Government of the People's Republic of Bangladesh
Ministry of Local Government, Rural Development & Cooperative
Local Government Division
Local Government Engineering Department

Guideline for Implementation of Rural Roads and Culverts Maintenance Program

Rural Infrastructure Maintenance Management Unit

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1.0 Introduction

01. Roads and road structures component represent major capital investments that must be protected in order to ensure adequate return on expenditure. Like other infrastructures, road infrastructures are also subjected to deterioration in time even with proper adherence to specified construction and material standards. It is progressive and is influenced by several factors including the climate and terrain, traffic volume and axle loading and original design and construction standards. Maintenance is an essential function that should be implemented as soon as each stage of construction has been completed and should continue throughout the entire life of the structure, until such time as reconstruction or rehabilitation becomes absolutely necessary. Maintenance provides an important and worthwhile contribution to the economic well being of the country and an effective road maintenance system is a valuable part of its economy.

02. The Government of Bangladesh and the Development Partners have invested substantial resources in rural infrastructure development in the country; most of these are on road and road structure development. Top priority has been given for the development of the road transport network in the country for providing easier and cheaper transport services. During the last decade, a significant expansion of Upazila road (former feeder road-B) and Union road (former rural road R1) network in the country has been observed. With the construction and improvement of Upazila road and Union road, the question of repair and maintenance of these infrastructures has becoming increasingly important. Considering the necessity of maintenance of these infrastructures, the Government of Bangladesh has started allocation of funds to Local Government Engineering Department (LGED) since 1992-93 from its revenue budget to address the rural road maintenance throughout the country.

03. The National Strategy for Accelerated Poverty Reduction 2004 highlights that the role of rural infrastructure is significant in Bangladesh and infrastructure development contributes both directly and indirectly to poverty reduction. There are many components of rural infrastructure of which three important elements are identified as - roads, markets and electrification. Several problems impose a tremendous burden on road maintenance and reduce the quality of services. It has also highlighted that rather than expanding the network, the Government would improve the quality of rural roads e.g. emphasize quality construction using labour-based technologies, maintain, widen and upgrade the existing network and undertake selective expansion to fill critical gaps to ensure rural-urban linkages.

04. Despite the substantial and ever-increasing amounts of money that are being allocated annually for this purpose, some financial constraints continue to exist and it is very necessary that priorities are carefully assessed in order to carry out maintenance activities in an efficient and cost-effective manner.

05. These guidelines provide a framework for the development of an efficient and cost-effective maintenance management system that will optimize the economic benefits to be derived from its implementation throughout the country and from the considerable funds being allocated from the national revenue budget.

06. This guideline for implementation of Rural Roads and Culverts Maintenance Program must be carefully studied and followed properly with immediate effect.

2.0 Definition and Objectives

07. To "maintain" something is, by definition, to keep it in its present condition by carrying out remedial works or repairs as and when necessary. If these works are deferred or delayed for any reason, costs will inevitably increase as further deterioration takes place in the meantime.

08. In this guide, the term "maintenance" is used to describe operations required to keep roads in good condition and repair. It does not include road improvement works or reconstruction; funds from separate head are allocated to take care of such works by the same organization.

09. The primary objectives relating to the maintenance of roads in general are as follows:

i) to reduce rates of deterioration and thereby extend their durability in order to achieve the design life that was originally envisaged;

ii) to reduce operating costs and accident rates by maintaining good riding surfaces; and

iii) to provide safe, regular, punctual and convenient transportation facilities for private and Commercial road-users.

10. In order to create direct employment opportunities for rural landless and poor people and to contribute in reduction of poverty through maintenance of road infrastructure, two other important objectives related to the maintenance of Upazila Road, Union Road, and bridges and culverts on these roads by LGED are as follows:

i) to provide employment opportunities and reduce poverty of the rural poor specially the destitute women in the rural areas; and

ii) to develop the interest, awareness and participation of road users (local people) and members of the Local Government Institutions (LGIs) by encouraging their involvement in the planning process and at other stages of implementation.

2.1 Maintenance Categories

11. The two most commonly accepted maintenance categories are:

- Routine Maintenance
- Periodic Maintenance

Under special circumstances one more category can be included, namely

- Emergency Maintenance

2.2 Re-classification of Roads

12. The road network of Bangladesh has been reclassified and the responsibilities of construction, development and maintenance of these roads have been entrusted to Roads and Highways

Department (RHD) and Local Government Engineering Department (LGED) respectively. The Planning Commission of Bangladesh during April 2003 approved this classification and fixed up the definition, ownership and responsibilities of the total road network of the country. According to the classification LGED will be responsible for construction, development and maintenance of three classes of roads, which has been named as Upazila Road, Union Road and Village Road in collaboration with Local Government Institution (LGI). Road type with definition and the ownership and responsibility are furnished in Table 2.1 below:

Table 2.1 Road Network Classification with Definition

Sl. No	Type	Definition	Ownership and Responsibility
1.	National Highway	Highways connecting National capital with Divisional HQs or sea ports or land ports or Asian Highway	RHD
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 (UZR)	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. (Former Feeder Road Type-B)	LGED/LGI**
5.	Union Road (UNR)	Roads connecting union HQ/s with Upazila HQs, Growth Centers or local markets or with each other. (Former Rural Road Class-1 (R1)	LGED/LGI
6.	Village Road (VR)	a) Roads connecting Villages with Union HQs, local markets, farms and ghats or with each other. (Former Rural Road Class-2 (R2) b) Roads within a Village. (Former Rural Road Class-3 (R3)	LGED/LGI

* Higher Road System- National Highway, Regional Highway, and Zila Roads;
** LGI- Local Government Institutions.

