Draft Final

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

RURAL ROAD MASTER PLAN

(MAIN TEXT)

LOCAL GOVERNMENT ENGINEERING DEPARTMENT

Local Government Division

MINISTRY OF LOCAL GOVERNMENT, RURAL DEVELOPMENT AND COOPERATIVES

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Table of Contents

		Page
1.0	Introduction	1
1.1	Socio-Economic Context of Bangladesh	1
1.2	Responsibilities of LGED	1
2.0	Strategy for Rural Development in Bangladesh	1
2.1	Comilla Model of Early 1960s	1
2.2	Strategy for Rural Development (RD) Projects, 1984	2
2.3	Bangladesh Rural Infrastructure Strategy Study, 1996	2
3.0	The Present Classification of Road System in Bangladesh	3
3.1	Road Types, Definition and Ownership/Responsibility as per Planning Commission's Notification, 2003	3
3.2	Rural Road Improvement Components and Future Vision	4
3.3	Rural Road Network	5
3.4	Rural Market and Growth Center	7
3.5	Participation of Union Parishad in Rural Infrastructure Development Activities	8
4.0	Development Impact of Rural Infrastructure	10
4.1	Findings of IFPRI-BIDS Research Report, 1990	10
4.2	Findings of Other Studies	12
5.0	National Strategy for Accelerated Poverty Reduction, 2004	13
5.1	Outlining the Poverty Reduction Strategy	13
5.2	Issues Relating to Infrastructure Development	14
5.3	Issues Relating to Road Infrastructure Improvement	15
6.0	Strategic Issues/Considerations and Investment Prioritisation	15
6.1	Strategic Issues/Considerations	15
6.2	Investment Prioritisation	16
7.0	Need for Master Plan for Improvement of Core Rural Road Network	17
7.1	Objectives of Rural Road Master Plan	17
7.2	Criteria for Selection of Core Rural Road Network Improvement	17
8.0	Status of Rural Infrastructure: Improved and Further Requirement (Road, Growth center/Rural Market and Union Parishad)	18
8.1	Rural Infrastructure Improved	18
8.2	Rural Infrastructure Not Covered by On-going LGED Projects	18
8.3	Further Need for Rural Infrastructure Development/Improvement and Resource Requirement	20
9.0	Resource Requirement for Rural Road Maintenance	21
10.0	Summary of Resource Requirement for Total Development, Rehabilitation and Maintenance in 5-Year Phasing	23
11.0	Guiding Principles to be followed by LGED for Rural Infrastructure Development/Improvement	25
12.0	Conclusion	25
	References	

List of Tables

		Page
Table-1	Feeder and Rural Road Network Classification and Definition	3
Table-2	Road Types, Definition and Ownership/Responsibility in Bangladesh	3
Table-3	Road Condition under Different Category Roads (Bituminous and Rigid Pavement)	5
Table-4	Surface Type, Structures and Existing Gaps	6
Table-5	Typical Gaps by Type of Road, Meters per Kilometer	6
Table-6	Total Length/Number of Rural Infrastructure: Improved and to be Improved	18
Table-7	Length/Number of Rural Infrastructure to be Improved: Covered under On-going Projects and Remaining	19
Table-8	Length/Number of Rural Infrastructure to be Improved and Resource Requirement	20
Table-9	Estimation of Resource for Road Maintenance, 2005-06	21
Table-10	Estimation of Resources and Rehabilitation	22
Table-11	Summary of Maintenance and Rehabilitation Need for FY: 2005-06	22
Table-12	Summary of Development, Rehabilitation and Maintenance Activities	24

List of Annexes

Annex-1	Summary of Development, Rehabilitation and Maintenance Activities (Year-wise)
Annex-2	Present and Projected Financing for Rural Infrastructure Development and Maintenance
Annex-3	Year-wise Road Development Plan and Resource Requirement
Annex-4	Year-wise Bridge/Culverts Development Plan and Resource Requirement
Annex-5	Year-wise Road Rehabilitation Plan and Resource Requirement
Annex-6	Year-wise Bridge/Culverts Rehabilitation Plan and Resource Requirement
Annex-7	Year-wise Growth Center and Rural Market Development Plan and Resource Requirement
Annex-8	Year-wise Union Parishad Development Plan and Resource Requirement
Annex-9	Year-wise Maintenance Plan and Resource Requirement
Annex-10	Tentative Maintenance Cost During Design Life Period of Upazila and Union Road for Flexible and Brick Pavement
Annex-11	Unit Cost for Development, Rehabilitation and Maintenance Works
Annex-12	Rural Road Master Plan-Rajshahi Division
Annex-13	Rural Road Master Plan-Khulna Division
Annex-14	Rural Road Master Plan-Dhaka Division
Annex-15	Rural Road Master Plan-Chittagong Division
Annex-16	Rural Road Master Plan-Barisal Division
Annex-17	Rural Road Master Plan-Sylhet Division

1.0 Introduction

1.1 Socio-Economic Context of Bangladesh

Bangladesh is overwhelmingly rural, very thickly populated and a vast majority of the population lives in the rural areas. It is estimated that about 76% of its population live in the rural areas, majority of whom fall below the poverty line and about half of them is considered as hard-core poor. Low production and productivity in all sectors, high dependence on agriculture, low purchasing power, high population growth, low literacy rate are the major problems of the economy as a whole. Amenities of life in the rural areas are inadequate.

Bangladesh is having high density of roads predominantly earthen in nature. However the paved road network in the country has increased steadily since independence in 1971 from 3600 km to 46000 km currently. It is evident that the improvement of rural road network has underpinned the economic growth, business and employment opportunities and agricultural production of the country.

1.2 Responsibilities of LGED

The local Government Engineering Department (LGED) under the Local Government Division of the Ministry of Local Government, Rural Development and Cooperatives (MoLGRD&C) is responsible for, construction, maintenance of Upazila Road, Union Road and Village Road along with the Local Government Institutions (LGIs) to improve transport network, development of rural market infrastructure and thereby contributing towards employment generation and poverty reduction. LGED is also responsible for providing technical support to LGIs both in rural and urban areas of the country.

2.0 Strategy for Rural Development in Bangladesh

2.1 Comilla Model of Early 1960s

The rural development programmes of the Government, which has originated in the early 1960s was conceptualised essentially as an instrument for providing support for increased agricultural production. The rural development model known as the “Comilla Model” emphasised the formation of cooperatives and the integration of support services provided by the Government departments. The model had four major elements and three elements of the Comilla Model were related to development of rural infrastructure as indicated below:

- Two tire cooperatives – Krishak Samabaya Samity (KSS) and Thana Central Cooperative Association (TCCA)
- Rural works programme (RWP)
- Thana Irrigation Programme (TIP)
- Thana Training and Development Centre (TTDC).

Thus the Comilla Model paved the way for development of the rural roads in the country under the RWP and LGED started implementing rural road improvement projects with support from the donors and GoB, as stated earlier

2.2 Strategy for Rural Development (RD) Projects, 1984

The Government of Bangladesh formulated the strategy for Rural Development Projects[1] with the broad objective of improving the quality of life of the rural people. The strategy adopted an integrated approach for formulating Rural development projects that contained the three elements as follows:

- Physical infrastructure including roads, storage and markets
- Irrigated agriculture, minor drainage and flood control work
- Production and employment programmes for the rural poor

For construction of the roads, the strategy considered the Growth Centre and Union Parishad connecting roads.

2.3 Bangladesh Rural Infrastructure Strategy Study, 1996

Later in 1996, Bangladesh Rural Infrastructure Strategy Study[2] was jointly conducted by GoB and the World Bank to check the validity of 1984 strategy. The main conclusions of the study were:

- 'The strategy of Growth Centre based approach (which focuses public investments on selected Growth Centres, where selections were made based on some well defined criteria to indicate their socio-economic importance) remains valid'.

- 'No major changes are required, only some readjustment or "fine tuning" may be justified in light of the experience acquired from the implementation of different RD Projects'.

- 'Targets will have to be reset after the recent increase from 1400 to 2100 Growth Centres and regional priorities will have to be redefined in view of the national potentials of the region'.

- 'Some minor readjustment will be needed in the spatial distribution of infrastructure development project investments to be in line with agriculture production and potential'

The study recommendations include among others the following:

- More emphasis on user/community participation in planning, implementation and monitoring phases.

- More use of local resources, such as, local materials, and the continued use of labour intensive techniques with appropriate equipment.

- Coordination in the use of complementary modes of transportation, especially waterways.

- Increasing the role of private sector and further strengthening of the capacity of contractors operating at the rural areas, who provide cost effective, labour intensive skills and resources to enhance the future sustainability of the rural infrastructure system.

[1] Strategy for Rural Development Projects (A Sectoral Policy Paper) by Bangladesh Planning Commission, January, 1984

[2] Bangladesh Rural Infrastructure Strategy Study prepared by SAI Infrastructure Division of the World Bank in association with LGED and RD&I Wing of the planning commission in 1996

- Institutional strengthening of LGED and its wide network at local levels with a great orientation towards community participation.

- Greater priority based investment programmes and highest emphasis on establishment of sustainable maintenance system for already built road infrastructure.

The 1996 strategy study includes, inter alia, Road Classification and composition of Feeder Road Type-A (FRA), Feeder Road Type-B (FRB), Rural Road Class-1 (R1), Rural Road Class-2 (R2), Rural Road Class-3 (R3) comprising category and definition as indicated in **Table-1.**

Table-1: Feeder and Rural Road Network Classification and Definition

Seq.	Category	Definition
1.	National Highway (NH)	Connecting national capital with divisional head quarters, old district headquarters, port cities and international highways;
2.	Regional Highway (RH)	Connecting different regions with each other, which are not connected by the national highways;
3.	Feeder Road Type-A (FRA)	Connecting Thana headquarters to the arterial network;
4.	Feeder Road Type-B (FRB)	Connecting growth centres to the RHD network (FRA or arterial road) or to the Thana Headquarters;
5.	Rural Road Class 1 (R1)	Connecting union headquarters/local markets with the Thana headquarters or road system;
6.	Rural Road Class 2 (R2)	Connecting villages and farms to local markets/union headquarters; and
7.	Rural Road Class 3 (R3)	Roads within villages

Source: World Bank, Bangladesh Rural Infrastructure Strategy study, 1996, pp. 4-5

3.0 The Present Classification of Road System in Bangladesh

3.1 Road Types, Definitions and Ownership/Responsibility as per Planning Commission's Notification, 2003

In November 2003, the Government has made a change to earlier road classification system and delineated the ownership/responsibility of each category of roads for their improvement and maintenance. (Bangladesh Gazette volume-I, dated 6th November 2003). The new definition classifies the road system into six main categories. The road type/category, definition and, ownership and responsibility are listed in Table 2:

Table 2: Road Types, Definitions and Ownership/Responsibility in Bangladesh[3]

Sl. No	Type/Category	Definition	Ownership/ Responsibility
1.	National Highway	Highways connecting National capital with Divisional HQs or seaports or land ports or Asian Highway.	RHD*

[3] Published in the Bangladesh Gazette, volume 1, 6th November, 2003

Sl. No	Type/Category	Definition	Ownership/ Responsibility
2.	Regional Highway	Highways connecting District HQs or main river or land ports or with each other not connected by National Highways.	RHD
3.	Zila Road	Roads connecting District HQ/s with Upazila HQ/s or connecting one Upazila HQ to another Upazila HQ by a single main connection with National/Regional Highway, through shortest distance/route.	RHD
4.	Upazila Road	Roads connecting Upazila HQ/s with Growth Center/s or one Growth Center with another Growth Center by a single main connection or connecting Growth Center to Higher Road System**, through shortest distance/route.	LGED*/ LGI*
5.	Union Road	Roads connecting Union HQ/s with Upazila HQs, growth centres or local markets or with each other.	LGED/ LGI
6.	Village Road	a) Roads connecting Villages with Union HQs, local markets, farms and ghats or with each other. b) Roads within a Village.	LGED/ LGI

1. The roads belong to the Pourashavas and the City Corporations have not been included under the above list. The responsibility for development and maintenance of such roads will lie with the respective Pourashavas and the City Corporations.

* LGED – Local Government Engineering Department, RHD – Roads and Highways Department, LGI - Local Government Institutions.

** Higher Road System - National Highway, Regional Highways, and Zila Roads.

3.2 Rural Road Improvement Components and Future Vision

Based on the rural development and rural infrastructure development strategies as stated above, the rural road improvement projects have included the following components during different five-year plan periods:

- ❖ Development of rural hats and bazaars identified as Growth Centres.
- ❖ Construction/Improvement of Upazila Roads connecting Upazila HQs with Growth Centres and Union Roads connecting Union HQs with Upazila HQs, Growth Centres or local rural markets.
- ❖ Construction of bridges/culverts on the above roads.

The components of rural road and Growth Centre/Market improvement as a package were included in such rural infrastructure development projects to increase agricultural production, ensure better

availability of agricultural inputs and facilitate transportation and marketing of agricultural produces and generation of employment opportunities in the farm and non-farm sectors.

In addition, promoting local governance is an added dimension in the process of rural development in Bangladesh. For better service delivery and local development activities by the Union Parishad and ensuring community participation including transparency and accountability, improvement of Union Roads and construction of Union Parishad Complexes have assumed much greater importance than before.

3.3 Rural Road Network

The roads under the jurisdiction of LGED play a significant role to serve the vast rural Bangladesh. They provide local access to markets, farms, social and welfare institutions; village service delivery centres and markets where buyers and sellers assemble to trade products of agriculture and rural cottage industries and other consumer goods. They also provide access to modern agricultural inputs, such as, fertiliser, certified seeds and pesticides. During the 1970s, 1980s and 1990s, the GoB invested heavily in expanding the rural road network through Food for Works and other Rural Development Programmes. During the last decades, GoB's major effort has been focusing on improving the condition of the rural road network. The main activities have included improving road embankments, bituminous carpeting and improvement of drainage facility.

The road condition survey conducted throughout the country during 2003-04, revealed that many Upazila Roads, Union Roads and Village Roads were still in poor to bad condition due to inadequate funding in spite of introduction of improved road maintenance management system in LGED. The survey shows that 51% paved Upazila Road, 60% paved Union Road and 64% paved Village Road are in good condition (**Table 3**).

Of the total 36166 km of Upazila Road about 21277 km or 59% and total of 42329 km of Union Road about 11780km or 28% are paved with some sort of hard surfacing (**Table 4**). The last road condition survey in 2004 also indicates that the total 4861 km of bituminous and rigid pavement roads and 12389 km of brick pavement roads, all together 17250 km of improved roads need major rehabilitation to bring them to good black top road standard. More details of the road inventory data are presented in Annexes.

