesh unlike many developing countries. This cash economy generates a high demand for rural transport and marketing system for providing the rural population with fertilizer, seeds and other agricultural inputs in time as well as for marketing of their agricultural produces with better price. Infrastructure development project especially rural road project has multi-dimensional impacts on socio-economic life of the rural people. **Figure 8.3-1** shows the mechanism of generating effects of rural road development.

The effects of this project are assessed based on bridge site survey data. Relevant socio-economic data have been collected through various methods including rapid appraisal and interviewing local residences, road users and LGED personals in Thana/Upazila level.

8.3.2 Beneficiaries

Construction of bridges on the existing gaps to connect the rural roads will make these roads effective in use for transportation and communication of the people in the influence areas of the roads as well as people in the region. People will be able to use these roads intensively and effectively which are now underused because of the absence of bridges. The people will be benefited in many ways. Improved mobility and accessibility to different facilities will help them to improve their living condition. The priority zones account for about 22% of the total land of the country, whereas they contain about 35% of the population of the country. The implementation of the projects in the priority zones will benefit more than one third of population of the country directly and population of the whole country indirectly.

As shown in Table 8.3-1, the influence area populations of priority 1A, 1B and 1C bridges are 3.869, 2.726 and 0.583 million respectively, totaling 7.178 million, who are more direct beneficiaries.