13. The roads belonging to the Pourashava and the City Corporation have not been included in the above table. The responsibility for development and maintenance of such roads will lie with the Pourashavas and the City Corporations respectively. Recently the government has further

re-organised the road categories and the responsibilities of Upazila road and Union road has been entrusted to LGED and the responsibilities of Village road is entrusted to Local Government Institution (LGI). Accordingly gazette notifications have been issued by the government stating the name of these roads along with ID Number, Length, etc. against the concerned agency.

14. The design standards relate the width of the road (geometric design) and thickness of various layers (pavement) to the classification of the road. It has been recommended that there should be 6 basic geometric design types for Zila, Upazila and Union Roads all based on traffic criteria. Design types 5 - 8 have been based primarily on forecasts/ survey of commercial vehicles (applicable for LGED). Design types 3 and 4 are based primarily on forecasts of peak hour passenger car units (pcu's). The approved pavement design section of various design type mentioned above are given in the Attachment-1.4, Appendix-1 of this guidelines. The approved geometric design for each type of road is summarised in Table 2.2

Table 2.2 Approved Geometric Design Standards

Road Class	Design Type	Carriageway (m)/(ft)	Hard Shoulder (m)/(ft)	Verge (m)/(ft)	Crest Width (m)/(ft)
Union Road	8	3.0/10	0/0	1.25/4	5.5/18
	7	3.7/12	0/0	0.90/3	5.5/18
Upazila Road	6	3.7/12	0/0	1.8/6	7.3/24
	5	3.7/12	0.9/3	0.9/3	7.3/24
	4	5.5/18	0/0	2.15/7	9.8/32
Zila Road	5	3.7/12	0.9/3	0.9/3	7.3/24
	4	5.5/18	0/0	2.15/7	9.8/32
	3	5.5/18	1.2/4	0.95/3	9.8/32

15. For Types 8, 7, 6 and 5 the criterion should be daily commercial vehicles. For Types 4 and 3 the criterion should be peak hour pcu's. Traffic criteria for each design type are shown in Table 2.3 below:

Table2.3 Traffic Criteria for Design Purposes

Design Type	Daily Commercial Vehicles (CVD)
8	Up to 50
7	51-100
6	101-200
5	201-300
4	301-600

3.0 Routine Maintenance

16. Routine maintenance activities refer to the day-by-day activities that are carried out on a regular, largely repetitive basis. The frequency may vary, in a particular season of the year the requirement may be high. Considering the nature and volume of damages routine maintenance operations are usually carried out by employing labour intensive method of working. Proper attention will be given to allocate fund for this purpose. Routine maintenance can further be categorized as off-pavement maintenance, on-pavement maintenance, road safety and traffic-sign maintenance.

3.1 Routine Off-Pavement Maintenance

17. This category dealing primarily with earthen shoulders (inward shoulder slope to be corrected by outward), side slopes, roadside tree plantations, culverts and surface water drainage, requiring few basic hand-tools and minimal technical expertise. No special skill is required for such work, ordinary labourers can easily manage this type of repair and maintenance works with acceptable quality. In case of earthen roads, repairs on the carriageways will also include under this category.

18. This operation, out side the pavement are mainly labour intensive as well as being extremely cost effective and that has to be given proper attention. The important road network of each district must be brought under this kind of maintenance. The paved Upazila Roads and paved Union Roads will be taken under such off-pavement maintenance program. Organized female labour group in the form of Labour Contracting Society (LCS) shall be assigned to carryout this task along with care taking of planted trees. Routine Off-pavement maintenance is very important for durability of the road network already developed.

3.2 Road Side Tree Plantation and Care-taking

19. Roadside tree plantation and care taking of the planted trees will have to be considered as an integrated part of routine maintenance. In order to prevent deterioration and to ensure durability of the road, as well as to increase the forest resources for maintaining ecological balance, tree plantation and care taking shall have to be implemented simultaneously. The roadside plantation program should normally be implemented under various road improvement projects of LGED. Preparation and implementation of such program should follow the tree plantation manual of LGED published in April 2003. After completion of plantation program (plantation and it's intensive care taking), general care-taking of the road side trees will come under off-pavement routine maintenance carried out by road maintenance workers as usual. Those important roads where tree plantation has not yet been done under any road improvement projects, routine maintenance fund from rural roads and culvert maintenance program could be used for this purpose. Besides, if the road side trees of previous plantation project did not survive, in that case re-plantation can also be done from district's routine maintenance allocation and care taking of all such plant shall have to be ensured through maintenance workers engaged for off-pavement maintenance. While new plantation or re-plantation (80 % or more) schemes are taken, one additional labour per kilometer shall have to be engaged meaning that two female labours will be working per kilometer of the road length. These additional labours will be working for one year only on contract basis after that period one maintenance labour will be responsible for both off-pavement repair and caretaking of the planted trees. At the time of scheme preparation necessary provision shall have to

be made, so that the relevant items are included in the estimate and the scheme is duly approved and implemented through Labour Contracting Society (LCS) involving the local community.