Table 3: Road Condition under Different Category Roads (Bituminous and Rigid Pavement)

ROAD TYPE	NUMBER OF ROAD	TOTAL LENGTH (Km)	LENGTH OF BC & RIGID PVT. ROAD (Km)	CONDITION OF BC & RIGID PVT. ROAD (Km)			
				GOOD	FAIR	POOR	BAD
Upazila Road	4254	36166	17889	9119	5851	1993	925
Union Road	7510	42329	8513	5149	2219	809	335
Village Road-A	29719	94059	6501	4106	1690	518	187
Village Road-B	38268	77276	1082	796	192	70	24
TOTAL	79751	249830	33985	19170	9952	3390	1471

Table 4: Surface Type, Structure and Existing Gaps

ROAD TYPE	NUMBER OF ROAD	TOTAL LENGTH (Km)	SURFACE TYPE-WISE BREAKE-UP (Km)				STRUCTURE		EXISTING GAP	
			EARTHEN	FLEXIBLE PAVEMENT (BC)	BRICK PAVEMENT (WBM/HBB/BFS)	RIGID PAVEMENT (CC/RCC)	NUMBER	SPAN (m)	NUMBER	SPAN (m)
Upazila Road	4254	36166	14889	17664	3388	225	46698	270060	6314	112233
Union Road	7510	42329	30551	8320	3267	193	43320	205142	11164	125267
Village Road-A	29719	94059	83195	6322	4363	179	51604	230439	28018	216957
Village Road-B	38268	77276	74824	1025	1371	57	23094	92703	24733	156226
TOTAL	79751	249830	203459	33331	12389	654	164716	798344	70229	610683

The existing rural roads are characterised by inadequate drainage facility and large gaps. Relatively flat and low-lying terrain of the country as well as heavy rainfall might be attributed to this. The gaps on the roads are a major hindrance to people's mobility during monsoon while the inadequate drainage facility causes damage to embankments, crops and creates other problems associated with water-logging.

At present, the average structure length per Kilometre of road is:

- 7.46 metre per km. on Upazila Road,
- 4.85 metre per km. on Union Road and
- 1.85 metre per km. on Village Road.

However per km existing opening including the existing gaps is a little bit higher. The estimated average structure length would stand at about:

- 10.56 metres per km of Upazila Road,
- 7.80 metres per km of Union Road and
- 4.06 metres per km of Village Road.

It may be mentioned that the Planning Commission in "Road Design Standards" prescribed standards of typical gaps by type of road as follows:

Table 5: Typical Gaps by Type of Road, Metres per Kilometre

Road Type	Road Design Type	Geographical location			
		Swampy	Hilly	Haor*	Plane
Zila Road	Types 3,4,5	10 - 15	7-15	10 -15	6 - 10
Upazila & Union Road	Type 6, 5, 4 Types 8, 7				

** To be determined case by case*

Existing structure density on Upazila Road is although close to the requirement for the plane areas however is inadequate for roads in haor, swampy or hilly areas. The density on the Union and Village road is far below the requirement. The above situation depicts that we need to provide structures on the existing gaps as well as provide additional opening for drainage and build structures where necessary.

According to the updated database, known gaps need bridging at 6314, 11164 and 52751 locations on Upazila Road, Union Road and Village Road respectively requiring one structure for every 5.73

km for Upazila Roads, 3.79 km for Union Roads and 3.25 km for Village Roads. This totals 610683 linear metres of new structures. (See **Table 4** above). In addition to that there is a large number of damaged structures those need immediate rehabilitation.

Many factors contribute to the poor condition of roads:

a) Most of the roads were built as footpaths with labour-intensive technology under FFW. Many of the embankments were built with poor compaction and no structures. While the road network does provide important service to rural Bangladesh, it also is a burden because of the high need of maintenance.
b) The poor nature of soil available to build embankments contributes to poor road conditions. Suitable construction materials are rare, even for road embankment construction and while for surfacing higher-grade materials are required, which are either imported or transported from distant places. On average, embankments as high as 4.5 metres are required to keep the road surface above the high flood level during monsoon season. Bridges and culverts are required to cross innumerable rivers and these requirements make the cost of building roads in Bangladesh one of the highest in the world and also it demands greater attention to be devoted to maintenance. At the same time, the extensiveness of the rural road network in Bangladesh also makes its maintenance to an acceptable condition very difficult. It appears that the higher the road density or the larger the network within a district, the more likely that road conditions, both in terms of surveyed conditions and number of gaps, will be poor. It is also evidenced that the poor condition of rural road infrastructure implies a negative impact on agricultural productivity and constrained marketing opportunity.

3.4 Rural Market and Growth Center

Bangladesh has an extensive network of about 17363 rural markets, or 'hats', comprising:

- 12863 primary markets, used primarily by the farmers selling surplus produces to local consumers and local traders.
- 1000 local assembly markets, used by farmers and local traders exchanging with intermediary traders who move agricultural produce upto higher level of marketing system, and for sale of foodstuffs, agricultural inputs and retail goods.
- About 3500 secondary markets, typically serve the Upazilas. They are used by intermediary traders exchanging with large buyers, and are focal points for wholesale and retail sale of agricultural and non-agricultural goods and services.

A complex, multi-stage trading systems prevail in rural Bangladesh for the accumulation and evacuation of surplus agricultural produce and the distribution of imported goods. Crops and other goods change hands several times between the producers and the final consumers, and different categories of trader are present at different levels of the marketing system. The more important markets are characterised by the presence of permanent and semi-permanent structures including shops, storage facilities, crop processing enterprises, banks, post offices etc. Many of the more important markets are centres for trading of a wide variety of agricultural produce and other goods, but some focus on the exchange of large quantities of particular commodity, such as, rice, cattle, locally produced cloth etc.

Toward the early part of 1990s, the Planning Commission of Bangladesh adopted a policy of identifying selected important markets as Growth Centres, to be the focal point of rural development where investments in rural economy and social infrastructure should be concentrated. 1408 rural

local assembly and secondary markets were designated as Growth Centre by the Planning Commission in 1990s selected with participation by the local authorities based on a set of guidelines that includes the revenue potentials, trading volume, area/population served, minimum distance between neighbouring Growth Centres, etc. In 1994, an additional number of 700 markets were selected by the Planning Commission, reflecting population growth and regional growth, giving a current total of 2100 Growth Centres. Each Upazila has at least three Growth Centres and maximum seven; there is one Growth Centre for every two Union Parishads.

3.5 Participation of Union Parishad in Rural Infrastructure Development Activities

Article 59 of the constitution of the People's Republic of Bangladesh provided that "Local Government in every administrative unit of the republic shall be entrusted to bodies, composed of persons elected in accordance with law". In sub-section 3A of the Local Government (Union Parishad) Ordinance, 1983 (as modified upto the 31st July, 2002), it has been stipulated that "Every Union shall be an administrative unit for the purpose of Article 59 of the Constitution of the People Republic of Bangladesh".

The Union Parishad (UP) has had a continuous existence since the 1880s, being the oldest local government institution (LGI) in the country. Though their functions and compositions have changed over time, UPs are currently the only elected statutory local government institution in the rural area. The Local Government (Union Parishads) Ordinance of 1983 and its subsequent amendments provide the legislative framework for UPs with defined roles and responsibilities.

The Union Parishads have civic functions, police and defence functions, revenue and general administrative functions and development functions.

UPs are broadly responsible for economic, social and community development at the local level and have 38 defined functions, of which the most important ones are:

- Maintenance of law and order, and assistance to administration in the maintenance of law and order.
- Adoption of development schemes in the field of measures for preventing crime, disorder and smuggling.
- Planning and implementation of development schemes in the fields of agriculture, forestry, fisheries, livestock, education, health, small and micro-enterprises, communications, irrigation and flood control, with a view to increase the economic and social upliftment of the people.
- Promotion of family planning.
- Development of local resources and their use.
- Protection and maintenance of public property such as roads, bridges, canals, embankments, markets, telephones and electricity lines.
- Review the development activities of all agencies at the Union level and to make recommendations to the Upazila Nirbahi Officer and to make recommendations to the "Upazila Nirbhahi " officer in regard to their activities.
- Motivation and persuasion of the people to install and use sanitary latrines.
- Registration of births, deaths, blinds, beggars and destitute.
- Conducting of census of all kinds.

Union Parishads have the power to raise revenue from 6 (Six) sources as stipulated in the ordinance which include, inter-alia, the following:

- Fees (lease money) from specified hats, bazaars and ferries within the union boundaries to be determined by the government.
- Fees (lease money) from jalmahals entirely within the union boundaries to be determined by the government.

In addition, the Ups receive grant from the central government. Certain measures have recently been adopted by the GoB to increase the resource-flow to Ups for development activities. These are:

- The proportion of market lease revenue, which is transferred to central government, has been reduced from 35% to 25%.
- The market lease value threshold at which a proportion (45%) of the revenue flows to Upazila, rather than to Union, level for development activities has been raised from Tk.50,000 to Tk. 100,000.
- There is a 2% tax on all land transfers. UPs now receive half the tax (1%) on land transfers within their boundaries.

The civic functions of Union Parishad includes adoption and implementation of development schemes in the field of communication, irrigation and flood protection and protection & maintenance of public property, such as, roads, bridges, canals, embankments etc. To carry out the development function, the union parishad will prepare and implement development plans.

To facilitate preparation and implementation of union development plans, LGED, with the approval from the Ministry of Local Government, Rural Development & Co-operatives (MoLGRD&C) prepared and distributed union plan books in 1992 and 1999. The plan books included the following factors and the union parishad prepared development schemes in various sectors with technical support from LGED:

- Road Development Plan including Bridge/Culvert.
- Growth Center/Market Development Plan.
- Embankment construction, Khal re-excavation and Sluice Gate/Regulator construction plan.
- Union Parishad Complex (UPC) construction plan.
- Cyclone Shelter/Flood Refuge/Killa construction plan.

The Union Parishad identifies, plans and implements the above types of scheme following the union plan book and involves the community in the process. The Union Parishads provides facilitating support to the above community organization/groups and render assistance to LGED in planning and implementation of infrastructure development and maintenance activities, at the local level. In particular, the roles of the union parishad include the following:

- Give proposals for infrastructure development schemes.
- Assist in the formation of Labour Contracting Society (LCS)
- Provide assistance in road maintenance activities and support to Road Maintenance Association (RMA).
- Arrange cost sharing of road maintenance/road development schemes.
- Take part in the activities of the Market Management Committees (MMC)
- Facilitate the activities of the Women Market Committees (WMC)
- Be involved in Ghat Management Committee (GMC) activities.
- Take part in the activities of Road User's Committee (RUC).

In the policy matrix on promoting Local Governance under the National Strategy for Accelerated Poverty Reduction (December, 2004), the key targets/concerns indicated are effective strengthening of Union Parishads and strengthen resources position of the Union Parishads. It has also been indicated in the policy matrix that the limited number of Union Parishad Complexes have so far been built.

To strengthen the institutional and functional bases of the Union Parishads for effective local development and promoting local governance, the GoB has decided to construct Union Parishad Complex (UPC) buildings at all the Unions to house the UPs and the Union level offices of different government departments. Thus the UPC would facilitate the UPs to coordinate all development activities and services more efficiently and would be a one-stop centre for providing services to the rural people.

The government plans to construct all 4489 Union Parishad Complex buildings through out the country in phases. Under different Rural Development Projects of LGED, provisions have been made to construct 2979 Union Parishad Complexes (**Annex-8**) and the rest will be constructed by other GoB/Donor financed project(s).

4. Developmental Impact of Rural Infrastructure

4.1 Findings of IFPRI-BIDS Research Report, 1990[4]

This is the most important study on the Developmental Impact of Rural Infrastructure in Bangladesh and the summary of findings of the Research Report include, inter-alia, the following:

- The study empirically addresses issues in the neglected area of research on how infrastructure affects growth of income and alleviation of poverty in a developing economy. Contrary to the conventional view that development of rural infrastructure is likely to aggravate poverty, it finds that the development of rural infrastructure has far-reaching implications for the alleviation of poverty by indirectly generating income.

- The study focuses on household economies in Bangladesh and concentrates on the benefits of infrastructure, particularly for the poorest segments of the population. It identifies, describes and measures the effects of development of rural infrastructure on agricultural production, employment, income, consumption, savings and investment and market and social development. Because transport and roads are the key contributors to development in rural areas, they are the primary form of infrastructure considered in this study.

- Estimates of user-cost savings typically used to measure the effects of new roads in developed countries are not adequate for measuring the profound structural changes brought about by the construction of infrastructure in developing countries. Studies to measure the effects of road development, electrification and institutional development have primarily focused on agricultural production and emphasized the contribution of individual factors when these factors are highly correlated.

- Infrastructure affects agricultural production indirectly through prices, diffusion of technology and the use of inputs. The study finds that fertilizer prices are 14 percent lower and labour costs 12

[4] Research Report 83: Developmental Impact of Rural Infrastructure in Bangladesh, October 1999, International Food Policy Research Institute in collaboration with the Bangladesh Institute of Development Studies

percent higher in the developed villages than in the underdeveloped. Moreover, 105 percent more farmland is irrigated, 71 percent more is sown with high yielding varieties (HYVs), and use of fertilizer is 92 percent higher in developed villages.

- The combined effects of wider and more efficient use of new technology as a result of infrastructure development is estimated to have increased agricultural production in developed areas as much as 32 percent.

- The most important finding of the study is the profound effect that infrastructure has on incomes of the poor. Overall, estimations based on the most and least developed villages indicate that infrastructure endowment causes household income to rise by 33 percent, income from agriculture increases about 24 percent, that from livestock and fisheries about 78 percent, that from wages almost doubles, but income from business and industries only rises by 17 percent. Most striking, however, is the distribution of these increase: the functionally landless and small farmers get a larger share of the increases from crops, wages and livestock and fisheries, while the large landowners capture most of the smaller increase in business and industries.

- Households in developed areas spend a large share of this incremental income on non-cereal foods, non-foods and services, which generates additional rounds of economic growth.

- According to this study, infrastructure development increases the speed of diffusion of agricultural technology, reduces the cost of marketing and improves the operation of both input and product markets, through improved linkages with other sectors.

- A comprehensive framework is used to measure the influences of infrastructure on household savings and investment, a key factor in sustaining economic growth. The savings rate, which averages about 14 percent, is slightly higher in developed villages.

- Infrastructure development encourages savings and investment indirectly through its positive effect on income.

- In examining the effects of infrastructure on social development, such as, education and health conditions in rural areas, development of infrastructure did not have a significant direct effect on literacy, which appears to be closely related to the size of households, land holding and a persons sex. The study does show, however, that infrastructure development has a positive effect on health.