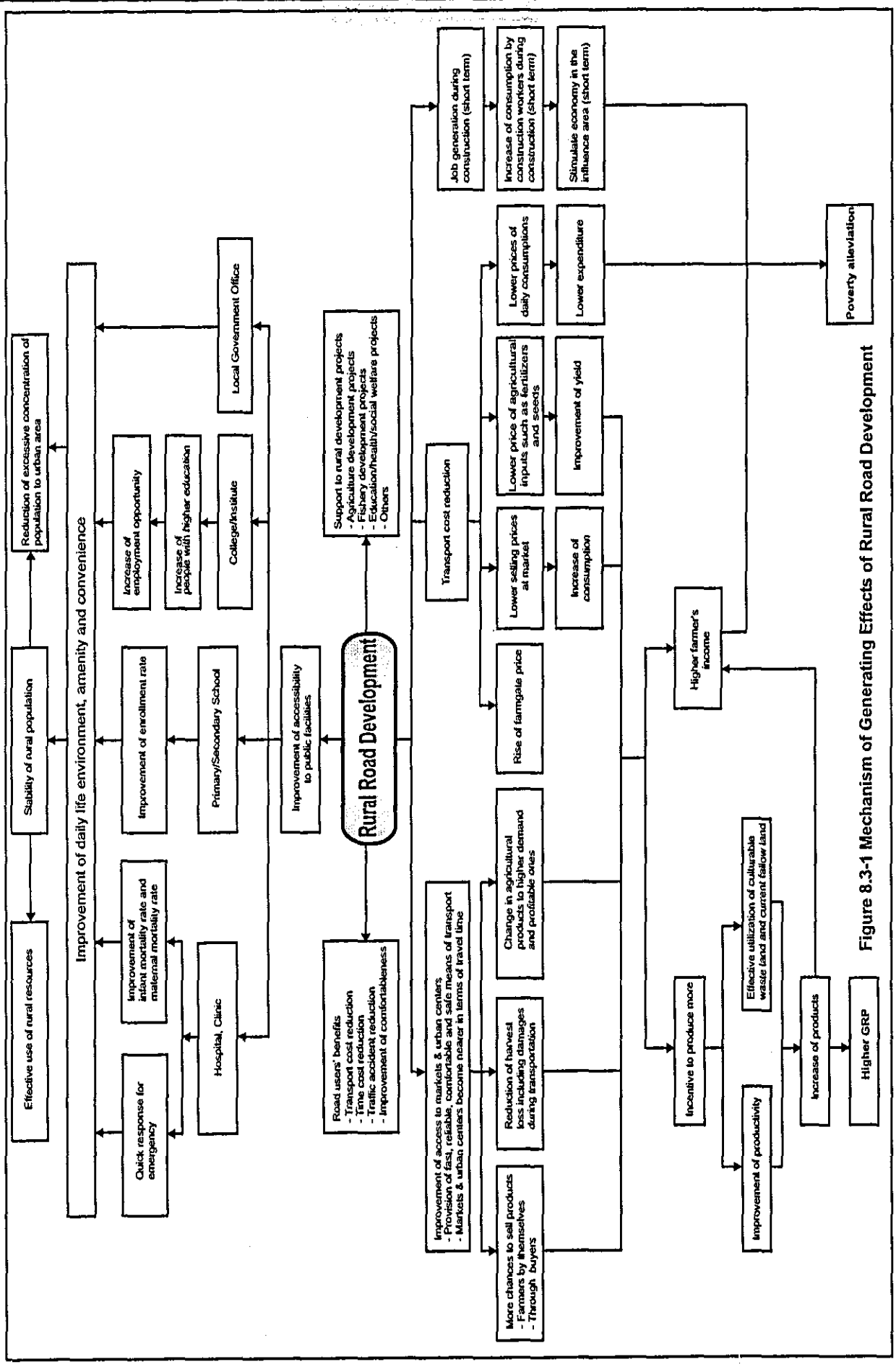


Figure 8.3-1 Mechanism of Generating Effects of Rural Road Development

Table: 8.3-1 Influence Area Population

Zone	District	Area in (Sq. Km)	District Population ('000') in 2001	No. of Upazila/ Thana Covered by Project Bridges	Number of Bridges				Influence Area Population ('000')			
					Priority 1A	Priority 1B	Priority 1C	Total	Priority 1A	Priority 1B	Priority 1C	Total
Zone-1	Dhaka	1464	8576	6	13	4	2	19	213	60	20	293
	Narayanganj	759	2138	4	7	5	3	15	84	66	32	182
	Munshiganj	955	1294	6	10	15	4	29	149	137	35	321
	Manikganj	1379	1275	7	17	24	13	54	291	225	100	616
	Narsingdi	1141	1891	3	0	1	2	3	0	12	14	26
	Total	**5698**	**15174**	**26**	**47**	**49**	**24**	**120**	**737**	**500**	**201**	**1438**
Zone-4	Rajbari	1119	940	3	3	1	1	5	65	15	5	85
	Gopalganj	1490	1132	4	8	5	0	13	133	62	0	195
	Faridpur	2073	1719	5	4	6	4	14	64	77	54	195
	Total	**4682**	**3791**	**12**	**15**	**12**	**5**	**32**	**262**	**154**	**59**	**475**
Zone-6	Comilla	3085	4587	9	9	6	1	16	380	410	40	830
	Brahmanbaria	1927	2366	3	2	2	2	6	37	53	65	155
	Chandpur	1704	2210	6	9	14	0	23	230	402	0	632
	Feni	928	1196	5	6	8	2	16	155	210	35	400
	Noakhali	3601	2533	5	7	8	1	16	228	205	20	453
	Lakshmipur	1456	1479	3	2	1	1	4	60	35	11	106
	Total	**12701**	**14371**	**31**	**35**	**39**	**7**	**81**	**1090**	**1315**	**171**	**2576**
Zone-13	Natore	1896	1521	5	5	6	1	12	135	82	20	237
	Sirajganj	2498	2707	7	22	2	1	25	975	78	8	1061
	Pabna	2371	2154	5	3	2	5	10	65	33	72	170
	Bogra	2920	2989	9	20	13	3	36	605	564	52	1221
	Total	**9685**	**9371**	**26**	**50**	**23**	**10**	**83**	**1780**	**757**	**152**	**2689**
All Zones		**32766**	**42707**	**95**	**147**	**123**	**46**	**316**	**3869**	**2726**	**583**	**7178**

8.3.3 Direct Effects of the Project

1) Provision of Safe and Stable Transport Means

In absence of un-interrupted and stable communication facility, people face tremendous trouble as described below:

- Marketing of agricultural product is difficult due to the absence of bridge. The farmers get low income and are discouraged from producing marketable agricultural products.
- Purchasing of agricultural inputs is required for improved production. It is difficult to get such inputs from the nearest market due to the absence of un-interrupted and stable transport means.
- Public facilities available in the area cannot fully serve the population.
- Guardians feel discouraged from sending their children specially girls to school and college for their education.
- People face problem for carrying emergency patients to the health facility close to their locality.
- People cannot use the recreational facility located in and around the commercial center close to their locality.
- In case of social unrest or crime, people cannot move quickly to the law and order authority to inform the situation. At the same time the authority cannot move quickly requiring more time to reach the place of incidence.

Table 8.3-2 shows the existing bridge condition. It is summarized as follows:

- No bridge = 231 sites (73%)
- Timber/Bamboo = 59 sites (19%)
- Permanent bridge in poor condition = 26 sites (8%)

Non-existence of bridge on the river or cannel discourages people to use the road. As a result, the road remains underused. It is expected that the permanent bridge provided by this project will encourage the people to travel and carry goods through the existing road and use it optimally. Crossing the river or canal on temporary bridge made of bamboo or wood is very risky for the road users, especially for women, children and patients.

The above problems will be solved and safe and stable transport means will be secured by this project.

2) Increase of Transport Capacity

Transport capacity of the existing road is very limited due to absence of bridge. In some cases, traffic is completely interrupted especially during rainy season. Transport capacity will be drastically increased by bridge construction.

It is expected that by bridge construction, number of people using the road and commodity volume will increase. Table 8.3-3 shows the expected total traffic volume for all the project bridges. Table 8.3-4 shows the average traffic volume per bridge.

8.3-2 Existing Bridge Condition

Zone	District	No bridge				Timber/Bamboo bridge				Permanent bridge in poor condition				Total			
		Priority 1A	Priority 1B	Priority 1C	Total	Priority 1A	Priority 1B	Priority 1C	Total	Priority 1A	Priority 1B	Priority 1C	Total	Priority 1A	Priority 1B	Priority 1C	Total
Zone-1	Dhaka	12	4	2	18	0	0	0	0	1	0	0	1	13	4	2	19
	Narayanganj	6	5	3	14	0	0	0	0	1	0	0	1	7	5	3	15
	Munshiganj	10	12	3	25	0	2	1	3	0	1	0	1	10	15	4	29
	Manikganj	10	17	8	35	6	3	4	13	1	4	1	6	17	24	13	54
	Narsingdi	0	1	2	3	0	0	0	0	0	0	0	0	0	1	2	3
	Total	**38**	**39**	**18**	**95**	**6**	**5**	**5**	**16**	**3**	**5**	**1**	**9**	**47**	**49**	**24**	**120**
Zone-4	Rajbari	0	0	1	1	3	1	0	4	0	0	0	0	3	1	1	5
	Gopalganj	3	2	0	5	4	2	0	6	1	1	0	2	8	5	0	13
	Faridpur	1	5	2	8	3	1	2	6	0	0	0	0	4	6	4	14
	Total	**4**	**7**	**3**	**14**	**10**	**4**	**2**	**16**	**1**	**1**	**0**	**2**	**15**	**12**	**5**	**32**
Zone-6	Comilla	8	4	0	12	0	0	0	0	1	2	1	4	9	6	1	16
	B-Baria	2	2	2	6	0	0	0	0	0	0	0	0	2	2	2	6
	Chandpur	6	12	0	18	3	1	0	4	0	1	0	1	9	14	0	23
	Feni	5	4	0	9	1	3	0	4	0	1	2	3	6	8	2	16
	Noakhali	6	6	0	12	0	1	0	1	1	1	1	3	7	8	1	16
	Laxmipur	2	1	0	3	0	0	0	0	0	0	1	1	2	1	1	4
	Total	**29**	**29**	**2**	**60**	**4**	**5**	**0**	**9**	**2**	**5**	**5**	**12**	**35**	**39**	**7**	**81**
Zone-13	Natore	3	3	0	6	2	3	1	6	0	0	0	0	5	6	1	12
	Sirajganj	18	1	1	20	4	1	0	5	0	0	0	0	22	2	1	25
	Pabna	1	2	4	7	2	0	1	3	0	0	0	0	3	2	5	10
	Bogra	17	11	1	29	3	1	0	4	0	1	2	3	20	13	3	36
	Total	**39**	**17**	**6**	**62**	**11**	**5**	**2**	**18**	**0**	**1**	**2**	**3**	**50**	**23**	**10**	**83**
	Grand Total	**110**	**92**	**29**	**231**	**31**	**19**	**9**	**59**	**6**	**12**	**8**	**26**	**147**	**123**	**46**	**316**