3.3 Routine On-Pavement Maintenance

20. Routine maintenance of carriageways is very important to keep the road in good condition throughout the year. The maintenance of carriageways of bitumen surfaced roads requires a higher level of technical competence and expertise than off-pavement maintenance of roads. Repair of small defects/ damages on the pavement, which includes patching; require technical skill in the use of suitable materials, hand tools and appropriate items of mechanical equipment. Many of Upazila Roads and Union roads in the rural area are bitumen surfaced roads and their maintenance is of high priority because they represent the most important routes of LGED road network. It is particularly important that small surface defects are dealt with properly and promptly, otherwise the cost of remedial work increases quickly.

21. All paved roads (Upazila Road and Union Road) under LGED shall have to be maintained on a regular basis by Mobile Maintenance Team (MMT) based at district level. One or more MMT could be constituted in the district considering the work volume and local condition. Each team will comprise of 3-5 skilled and semi-skilled labourers. The team will be mobile and repair small damages like, potholes, depressions, cracks, edge distresses on the road pavement within a shortest possible time after the observance of defects, so that it would be possible arrested further deterioration of the damaged spots.

22. Generally, the MMT should carry out patch repair works using Bitumen Emulsion preparing Premixed Soft and Cold Mixture, detailed of repair procedure has been described in section 21.4 of this guidelines. Defects observed in the road pavement must be recorded in the prescribed forms (Appendix-3, Form 3.1: Rapid Road Condition Survey and Form 3.4: Detailed Road Condition Survey). Necessary measurements shall have to be taken before starting any repair work and that has to be recorded properly. Stock register of materials must be maintained to keep records of consumption in prescribed forms. On the job training has to be provided to the workers to prepare them as an effective work force.

3.4 Road Safety and Traffic Sign Maintenance

23. Road accident is increasing seriously over Bangladesh. It is also noteworthy that fatalities and severe injuries sustained from road accidents are more than the minor injuries sustained from the same. Reckless driving, overloading of passengers and goods, defective vehicle and lack of knowledge of road users on road safety are the main reasons for road accident among others. Safety of road communication has become an issue of great concern needing urgent attention. According to Road Safety Specialists, accidents are generally occurred at a particular location of the road. The personnel working with road management agency should identity those black spots and take necessary actions to ensure safety in road communication.

24. Possibility of getting road accident can definitely be reduced to a great extent by installing proper traffic signs and signals on the roads and they are followed properly. All road users should abide by the traffic rules. The road construction projects must include various road safety

measures e.g. installation of traffic signs and signals, kilometer posts, road identification post etc. in the planing and design stage of the project. In case of those improved LGED roads, where adequate safety measure has not yet been taken, proper attention should be given to address this problem. The Mobile Maintenance Team of the district should be assigned to maintain the traffic signs on these roads as per direction of the district XEN. Similarly, road identification posts shall have to be installed at the starting and ending chainage of each road already developed. A sample of such road identification post, kilometer-post and road signs including their design, specifications are given in the attachment 1.2 of appendix-1 of this guideline.

25. In order to prevent accidents and to ensure safety of rural roads a few suggestions are given below:

a) The access must remain free and open for plying traffic all the time.

b) Temporary structures/ unauthorized installations/ illegal parking/ cultivation of vegetables on road shoulders etc. must not be allowed.

c) When a road passes through the growth center/ rural market the level (height) of carriageway including the hard shoulder should be set at least one foot above the adjacent land level.

d) Super elevation should be provided on sharp bend, T-junction and crossing point of the paved road with a minimum pavement width of 18 ft. Besides, measure should be taken to straighten the zigzag stretch to maintain uninterrupted sight distance while driving on road.

e) Excavation of earth from slope and shoulder of the road embankment should strictly be prohibited, also removal of turf will not be allowed. Cattle should not be allowed for grazing on the road. Rice, jute, other crops should not be allowed for drying on the road surface.

f) Unwanted bushes and jungles grown on road shoulders creating disturbance in vehicle operation, should be removed/ trimmed regularly.

g) Traffic signs should be installed on the rural roads and the road users, especially the rural people should be encouraged to follow traffic rules.

h) Signboard, inscribing road name, ID Number, LGED's ownership should be installed at the beginning and ending of the road. At the same time Kilometer-posts of standard size should also be installed at regular intervals.

i) Seminar/ workshop could be organised involving the road users at Upazila/ Union level to grow awareness of the rural people about road use, safety, traffic rules and regulations to avoid accidents on road.