- Because the effects of infrastructure on rural development are so definitive in agriculture-based, low-income developing countries, a fresh look at policies to encourage rural infrastructure development is called for. All potential infrastructure projects should be identified, ranked according to their benefit-cost ratios, and funded accordingly. But determining benefits is a challenging task and good judgment will always be required. In addition, strong local government institutions should be built up, the flow of government funds should be linked to local initiatives, and revenue sharing between local and central governments should be arranged.

4.2 Findings of others studies

Some findings and conclusions of international/regional studies about LGED's role in rural infrastructure development and effects of such development towards various beneficiary groups are indicated below:

Report of the Independent South Asian Commission on Poverty Alleviation[5]

In case study 36 on Decentralized Rural Infrastructure: the LGED story (Bangladesh), the following has been included:

Even towards the end of the 1980s, most villages of Bangladesh were not connected by all weather infrastructure. Within a decade, the situation has dramatically changed; most villages are now linked to a network of all-weather rural roads called Feeder Roads. This has had a major impact on poverty allowing greater mobility to the poor, easier access of rural goods to urban markets and stronger capacity of the government to deal with emergencies and natural disasters. This highly successful decentralized rural infrastructure strategy has been spearheaded by the Local Government Engineering Department (LGED), a public sector agency marked by the critical institutional attributes of decentralization, professionalism, monitoring system, informal decision-making, leadership, team work and sense of mission. As a central agency, LGED has been distinguished by its emphasis on human resource development and use of ICT. In 2002-2003, LGED's annual development budget allocation amounted to US$ 342 million.

Infrastructure development activities of LGED are planned and implemented through community participation process involving beneficiaries, project affected persons, local government institutions and NGOs. The community includes all the stages of scheme cycle, such as, identification, selection, planning, design, implementation/construction, operation & maintenance, cost sharing and monitoring/evaluation. As a part of participatory development, management and operation, beneficiary groups and user committees, such as, Labour Contracting Society (LCS) formed by groups of landless men and women labourers, Road Maintenance Association (RMA), Market Management Committee (MMC), Ghat Management Committee (GMC), Road User's Committee (RUC) have been formed under various project of LGED.

Case study 12 no women corner in market-centers (Bangladesh) includes the following:

- A key constraint to greater participation of women in trading and marketing activities is the physical environment of market-centers which tend to be highly unfriendly for women. Lack of toilet facilities, inability to compete for physical space and generally inhospitable environment deter women from playing a larger role in the market-centers. With these constraints in mind, Local Government Engineering Department (LGED), a government agency, has launched the Women's Corner Project within its larger rural development strategy of building growth centers in the rural areas. Within each selected growth center, a separate structure containing several outlets and common facilities are being built to accommodate poor women entrepreneurs. The women sign lease contracts with the municipal authorities on prescribed formats prepared by LGED. The premise can only be used for trading and marketing activities. The project is in its early stages but has generated significant enthusiasm.
- ADB review of November-December, 2002 issue in one of its article entitled "Making Infrastructure Work in Bangladesh" highlighted the beneficial impact of Women Market Section in Bangladesh.

[5] Report of the Independent South Asian Commission on Poverty Alleviation.

- The publication of the International Labour Office, ILO, Geneva in its 2005 year issue focussed the partnership of LGED and RDP-21 with many institutions including local government, NGOs, donor agencies, and community organisations. Partnership takes a variety of forms, from memoranda of understanding signed with other government and non-government agencies to ongoing coordination and discussion with donor agencies and sharing of reports and other information.

In particular, **partnership with local institutions and initiatives has been a key factor in the project's success.** It is largely due to community initiatives that many rural women have come out of their homes, obtained social security and begun to do business in the women's market sections or to sell their products in the open sheds of the markets. The chairs of Union Parishads and Market Management Committees provides support to the women sellers and buyers.
Each local market has a Market Management Committee and a Trader's Association, in both of which the women's market section is represented by the chairperson of the Women's Market Section Management Committee. Women's representation in the Market Management Committee is compulsory because it has been incorporated in the government's policy guidelines and approved by the Ministry of Local Government, Rural Development and Co-operatives.

The report further indicates the ways in which RDP-21 of LGED has created employment and promoted equal opportunities for women and men:

- As February 2004, 768 women have been allocated shops in the markets;
- 40 percent of the open shed space in the growth center markets has been utilised by women temporary vendors for selling their products;
- 733 women vendors in women's market sections have been trained in shop management and trading skills development;
- 1830 women from the Labour Contracting Society (LCS) programme, who have received one day's on-the-job training and have individual savings bank accounts, have been enrolled in the routine maintenance and tree plantation programme;
- 935 women have been trained in awareness-raising and income-generating activities and, following this training, some LCS women have started up their own income-generating activities, using their compulsory savings;
- An orientation training course for the elected representatives of Union Parishads, on local administration, village courts, resource mobilisation, financial management, etc., began in January 2004 and will continue to the end of the year. By February 2004 about 700 chairmen and members had been trained, of whom 78 are women representatives with reserved seats. The training will eventually cover 996 unions of the 13 districts of RDP-21;
- A total of 4038 Union Parishad chairs, secretaries, and members (men and women) have been trained, of whom 938 were female Union Parishad members;
- Its partners now deem LGED a gender-sensitive organisation.

5.0 National strategy for Accelerated Poverty Reduction, 2004[6]

5.1 Outlining the Poverty Reduction Strategy

Bangladesh faces a triple challenge in building a road map for accelerated poverty reduction. These are: firstly, build on past achievements while preventing slippages, secondly, address the multidimensionality of poverty through a strategic choice of priorities, and thirdly, unlock the agency

[6] Unlocking the Potential: National Strategy for Accelerated Poverty Reduction, General Economic Division, Planning Commission, December 2004

potentials of the nation through an optimal mix of public action, private initiatives and community mobilization. The policy triangle on which such a road map broadly rests is constituted of:

- Pro-poor economic growth,
- Human development, and
- Governance.

There are eight specific avenues - four strategic blocks and four supporting strategies through which the goal of accelerated poverty reduction will be pursued. These are:

- **Firstly** supportive macroeconomics to ensure rapid growth with particular focus on stable macroeconomic balances, improved regulatory environment. Higher private investment and increased in flow of FDIs, effective trade and competition policies, and poor and gender sensitive budgetary process;
- **Secondly**, choice of critical sectors to maximize pro-poor benefits from the growth process with special emphasis on the rural, agriculture, informal and SME sectors, improved connectivity through rural electrification, roads, and telecommunications;
- **Thirdly**, safety net measures to protect the poor, especially women, against anticipated and unanticipated income/consumption shocks through targeted and other efforts;
- **Fourthly**, human development of the poor for raising their capability through education, health, nutrition and social interventions;
- **Fifthly**, participation and empowerment of the poor, specially women, and other disadvantaged and marginalized groups such as disabled, ethnic minorities, ecologically vulnerable;
- **Sixthly**, promoting good governance through improving implementation capacity, promoting local governance, tackling corruption, enhancing access to justice for the poor, and improving sectoral governance;
- **Seventhly**, improving service-delivery in the areas of basic needs; and
- **Eighthly,** caring for environment and its sustainability;

5.2 Issues Relating to Infrastructure Development:

A good infrastructure is critical for higher economic growth, poverty reduction and social development. It plays a pivotal role, *inter alia*, in product diversification, trade expansion, provisioning of basic services, increasing productivity, decreasing production cost, and thereby, enhancement of quality of life and welfare of people. Infrastructure facilities provide impetus to the growth-poverty nexus through three distinctive channels:

- **First**, physical infrastructure services directly affect the socio-economic condition of people (for example, access to health, education, water supply and sanitation, rural roads, electricity and similar infrastructure) and enhance the capabilities of the poor,
- **Second**, Infrastructure services help the poor in availing themselves of the economic opportunities of growth e.g. through better access to markets and services; increased inter-sectoral and inter-regional labour migration; and investment in more profitable economic activities.
- **Third**, infrastructure helps in the realization of the benefits of policy reforms through providing the needed socio-economic and spatial integration of the economy.

Notwithstanding all the merits and essential roles that infrastructure may impart, infrastructure deficiencies continue to act as a major drag on Bangladesh's development efforts. Inadequate coverage, poor management and inefficiency of publicly managed utilities have created a huge fiscal burden and restricted the much-needed expansion of infrastructure services to meet the

growing needs of the economy. Therefore, it would be appropriate to adopt a new approach to infrastructure development involving reorientation of sectoral priorities and increased private participation so as to alleviate infrastructure bottlenecks. Keeping this in mind, it would be prudent to design and implement a comprehensive reform agenda for infrastructure development and management through a carefully sequenced approach to ensure reduced physical distribution costs and improved services delivery to the poor people and the backward areas. Major components of the physical infrastructure in Bangladesh are: power (rural and urban); gas; renewable energy, including solar energy; coal and other minerals; transport (road, railway, inland water and air) and ports (sea, air and land). However, all of these suffer from numerous problems.

5.3 Issues Relating to Road Infrastructure Improvement:

In order to accelerate the income multiplier effects and employment generation from infrastructure development the following actions have been suggested:

- Priority will be given to the creation of macro and micro-level interactions, i.e. through close interactions between the central and local government institutions.
- A proper decentralization of design, implementation and management of rural infrastructure programmes will have far-reaching implications for cost effectiveness, maintenance and provision for sustainable infrastructure services.
- To maximize the impact of decentralization, the formal rural infrastructure programmes (e.g. those implemented by LGED or REB) should focus on provision of basic economic and social services in collaboration with different local agencies, NGOs and the private sector based on sharing of responsibilities through experience and best practice examples.
- To realize this, the overall responsibilities of local level institutions should be enhanced.
- In order to ensure efficient planning, implementation, and operation and maintenance of the rural infrastructure, a community participation process needs to be adopted with involvement of local governance institutions, NGOs beneficiary groups, user committees, and the private sector.

6.0 Strategic Issues/Considerations and Investment Prioritisation:

Based on the policy/strategy documents and implementation experience, there is a need for identifying the strategic issues/considerations and investment prioritisation of rural road improvement in Bangladesh.

6.1 Strategic Issues/Considerations:

The strategic considerations include, inter-alia, the following:

- The poor condition of existing rural roads, even though fairly extensive, seriously limits their usefulness. An immediate priority is to invest in improving the existing road quality, through better surfaces and bridging road gaps, rather than constructing new roads.

- Even with a concerted effort on the part of the Government to improve infrastructure facilities over the past decade, only modest gains have been realised. A major effort has to be made over the future to improve the Growth Centres, because of the high association between Growth Centres and local socio-economic development.
- The high priority Growth Centre connecting Upazila Roads require well engineered construction and good pavement in view of the potentially high traffic level and increased buses/trucks movement after improvement. For rest of the road system, where traffic is generally low high investment is not justified, and the focus should be to provide all-weather accessibility.
- While there exists a close match between distribution of good roads and the demand for those facilities, some areas have been given inadequate attention in the past, which affect adversely to their growth potentials – more emphasis on road improvement and maintenance are to be provided to improve the over-all road-condition.
- Inadequate attention has been paid to provide berthing facilities of the country boats along with development of Growth Centre in Rural Infrastructural Development Projects, even though they are an important aspect of rural life. In future, adequate measures have to be taken so that this natural endowment is fully utilised.

6.2 Investment Prioritisation

Maintenance Priority: for sustainability, it is important to have adequate maintenance systems and a viable funding mechanism based on local resources, emphasising local participation and ownership. Maintenance needs are increasing from annual Tk.1.3 billion in 1996 to about Tk.5.50 billion in 2005. The Government and the local bodies should make special efforts to fully fund these needs. LGED is making major efforts to improve maintenance efficiency and local participation. The use of labour-based methods in road maintenance further enhances sustainability and affordability.

There are competing needs for various aspects of rural infrastructure. Upazila roads, Union Roads, markets, ghat facilities, need GoB's close attention. Even for roads alone, there is need for improvement, maintenance, and bridging gaps. At the spatial level, there are competing needs for different geographical regions. It is, therefore, necessary to develop a guideline for investment prioritisation and selectivity. Calculation of economic return should guide the major investment decisions.

The first priority should be to maintain those roads, which are functionally important, and currently in reasonable condition – that is to first define a core network for maintenance. Routine Maintenance and periodic maintenance should be identified as specific components of rural road priorities with defined tasks and budgets and measurable outputs with monitoring/accountability. Since Village Roads are mostly footpaths within the villages, they should be excluded from the core network. As for the Union Roads, socio-economic analysis has to be made in order to determine if a road section should be included in the core road network.

The second priority is to improve from earth to paved roads from among the important Upazila Roads, Union Roads, and at the same time, to provide all weather accessibility to all other rural roads (Union Road and Village Road-A) by constructing culverts/bridges to bridge the existing gaps, and with some ancillary earth works for spot improvement.

The third priority is to improve Growth Centres and the construction of ghat facilities at Growth Centres located on the bank of inland waterways; this will help better integration of the rural transport and trading system. Also construction of Union Parishad Complexes for local socio-economic and governance development will be included under this category of priority.

The fourth priority for rural roads spending should be to selectively add roads to the maintainable core road network through rehabilitation and upgrading, including spot improvement of drainage and badly damaged road sections. Separate provisions should be made for reconstruction works required to keep lower quality roads open and serviceable.

7.0 Need for Master Plan for Development/Improvement of Core Rural Road Network

7.1 Objectives of Rural Road Master Plan:

In view of the needed investment prioritisation, it is necessary for LGED to prepare a master plan for Upazila roads, Union roads and Village Roads along with Growth Centres/Rural Markets, Ghats and Union Parishad Complexes. The objectives of Rural Road Master Plan will be:

- To identify/prioritise a most useful and effective rural road network through out the country to ease the rural life as a whole.
- To provide all weather access to all Growth Centres, all Union Parishads Complexes, most of the rural markets and other service delivery centres of the rural areas.
- To improve rural accessibility for facilitating agricultural production and marketing of different products.
- To reduce poverty through employment generation and accelerating economic activities in rural areas.
- To strengthen the Local Government Institutions and promoting local governance.

7.2 Criteria for Selection of Core Rural Road Network Improvement

The criteria for selection of core rural road network improvement will be as follows:

- Route selection will be based on network approach and no scattered road-link should be selected.
- Basic rural road master plan network will consist of the road links connecting Growth Centres with Upazila HQs, Growth Centre to Growth Centre, and Growth Centre to higher road system (NH, RH or ZR).
- All these links will be single main connection, shortest route and not necessarily be limited within Upazila or district boundary and maximise community benefits.
- Road links connecting Union HQ to Upazila HQ, Union HQ to Growth Centre, Union HQ to Rural Markets, and one Union HQ to another Union HQ will be part of Rural Road Master Plan.
- Road links connecting maximum number of Rural Markets, villages and other socio-economic infrastructure like schools, hospitals etc. of the area will get preference.
- The partially developed route will get preference over the newly proposed route under the master plan to maximise immediate benefit.