Table: 8.3-3 Expected Total Traffic Volume

Zone	District	Traffic Volume by Type																													
		Car				Pickup/Truck				Bus				Motorcycle				Rickshaw/Van				Autorickshaw				Bullock Cart				Pedestrian			
		Priority 1A	Priority 1B	Priority 1C	Total	Priority 1A	Priority 1B	Priority 1C	Total	Priority 1A	Priority 1B	Priority 1C	Total	Priority 1A	Priority 1B	Priority 1C	Total	Priority 1A	Priority 1B	Priority 1C	Total	Priority 1A	Priority 1B	Priority 1C	Total	Priority 1A	Priority 1B	Priority 1C	Total	Priority 1A	Priority 1B	Priority 1C	Total
Zone-1	Dhaka	305	30	60	395	295	65	35	395	365	36	105	506	345	160	80	585	2200	500	350	3050	420	70	130	620	69	7	1	77	26900	6700	1500	35100
	Narayanganj	196	55	45	296	110	105	90	305	61	44	38	143	105	295	125	525	900	820	400	2120	95	210	100	405	5	0	0	5	13500	7400	4500	25400
	Munshiganj	240	283	20	543	290	242	40	572	177	60	15	252	470	610	95	1175	1800	2350	450	4600	590	685	120	1395	0	0	15	15	20000	23400	5000	48400
	Manikganj	561	403	141	1105	400	378	114	892	139	216	76	431	815	552	224	1591	2725	3214	1087	7026	402	474	143	1019	534	275	80	889	39800	20985	7326	68111
	Narsingdi	0	5	13	18	0	12	11	23	0	15	3	18	0	30	35	65	0	120	225	345	0	15	35	50	0	0	10	10	0	3000	2100	5100
	Total	**1302**	**776**	**279**	**2357**	**1095**	**802**	**290**	**2187**	**742**	**371**	**237**	**1350**	**1735**	**1647**	**559**	**3941**	**7625**	**7004**	**2512**	**17141**	**1507**	**1454**	**528**	**3489**	**608**	**282**	**106**	**996**	**100200**	**61485**	**20426**	**182111**
Zone-4	Rajbari	20	3	2	25	21	5	2	28	12	4	2	18	75	25	4	104	460	150	50	660	44	12	8	64	24	6	5	35	6700	2000	600	9300
	Gopalganj	37	29	0	66	53	32	0	85	39	26	0	65	180	123	0	303	1265	665	0	1930	113	84	0	197	136	46	0	182	19450	6400	0	25850
	Faridpur	31	18	15	64	37	28	20	85	20	22	14	56	125	88	63	276	575	590	425	1590	73	75	44	192	28	26	23	77	6900	6400	4000	17300
	Total	**88**	**50**	**17**	**155**	**111**	**65**	**22**	**198**	**71**	**52**	**16**	**139**	**380**	**236**	**67**	**683**	**2300**	**1405**	**475**	**4180**	**230**	**171**	**52**	**453**	**188**	**78**	**28**	**294**	**33050**	**14800**	**4600**	**52450**
Zone-6	Comilla	161	84	20	265	156	76	5	237	265	125	30	420	825	490	50	1365	3125	1600	250	4975	1110	440	100	1650	0	0	0	0	33400	24500	4000	61900
	B.Baria	60	35	40	135	50	35	27	112	25	8	6	39	40	50	35	125	260	335	250	845	30	45	23	98	40	0	10	50	3000	3500	2250	8750
	Chandpur	115	205	0	320	123	210	0	333	215	330	0	545	715	1080	0	1795	2420	4385	0	6805	520	1125	0	1645	0	0	0	0	38500	60000	0	98500
	Feni	120	145	35	300	147	195	38	380	235	270	55	560	490	605	140	1235	2200	2200	400	4800	700	755	120	1575	50	65	0	115	29500	40000	8000	77500
	Noakhali	125	185	20	330	169	220	25	414	280	355	40	675	678	945	90	1713	2500	3200	400	6100	860	1020	100	1980	10	10	0	20	38600	45000	5000	88600
	Lakshmipur	30	20	20	70	28	23	15	66	60	35	30	125	155	80	70	305	550	400	250	1200	200	120	100	420	35	0	0	35	8000	5000	6000	19000
	Total	**611**	**674**	**135**	**1420**	**673**	**759**	**110**	**1542**	**1080**	**1123**	**161**	**2364**	**2903**	**3250**	**385**	**6538**	**11055**	**12120**	**1550**	**24725**	**3420**	**3505**	**443**	**7368**	**135**	**75**	**10**	**220**	**151000**	**178000**	**25250**	**354250**
Zone-13	Natore	55	24	3	82	46	29	3	78	28	16	2	46	140	105	20	265	755	650	80	1485	65	58	8	131	51	77	16	144	9800	7750	1500	19050
	Sirajganj	237	14	1	252	400	25	2	427	120	9	1	130	2555	116	10	2681	4400	315	100	4815	178	26	10	214	150	4	40	194	49950	2900	800	53650
	Pabna	28	11	37	76	23	10	32	65	15	6	20	41	80	30	87	197	420	280	520	1220	37	22	61	120	16	14	42	72	5800	2750	5300	13850
	Bogra	154	59	9	222	404	111	20	535	154	55	7	216	2290	990	210	3490	3800	1965	500	6265	170	73	19	262	70	50	10	130	40300	20000	4200	64500
	Total	**474**	**108**	**50**	**632**	**873**	**175**	**57**	**1105**	**317**	**86**	**30**	**433**	**5065**	**1241**	**327**	**6633**	**9375**	**3210**	**1200**	**13785**	**450**	**179**	**98**	**727**	**287**	**145**	**108**	**540**	**105850**	**33400**	**11800**	**151050**
Grand Total		**2475**	**1608**	**481**	**4564**	**2752**	**1801**	**479**	**5032**	**2210**	**1632**	**444**	**4286**	**10083**	**6374**	**1338**	**17795**	**30355**	**23739**	**5737**	**59831**	**5607**	**5309**	**1121**	**12037**	**1218**	**580**	**252**	**2050**	**390100**	**287685**	**62076**	**739861**

Table 8.3-4 Average Traffic Volume per Bridge

	Priority 1A	Priority 1B	Priority 1C	Total
Car	16.8	13.1	10.5	14.4
Pickup/Truck	18.7	14.6	10.4	15.9
Bus	15.0	13.3	9.7	13.6
Motorcycle	68.6	51.8	29.1	56.3
Rickshaw/Van	206.5	193.0	124.7	189.3
Autorickshaw	38.1	43.2	24.4	38.1
Bullock cart	8.3	4.7	5.5	6.5
Pedestrian	2654	2339	1349	2341

3) Saving in Transport Cost

As mentioned in 1) above, 73% of project bridge sites have no exiting bridge and 19% have bamboo or timber bridge good for pedestrians only. In these sites, people usually transport their goods by boat, which requires high cost and time. By bridge construction, transport cost will be saved.