26. To prevent road accidents and to provide safer road for the users, more safety-conscious planning, designing, construction and maintenance have to be implemented using cost-effective technologies. It is noteworthy to mention the circular of the Chief Engineer LGED dated 07.02.2005 where necessary directives have been given to the district XENs in this regard. Copy of the circular is given as attachment in Appendix-1 for ready reference. Furthermore, to aware the local people and Rikshaw/ Rikshaw-van operators in road use and road safety through various program, like; training, workshop, symposium, etc the manuals published by LGED

Road Safety Unit (Road use and road safety guidelines for rural roads, Awareness raising of Rikshaw/ Rikshaw-van operators and road safety training guide, and Awareness raising of Rikshaw/ Rikshaw-van operators and road safety training guide for training of trainers) should be used which has already been distributed to all district Executive Engineer's offices. Besides, efforts must be made to enrich the road accident database preserved in the Road Safety Unit of LGED HQ. The Upazila Engineers should collect and send road accident report to Road Safety Unit of LGED HQ in the prescribed form (Appendix-1, attachment 1.2(a) through the respective district XENs on a regularly basis.

4.0 Periodic Maintenance

27. Periodic maintenance is so called because the activities are undertaken at intervals, over a period of time. Periodic maintenance is not upgrading or changing the type of road surface. Periodic maintenance activities in case of bituminous road are again sub-categorised into:

(a) Resealing;
(b) Overlaying; and
(c) Rehabilitation

(a) **Resealing**: This type of periodic maintenances are normally carried out at an intervals of three to five years in order to arrest further deterioration of roads and to restore them as far as possible to their original condition. Resealing type periodic maintenance in general will include the addition of a thin film of surfacing to improve surface integrity and waterproofing, or to improve skid resistance, that does not increase the strength of the pavement. The following treatments are some examples of resealing:

a) Re-sealing (7mm/12mm seal coat),
b) Spot repair in combination with surface sealing,
c) Single/ Double Bitumen Surface Treatment.

(b) **Overlay**: This type of periodic maintenances are normally carried out at an interval of eight to ten years in order to bring back rough undulated paved surface to its original smoothness. Overlay type periodic maintenances include addition of thick layer to improve structural integrity and to increase the strength of the pavement. The following treatments are some of the examples of overlay type periodic maintenance:

i) Bituminous Carpeting,
ii) Spot improvement with bituminous carpeting (25mm/40mm dense or normal graded bituminous carpeting).

(c) **Rehabilitation**: Means the activities required re-instating the pavement to the same condition they were at the time of construction or subsequent reconstruction. It essentially includes strengthening activities to restore structural strength and functional performance for continued serviceability. The load bearing capacity of pavement

gradually reduced with time and at one stage; after the expiry of design life the pavement become failing. Traffic and axle load has great influence over the process of reducing the pavement strength along with other factors. The purpose of rehabilitation is to:

- Add strength to the pavement by providing additional thickness to the layer and thereby maintain structural integrity. This is required when the pavement is failed or tends to fail after expiry of design life.
- Due to the change in nature and volume of traffic on the road in such a way that the existing traffic and the capacity ratio is exceeding design limit creating traffic congestion and the axle load increased, the pavement requires widening along with strengthening

Generally, the pavement in bad (broken) condition require strengthen by providing additional thickness in the base course layer, plus 25mm/40mm bituminous carpeting followed by seal coat and there by rehabilitating the pavement to regain required strength. Besides widening of pavement, provision of laying hard shoulders should also be considered due to increase in traffic volume. Since these treatments are very expensive, adequate tests, surveys and investigations have to be conducted to ensure the existing pavement strength before taking such scheme for implementation.

28. For structures, Periodic Maintenance includes- re-pointing brickwork in abutment walls, brick-arch bridges or culvert headwalls, replacing damaged sections of concrete pipe culverts or repairing concrete beams that have eroded to the extent that steel reinforcing bars have become exposed.

29. Periodic maintenance operations usually require a higher level of technical knowledge and skill, mechanical equipment and materials that meet more precise specifications and standards. Consequently periodic maintenance activities are costlier than that of labour-intensive routine maintenance operations. Periodic maintenance activities are normally carried out by employing local contractors through open tendering method.

4.1 Importance of Periodic Maintenance

30. The greatest danger to bituminous road is the water; accumulation of water on the road surface causes lot of problems to the pavement structure. It decreases the adhesion properties of bitumen, water enters into the pavement through small cracks and the BC layer get damaged while carrying heavy traffic on it, causing potholes on the surface. Subsequently water infiltrate into the base and sub-base course and make the underlying layers weaken, as a result the load bearing capacity of the road is reduced and various defects like – depression, deep-pothole, edge failure, etc. start appearing on the road surface. Once these defects appear, the road deteriorates very quickly and at one stage the pavement structure completely fails. It is therefore very important that the BC roads are made regularly waterproof by putting an additional bitumen layer to cover the entire paved surface on a regular basis.