8.0 Status of Rural Infrastructure: Developed/Improved and Further Requirement (Road, Growth Centre/Rural Market and Union Parishad)

8.1 Rural Infrastructure Developed/Improved

The total length of the Upazila road, Union road and Village road along with bridge/culvert and the total number of growth centre and Union Parishad Complex developed so far and the total length/number to be developed are given in **Table 6.**

Table 6: Total Length/Number of Rural Infrastructure: Improved and to be Improved

Component	Total Length/ Number	Total Length/ Number Improved	Total Length/ Number Partially Improved	Total Length/ Number Unimproved	Total Length/ Number to be Improved
1	2	3	4	5	6 (4+5)
Upazila Road					
Road (km)	**36166**	**17889 (49%)**	**3388**	**14889**	**18277**
Bridge/Culvert (m)	**382293**	**270060 (71%)**		**112233**	**112233**
Union Road					
Road (km)	**42329**	**8513 (20%)**	**3267**	**30551**	**33818**
Bridge/Culvert (m)	**330409**	**205142 (62%)**		**125267**	**125267**
Village Road - A					
Road (km)	**94059**	**6501 (7%)**	**4363**	**83195**	**87558**
Bridge/Culvert (m)	**447396**	**230439 (52%)**		**216957**	**216957**
Village Road - B					
Road (km)	**77276**	**1082 (1%)**	**1371**	**74824**	**76195**
Bridge/Culvert (m)	**248929**	**92703 (37%)**		**156226**	**156226**
Growth Centre (no)	**2100**	**1059 (50%)**		**1041**	**1041**
Rural Market (no)	**15263**	**956 (6%)**		**14307**	**14307**
Union Parishad Complex (no)	**4489**	**1510 (34%)**		**2979**	**2979**

8.2 Rural Infrastructure Not Covered by On-Going LGED Projects

The total length/number of rural infrastructure to be developed, total length/number already included under the existing projects of LGED and need for further developments are given **Table 7**.

Table 7: Length/Number of Rural Infrastructure to be Improved: Covered under On-Going Projects and Remaining

Component	Total Length/ Number to be Improved	Requirement of Fund (Million Taka)
Upazila Road (to be Completed by 2014-15)		
Road (km)	18277 (100%)	104482
Bridge/Culvert (m)	112233 (100%)	49411
Union Road (to be Completed by 2019-20)		
Road (km)	33818 (100%)	200174
Bridge/Culvert (m)	125267 (100%)	45302
Village Road-A (to be Completed by 2024-25)		
Road (km)	0	0
Bridge/Culvert (m)	216957 (100%)	120678
Village Road-B (to be Completed by 2024-25)		
Road (km)	0	0
Bridge/Culvert (m)	0	0
Growth Center (no.) (to be Completed by 2009-10)	1041 (100%)	4146
Rural Market (no.) (to be Completed by 2024-25)	14307 (100%)	69314
Union Parishad Complex (no.) (to be Completed by 2009-10)	2979 (100%)	12358
	Total:	**Tk.605865 Million.**

8.3 Further Need for Rural Infrastructure Improvement and Resource Requirement

The total length/number of rural infrastructure to be developed/improved beyond the length/number covered under the existing LGED projects and resource requirement for development of those are given in **Table 8.**

Table 8: Length/Number of Rural Infrastructure to be Improved & Resource Requirement

Component	Target		Provision under Different Projects		Remaining	
	Total Length/ Number to be Improved	Requirement of Fund (Million Tk.)	Total Length/ Number to be Improved	Requirement of Fund (Million Tk.)	Total Length/ Number to be Improved	Requirement of Fund (Million Tk.)
1	2	3	4	5	6 (2-4)	7 (3-5)
Upazila Road (to be completed by 2014-15)						
Road (km)	18277 (100%)	104482	5400 (30%)	16190	12877 (70%)	88292
Bridge/Culvert (m)	112233 (100%)	49411	28742 (25%)	4560	83491 (75%)	44851
Union Road (to be completed by 2019-20)						
Road (km)	33818 (100%)	200174	5762 (17%)	10450	28056 (83%)	189724
Bridge/Culvert (m)	125267 (100%)	45302	30751 (25%)	4420	94516 (75%)	40882
Village Road (to be completed by 2024-25)						
Road (km)	0	0	0	0	0	0
Bridge/Culvert (m)	216957 (100%)	120678	13010 (6%)	1540	203947 (94%)	119138
Growth Center (no.) (to be completed by 2009-10)	1041 (100%)	4146	510 (49%)	1560	531 (51%)	2586
Rural Market (no.) (to be completed by 2024-25)	14307 (100%)	69314	340 (2%)	610	13967 (98%)	68704
Union Parishad Complex (no.)	2979 (100%)	12358	1151 (39%)	3450	1828 (61%)	8908

Component	Target		Provision under Different Projects		Remaining	
	Total Length/ Number to be Improved	Requirement of Fund (Million Tk.)	Total Length/ Number to be Improved	Requirement of Fund (Million Tk.)	Total Length/ Number to be Improved	Requirement of Fund (Million Tk.)
1	2	3	4	5	6 (2-4)	7 (3-5)
(to be completed by 2009-10)						
Total:		**Tk.605865 Million**		**Tk.42780 Million**		**Tk.563085 Million**

9.0 Resources Requirement for Rural Road Maintenance

To ensure the sustainability of the rural infrastructure being developed/improved, it is important to build up a good maintenance system and a viable funding mechanism based on national and local resources, particularly for its ever-increasing nature of maintenance need. GoB has accepted this principle and has allocated substantial funds for maintenance, in spite of its limited revenue capability, has actually indicated its commitment towards maintenance of rural road infrastructure. The LGED has set up a national maintenance system and this system is being decentralised more operationally efficient. Currently, funds for maintenance come from domestic Government revenue, part of foreign aided Food-for-Work programme and maintenance component of foreign aided projects.

Maintenance Need for 2005-06 as an Example and Basis for Calculation

Estimation of resources for routine and periodic maintenance of LGED's important road network during 2005-06 as per road and structure database (updated in February 2005) and standard cost estimate is given in T**able 9** below:

Table 9: Estimation of Resource for Road Maintenance, 2005- 06

Component	Routine Maintenance		Periodic Maintenance		Total Cost (million Tk)
	Length (km/m)	Cost (Million Tk)	Length (km/m)	Cost (Million Tk)	
Upazila Road	32624	708	6435	2953	3661
Union Road (paved portion)	10620	238	4263	1158	1396
Bridge/culvert on Upazila Road	270060	6	27006	297	303
Bridge/culvert on Union Road	205142	5	20514	181	186
Total:		**957**		**4589**	**5546**

Further to the above, a part of the improved road network will require extensive repairs, which are in addition to the regular routine and periodic maintenance requirements. Lack of adequate fund for normal maintenance operations over a number of years has produced such backlog of maintenance work.

The resource requirement for rehabilitation has been estimated considering the condition of the road and structure as per the updated road inventory and standard cost is shown in **Table 10** below:

Table 10: Estimation of Resources for Rehabilitation

Component	Length	Cost (million Tk)
Upazila Road	925 km	2775.0
Union Road	335 km	840.0
Bridge/culvert on Upazila Road	11762 m	2940
Bridge/culvert on Union Road	7500 m	1500.0
Total:		**8055.0** **Say 8100 mil.**

The estimated cost for rehabilitation of the roads and structures as of present condition is Tk 8100 Million, which is a quiet big amount. It is neither possible to arrange fund nor practical to undertake the whole rehabilitation work within a short span of time (1-2 years) in addition to normal maintenance activities funding. Therefore, a medium to long term planning is required to address the problem of backlog maintenance. Once these damaged/bad roads and structures are brought back to maintainable standard, normal routine and periodic maintenance programme could be implemented with small rehabilitation in certain intervals.

In addition to this damaged length, every year about 1/20th of the total paved road length would be added to the rehabilitation obligation, as their designed life would be over requiring major rehabilitation. Detailed year-wise rehabilitation plan and resource requirements are shown in the Annex-1.

During the year 2004-05, an amount of Tk 1200 Million was channelled through GoB revenue budget, which was received from Japan Debt Cancellation Programme to implement such reconstruction work by LGED. Accordingly, detailed programme has been drawn up to implement the project and progress achieved so far is very satisfactory. For the next year (2005-06), an amount of Tk 1200 Million is being proposed for the same purpose.

Based on the above estimate, a summary of total road maintenance and rehabilitation need for 2005-06 is shown in **Table 11** below;

Table 11: Summary of Maintenance and Rehabilitation Need for FY: 2005-06

a.	Routine Maintenance	Tk 957.0 Million
b.	Periodic Maintenance	Tk 4589.0 Million
	Maintenance Total:	**Tk 5546.0 Million**
c.	Rehabilitation	Tk 4802.0 Million
	Total:	**Tk 10348.0 Million** **Tk 10350 Million (say)**

Out of the total maintenance and rehabilitation need (Tk 10350 Million) for 2005-06, GoB will provide Tk 2800 Million for general maintenance work (covering routine and periodic maintenance) from the national revenue budget. In addition, the allocation from maintenance component of various RD Projects and food aid support is expected to be at the same level as was in the previous year of 2004-05 amounting to Tk 1000 Million. This gives an impression that the fund from the above sources for routine and periodic maintenance would be around Tk 3800 Million, which is only 69% of the total maintenance need of 2005-06. The rehabilitation need will be met from the development funding from GoB and foreign donor sources and the phasing are shown in the Annexes.

10.0 Summary of Resource Requirement for Total Development, Rehabilitation and Maintenance in 5-Year Phasing

Based on the above calculations, resource requirements of total improvement, rehabilitation and maintenance activities in 5-year phasing of the rural infrastructure is shown in **Table-12** which are in first 5-years Tk .210631 million, in second 5-years Tk. 352542 million, in third 5-years Tk. 549267 million and in the fourth 5-years Tk.695487 million. The projected figures indicate that the expenditure for improvement works will be increasing at a moderate rate upto the middle of third 5-year phase of proposed planning period and will be followed by a steady decrease. The requirement of funds for rehabilitation would reach almost a constant rate by the same time with an initial higher rate of increase in the early years as seen the Figure given below. For the maintenance activities, the need will keep increasing each year almost at a steady rate throughout the whole master plan period.

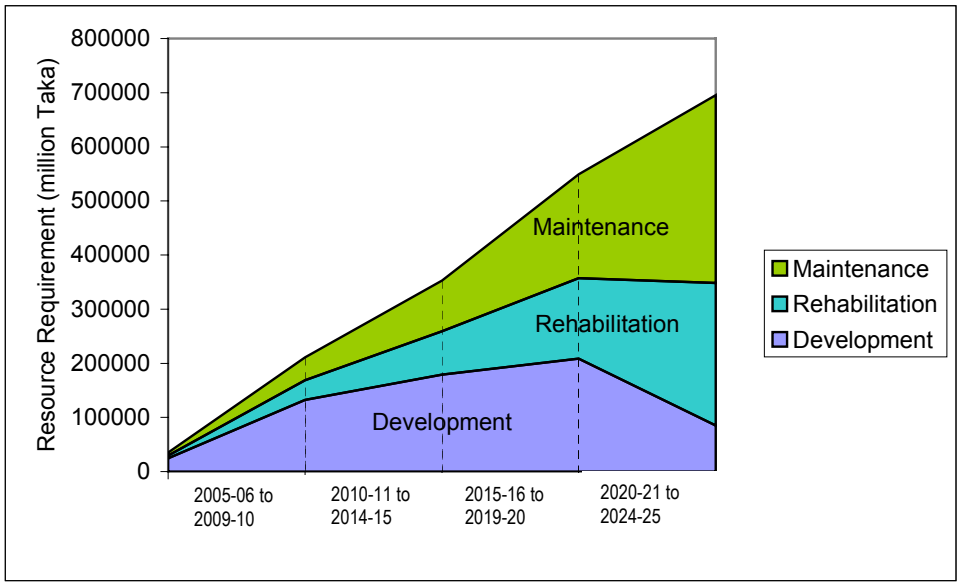


Table-12: Summary of Development, Rehabilitation and Maintenance Activities

(Financial Figure in million Taka (MT))

Activities	Sl No	Component	Unit	Physical Target and Resource Requirement			
				1st 5 Year (2005-06 to 2009-10)	2nd 5 Year (2010-11 to 2014-15)	3rd 5 Year (2015-16 to 2019-20)	4th 5 Year (2020-21 to 2024-25)
Development	1	Upazila Road	Physical (km)	9543	8734	0	0
			Finalcial (MT)	41816	62666	0	0
	2	Bridge/Culvert on Upazila Road	Physical (m)	55437	56796	0	0
			Finalcial (MT)	18697	30714	0	0
	3	Unon Road	Physical (km)	8561	7791	17464	0
			Finalcial (MT)	26782	39545	133847	0
	4	Bridge/Culvert on Union Road	Physical (m)	46505	39381	39381	0
			Finalcial (MT)	9924	13552	21826	0
	5	Bridge/Culvert on Village Road-A	Physical (m)	54989	54989	54989	54989
			Finalcial (MT)	12348	20816	33524	53990
	6	Growth Center	Physical (no.)	1041		0	0
			Finalcial (MT)	4146		0	0
	7	Rural Market	Physical (no.)	3160	3716	3716	3716
			Finalcial (MT)	6568	12056	19417	31271
	8	Union Parishad Complex	Physical (no.)	2979		0	0
			Finalcial (MT)	12358		0	0
	Total		Finalcial (MT)	132640	179349	208614	85262
Rehabilitation	1	Upazila Road	Physical (km)	5967	8191	9042	9042
			Finalcial (MT)	23595	51905	91344	147111
	2	Bridge/Culvert on Upazila Road	Physical (m)	5881	5881	0	0
			Finalcial (MT)	1975	3180	0	0
	3	Union Road	Physical (km)	3077	5025	8254	10582
			Finalcial (MT)	8257	21518	57223	115830
	4	Bridge/Culvert on Union Road	Physical (m)	3750	3750	0	0
			Finalcial (MT)	881	1420	0	0
	5	Bridge/Culvert on Village Road-A	Physical (m)	5209	5209	0	0
			Finalcial (MT)	1224	1972	0	0
	Total		Finalcial (MT)	35933	79995	148568	262941
Maintenance	1	Upazila Road	Finalcial (MT)	26804	56862	104762	168721
	2	Bridge/Culvert on Upazila Road	Finalcial (MT)	1973	3789	6659	10724
	3	Union Road	Finalcial (MT)	12054	30220	76369	160424
	4	Bridge/Culvert on Union Road	Finalcial (MT)	1227	2327	4296	7415
	Total		Finalcial (MT)	42058	93198	192086	347284
Grand Total			Finalcial (MT)	210631	352542	549267	695487

11.0 Guiding Principles to be Followed by LGED for Rural Infrastructure Development/Improvement

The guiding principles to be followed by LGED for rural infrastructure development/improvement will be derived from the findings of Effect/Benefit/Impact Studies carried out in respect of rural infrastructure development projects and the Principles/elements as included in the National strategy for Accelerated Poverty Reduction, December 2004.