Even at the sites where permanent bridges exist, savings in transport cost are also expected since large vehicles will be able to pass and consequently transport efficiency will be improved after implementation of the project.

4) Saving in Bridge Maintenance Cost

Where locally made bamboo/timber bridges are used for crossing the rivers, maintenance costs and occasional reconstruction costs are required. People of surrounding areas usually bear the costs.

Where permanent bridges exist, the bridges are weak and often require the repair costs.

All these costs will be saved by this project.

5) Improvement of Inhabitants' Daily Life

The road plays an important role in daily life of inhabitants for attending school, commuting, shopping, visiting clinic and mosque, etc. Table 8.3-5 indicates total number of public facilities available to the people in the influence areas of the project bridges. Table 8.3-6 shows the average number of public facilities per bridge.

Table: 8.3-5 Total Number of Public Facilities in the Influence areas of the Project Bridges

Zone	District	School				Clinic				Bazaar				Mosque				Government Office				Others				Total			
		Priority A	Priority B	Priority C	Total	Priority A	Priority B	Priority C	Total	Priority A	Priority B	Priority C	Total	Priority A	Priority B	Priority C	Total	Priority A	Priority B	Priority C	Total	Priority A	Priority B	Priority C	Total	Priority A	Priority B	Priority C	Total
Zone-1	Dhaka	82	27	6	115	29	15	4	48	35	12	3	50	116	36	8	160	46	8	3	57	77	18	8	103	385	116	32	533
	Narayanganj	45	37	15	97	14	14	5	33	23	16	11	50	57	43	18	118	41	12	8	61	44	30	20	94	224	152	77	453
	Munshiganj	74	99	19	192	16	32	7	55	31	38	8	77	125	136	38	299	22	33	12	67	52	75	22	149	320	413	106	839
	Manikganj	125	196	91	412	39	53	24	116	49	68	27	144	115	209	74	398	39	32	10	81	62	97	36	195	429	655	262	1346
	Narsingdi	0	5	10	15	0	2	3	5	0	4	6	10	0	6	19	25	0	3	2	5	0	4	7	11	0	24	47	71
	Total	**326**	**364**	**141**	**831**	**98**	**116**	**43**	**257**	**138**	**138**	**55**	**331**	**413**	**430**	**157**	**1000**	**148**	**88**	**35**	**271**	**235**	**224**	**93**	**552**	**1358**	**1360**	**524**	**3242**
Zone-4	Rajbari	22	5	3	30	5	1	1	7	6	2	2	10	28	8	3	39	6	1	0	7	10	4	3	17	77	21	12	110
	Gopalganj	48	25	0	73	16	7	0	23	19	10	0	29	68	25	0	93	17	11	0	28	30	19	0	49	198	97	0	295
	Faridpur	23	30	14	67	6	6	4	16	9	14	6	29	32	44	24	100	10	7	5	22	16	16	11	43	96	117	64	277
	Total	**93**	**60**	**17**	**170**	**27**	**14**	**5**	**46**	**34**	**26**	**8**	**68**	**128**	**77**	**27**	**232**	**33**	**19**	**5**	**57**	**56**	**39**	**14**	**109**	**371**	**235**	**76**	**682**
Zone-6	Comilla	120	51	6	177	32	17	2	51	52	25	3	80	185	75	7	267	43	27	2	72	38	24	1	63	470	219	21	710
	B. Baria	17	16	15	48	4	4	4	12	7	7	5	19	16	18	20	54	5	2	1	8	2	12	7	21	51	59	52	162
	Chandpur	106	138	0	244	16	23	0	39	57	96	0	153	179	229	0	408	54	103	0	157	87	159	0	246	499	748	0	1247
	Feni	63	74	12	149	10	12	3	25	26	30	9	65	139	207	35	381	32	33	4	69	39	52	15	106	309	408	78	795
	Noakhali	86	119	8	213	19	31	1	51	32	47	3	82	305	345	30	680	24	72	2	98	65	87	7	159	531	701	51	1283
	Lakshmipur	*25*	*10*	*3*	*38*	*7*	*1*	*3*	*11*	*10*	*6*	*2*	*18*	*18*	*40*	*10*	*68*	*8*	*6*	*0*	*14*	*12*	*6*	*5*	*23*	*80*	*69*	*23*	*172*
	Total	**417**	**408**	**44**	**869**	**88**	**88**	**13**	**189**	**184**	**211**	**22**	**417**	**842**	**914**	**102**	**1858**	**166**	**243**	**9**	**418**	**243**	**340**	**35**	**618**	**1940**	**2204**	**225**	**4369**
Zone-13	Natore	44	32	4	80	8	6	2	16	11	8	1	20	59	37	8	104	20	4	1	25	24	20	3	47	166	107	19	292
	Sirajganj	488	20	5	513	131	4	1	136	132	7	1	140	481	16	6	503	126	7	1	134	127	8	4	139	1485	62	18	1565
	Pabna	20	9	35	64	5	2	6	13	6	3	10	19	28	13	41	82	21	3	10	34	16	8	16	40	96	38	118	252
	Bogra	*220*	*108*	*23*	*351*	*75*	*40*	*6*	*121*	*98*	*47*	*7*	*152*	*253*	*145*	*14*	*412*	*81*	*43*	*9*	*133*	*100*	*63*	*13*	*176*	*827*	*446*	*72*	*1345*
	Total	**772**	**169**	**67**	**1008**	**219**	**52**	**15**	**286**	**247**	**65**	**19**	**331**	**821**	**211**	**69**	**1101**	**248**	**57**	**21**	**326**	**267**	**99**	**36**	**402**	**2574**	**653**	**227**	**3454**
Grand Total		**1608**	**1001**	**269**	**2878**	**432**	**270**	**76**	**778**	**603**	**440**	**104**	**1147**	**2204**	**1632**	**355**	**4191**	**595**	**407**	**70**	**1072**	**801**	**702**	**178**	**1681**	**6243**	**4452**	**1052**	**11747**

Table 8.3-6 Average Number of Public Facilities per Bridge

	Priority 1A	Priority 1B	Priority 1C	Total
School	10.9	8.1	5.8	9.1
Clinic	2.9	2.2	1.7	2.5
Bazaar	4.1	3.6	2.3	3.6
Mosque	15.0	13.3	7.7	13.3
Government Office	4.0	3.3	1.5	3.4
Others	5.4	5.7	3.9	5.3
Total	**42.3**	**36.2**	**22.9**	**37.2**

It is expected that people in the influence areas of the project bridges will be able to enjoy all the public facilities and recreational facilities available in the areas, and encouraged to move for more social and community interactions. Thus the project will contribute to the improvement of their quality of life.