31. All the defects on the surface must be repaired properly before proceeding with the re-sealing work. Reseal should only be done over a surface that has an adequate camber, no potholes, no depressions, and no edge failure appeared on the road surface. It would be a waste of money to re-seal over a badly repaired surface that will fail again. So, before resealing it must be ensured that the repairs have been done properly, so that the road surface is properly cambered, no pothole, depression or edge failure etc. are visible on the road surface and then it might be expected that resealing will last long.

32. Under various conditions like -effect of weathering actions, higher volume of traffic and axle load, lack of maintaining construction and material standard the road pavement has become weaken and it has lost its bearing capacity to great extent as a result localised depression, wavy surface, etc. will appear on the road surface. Simple routine maintenance or routine resealing operations will not be enough to take care of all these problems. In such situation, replacement of damaged/weak layer along with overlay would be necessary for strengthening the pavement structure and to bring back the road to a maintainable standard.

33. If bituminous road surface is not regularly re-sealed/overlaid, it would not be possible to maintain the road by means of routine maintenance alone, as defects will appear quicker with greater severity and extent. The road will break up and eventually have to be reconstructed. In order to ensure the designed life of the road and for effective utilisation of maintenance fund appropriate surface sealing has to be provided on the road surface at a certain interval of time.

4.2 Surface Re-seal Rolling Programme

34. In order to prepare a realistic surface re-seal rolling programme, the important paved road network of each district has to be identified first. All the roads under the said network will have to be re-sealed on a cyclic basis. The length of the cycle may vary from place to place, but to prepare such programme a 4-year cycle may be considered. Year of construction, nature and volume of traffic and the physical condition of the pre-selected roads of the identified network should receive proper consideration while preparing such programme. Depending upon the design, specification and materials used during construction of road, the type of re-seal (sand seal, SBST, pre-mixed seal coat) has to be determined to make the surface waterproof. The total length of ‘fair’ portion of the paved network, whose total amount is about one-forth of the entire paved length of the district, assessed by the most recent Road Condition/Roughness survey, should be covered by re-sealing programme in each year, so that at every 4-year cycle each road of the important road network can get a full waterproofing layer on its surface. This will be rolling continuously at an interval of four years on an average.

35. All eligible fair rated bitumen roads of the respective district shall be listed from the road database of the concerned district. All the donor's supported roads from the list will receive priority and due importance shall be given for full length paved Upazila Roads. The priority for periodic maintenance will be given based on actual traffic on the road.

36. Before taking up in reseal programme the following should be checked:

- Road segments must be rated ‘fair’ by most recent road condition/ roughness survey.

- All defects (major and minor) on the road surface have already been repaired and the carriageways are cambered properly.
- Proper cross-fall is maintained for shoulders and the side slopes are in good condition.
- Water can drain out easily from the road surface.

37. It is to mention that the structural strength of the pavement shall have to be taken into account before applying re-seal. Weak pavement must need strengthening before taking up under re-seal programme; existing strength of pavement can be assessed by Benkelman beam survey.

4.3 Surface Overlay Rolling Programme

38. The portion of the paved road network of the district rated as 'poor' by the most recent visual condition survey/roughness survey and where substantial sign of distress is found all over the road surface, and also the deflection survey does not indicate the total failure of the pavement stretch, in those sections 'overlay' type of periodic maintenance could safely be provided to restore the initial smoothness of the pavement. This type of maintenance operation is usually taken at an interval of 8–10 years; at this age of pavement, re-seal does not help much in restoring proper roughness. Overlay is quite expensive and an initiative should be taken to cover up the whole paved network by 'overlay' at a cycle of ten years, otherwise vehicle operating cost of the user vehicles will shoot up and the network will become uneconomical with any amount of routine or periodic reseal and soon it requires major reconstruction of the whole network, which is very expensive. Regular overlaying is crucial for the network and should be given equal importance with the re-sealing programme and should pursue as a continuous process.

39. Before placing overlay on pavement surface the following points must be checked:

- Road segments must be rated 'poor' by most recent road condition/ roughness survey
- All spot improvements have been done on the road surface and the carriageways are cambered properly
- Assessment of pavement strength is done by Benkelman beam survey or any other suitable method, and necessary improvement required for pavement sections have been completed
- Proper cross-fall is maintained for shoulders and the side slopes are in good condition
- Water can drain out easily from the road surface.

4.4 Road Rehabilitation Program

40. The portion of the bituminous paved road network (Upazila road and Union road) of the district rated as 'bad' by the most recent condition survey/ roughness survey to be identified, where substantial sign of distress is found all over the road surface and also the deflection test indicates total failure of the pavement. In such sections 'rehabilitation' type of maintenance could applied to restore the road pavement to its original condition. To this effect, traffic survey

and axle load survey on the proposed road has to be completed (if the most recent data is not in hand) and the pavement design shall have to be done for next ten years period considering the projected traffic growth. After performing necessary analysis and comparing the previous and present road designs, the additional thickness of base course layer shall have be determined and added together with the existing pavement to cover the total designed thickness. It should be noted that the thickness of the new base course layer will not be less than 100 mm in any case. This is to mention that when the existing traffic volume and the capacity ration exceed .08, the pavement should be widened. The damaged pavement requires strengthening by rehabilitation will follow the road design standards published by the government through gazette notification. Since rehabilitation is a costly treatment, it should normally be taken only after expiry of pavement design life, when other options of periodic maintenance will not work.