12.0 Conclusion

The development of rural infrastructure by LGED will not be limited to the output related activities only, such as, improved rural road, growth centre/market, and Union Parishad office. In the process of delivery of the above output related service, LGED will parallely adopt process related activities by involving the local government institutions, beneficiaries of the community, Non-Government Organizations (NGOs)/Community Based Organizations (CBOs) and the private sector entities in planning, implementation and operation & maintenance of rural infrastructure. With the above two-prone approaches for rural infrastructure development, (output and process), the activities of LGED will directly and indirectly contribute towards providing sustainable rural infrastructure, stimulating farm and non-farm activities, promoting employment, strengthening Local Government Institutions, promoting local governance and reducing poverty.

Annex-1

Summary of Development, Rehabilitation and Maintenance Activities (Year-Wise) (2005-06 to 2014-15)

(Financial Figure in million Taka (MT))

Activities	Sl No	Component	Unit	Financial Year						Financial Year					
				2005-06	2006-07	2007-08	2008-09	2009-10	Total (1-5)	2010-11	2011-12	2012-13	2013-14	2014-15	Total (6-10)
Year				1	2	3	4	5		6	7	8	9	10	
Development	1	Upazila Road	Physical (km)	2556	1747	1747	1747	1747	9543	1747	1747	1747	1747	1747	8734
			Finalcial (MT)	9279	7011	7712	8483	9331	41816	10265	11291	12420	13662	15028	62666
	2	Bridge/Culvert on Upazila Road	Physical (m)	10000	11359	11359	11359	11359	55437	11359	11359	11359	11359	11359	56796
			Finalcial (MT)	2750	3436	3780	4158	4574	18697	5031	5534	6087	6696	7366	30714
	3	Unon Road	Physical (km)	2328	1558	1558	1558	1558	8561	1558	1558	1558	1558	1558	7791
			Finalcial (MT)	6250	4424	4866	5353	5888	26782	6477	7125	7838	8621	9483	39545
	4	Bridge/Culvert on Union Road	Physical (m)	15000	7876	7876	7876	7876	46505	7876	7876	7876	7876	7876	39381
			Finalcial (MT)	2888	1516	1668	1835	2018	9924	2220	2442	2686	2955	3250	13552
	5	Bridge/Culvert on Village Road-A	Physical (m)	8000	13995	10998	10998	10998	54989	10998	10998	10998	10998	10998	54989
			Finalcial (MT)	1540	2329	2562	2818	3100	12348	3410	3751	4126	4538	4992	20816
	6	Growth Center	Physical (no.)	261	195	195	195	195	1041						
			Finalcial (MT)	861	708	779	856	942	4146						
	7	Rural Market	Physical (no.)	187	743	743	743	743	3160	743	743	743	743	743	3716
			Finalcial (MT)	309	1349	1484	1632	1795	6568	1975	2172	2390	2628	2891	12056
	8	Union Parishad Complex	Physical (no.)	207	693	693	693	693	2979						
			Finalcial (MT)	683	2516	2767	3044	3348	12358						
	Total		Finalcial (MT)	24559	23288	25617	28179	30997	132640	29377	32315	35546	39101	43011	179349
Rehabilitation	1	Upazila Road	Physical (km)	986	1114	1202	1289	1376	5967	1464	1551	1638	1726	1813	8191
			Finalcial (MT)	3147	3910	4638	5473	6428	23595	7519	8765	10184	11800	13637	51905
	2	Bridge/Culvert on Upazila Road	Physical (m)	1176	1176	1176	1176	1176	5881	1176	1176	1176	1176	1176	5881
			Finalcial (MT)	323	356	391	431	474	1975	521	573	630	693	763	3180
	3	Unon Road	Physical (km)	460	538	615	693	771	3077	849	927	1005	1083	1161	5025
			Finalcial (MT)	986	1269	1598	1981	2423	8257	2935	3525	4203	4982	5874	21518
	4	Bridge/Culvert on Union Road	Physical (m)	750	750	750	750	750	3750	750	750	750	750	750	3750
			Finalcial (MT)	144	159	175	192	211	881	233	256	281	309	340	1420
	5	Bridge/Culvert on Village Road-A	Physical (m)	1042	1042	1042	1042	1042	5209	1042	1042	1042	1042	1042	5209
			Finalcial (MT)	201	221	243	267	294	1224	323	355	391	430	473	1972
	Total		Finalcial (MT)	4802	5914	7045	8343	9830	35933	11531	13474	15690	18214	21087	79995

Annex-1

Summary of Development, Rehabilitation and Maintenance Activities (Year-Wise) (2005-06 to 2014-15)

(Financial Figure in million Taka (MT))

Activities	Sl No	Component	Unit	Financial Year						Financial Year					
				2005-06	2006-07	2007-08	2008-09	2009-10	Total (1-5)	2010-11	2011-12	2012-13	2013-14	2014-15	Total (6-10)
Year				1	2	3	4	5		6	7	8	9	10	
Maintenance	1	Upazila Road	Finalcial (MT)	3667	4498	5279	6171	7189	26804	8349	9668	11168	12872	14805	56862
	2	Bridge/Culvert on Upazila Road	Finalcial (MT)	297	339	388	443	506	1973	577	656	746	848	962	3789
	3	Union Road	Finalcial (MT)	1401	1911	2363	2887	3492	12054	4189	4990	5910	6963	8169	30220
	4	Bridge/Culvert on Union Road	Finalcial (MT)	181	213	243	276	314	1227	357	405	459	519	588	2327
		Total	Finalcial (MT)	5546	6961	8273	9778	11501	42058	13470	15719	18283	21202	24523	93198
Grand Total			Finalcial (MT)	34906	36163	40935	46299	52327	210631	54378	61507	69519	78517	88621	352542

Annex-1

Summary of Development, Rehabilitation and Maintenance Activities (Year-Wise) (2015-16 to 2024-25)

(Financial Figure in million Taka (MT))

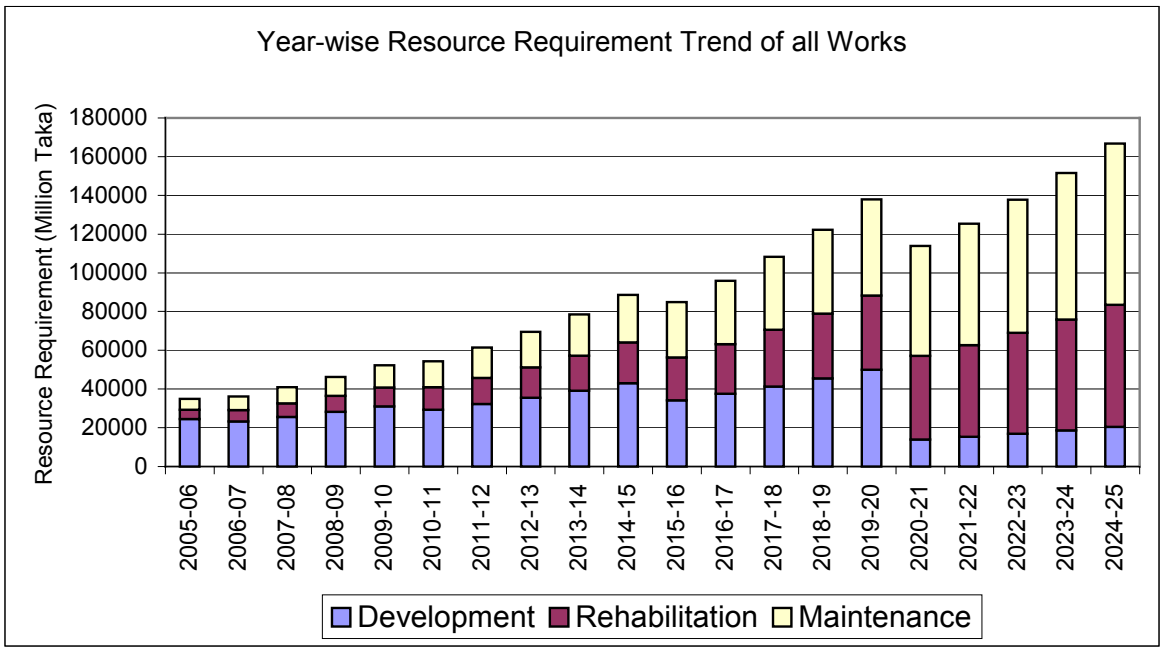
Activities	Sl No	Component	Unit	Financial Year						Financial Year					
				2015-16	2016-17	2017-18	2018-19	2019-20	Total	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Year				11	12	13	14	15	(11-15)	16	17	18	19	20	(16-20)
Development	1	Upazila Road	Physical (km)	0	0	0	0	0	0	0	0	0	0	0	0
			Finalcial (MT)	0	0	0	0	0	0	0	0	0	0	0	0
	2	Bridge/Culvert on Upazila Road	Physical (m)	0	0	0	0	0	0	0	0	0	0	0	0
			Finalcial (MT)	0	0	0	0	0	0	0	0	0	0	0	0
	3	Unon Road	Physical (km)	3493	3493	3493	3493	3493	17464	0	0	0	0	0	0
			Finalcial (MT)	21924	24116	26528	29181	32099	133847	0	0	0	0	0	0
	4	Bridge/Culvert on Union Road	Physical (m)	7876	7876	7876	7876	7876	39381	0	0	0	0	0	0
			Finalcial (MT)	3575	3933	4326	4758	5234	21826	0	0	0	0	0	0
	5	Bridge/Culvert on Village Road-A	Physical (m)	10998	10998	10998	10998	10998	54989	10998	10998	10998	10998	10998	54989
			Finalcial (MT)	5491	6040	6644	7309	8040	33524	8844	9728	10701	11771	12948	53990
	6	Growth Center	Physical (no.)						0						0
			Finalcial (MT)						0						0
	7	Rural Market	Physical (no.)	743	743	743	743	743	3716	743	743	743	743	743	3716
			Finalcial (MT)	3180	3499	3848	4233	4657	19417	5122	5634	6198	6818	7499	31271
	8	Union Parishad Complex	Physical (no.)						0						0
			Finalcial (MT)						0						0
	Total		Finalcial (MT)	34170	37587	41346	45481	50029	208614	13966	15362	16898	18588	20447	85262
Rehabilitation	1	Upazila Road	Physical (km)	1808	1808	1808	1808	1808	9042	1808	1808	1808	1808	1808	9042
			Finalcial (MT)	14962	16458	18104	19914	21906	91344	24096	26506	29157	32072	35279	147111
	2	Bridge/Culvert on Upazila Road	Physical (m)	0	0	0	0	0	0	0	0	0	0	0	0
			Finalcial (MT)	0	0	0	0	0	0	0	0	0	0	0	0
	3	Unon Road	Physical (km)	1301	1476	1651	1825	2000	8254	2116	2116	2116	2116	2116	10582
			Finalcial (MT)	7244	9038	11118	13524	16299	57223	18973	20870	22957	25253	27778	115830
	4	Bridge/Culvert on Union Road	Physical (m)	0					0						0
			Finalcial (MT)						0						0
	5	Bridge/Culvert on Village Road-A	Physical (m)							0	0	0	0	0	0
			Finalcial (MT)							0	0	0	0	0	0
	Total		Finalcial (MT)	22206	25496	29222	33438	38205	148568	43069	47376	52114	57325	63057	262941

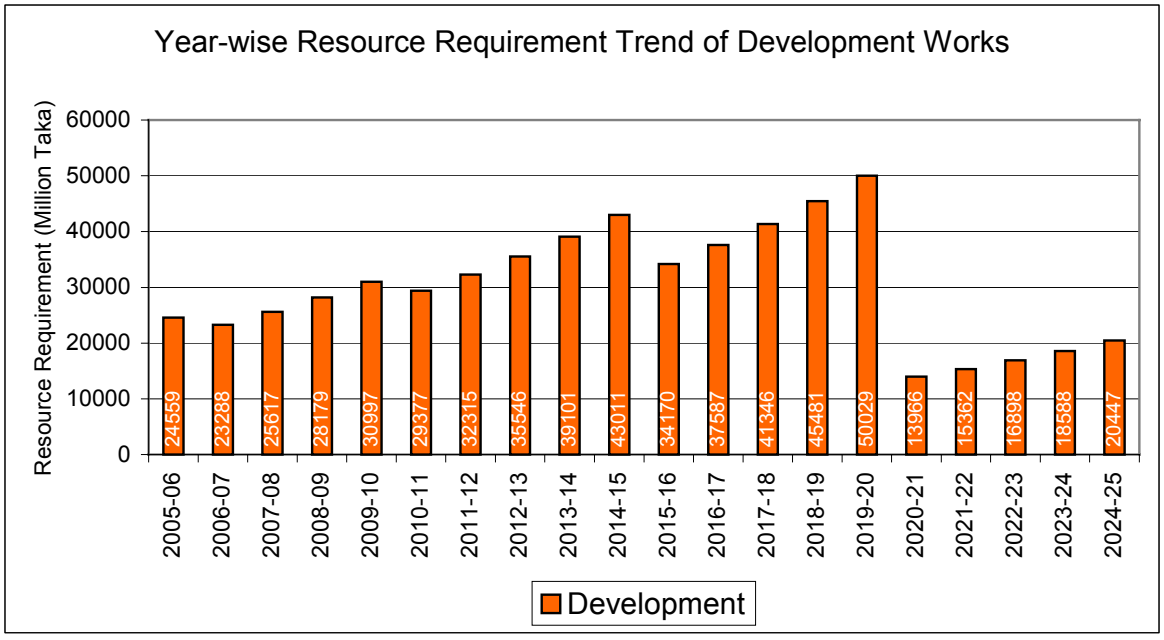
Annex-1

Summary of Development, Rehabilitation and Maintenance Activities (Year-Wise) (2015-16 to 2024-25)

(Financial Figure in million Taka (MT))