8.3.4 Indirect Effects of the Project

1) Encouragement of Road Network Development

In the absence of bridges, the existing roads are not fully utilized. Construction of the bridges where required will make the roads usable effectively. Thus the construction of bridges is a key component of the road network development. Furthermore it will encourage the improvement of the connecting/related roads. Thus the project will make an impact on overall road network development of the area.

2) Acceleration of Agricultural Production

In the project sites, agricultural produces are not effectively transported to the markets due to the gap on the connecting roads which has no bridge or temporary bridge only for pedestrians or permanent bridge with limited loading capacity. Likewise the farmers have difficulty in carrying the agricultural inputs such as fertilizers and seeds. The construction of bridges will solve such situation and reduce the transport cost. The reduction of the transport cost will result in lower agricultural production costs and higher farmgate prices and stimulate the farmer's will to produce marketable crops. As a result, agricultural production will be accelerated.

Table 8.3-7 shows that the project areas produce varieties of agricultural products, of which rice is prominent followed by vegetables. The priority zones with 22% of total land of the country, account for 35% of total population of the country including the capital Dhaka. It demonstrates high demand of agricultural produces especially vegetables. Under such situation, the impact of the project on agricultural development is expected to be big.

3) Promotion of Industries

As previously stated, the project will provide the stable means of transport and accelerate the agricultural production. Transport industries will be promoted by the provision of stable means of transport and agro-based industries such as food processing will be promoted by the increase of agricultural production. Other industries may also be promoted as a result of activation of local economy by the project. Thus the project will give an impact on industrial development.

4) Increase of Employment Opportunities

As a result of industrial development and activation of local economy by the project, employment opportunities will be generated/increased.

5) Stabilization of Prices

Commodity prices depend on demand and supply. If the steady supply is secured, commodity prices will be stabilized and lowered. The project will provide the stable means of transport and thereby help the steady supply of commodities.

Table: 8.3-7 Main Industries and Major Agricultural Products

Zone	District	Main Industries	Major Agricultural Products
Zone-1	Dhaka	Agriculture, Textile	Rice,Jute,Wheat,Vegetables
	Narayanganj	Agriculture, Textile,Paper & Husking mill	Rice, Wheat, Jute, Vegetables
	Munshiganj	Agriculture, Cold Storage,Sppining mill & Poultry	Rice,Wheat,Jute, Vegetables
	Manikganj	Agriculture, Handloom, Husking mill	Rice,Vegetables,Fruit Sugarcane,Fruit
	Narsingdi	Agriculture, Jute mill	Rice,Fruit,Jute, Vegetables
Zone-4	Faridpur	Agriculture	Jute,Rice,Onion,Garlic, Pulses & Sugarcane
	Gopalganj	Agriculture	Jute,Rice,Pulses,Tobacco & Sugarcane
	Rajbari	Agriculture	Jute,Rice,Pulses,Vegetables & Sugarcane
Zone-6	B. Baria	Agriculture	Rice,Wheat & Jute
	Comilla	Agriculture	Rice,Sugarcane,Jute & Wheat
	Chandpur	Agriculture, Fishery	Rice,Sugarcane,Jute,Wheat & Bamboo
	Feni	Agriculture, Fishery & Forestry	Rice,Vegetables,Sugarcane & Fruit
	Lakshmipur	Agriculture, Fishery	Rice,Jute & Vegetables
	Noakhali	Agriculture, Fishery	Rice,Fruits,Vegetables, Sugarcane
Zone-13	Bogra	Agriculture, Fishery,Husking mill, Manufacturing & Saw mill	Rice,Jute,Potato,Vegetables,Maize, Green Chillies & Banana
	Natore	Agriculture	Rice,Jute,Sugarcane, Pulses & Fruit
	Pabna	Agriculture	Rice,Jute,Sugarcane, Pulses,Muster seeds
	Sirajganj	Agriculture, Handloom, Cement Factory & Manufacturing	Rice,Wheat,Jute, Vegetables,Ground nut, Onion

6) Alleviation of Poverty

Bangladesh is poverty-ridden, being trapped in the vicious circle of poverty which is characterized by large scale unemployment and underemployment, low level of income, low productivity due to deficiency of capital, weak technological base, market imperfections and lack of skill. Alleviation of poverty is a major national objective.

The project will contribute to the alleviation of poverty especially of the rural population through the following effects of the project:

- Increase of farmer's income resulting from lower agricultural production costs and higher farmgate prices
- Acceleration of agricultural production
- Promotion of industries
- Expansion of employment opportunities
- Stabilization of prices

7) Promotion of the Effects of Other Development Projects

Effects of rural development projects will not be fully attained without effective transport means. Improvement of road transport by constructing bridges will support/promote the development projects. On the other hand, the rural development projects will generate traffic demand and thus increase the effect of the bridge construction project. The bridge construction project has a synergistic effect with other development projects.

As mentioned in chapter 7.2, there are many development projects in the priority zones and therefore the impact of the bridge construction project on those development projects is expected to be big. Major development projects located in the priority zones are as follows.

- Meghna Bridge Construction Project (Japan's grant)
- Meghna-Gumti Bridge Construction Project (Japan's grant)
- Bangabandhu Bridge (Jamuna Bridge) Construction Project (JBIC, etc)
- Second Road Rehabilitation & Maintenance (IDA)
- Jamuna Bridge Access Road (JBIC, etc)
- Reconstruction of Five Bridges on Dhaka-Chittagong Highway (Japan's grant)
- Third Road Rehabilitation & Maintenance (IDA)
- Paksey Bridge Construction Project (JBIC)
- Southwest Road Network Development Project (ADB, etc)
- Rural Development-II (IDA)
- Model Rural Development Project (Japan's grant)
- Rural Livelihood (ADB)
- Greater Faridpur Infrastructure Development Project (JBIC)
- Narayanganj-Narsingdi Irrigation Project (Japan's grant)
- Rural Poor Cooperative (ADB)
- Northeast Minor Irrigation (ADB)
- Small Scale Water Resources Development (ADB, etc)
- Participatory Livestock Development (ADB, etc)
- Second Small Scale Water Resources Development (ADB, etc)

8.3.5 Preliminary Economic Evaluation

Economic evaluation is made by priority group, i.e. based on the total costs of all the project bridges in each priority group and the total benefits thereof.