41. Before taking up rehabilitation on any road section the following points must be checked:

- Road segments must be rated 'bad' by the most recent road condition/ roughness survey;
- Existing strength of the pavement is measured by Benkelman beam test or any other suitable method and found that the deflection has gone below the allowable limit;
- Traffic on the road (AADT) has increased significantly and crossed the previous design limit; and
- Proper cross-fall is maintained for shoulders and the side slopes are in good condition.

4.5 Use of Available Periodic Maintenance Fund

42. Fund allocated for periodic maintenance in each district must be utilised as planned, so that appropriate periodic maintenance options are applied properly. However, the cost of various maintenances will vary, depending upon nature and type of treatment prescribed. It may be mentioned that as a whole periodic maintenance is a costlier operation and it requires more money to be allocated against periodic maintenance than routine maintenance. For giving proper importance to various components of periodic maintenance allocations are made against these components accordingly.

43. The fund allocated for surface re-sealing, overlaying and rehabilitation could be adjusted considering the present condition of the important paved road network of the district. Executive Engineer of the respective district will propose such requirement as deemed necessary. It is to mention that re-sealing of one-forth of 'fair' rated paved length and overlaying of one tenth of 'poor' rated paved network of the district should receive priority in district's programme.

4.6 Combination of Periodic and Routine Maintenance

44. There must be a good balance between routine and periodic maintenance in order to achieve an effective and efficient road maintenance management system, which is

complementary to each other. If any one of these operations remains absent it would not be possible to establish the effective and efficient maintenance management system. It is necessary to maintain close relationship between these two categories of maintenance while allocating fund and preparing maintenance plan of the district.

45. The purpose of routine maintenance is to repair small defects on the road surface as and when they appear, so that these small defects do not get chance to aggravate further. This works largely are to be done on a repetitive basis. To accomplish this type of repair works required number of Mobile Maintenance Team (MMT) has been formed at the district level. If routine maintenance were carryout effectively it would be possible to extend the periodic re-sealing cycle. Off-pavement Maintenance on the shoulders and side-slopes are equally important as on-pavement maintenance and that has to be continued. For this purpose the existing LCS system is a preferred method of implementing off-pavement maintenance, which is already established in all districts. The shoulders and side slopes of the road are important elements and that must be maintained to its proper grade so that rainwater can drain out easily from the road surface before it finds ways to penetrate into underlying layers of road pavement.

46. Periodic re-sealing should only be done over a surface that has an adequate camber and no defects are found on the surface and the stretch is rated as 'fair'. Re-seal over a bad surface will not bring any good result; it would be a waste of money. While the severity and extent of damages are more, contractor could be assigned instead of MMT in such situation. Savings against routine maintenance allocation (if there is any) can be used for repair of major defect in pavement as mentioned above. Necessary repair works could also be done in the year before re-sealing is planned. To protect the road it is important that the off-pavement drainage is working properly and that water is not standing on the road surface. The road shoulders are needed to bring at 5% slope (cross-fall) along the section to be re-sealed before periodic maintenance begin.

47. Typical routine and periodic maintenance activities are given in Table 1.1 of Appendix 1

5.0 Emergency Maintenance

48. Emergency maintenance activities can only be anticipated as a historical trends based on previous experiences. Annual flood-damage repair due to recurrent flooding problems may be an example but the extent or seriousness of the damage that will be caused cannot be predicted with any accuracy. Some sections of road may be washed away completely or large concrete structures undermined so seriously that it can result in their total collapse. The ministry of finance has issued instructions to address these unpredicted emergency works and instructed to keep reserve 10% of the allocated maintenance fund for this purpose. This type of emergency maintenance scheme shall have to be implemented by following Open Tendering Method.

6.0 Maintenance of Bridges and Culverts

49. Proper maintenance of bridges and culverts through regular inspection/ survey should be regarded as matters of high importance. It should be carried out at intervals not more than a

year; preferably immediately after the rainy season (after receding flood water) or other natural calamity. A long stretch of well-maintained road in good condition could become useless, if a structure in the mid-way along the road suddenly collapses, inevitably results in delay in traffic movement, inconvenience and frustration among the road users.

50. All structures, large and small, should come under routine inspection program. The Upazila Engineer or his nominated trained staff will perform this task at a regular interval. The forms to be used in this survey are given in Appendix-3, Form: 3.5(a) and 3.5(b), data collected from the field has to be entered into the particular window of RSDMS-VII. The condition survey of bridges/ culverts will follow the procedure laid down in article 7.3 of this guideline. The basic visual symptoms of serious distress in a concrete structure are cracking, spelling and disintegration.