Activities	Sl No	Component	Unit	Financial Year						Financial Year					
				2015-16	2016-17	2017-18	2018-19	2019-20	Total (11-15)	2020-21	2021-22	2022-23	2023-24	2024-25	Total (16-20)
Year				11	12	13	14	15		16	17	18	19	20	
Maintenance	1	Upazila Road	Finalcial (MT)	17160	18876	20763	22840	25124	104762	27636	30400	33440	36784	40462	168721
	2	Bridge/Culvert on Upazila Road	Finalcial (MT)	1091	1200	1320	1452	1597	6659	1757	1932	2126	2338	2572	10724
	3	Union Road	Finalcial (MT)	9561	11998	14827	18101	21882	76369	26277	28905	31795	34975	38472	160424
	4	Bridge/Culvert on Union Road	Finalcial (MT)	664	750	847	956	1078	4296	1215	1336	1470	1617	1778	7415
		Total	Finalcial (MT)	28476	32824	37757	43349	49681	192086	56884	62573	68830	75713	83284	347284
Grand Total			Finalcial (MT)	84852	95907	108325	122267	137915	549267	113919	125311	137842	151626	166789	695487


Year-wise Resource Requirement Trend of all Works
Resource Requirement (Million Taka)
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
2021-22
2022-23
2023-24
2024-25
Development
Rehabilitation
Maintenance


Year-wise Resource Requirement Trend of Development Works
Resource Requirement (Million Taka)
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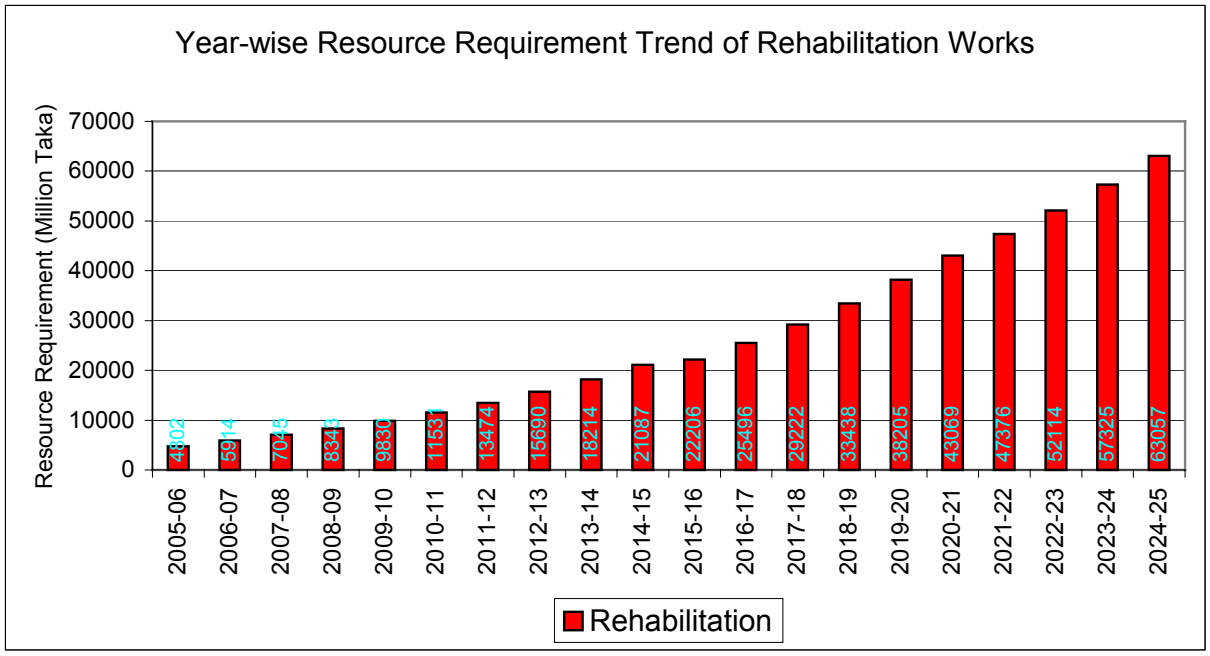
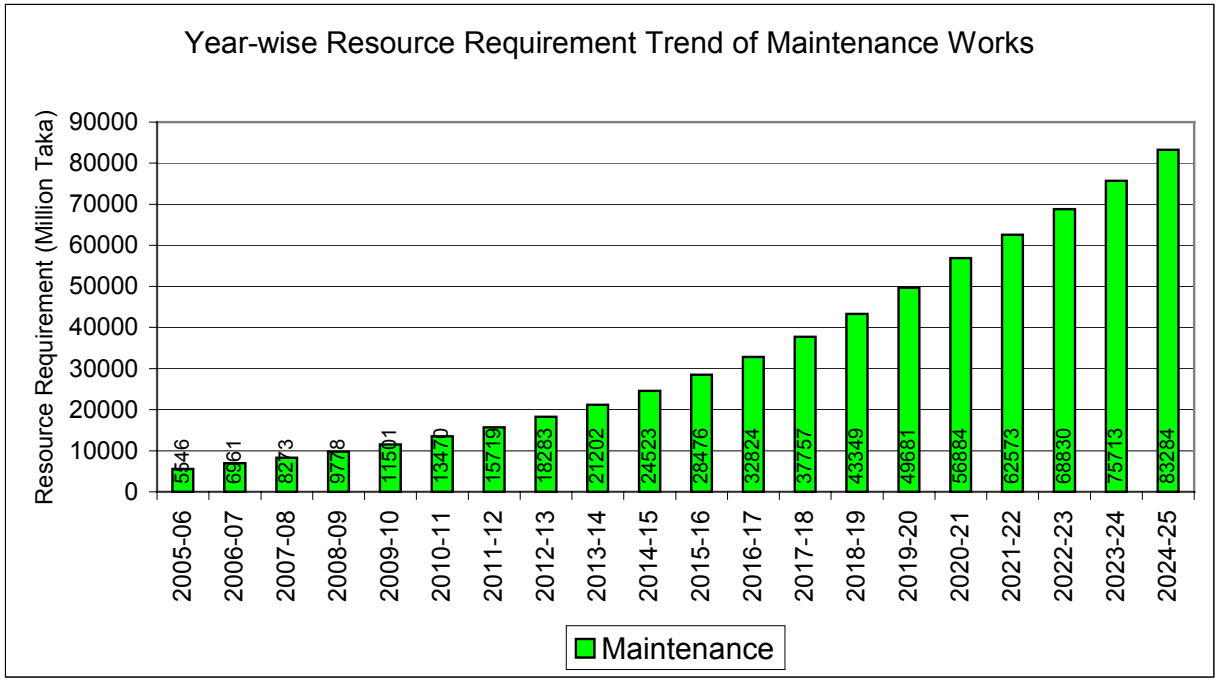
50000
40000
30000
20000
10000
0
24559
23288
25617
28179
30997
29377
32315
35546
39101
43011
34170
37587
41346
45481
50029
13966
15362
16898
18588
20447
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
2021-22
2022-23
2023-24
2024-25
Development


Year-wise Resource Requirement Trend of Rehabilitation Works
Resource Requirement (Million Taka)
70000
60000
50000
40000
30000
20000
10000
0
4802
5914
7085
8343
9830
11531
13474
15690
18214
21087
22206
25496
29222
33438
38205
43069
47676
52414
57325
63057
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
2021-22
2022-23
2023-24
2024-25
Rehabilitation


Year-wise Resource Requirement Trend of Maintenance Works
Resource Requirement (Million Taka)
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
5546
6961
8273
9778
11501
13470
15719
18283
21202
24523
28476
32824
37757
43349
49681
56884
62573
68830
75713
83284
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
2021-22
2022-23
2023-24
2024-25
Maintenance

Annex-2

Present and Projected Financing for Rural Infrastructure development and maintenance:

Estimate for Resources Needed for Rural Infrastructure Development

1. The estimates given from Annex 3 to 9 indicates the future resource requirements for developing existing rural roads, markets and Union Parishad Complexes over the next 20 (twenty) years, as well as the increasing maintenance costs which would go up as the road network will be upgraded and gradually the damaged network will be brought back to maintainable condition. These are based on the probable fund flow in the years to come considering the existing financing trends and possibilities. If funds are available, the proposed planning can be achieved as the implementation capability of LGED has increased significantly, and it will require strong commitment at all levels of LGED.
2. The assumptions relating to Table (Development) are given below:
    a. It is assumed that 2556 kms of Upazila Road will be developed fully upto Bituminous Carpeting (BC) standard in the first year (2005-06) and 1747 kms road will be fully developed each of the subsequent years upto 2014-15. Among those, 1427km and 320 kms will be developed from earthen road and partially developed (HBB/WBM) road to BC standard respectively. At the initial year the figure is rather higher compared to subsequent years, because of the fact that most of the RD Projects have planned to construct higher mileage of road in this particular year. Altogether 18,273 kms of Upazila Road will be developed in next 10(ten) years and thus, by the end of 2014-15 all 36,166 kms of Upazila Road will be fully developed to BC standard (Annex-3).
    b. Regarding the structures on the Upazila Road, it is assumed that in 2005-06, 10000 M of Bridge/Culvert will be constructed over the gaps on Upazila Road and the remaining 9 years upto 2014-15, an equal quantity of 11359/11360 M of Bridge/Culvert will be developed to bridge the rest of the gaps on Upazila Road (Annex-4).
    c. For the Union Roads, 2328 kms will be paved in 2005-06, as planned under different projects, and during the remaining nine years, a length equal to 1558 km each year will be paved and that brings to a total mileage of 33818 kms paved Union Road in 15 (Fifteen) years. It is also assumed that out of 1558 kms of union road, 1273 km will be developed from earthen to BC and 285 km from HBB/WBM to BC road respectively. By 2019-20, the total mileage of paved Union Road will stand at 42,329 km, which is around 100% of the total union road of the country (Annex-3).
    d. Regarding the structures on the Union Road, it is assumed that in 2005-06, 15000 M of Bridge/Culvert will be constructed over the gaps on Union Road and the remaining 14 years upto 2019-20, an equal quantity of 7876/7877 M of Bridge/Culvert will be developed to bridge the rest of the gaps on Union Road (Annex-4).

e. Development of the Village Road-A and B have not been included in the Master Plan considering their low volume of traffic and these will be the responsibility of the LGIs (UPs). However, considering the resource limitation and implementation capacity, the bridge/culverts on VR-A has been included as a component in the master plan to ensure uninterrupted access to the village level (Annex-4).
f. In the first years of 2005-06, 261 Growth Centres will be developed under different RD Projects and it is assumed that during the remaining 4 (three) years, 195 Growth Centres will be developed each year. At the end of financial-year 2009-10, all-together 1041 Growth Centres will be developed and the total number of developed Growth Centre will stand at 2100 (Annex-7).
g. In the first years of 2005-06, 187 Rural Markets will be developed under different RD Projects and it is assumed that during the remaining 19 (nineteen) years, 743 Rural Markets will be developed each year. At the end of financial-year 2024-25, all-together 14307 Rural Markets will be developed and the total number of developed Rural Markets will stand at 15263 (Annex-7).
h. Regarding construction of Union Parishad Complexes, it is planned that 596/597 Union Parishad Complexes will be constructed each year upto 2009-10 and all the 4489 Union Parishad Complexes will be completed by that time (Annex-8).

Road Rehabilitation and Maintenance Resources:

3. It has been assumed in preparing the estimates that about 1/20th of the total developed network would expire their designed life each year and will require major rehabilitation to bring back to maintainable condition. This would require a fund flow as shown in **Annex-5 & 6.** This table does not include Growth Centres, Rural Markets and Union Parishad Complexes, as it is assumed that these are newly built infrastructure and does not require any rehabilitation work during period ending by 2024-25. The budget allocation for this rehabilitation work will be the contribution from donor and Government financed RD projects and allocation from revenue the budget of the Government. The assumptions relating to **Annex-5&6** are given below:

    i) The accumulated length of damaged road in the Upazila Road category stands at 925 km for the whole network. This will equally be divided among the 10 (Ten) consecutive years, so a length of 92.5 kms of the Upazila Road will be rehabilitated each year. The length of damaged bridge/culvert requiring rehabilitation fall over the damaged road length will also be rehabilitated simultaneously together with the roads, so that the rehabilitation road length comes under immediate use (Annex-5).
    ii) Similarly, the accumulated length of damaged Union Road of about 340 km, will also be rehabilitated along with the damaged bridge/culvert thereon, in next 10 (ten) years at a rate of 33/34 km each year (Annex-5).
    iii) Similarly, the damaged bridge/culverts on VR-A will be rehabilitated by LGED together with those on the Upazila Road or the Union Road (Annex-6).

Road Maintenance Resources

4. It is assumed that the total resource requirement for maintenance of the developed road network will be provided from GoB revenue budget and also the development assistance from donor supported projects. It is estimated that in the year 2005-06 the total maintenance need will stand at Tk.550 Cr. where as the available funding so far contemplated is only Tk.380 Cr. which is only 69%, rest 31% resources must be provided, without that the total estimation will be up-set and will need readjustment in the subsequent years i.e. additional funding which is again very unlikely (Annex-9).