1) Traffic Demand

Total traffic demand in terms of number of passengers and freight tonnage is calculated based on the estimated average number of passengers/load per vehicle and the expected traffic volume as shown in Table 8.3-8. This demand may include such demand as is not presently realized due to absence of bridge.

Table 8.3-8 Total Traffic Demand

		Passenger Car	Pickup /Truck	Bus	Motor Cycle	Rickshaw	Auto rickshaw	Vehicle Total	Pedestrian
Average Number of Passengers (person/vehicle)		3	-	30	1.5	1	5		
Average Load (ton/vehicle)		-	1.5	0.25	-	0.05	0.05		
Expected Traffic Volume by Priority Group	1A	2475	2752	2210	10083	30355	5607	53482	390100
	1B	1608	1801	1632	6374	23739	5309	40463	287685
	1C	481	479	444	1338	5737	1121	9600	62076
	Total	*4564*	*5032*	*4286*	*17795*	*59831*	*12037*	*103545*	*739861*
Number of Passengers by Priority Group	1A	7425	-	66300	15125	30355	28035	147240	
	1B	4824	-	48960	9561	23739	26545	113629	
	1C	1443	-	13320	2007	5737	5605	28112	
	Total	**13692**	-	**128580**	**26693**	**59831**	**60185**	**288981**	
Freight Tonnage by Priority Group	1A	-	4128.0	552.5	-	1517.75	280.35	6478.6	
	1B	-	2701.5	408.0	-	1186.95	265.45	4561.9	
	1C	-	718.5	111.0	-	286.85	56.05	1172.4	
	Total	-	*7548.0*	*1071.5*	-	*2991.55*	*601.85*	*12212.9*	

2) Economic Cost

The economic costs are assumed to be 60% of superstructure material costs plus 90% of other costs. The salvage values after the benefit period of 20 years are assumed to be 30% of the initial construction costs. The economic costs and the salvage values are shown in Table 8.3-9.

Table 8.3-9 Economic Costs and Salvage Values

Priority Group	Financial Cost (million Taka)	Economic Cost (million Taka)	Salvage Value (million Taka)
1A	3022.7	2053.7	616.1
1B	2694.5	1826.9	548.1
1C	1200.9	811.8	243.5
Total	**6918.1**	**4692.4**	**1407.7**

3) Benefits

Savings in the following costs are taken into account as the project benefits:

- Vehicle operating cost (VOC)
- Cost for pedestrians to cross the river
- Time cost for passengers and pedestrians

Unit VOC

The unit VOC is shown in Table 8.3-10

Table 8.3-10 Unit Vehicle Operating Cost (VOC)

	Passenger Car	Pickup/ Truck	Bus	Motor Cycle	Rickshaw	Auto-rickshaw
VOC (Taka/km) *	11.62	9.23	9.52	1.11	2.27	1.25
Cost for river ** crossing by boat (50m)	Passenger : 0.75 Taka/person Freight : 37.50Taka/ton					

* Source: RHD Road User Cost Annual Report 2000-2001 (assuming the international roughness index of 14 as the average condition of the approach roads of the project bridges)

** excluding tax and profit (approximately 75% of fare)

VOC in the without project case

The existing bridge conditions are as follows:

- 231 sites : no bridge
- 59 sites : bamboo/timber bridge for pedestrian
- 26 sites : damaged permanent bridge

VOC in the without project case is calculated assuming the typical transportation patterns as follows:

- Pattern-1: 3.5km by autorickshaw+crossing river by boat (50m)+1.5km by rickshaw (40%)
- Pattern-2: 2.0km by rickshaw + crossing river by boat (50m) + 1.5km by rickshaw (60%)

(Note) 1) The above patterns are assumed both for the sites where no bridge exists and the sites where a bamboo/timber bridge exists, assuming that, in the latter sites, the maintenance/reconstruction costs of the bamboo/timber bridge are equivalent to the cost for crossing the river by boat.

2) For the sites where a permanent bridge is existing, it is assumed that the bridge will be used for five years and will be unusable thereafter (no benefit for the first five years and the same benefit as in case of no existing bridge for the remaining years)

Unit VOC in the without project case is calculated as follows:

- Passenger:

Pattern-1:	3.5km autorickshaw	: 1.25Tk/km*3.5km/6person=	0.729Tk/person
	boat (50m)	:	0.750 Tk/person
	1.5km rickshaw	: 2.27Tk/km*1.5km/2person=	1.703Tk/person
	Total	:	3.182Tk/person(40%)
Pattern-2:	2.0km rickshaw	: 2.27Tk/km*2.0km/2person=	2.270Tk/person
	boat (50m)	:	0.750 Tk/person
	1.5km rickshaw	: 2.27Tk/km*1.5km/2person=	1.703Tk/person
	Total	:	4.723Tk/person(60%)
Average	4.1Tk/person (average distance 4.1 km)		

- Freight:

Pattern-1:	3.5km autorickshaw	: 1.25Tk/km*3.5km/0.3ton =	14.583Tk/ton
	boat (50m)	:	37.500Tk/ton
	1.5km rickshaw	: 2.27Tk/km*1.5km/0.1ton =	34.050Tk/ton
	Total	:	86.133Tk/ton (40%)
Pattern-2:	2.0km rickshaw	: 2.27Tk/km*2.0km/0.1ton=	45.400Tk/ton
	boat (50m)	:	37.500Tk/ton
	1.5km rickshaw	: 2.27Tk/km*1.5km/0.1ton=	34.050Tk/ton
	Total	:	116.950Tk/ton (60%)
Average	104.6Tk/ton (average distance 4.1 km)		

VOC in the with project case

VOC in the with project case is calculated as the total vehicle operating costs of the traffic shown in Table 8.3-8 (average distance 4.1 km).