51. Whenever the overall condition of a bridge/ culvert, or of any component thereof, is observed as “major structural defect”, it should immediately receive the attention of the Upazila Engineer/ XEN who should take a prompt decision as to whether it should immediately be closed or make restricted use for the interests of public safety and will invite the Bridge Unit of LGED HQ for further inspection and necessary advise. The planning and implementation of remedial works shall then be put in hand as quickly as possible. Provision of allocating bridge/ culvert maintenance fund has been made under periodic maintenance component, so that proper maintenance of these valuable assets is ensured.

52. Various types of defects could be observed in bridges and culverts over time, a few examples of common defects are given below:

- Blocking/clogging of the waterway. Debris, rubbish, etc. block the free flow of water along the channel and ultimately reduce the water carrying capacity;
- Growing of shrub, trees, etc. on structure. The roots of these trees penetrate into the body of structure and sometimes it appears as threat to the structure;
- Choking the weep-hole. Weep-holes are kept to release the hydrostatic active pressure. But when it is choked, the increased active pressure may cause damage to the structure by overturning/sliding;
- Clogging the rain water pipe. Water takes much time to dry up and causes damage to the deck slab;
- Removal of mortar from brick joints by flowing water or by other means. Re-pointing or re-plastering on worn brick wall become necessary, otherwise the individual brick will come out;
- Damage of approach road, sometimes protective measures are required to safeguard the structures;
- Damage of concrete resulting cracking, spelling and disintegration;
- Damage of wearing course;
- Damage of handrails;

- Scour in abutment, pier, and approach road resulting severe damage to the structure.

53. This type of maintenance scheme shall have to be implemented by following Open Tendering Method.

7.0 Road and Structure Inventory

54. A comprehensive and reliable road inventory database is a basic requirement to establish an effective and efficient road maintenance management system. It should contain detailed information about the physical features of the roads along with identification number, geometric features, Present Condition, Annual Average Daily Traffic (AADT), International Roughness Index (IRI), Chronological History of Construction and Maintenance, location of Bridges/ Culverts, Growth centres, Rural Market, UP Complex, Other Social Infrastructures (School, College, Madrasa, Community Clinic, Health Centre, Cyclone Shelter, etc.) on the road in detailed form chainage-wise. A great amount of work has been done by the Upazila Engineers and concern technical staff to create inventory of all Upazila Roads, Union Roads and Village Roads under LGED through out the country. These data have been compiled and managed through computer based software named as - Road and Structure Database Management System (RSDMS) installed in each Upazila, District and in the RIMMU at LGED HQ Dhaka. During this year, the existing features have been improved and some new features have been added with the system to accommodate the growing needs. The purpose of all this improvement is to fulfil the requirement of proper planning and management for maintenance, rehabilitation and improvement of road network under LGED through out the country.

55. A large number of roads including its appurtenant structures are being constructed in every year under various development projects of LGED. Deterioration of road and structures is a common phenomenon with time, virtually; road deterioration start immediately after its construction and it is progressive. It is therefore very important to maintain a reliable database of the roads and structures with their physical condition through introducing regular surveys/ inspections system and there by up-dating the database of roads and structures at a regular interval systematically.

7.1 Up-dating Upazila Road Map and Inventory

56. The Upazila Road Map is a vital tool for physical planning and that must be available in the offices of all Upazila Engineers. It will enable them to see at a glance the relationships between different roads and support them to plan their annual maintenance program. The Upazila Engineer should update the road map of his Upazila as per necessity and sent the version of the updated map to GIS Unit at LGED HQ for maintaining the updated GIS database at central level.

57. The Upazila Engineer will up-date and maintain a reliable physical inventory and condition database through the RSDMS-VI software, primarily for their own purposes, and also having them available to furnish to the Executive Engineers of their respective districts on a regular basis. At the district level, after receiving updated data from the upazila, the concerned

Assistant Engineer of the district XEN office will verify and check the submission and finally compile these data through RSDMS-VI after proper validation. The district XEN will then sent them to the Rural Infrastructure Maintenance Management Unit (RIMMU) at LGED HQ, Dhaka.

58. Upazila Engineers will have a key role in ensuring that inventory and condition data are accurate by establishing system of regular surveys through trained staff. This information will be used as basis for assessing annual maintenance need and preparation of annual maintenance program of the district with ranking priority of schemes. All Upazila roads should normally be inspected once in every six months and other roads (Union and Village) at yearly intervals to update their condition. Additional inspections should be carried out after serious flooding or after other extreme weather conditions or disasters have been experienced.

59. In order to capture segment wise road condition data and to enter them into the database, the RSDMS software has made the following provisions:

- Determination of road segment shall have to be done generally on the basis of surface type. Besides, in order to record pavement damages on the carriageways, RSDMS-VI will provide segment at the rate of 500 m interval automatically from “Segment-wise Condition Tab”. There exists no scope of creating segment manually at this stage;
- Existing condition of the carriageways shall have to be determined with the help of road condition survey, which has been elaborated in article 7.2 of this guideline.