Year-Wise Road Development Plan and Resource Requirement

Year	Total Length (km)	Fully Developed (BC) (km)	Undevloped (km)	Partially Developed (HBB) (km)	Further Need to be Developed (km)	Cost (million Tk.)	Remarks
1	2	3	4	5	6=4+5	7	8
Upazila Road							
Upto 2004-05	36166	17889	14889	3388	18277		1. It is planned that 100% upazila road will be fully improved by 2014-15. Improvement of 2556km road in 2005-06 is already palnned under different projects. The yearly target for improvement of Upazila Road in the next nine years has been fixed at 1747 km of which 320km is partially developed (HBB/WBM). 2. Base Cost: 35 LT/km (developed from earthen) and 25 LT/km (developed from partially developed).
Upto 2005-06		20445	12844	2877	15721	9279	
Upto 2006-07		22192	11417	2557	13974	7011	
Upto 2007-08		23939	9990	2238	12227	7712	
Upto 2008-09		25685	8563	1918	10481	8483	
Upto 2009-10		27432	7136	1598	8734	9331	
Upto 2010-11		29179	5708	1279	6987	10265	
Upto 2011-12		30926	4281	959	5240	11291	
Upto 2012-13		32672	2854	639	3494	12420	
Upto 2013-14		34419	1427	320	1747	13662	
Upto 2014-15		36166	0	0	0	15028	
Union Road							
Upto 2004-05	42329	8513	30551	3267	33818		1.It is planned that improvement of 100% Union Road would be completed by 2019-20. Improvement of 2328km has been planned in 2005-06 under different projects. The yearly target for improvement of Union Road in the next 14 years has been fixed at 1558 km of which 285km is partially developed. 2. Base Cost: 30 LT/km (developed from earthen) and 22 LT/km (developed from partially developed).
Upto 2005-06		10841	28923	2567	31490	6250	
Upto 2006-07		12399	27650	2282	29932	4424	
Upto 2007-08		13957	26377	1997	28374	4866	
Upto 2008-09		15516	25104	1711	26815	5353	
Upto 2009-10		17074	23831	1426	25257	5888	
Upto 2010-11		18632	22558	1141	23699	6477	
Upto 2011-12		20190	21285	856	22141	7125	
Upto 2012-13		21749	20012	570	20582	7838	
Upto 2013-14		23307	18739	285	19024	8621	
Upto 2014-15		24865	17466	0	17466	9483	
Upto 2015-16		28358	13971	0	13971	21924	
Upto 2016-17		31851	10478	0	10478	24116	
Upto 2017-18		35343	6986	0	6986	26528	
Upto 2018-19		38836	3493	0	3493	29181	
Upto 2019-20		42329	0	0	0	32099	

Year-Wise Bridge/Culverts Development Plan and Resource Requirement

Year	Total Span (m)	Developed (m)	Undevloped (m)	Further Need to be Developed (m)	Cost (million Tk.)	Remarks
1	2	3	4	5=4	6	7
Bridge/Culvert on Upazila Road						
Upto 2004-05	382293	270060	112233	112233		1. It is expected that 100% of the required bridge/culvert will be constructed by 2014-15, of which 10000m will be done in 2005-06 under different projects according to existing plan. The yaerly target for the remaining years in the planning period is 11359m. 2. Base Cost: 2.5 LT/m.
Upto 2005-06		280060	102233	102233	2750	
Upto 2006-07		291419	90874	90874	3436	
Upto 2007-08		302778	79515	79515	3780	
Upto 2008-09		314138	68155	68155	4158	
Upto 2009-10		325497	56796	56796	4574	
Upto 2010-11		336856	45437	45437	5031	
Upto 2011-12		348215	34078	34078	5534	
Upto 2012-13		359575	22718	22718	6087	
Upto 2013-14		370934	11359	11359	6696	
Upto 2014-15		382293	0	0	7366	
Bridge/Culvert on Union Road						
Upto 2004-05	330409	205142	125267	125267		1.It is planned that construction of 100% of the required bridge/culvert will be completed by 2019-20 of which 15000m will be developed in 2005-06 under different projects. The yaerly target for the remaining years in the planning period is t 7876m. 2. Base Cost: 1.75 LT/m.
Upto 2005-06		220142	110267	110267	2888	
Upto 2006-07		228018	102391	102391	1516	
Upto 2007-08		235894	94515	94515	1668	
Upto 2008-09		243771	86638	86638	1835	
Upto 2009-10		251647	78762	78762	2018	
Upto 2010-11		259523	70886	70886	2220	
Upto 2011-12		267399	63010	63010	2442	
Upto 2012-13		275276	55134	55134	2686	
Upto 2013-14		283152	47257	47257	2955	
Upto 2014-15		291028	39381	39381	3250	
Upto 2015-16		298904	31505	31505	3575	
Upto 2016-17		306780	23629	23629	3933	
Upto 2017-18		314657	15752	15752	4326	
Upto 2018-19		322533	7876	7876	4758	
Upto 2019-20		330409	0	0	5234	

Year-Wise Bridge/Culverts Development Plan and Resource Requirement

Bridge/Culvert on Village Road - A						
Upto 2004-05		230439	216957	216957		1. It is assumed 8000 m Bridge/Culvert on Village Road Rype-A will be constructed in each year with a view to complete the total construction by 2024-25.
Upto 2005-06		238439	208957	208957	1540	
Upto 2006-07		252434	197959	197959	2329	
Upto 2007-08		263432	186962	186962	2562	
Upto 2008-09		274430	175964	175964	2818	
Upto 2009-10		285428	164966	164966	3100	
Upto 2010-11		296425	153968	153968	3410	
Upto 2011-12		307423	142971	142971	3751	
Upto 2012-13		318421	131973	131973	4126	
Upto 2013-14		329419	120975	120975	4538	
Upto 2014-15	447396	340416	109977	109977	4992	2. Base Cost: 1.75 LT/m.
Upto 2015-16		351414	98980	98980	5491	
Upto 2016-17		362412	87982	87982	6040	
Upto 2017-18		373410	76984	76984	6644	
Upto 2018-19		384407	65986	65986	7309	
Upto 2019-20		395405	54989	54989	8040	
Upto 2020-21		406403	43991	43991	8844	
Upto 2021-22		417401	32993	32993	9728	
Upto 2022-23		428398	21995	21995	10701	
Upto 2023-24		439396	10998	10998	11771	
Upto 2024-25		450394	0	0	12948	

Year-Wise Road Rehabilitation Plan and Resource Requirement

Year	Further Need to be Rehabilitation (km)	Cost (million Tk.)	Cost per Km (million Tk./km)	Remarks
Upazila Road				
2005-06	986	3147	3.190	1. Approximately 10% of paved Upazila Road network would require rahabiliatation each year in a cyclic manner upon the expiry of 20 year design life. Additional 92 km would also be taken up for rehabilitation each year as back log works, being 10% of 925km damaged road at present. 2. Base Cost: 29 LT/km.
2006-07	1114	3910	3.509	
2007-08	1202	4638	3.860	
2008-09	1289	5473	4.246	
2009-10	1376	6428	4.670	
2010-11	1464	7519	5.138	
2011-12	1551	8765	5.651	
2012-13	1638	10184	6.216	
2013-14	1726	11800	6.838	
2014-15	1813	13637	7.522	
2015-16	1808	14962	8.274	
2016-17	1808	16458	9.101	
2017-18	1808	18104	10.012	
2018-19	1808	19914	11.013	
2019-20	1808	21906	12.114	
2020-21	1808	24096	13.325	
2021-22	1808	26506	14.658	
2022-23	1808	29157	16.124	
2023-24	1808	32072	17.736	
2024-25	1808	35279	19.510	

Union Road				
2005-06	460	986	2.146	1. Approximately 10% of paved Union road network would require rahabiliatation each year in a cyclic manner upon the expiry of 20 year design life. Additional 34 km would also be taken up for rehabilitation each year as back log works, being 10% of 335km damaged road at present.
2006-07	538	1269	2.361	
2007-08	615	1598	2.597	
2008-09	693	1981	2.856	
2009-10	771	2423	3.142	
2010-11	849	2935	3.456	

Union Road				
2011-12	927	3525	3.802	
2012-13	1005	4203	4.182	
2013-14	1083	4982	4.600	2. Base Cost: 20 LT/km.
2014-15	1161	5874	5.060	
2015-16	1301	7244	5.566	
2016-17	1476	9038	6.123	
2017-18	1651	11118	6.735	
2018-19	1825	13524	7.409	
2019-20	2000	16299	8.149	
2020-21	2116	18973	8.964	
2021-22	2116	20870	9.861	
2022-23	2116	22957	10.847	
2023-24	2116	25253	11.932	
2024-25	2116	27778	13.125	

Year-Wise Bridge/Culverts Rehabilitation Plan and Resource Requirement

Year	Fully Damaged (m)	Further Need to be Rehabilitation (m)	Cost (million Tk.)	Cost per m (million Tk./m)	Remarks
Upazila Road					
2005-06	11762	1176	323	0.275	1. It is assumed 1042m of fully damaged Bridge/Culvert on upazila road will be rehabilitated in each year for next 10 years out of 10422m of bridge/culvert that is already damaged. 2. Base Cost: 2.50 LT/m.
2006-07		1176	356	0.303	
2007-08		1176	391	0.333	
2008-09		1176	431	0.366	
2009-10		1176	474	0.403	
2010-11		1176	521	0.443	
2011-12		1176	573	0.487	
2012-13		1176	630	0.536	
2013-14		1176	693	0.589	
2014-15		1176	763	0.648	
Union Road					
2005-06	7500	750	144	0.193	1. It is assumed 750m of fully damaged Bridge/Culvert on union road will be rehabilitated in each year for next 10 year out of 7504m of bridge/culvert that is already damaged. 2. Base Cost: 1.75 LT/m.
2006-07		750	159	0.212	
2007-08		750	175	0.233	
2008-09		750	192	0.256	
2009-10		750	211	0.282	
2010-11		750	233	0.310	
2011-12		750	256	0.341	
2012-13		750	281	0.375	
2013-14		750	309	0.413	
2014-15		750	340	0.454	
Village Road					
2005-06	10418	1042	201	0.193	1. It is assumed 1042m of fully damaged Bridge/Culvert on village road type-A will be rehabilitated in each year for next 10 years out of 10418m of bridge/culvert that is already damaged. 2. Base Cost: 1.75 LT/m.
2006-07		1042	221	0.212	
2007-08		1042	243	0.233	
2008-09		1042	267	0.256	
2009-10		1042	294	0.282	
2010-11		1042	323	0.310	
2011-12		1042	355	0.341	
2012-13		1042	391	0.375	
2013-14		1042	430	0.413	
2014-15		1042	473	0.454	

Year-Wise Growth Center and Rural Market Development Plan and Resource Requirement

Year	Total (nos)	Developed (nos)	Undevloped (nos)	Further Need to be Developed (nos)	Cost (million Tk.)	Remarks
1	2	3	4	5=4	6	7
Growth Center						
Upto 2004-05	2100	1059	1041	1041		1.It is planned that all GCs will be fully developed by 2009-10. Existing projects would improve 261 nos. of growth center in 2005-06. Around 195 nos. GC will be developed in each year for remaining 4 years time. 2. Base Cost of each GC is 30 LT.
Upto 2005-06		1320	780	780	861	
Upto 2006-07		1515	585	585	708	
Upto 2007-08		1710	390	390	779	
Upto 2008-09		1905	195	195	856	
Upto 2009-10		2100	0	0	942	
Rural Market						
Upto 2004-05	15263	956	14307	14307		1. It is planned that all Rural Market will be fully developed by 2024-25. Existing project would improve 187 nos. of RM in 2005-06. Around 743nos. RM will be developed in each year for remaining 19 years time. 2. Base Cost of each RM is 15 LT.
Upto 2005-06		1143	14120	14120	309	
Upto 2006-07		1886	13377	13377	1349	
Upto 2007-08		2629	12634	12634	1484	
Upto 2008-09		3372	11891	11891	1632	
Upto 2009-10		4116	11147	11147	1795	
Upto 2010-11		4859	10404	10404	1975	
Upto 2011-12		5602	9661	9661	2172	
Upto 2012-13		6345	8918	8918	2390	
Upto 2013-14		7088	8175	8175	2628	
Upto 2014-15		7831	7432	7432	2891	
Upto 2015-16		8575	6688	6688	3180	
Upto 2016-17		9318	5945	5945	3499	
Upto 2017-18		10061	5202	5202	3848	
Upto 2018-19		10804	4459	4459	4233	
Upto 2019-20		11547	3716	3716	4657	
Upto 2020-21		12290	2973	2973	5122	
Upto 2021-22		13034	2229	2229	5634	
Upto 2022-23		13777	1486	1486	6198	
Upto 2023-24		14520	743	743	6818	
Upto 2024-25		15263	0	0	7499	

Year-Wise Union Parishad Development Plan and Resource Requirement

Year	Total (nos)	Developed (nos)	Undevloped (nos)	Further Need to be Developed (nos)	Cost (million Tk.)	Remarks
1	2	3	4	5=4	6	7
Union Parishad Complex						
Upto 2004-05	4489	1510	2979	2979		1. It is envisaged that 100% Union Parishad Complex will be constructed by 2009-10. Approximately 596 nos of Union Parishad will be taken up in each year during the planning period. 2. Base Cost of each UPC is 30 LT.
Upto 2005-06		1717	2772	2772	683	
Upto 2006-07		2410	2079	2079	2516	
Upto 2007-08		3103	1386	1386	2767	
Upto 2008-09		3796	693	693	3044	
Upto 2009-10		4489	0	0	3348	

Year- wise Maitenance Plan and Resource Requirement

(2005-06 to 2014-15)

Road Type	Maintenance Type	Unit	Financial Year									
			2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Upazila Road	Routine Maintenance (off)	Length (km)	32624	33305	33218	33130	33043	32956	32868	32781	32694	32606
		Cost (million Tk.)	646	725	796	873	958	1051	1153	1265	1388	1522
	Routine Maintenance (on)	Length (km)	12455	14244	15466	16689	17912	19135	20357	21580	22803	24026
		Cost (million Tk.)	68	86	103	122	144	169	198	231	269	312
	Periodic Maintenance (Surfacing)	Length (km)	4656	4592	4447	4302	4157	4012	3867	3722	3577	3432
		Cost (million Tk.)	849	1040	1219	1423	1657	1922	2225	2568	2958	3401
	Periodic Maintenance (Overlaying)	Length (km)	1779	2035	2209	2384	2559	2734	2908	3083	3258	3432
		Cost (million Tk.)	2104	2647	3161	3752	4430	5206	6092	7104	8257	9570
	Upazila Maintenance Total:	Cost (million Tk.)	3667	4498	5279	6171	7189	8349	9668	11168	12872	14805
Union Road	Routine Maintenance (off)	Length (km)	10620	12585	13780	14975	16170	17366	18561	19756	20951	22146
		Cost (million Tk.)	210	274	330	395	469	554	651	762	889	1034
	Routine Maintenance (on)	Length (km)	5934	7592	8683	9774	10864	11955	13046	14137	15227	16318
		Cost (million Tk.)	33	46	58	72	87	106	127	152	180	212
	Periodic Maintenance (Surfacing)	Length (km)	3415	3366	3237	3108	2978	2849	2719	2590	2461	2331
		Cost (million Tk.)	330	426	509	606	716	842	987	1152	1340	1554
	Periodic Maintenance (Overlaying)	Length (km)	848	1085	1240	1396	1552	1708	1864	2020	2175	2331
		Cost (million Tk.)	828	1165	1466	1815	2220	2687	3225	3844	4555	5369
	Union Maintenance Total:	Cost (million Tk.)	1401	1911	2363	2887	3492	4189	4990	5910	6963	8169
Bridge/ Culvert	Upazila Road	Length (m)	27006	28006	29142	30278	31414	32550	33686	34822	35957	37093
		Cost (million Tk.)	297	339	388	443	506	577	656	746	848	962
	Union Road	Length (m)	20514	22014	22802	23589	24377	25165	25952	26740	27528	28315
		Cost (million Tk.)	181	213	243	276	314	357	405	459	519	588
	Structure Total Cost (million Tk.):		478	552	631	720	820	933	1061	1205	1367	1550
Maintenance Grand Total:		Cost (million Tk.)	5546	6961	8273	9778	11501	13470	15719	18283	21202	24523

Year- wise Maitenance Plan and Resource Requirement

(2015-16 to 2024-25)