Cost for pedestrians to cross the river in the without project case

Cost for pedestrians to cross the river in the without project case is calculated assuming that:

- At the sites where no bridge exists, crossing the river by boat (with cost).
- At the sites with existing bridge, crossing the river on foot(without cost).

Time Cost for passengers and pedestrians

Savings of the time cost are applied to all passengers and pedestrians for the following periods:

- All benefit period for the site where no bridge or bamboo/timber bridge exists.
- After sixth year for the site where permanent bridge exists.

Saving of time cost is assumed to be 2.00 Taka per person (according to RHD Road User Cost Annual Report 2000-2001, travel time cost is 12 to 27 Taka/hour in case of feeder roads).

Benefits

The benefits are summarized in Table 8.3-11

Table 8.3-11 Benefits

			Priority Group			
			1A	1B	1C	Total
Number of passengers			147240	113629	28112	288981
Freight tonnage			6478.6	4561.9	1172.4	12212.9
Number of pedestrians			390100	287685	62076	739861
Traffic Cost, without case (1,000 Taka/day)	First 5 years	VOC	1229.0	851.0	196.5	2276.6
		Cost for pedestrian to cross the river	218.9	161.4	29.4	409.7
		Time cost saving	1030.8	724.3	149.0	1904.1
	Remaining years	VOC	1281.3	943.1	237.9	2462.3
		Cost for pedestrian to cross the river	218.9	161.4	29.4	409.7
		Time cost saving	1074.7	802.6	180.4	2057.7
Traffic Cost, with case (1,000 Taka/day)	First 5 years	VOC	638.3	438.2	102.1	1178.6
	Remaining years	VOC	665.5	485.6	123.6	1274.7
Benefits (1,000 Taka/day)	First 5 years		1840.5	1298.5	272.8	3411.8
	Remaining years		1909.5	1421.4	324.0	3655.0

4) Economic Evaluation

The economic evaluation results are summarized in Table 8.3-12.

Table 8.3-12 Economic Evaluation

		Priority Group			
		1A	1B	1C	Total
Cost (million Taka)	Year 0	2053.7	1826.9	811.8	4692.4
Annual benefits (million Taka)	Year 1 to 5	671.8	474.0	99.6	1245.3
	Year 6 to 20	697.0	518.8	118.3	1334.1
Salvage value (million Taka)	Year 20	616.1	548.1	243.5	1407.7
Economic internal rate of return (%)		32.9	26.5	12.5	26.9

APPENDIX A

TERMS OF REFERENCE

TERMS OF REFERENCE FOR CONSULTANCY SERVICES FOR THE MASTER PLAN STUDY FOR PORTABLE STEEL BRIDGE CONSTRUCTION ON FEEDER AND RURAL ROADS IN BANGLADESH

1. Objectives of the Study

The objectives of the Study are:

1) to obtain basic data and information on the bridges needing construction/reconstruction on feeder and rural roads;
2) to formulate a master plan for portable steel bridge construction on feeder and rural roads; and
3) to assess the effects of the construction of bridges in the priority zones and to formulate an investment plan thereof.

2. Study Area and Study Bridges

The Study area covers the whole country. Number of the study bridges are summarized as follows:

1) Dhaka Division

Sl. No.	District	Number of Bridges
1.	DHAKA	30
2.	GAZIPUR	15
3.	NARAYANGONJ	12
4.	MUNSHIGONJ	17
5.	MANIKGONJ	47
6.	NARSHINGDI	18
7.	MYMENSHINGH	49
8.	KISHOREGONJ	30
9.	SHERPUR	17
10.	TANGAIL	19
11.	RAJBARI	11
12.	GOPALGONJ	23
13.	JAMALPUR	24
14.	NETRAKONA	21
15.	SHARIATPUR	67
16.	FARIDPUR	26
17.	MADARIPUR	46
		472

2) Chittagong Division

18.	CHITTAGONG	72
19.	COMILLA	49
20.	B. BARIA	34
21.	CHANDPUR	30
22.	FENI	28
23.	NOAKHALI	28
24.	LAXMIPUR	9
25.	COX'S BAZAR	26
26.	RANGAMATI	13
27.	KHAGRACHARI	11
28.	BANDARBAN	2
		302

3) Sylhet Division

29.	SYLHET	42
30.	MOULVI BAZAR	19
31.	SUNAMGONJ	34
32.	HABIGONJ	12
		107

4) Khulna Division

33.	KHULNA	35
34.	BAGERHAT	38
35.	JESSORE	15
36.	SATKHIRA	17
37.	JHENAIDAH	11
38.	MAGURA	7
39.	KUSHTIA	13
40.	NARAIL	5
41.	MEHERPUR	6
42.	CHUADANGA	8
		155

5) Barisal Division

43.	BARISAL	109
44.	BHOLA	10
45.	PIROJPUR	34
46.	JHALAKATHI	23
47.	BORGUNA	23
48.	PATUAKHALI	28
		227

6) Rajshahi Division

49.	RAJSHAHI	24
50.	GAIBANDHA	28
51.	RANGPUR	25
52.	NATORE	18
53.	NAOGAON	21
54.	NABABGONJ	6
55.	SIRAJGONJ	33
56.	PABNA	32
57.	BOGRA	32
58.	DINAJPUR	32
59.	PANCHAGAR	4
60.	THAKURGAON	12
61.	LALMONIRHAT	9
62.	NILPHAMARI	19
63.	JOYPURHAT	13
64.	KURIGRAM	8
		316

7) Total number of the study bridges : 1579

3. Scope of the Study

In order to achieve the objectives mentioned above, the Study shall cover the following items:

1) Preparation of location map of the study bridges

- Thana base map showing the study bridges, connecting roads and rivers/khals.
- Whole country map showing district boundaries, arterial roads and the study bridges.

2) Division into zones

- Division of whole country into 14 to 16 zones, each of which covers approximately 100 to 120 study bridges.

3) Collection of socio-economic data by zone

Collect the following data and compile them by zone:

- Land area
- Population
- Gross regional product by industrial sector
- Production of major agricultural crops
- Average income
- Incidence of poverty
- Ethnic group (population by group)
- Number of schools by category
- Number of health facilities by category
- Number of Growth Centers/ Hat Bazaars
- Road length by road class
- Number of bridges by road class

4) Collection of information of relevant projects

- Major ODA projects, the effects of which may be promoted by feeder and rural road improvement in the affected areas (project name, sector, major components, implementation period, project location, fund source, cost, etc.)

- Portable steel bridge construction projects (completed, on-going and planned) (project name, number of bridges, total bridge length, implementation period, project location, fund source, cost, etc.)

5) Evaluation of the zones on effect and urgency of bridge construction

- Factors of socio-economic constraint due to insufficiency of bridges (items and their magnitudes)
- Evaluation of urgency of bridge construction

6) Request to LGED local offices for providing basic data of the study bridges

Assist LGED Central Office in requesting its Thana offices to submit the basic data of the study bridges to District offices, and follow it up. Basic data include the following:

- Location (District, Thana, road ID number and chainage)
- Present condition of the bridge
  - Existing or not
  - Bridge length
  - Bridge width/ carriageway width
  - Superstructure type
  - Substructure type
  - Usage of bridge (all vehicles/ light vehicles only/ pedestrians only)
  - Existing condition (fair/ weak/ damaged/ collapsed)
- Connecting road/ approach road condition
  - Road class
  - Road width
  - Surface type
- Surface condition
- Detour road length
- Socio-economic condition of the influence area (the area benefited by the bridge)
  - Population
  - Main industry
  - Major agricultural products
  - Public facilities (school, clinic, bazaar, mosque, government office, etc.)

- Traffic volume by category (car, rickshaw, pedestrian)
- Proposed bridge length and span lengths
- Specific project covering the bridge if any
- Relative priority (high/ medium/ low) with justification

For the study bridges which have been constructed in recent years, provide such information as location, bridge length, bridge width, carriageway width, superstructure type, substructure type, construction year and fund source, instead of the above information.

7) Collection of the basic data of the study bridges and spot check

- Collection of the basic data at District offices and confirmation of the sufficiency of the data
- Spot check at bridge sites for approximately 10% of the total study bridges

8) Study on fund availability and implementation system

- Estimation of the possible fund for the project
- Study on the implementation system including maintenance
- Identification of problems in the implementation system and recommendation for improvement

9) Formulation of master plan for portable steel bridge construction

- Establishment of criteria for prioritization of the zones
- Prioritization of the zones
- Establishment of criteria for selection of the bridges to be included in the master plan (project bridges)
- Selection of the project bridges
- Establishment of criteria for prioritization of the project bridges
- Categorization of the project bridges by priority
- Rough cost estimate of each project bridge with breakdown into detailed design cost, steel material cost and other construction cost
- Preparation of implementation program

10) Selection of priority zones

- Selection of priority zones covering approximately 360 project bridges

11) Site survey of the project bridges in the priority zones

Survey items shall include the following:

- Location (District, Thana, road ID number and chainage)
- Present condition of the bridge
  - Existing or not
  - Bridge length
  - Bridge width/ carriageway width
  - Superstructure type
  - Substructure type
  - Usage of bridge (all vehicles/ light vehicles only/ pedestrians only)
- Existing condition (fair/ weak/ damaged/ collapsed)
- Present navigation clearance height
- River condition
  - Flood water depth
- Flood water width
- Lowest water depth
- Tidal fluctuations(if any)
- Water velocity (fast/medium/slow)
- Angle of bridge to direction of stream
- Required navigation clearance height with type of river traffic
- Condition of bank/riverbed scour
- Connecting road/ approach road condition
  - Road class
  - Total road width
- Carriageway width
- Embankment height
  - Surface type
  - Surface condition
  - Detour road length
- Socio-economic condition of the influence area
  - Population
  - Main industry
  - Major agricultural products
  - Public facilities (school, clinic, bazaar, mosque, government office, etc.)

- Traffic volume
  - Passenger car
  - Pick-up/truck
  - Bus
  - Rickshaw
  - Motorcycle
  - Pedestrian
- Bridge site condition
  - Land use
  - Topography
  - Necessity of realignment of approach road
- Proposed bridge length, span lengths and bridge width/ carriageway width
- Environmental issue
  - Necessary land to be additionally acquired
  - Number of houses to be relocated
  - Necessity of removal of obstruction other than houses

Take photographs of the bridge from 4 directions, and make a bridge site plan by sketch.

12) Formulation of investment plan for the project bridges in the priority zones

13) Assessment of project effects
- Number of beneficiaries
- Number of vehicles using the bridges (car, rickshaw)
- Average distance to be saved by eliminating detour
- Number of social facilities to which accessibility will be improved
- Qualitative assessment of other project effects, including promotion of the effect of other project

4. Study Schedule

The Study will be carried out in two phases, with durations of approximately 1.5 months for Phase-1 and approximately 5.0 months for Phase-2. Items 1) to 6) and half of 7) of the scope of the Study mentioned in 3 above will be performed in Phase-1 and remains in Phase-2.

- Traffic volume
  - Passenger car
  - Pick-up/truck
  - Bus
  - Rickshaw
  - Motorcycle
  - Pedestrian
- Bridge site condition
  - Land use
  - Topography
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5. Reporting

The Consultant shall prepare and submit the following reports in English to JICA :

1) Inception Report

Major contents	:	Methodology and schedule of the Study
No. of copies	:	30 copies
Expected date	:	Within one (1) week after commencement of Phase-1 of the Study

2) Progress Report

Major contents	:	Compilation of socio-economic data of each zone and evaluation of effect and urgency of bridge construction in each zone
No. of copies	:	30 copies
Expected date	:	Within 1.5 months after commencement of Phase-1 of the Study

3) Interim Report

Major contents	:	Master plan for portable steel bridge construction and selection of priority zones
No. of copies	:	30 copies
Expected date	:	Within 2 months after commencement of Phase-2 of the Study

4) Draft Final Report

Major contents	:	All results of the Study
No. of copies	:	30 copies
Expected date	:	Within 4 months after commencement of Phase-2 of the Study

JICA Bangladesh Office will provide the study team with comments within two (2) weeks after receipt of Draft Final Report.

5) Final Report

Major contents	:	All results of the Study with necessary amendments based on the comments
No. of copies	:	50 copies (offset printing with color)
Expected date	:	Within 5 months after commencement of Phase-2 of the Study
Attachment	:	3 copies each of location map and bridge site photographs in separate volumes

6. Establishment of Coordination Committee

For the effective implementation of the Study, a Coordinating Committee will be established which comprises Local Government Engineering Department as counterpart agency, JICA Bangladesh Office, other relevant governmental and non-governmental agencies. The Consultant is required to present and discuss the result of analysis and issues periodically.