Road Type	Maintenance Type	Unit	Financial Year									
			2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Upazila Road	Routine Maintenance (off)	Length (km)	34358	34358	34358	34358	34358	34358	34358	34358	34358	34358
		Cost (million Tk.)	1764	1941	2135	2349	2583	2842	3126	3438	3782	4161
	Routine Maintenance (on)	Length (km)	25316	25316	25316	25316	25316	25316	25316	25316	25316	25316
		Cost (million Tk.)	361	397	437	481	529	582	640	704	774	852
	Periodic Maintenance (Surfacing)	Length (km)	3617	3617	3617	3617	3617	3617	3617	3617	3617	3617
		Cost (million Tk.)	3942	4336	4769	5246	5771	6348	6983	7681	8449	9294
	Periodic Maintenance (Overlaying)	Length (km)	3617	3617	3617	3617	3617	3617	3617	3617	3617	3617
		Cost (million Tk.)	11092	12202	13422	14764	16240	17865	19651	21616	23778	26155
	Upazila Maintenance Total:	Cost (million Tk.)	17160	18876	20763	22840	25124	27636	30400	33440	36784	40462
Union Road	Routine Maintenance (off)	Length (km)	23564	26882	30200	33518	36836	40213	40213	40213	40213	40213
		Cost (million Tk.)	1210	1519	1877	2291	2770	3326	3659	4024	4427	4870
	Routine Maintenance (on)	Length (km)	17363	19808	22253	24697	27142	29630	29630	29630	29630	29630
		Cost (million Tk.)	248	311	384	469	567	681	749	824	906	997
	Periodic Maintenance (Surfacing)	Length (km)	2480	2830	3179	3528	3877	4233	4233	4233	4233	4233
		Cost (million Tk.)	1819	2282	2820	3443	4163	4999	5499	6048	6653	7319
	Periodic Maintenance (Overlaying)	Length (km)	2480	2830	3179	3528	3877	4233	4233	4233	4233	4233
		Cost (million Tk.)	6284	7886	9745	11898	14383	17272	18999	20899	22989	25287
	Union Maintenance Total:	Cost (million Tk.)	9561	11998	14827	18101	21882	26277	28905	31795	34975	38472
Bridge/ Culvert	Upazila Road	Length (m)	38229	38229	38229	38229	38229	38229	38229	38229	38229	38229
		Cost (million Tk.)	1091	1200	1320	1452	1597	1757	1932	2126	2338	2572
	Union Road	Length (m)	29103	29890	30678	31466	32253	33041	33041	33041	33041	33041
		Cost (million Tk.)	664	750	847	956	1078	1215	1336	1470	1617	1778
	Structure Total Cost (million Tk.):		1755	1950	2167	2408	2675	2971	3268	3595	3955	4350
Maintenance Grand Total:		Cost (million Tk.)	28476	32824	37757	43349	49681	56884	62573	68830	75713	83284

TENTATIVE MAINTENANCE COST DURING DESIGN LIFE PERIOD OF UPAZILA ROAD and UNION ROAD
(Flexible Pavement)

		Upazila Road		Union Road	
Year	Type of Maintenance	Maintenance Cost per KM per Year	Maintenance Cost per KM per Year considering Cost escalation	Maintenance Cost per KM per Year	Maintenance Cost per KM per Year considering Cost escalation
Yr-1	RM (off)	18000	19800	18000	19800
Yr-2	RM (off) + RM (on)	23000	27830	23000	27830
Yr-3	RM (off) + PM (on)	23000	30613	23000	30613
Yr-4	RM (off) + RM (Resealing)	400000	585640	275000	402628
Yr-5	RM (off) + RM (on)	23000	37042	23000	37042
Yr-6	RM (off) + PM (on)	23000	40746	23000	40746
Yr-7	RM (off) + RM (on)	23000	44820	23000	44820
Yr-8	RM (off) + PM (Overlaying)	1093000	2342943	906000	1942091
Yr-9	RM (off) + PM (on)	23000	54233	23000	54233
Yr-10	RM (off) + RM (on)	23000	59656	23000	59656
Yr-11	RM (off) + RM (on)	23000	65622	23000	65622
Yr-12	RM (off) + RM (Resealing)	400000	1255371	275000	863068
Yr-13	RM (off) + RM (on)	23000	79402	23000	79402
Yr-14	RM (off) + RM (on)	23000	87342	23000	87342
Yr-15	RM (off) + RM (on)	23000	96077	23000	96077
Yr-16	RM (off) + PM (Overlaying)	1093000	5022305	906000	4163046
Yr-17	RM (off) + RM (on)	23000	116253	23000	116253
Yr-18	RM (off) + RM (on)	23000	127878	23000	127878
Yr-19	RM (off) + PM (on)	23000	140666	23000	140666
Yr-20	Rehabilitation	2900000	19509750	2000000	13455000
	Life Time Maintenance Cost :	6226000	29743989	4702000	21853812

* Inflation Rate considered 10%.

	Upazila Road		Union Road	
Type of Maintenance	Life Time Maintenance Cost	Life Time Maintenance Cost per KM	Life Time Maintenance Cost	Life Time Maintenance Cost per KM
RM (off) (19 Times)	342000	18000	342000	18000
RM (on) (14 Times)	70000	5000	70000	5000
PM (Surfacing) (2 Times)	764000	382000	514000	257000
PM (Overlaying) (2 Times)	2150000	1075000	1776000	888000

		Upazila Road (cost/km)			
	Year	RM (off) (10 Times)	RM (on) (6 Times)	PM (Surfacing) (2 Times)	PM (Overlaying) (2 Times)
	2004-05	18000	5000	382000	1075000
1	2005-06	19800	5500	420200	1182500
2	2006-07	21780	6050	462220	1300750
3	2007-08	23958	6655	508442	1430825
4	2008-09	26354	7321	559286	1573908
5	2009-10	28989	8053	615215	1731298
6	2010-11	31888	8858	676736	1904428
7	2011-12	35077	9744	744410	2094871
8	2012-13	38585	10718	818851	2304358
9	2013-14	42443	11790	900736	2534794
10	2014-15	46687	12969	990810	2788273
11	2015-16	51356	14266	1089891	3067100
12	2016-17	56492	15692	1198880	3373811

Annex-10

	Year	Upazila Road (cost/km) RM (off) (10 Times)	RM (on) (6 Times)	PM (Surfacing) (2 Times)	PM (Overlaying) (2 Times)
13	2017-18	62141	17261	1318768	3711192
14	2018-19	68355	18987	1450644	4082311
15	2019-20	75190	20886	1595709	4490542
16	2020-21	82710	22975	1755280	4939596
17	2021-22	90980	25272	1930808	5433556
18	2022-23	100079	27800	2123888	5976911
19	2023-24	110086	30580	2336277	6574602
20	2024-25	121095	33637	2569905	7232062

	Year	Union Road (cost/km) RM (off) (10 Times)	RM (on) (6 Times)	PM (Surfacing) (2 Times)	PM (Overlaying) (2 Times)
0	2004-05	18000	5000	257000	888000
1	2005-06	19800	5500	282700	976800
2	2006-07	21780	6050	310970	1074480
3	2007-08	23958	6655	342067	1181928
4	2008-09	26354	7321	376274	1300121
5	2009-10	28989	8053	413901	1430133
6	2010-11	31888	8858	455291	1573146
7	2011-12	35077	9744	500820	1730461
8	2012-13	38585	10718	550902	1903507
9	2013-14	42443	11790	605993	2093858
10	2014-15	46687	12969	666592	2303243
11	2015-16	51356	14266	733251	2533568
12	2016-17	56492	15692	806576	2786924
13	2017-18	62141	17261	887234	3065617
14	2018-19	68355	18987	975957	3372179
15	2019-20	75190	20886	1073553	3709396
16	2020-21	82710	22975	1180908	4080336
17	2021-22	90980	25272	1298999	4488370
18	2022-23	100079	27800	1428899	4937207
19	2023-24	110086	30580	1571789	5430927
20	2024-25	121095	33637	1728967	5974020

TENTATIVE MAINTENANCE COST DURING DESIGN LIFE PERIOD OF UPAZILA ROAD and UNION ROAD
(Brick Pavement)

Year	Type of Maintenance	Maintenance Cost per KM per Year	Maintenance Cost per KM per Year considering Cost escalation
Yr-1	RM (off)	38000	41800
Yr-2	RM (off) + PM (Resetting)	38000	45980
Yr-3	RM (off) + PM (Damaged HBB F	78000	103818
Yr-4	RM (off) + PM (Resetting)	38000	55636
Yr-5	RM (off) + PM (Resetting)	38000	61199
Yr-6	RM (off) + PM (Damaged HBB F	78000	138182
Yr-7	RM (off) + PM (Resetting)	38000	74051
Yr-8	RM (off) + PM (Resetting)	38000	81456
Yr-9	RM (off) + PM (Damaged HBB F	78000	183920
Yr-10	RM (off) + PM (Resetting)	38000	98562
	Life Time Maintenance Cost :	500000	884605

* Inflation Rate considered 10%.

	Upazila & Union Road	
Type of Maintenance	Maintenance Cost per KM	Life Time Maintenance Cost per KM
RM (off) - 10 Times	180000	18000
PM (Resetting) (7 Times)	140000	20000
PM (Damaded HBB Repair) - (3 Times)	180000	60000

		Upazila & Union Road		
	Year	RM (off) - (10 Times)	PM (Resetting) (7 Times)	PM (Damaded HBB Repair) (3 Times)
0	2004-05	18000	20000	60000
1	2005-06	19800	22000	66000
2	2006-07	21780	24200	72600
3	2007-08	23958	26620	79860
4	2008-09	26354	29282	87846
5	2009-10	28989	32210	96631
6	2010-11	31888	35431	106294
7	2011-12	35077	38974	116923
8	2012-13	38585	42872	128615
9	2013-14	42443	47159	141477
10	2014-15	46687	51875	155625
11	2015-16	51356	57062	171187
12	2016-17	56492	62769	188306
13	2017-18	62141	69045	207136
14	2018-19	68355	75950	227850
15	2019-20	75190	83545	250635
16	2020-21	82710	91899	275698
17	2021-22	90980	101089	303268
18	2022-23	100079	111198	333595
19	2023-24	110086	122318	366955
20	2024-25	121095	134550	403650

UNIT COST for DEVELOPMENT, REHABILITATION and MAINTENANCE WORKS

Year	Upazila Road Construction		Union Road Construction		Rehabilitation		Construction			Bridge/Culvert on		Routine Maintenance of UZR & UNR		Periodic Maintenance on Upazila Road		Periodic Maintenance on Union Road	
	HBB to Flexible (Design Type-6)	Earthen to Flexible (Design Type-6)	HBB to Flexible (Design Type-7)	Earthen to Flexible (Design Type-7)	Upazila Road	Union Road	Growth Center	Union Parishad	Rural market	Upazila Road	Union Road	Routine (off)	Routine (on)	Resealing	Overlay	Resealing	Overlay
2004-05	2.500	3.500	2.200	3.000	2.900	1.951	3.000	3.000	1.500	0.250	0.175	0.018	0.005	0.382	1.075	0.257	0.888
2005-06	2.750	3.850	2.420	3.300	3.190	2.146	3.300	3.300	1.650	0.275	0.193	0.020	0.006	0.420	1.183	0.283	0.977
2006-07	3.025	4.235	2.662	3.630	3.509	2.361	3.630	3.630	1.815	0.303	0.212	0.022	0.006	0.462	1.301	0.311	1.074
2007-08	3.328	4.659	2.928	3.993	3.860	2.597	3.993	3.993	1.997	0.333	0.233	0.024	0.007	0.508	1.431	0.342	1.182
2008-09	3.660	5.124	3.221	4.392	4.246	2.856	4.392	4.392	2.196	0.366	0.256	0.026	0.007	0.559	1.574	0.376	1.300
2009-10	4.026	5.637	3.543	4.832	4.670	3.142	4.832	4.832	2.416	0.403	0.282	0.029	0.008	0.615	1.731	0.414	1.430
2010-11	4.429	6.200	3.897	5.315	5.138	3.456	5.315	5.315	2.657	0.443	0.310	0.032	0.009	0.677	1.904	0.455	1.573
2011-12	4.872	6.821	4.287	5.846	5.651	3.802	5.846	5.846	2.923	0.487	0.341	0.035	0.010	0.744	2.095	0.501	1.730
2012-13	5.359	7.503	4.716	6.431	6.216	4.182	6.431	6.431	3.215	0.536	0.375	0.039	0.011	0.819	2.304	0.551	1.904
2013-14	5.895	8.253	5.187	7.074	6.838	4.600	7.074	7.074	3.537	0.589	0.413	0.042	0.012	0.901	2.535	0.606	2.094
2014-15	6.484	9.078	5.706	7.781	7.522	5.060	7.781	7.781	3.891	0.648	0.454	0.047	0.013	0.991	2.788	0.667	2.303
2015-16	7.133	9.986	6.277	8.559	8.274	5.566	8.559	8.559	4.280	0.713	0.499	0.051	0.014	1.090	3.067	0.733	2.534
2016-17	7.846	10.984	6.905	9.415	9.101	6.123	9.415	9.415	4.708	0.785	0.549	0.056	0.016	1.199	3.374	0.807	2.787
2017-18	8.631	12.083	7.595	10.357	10.012	6.735	10.357	10.357	5.178	0.863	0.604	0.062	0.017	1.319	3.711	0.887	3.066
2018-19	9.494	13.291	8.354	11.392	11.013	7.409	11.392	11.392	5.696	0.949	0.665	0.068	0.019	1.451	4.082	0.976	3.372
2019-20	10.443	14.620	9.190	12.532	12.114	8.149	12.532	12.532	6.266	1.044	0.731	0.075	0.021	1.596	4.491	1.074	3.709
2020-21	11.487	16.082	10.109	13.785	13.325	8.964	13.785	13.785	6.892	1.149	0.804	0.083	0.023	1.755	4.940	1.181	4.080
2021-22	12.636	17.691	11.120	15.163	14.658	9.861	15.163	15.163	7.582	1.264	0.885	0.091	0.025	1.931	5.434	1.299	4.488
2022-23	13.900	19.460	12.232	16.680	16.124	10.847	16.680	16.680	8.340	1.390	0.973	0.100	0.028	2.124	5.977	1.429	4.937
2023-24	15.290	21.406	13.455	18.348	17.736	11.932	18.348	18.348	9.174	1.529	1.070	0.110	0.031	2.336	6.575	1.572	5.431
2024-25	16.819	23.546	14.800	20.182	19.510	13.125	20.182	20.182	10.091	1.682	1.177	0.121	0.034	2.570	7.232	1.729	5.974

* Inflation Rate considered 10%.