60. Side by side, union-wise break-up of the road as well as location of UP complex, Growth Centre, Rural Market, Other Social Infrastructures (School, College, Madrasa, Community Clinic, Health Centre, Cyclone Shelter, etc.) shall also have to be recorded in detailed chainage-wise. Detailed description of shoulder and slope, cost of construction, year of construction, source of funding, last maintenance operation, etc. shall have to be recorded in the database using RSDMS-VI software. Chainage-wise detailed information of the road structures (bridges/ culverts) will also be recorded. All these data/ information will form the basis for assessment of physical and financial need including prioritization of maintenance work of the Upazila/ District

61. It has been observed that updated data from the district/ upazila are not sent to RIMMU timely, more over, anomalies/ ambiguity are also found in condition (road surface/ structures) database and that does not reflect the real situation. Virtually, it would not be possible to find out actual maintenance need as well as to develop a comprehensive annual maintenance program unless a reliable database is in hand. So, the concerned districts/upazilas technical staff is requested to make necessary updating of the database with outmost sincerity.

62. The up-dated road database of the districts shall have to be sent to RIMMU at LGED HQ Dhaka within the stipulated time (mentioned in section 26) of each year through FTP Server / mobile disk/ CD. These data will be compiled with central server at LGED HQ for its use by the concerned projects/ officials. The latest data preserved in the central database of HQ shall be treated as the version of current year. The same copy of those data shall have to be maintained by the district and Upazila offices. The concerned AE of XEN's office will have to take a lead role

in the management, storage and updating of this database from time to time at district level as per instruction from LGED HQ.

63. Steps must be taken to prevent frequent amendments of the database by adding new road or by changing road classes from one category to other (e.g, from UNR to UZR, VR to UNR, etc). If any road is required to be added in the database for some obvious reason, the XEN of the concerned district has to explain the reasons and will ask approval of the chief engineer for inclusion of the road in the road inventory under the particular upazila of the district. Subsequently the Chief Engineer will send the proposal to the committee constituted by the Planning Commission for necessary examination. Any addition/ change in the road class would be acceptable only after obtaining due approval from the said committee. When any addition/ change is approved the road database as well the Upazila road map shall have to be updated and will be sent to RIMMU at LGED HQ through a special messenger of the concern Upazila/ district for necessary inclusion in the central database at LGED HQ.

7.2 Road Condition Survey

64. The road condition survey is very important because it provides valuable information to the management at all levels. Road Condition Survey basically means the collection of data concerning the quality of the road network and this enable preparation of annual maintenance need for allocation of fund and subsequently drawing up annual maintenance program of the district in details. The method of collecting these quality data is based on two different levels of inspections:

A. Rapid Road Condition Survey (RRCS) to assess road maintenance need
B. Detailed Road Condition Survey (DRCS) to prepare working estimate to execute planned works within the available fund

65. The RRCS is to be conducted over the entire bituminous road network (Upazila Roads and Union Roads) considered for maintenance by LGED at an annual frequency. This basic survey is primarily visual. It will provide a quick assessment of the general condition of the road network and the effectiveness and efficiency of routine maintenance. While the DRCS has to be conducted on those roads or road sections that are identified by RRCS as needing further inspection for appropriate maintenance treatment. The appraisal of condition is to be made by recording approximate quantitative values from RRCS to the parameters prescribed in the Form-3.1 of Appendix-3, of this document. Once these data are entered into the computer based system, called Road and Structure Database Management System (RSDMS), the software will do necessary calculation and analysis and evaluate the condition based on certain pre-defined criteria.

66. The survey should be carried out by one or more teams of Upazila Technical Staff constituted by the Upazila Engineer (UE). The team should be composed of a Team Leader (not below the rank of Sub Assistant Engineer) and one or two assistants according to the amount of work involved. The Team Leader will be responsible for organising and managing all works within his jurisdiction and make sure that the required forms are filled in correctly and the

data are entered into the database using RSDMS software.

67. Detailed Road Condition Survey (DRCS) has to be carried out to record the type, extent and severity of damages accurately for the road sections identified from RRCS. This will help determining the cause of damage, identify the appropriate repair procedure and quantify the amount of work required with estimation of cost. DRCS has to be carried out by using Form: 3.4 given in Appendix-3 of this document. The detailed road condition survey should be carried out preferably by the same team who performed the rapid road condition survey. Data obtained from this survey will be used in preparing working estimate of scheme and that will be submitted to the appropriate level for necessary approval. Detailed procedures of Road Condition Survey are described in the "Road Maintenance Management" training manual which can be considered as useful reference.

68. The UE will be responsible for coordinating all works within his Upazila and for ensuring that the data are recorded into RSDMS database and transmitted to the district office within the stipulated time mentioned in article-26 of this guideline for taking into the district road database maintained in Executive Engineer's office after necessary validation.

7.3 Structure Condition Survey

69. Regular inspection/ survey of structures (bridges/ culverts) should be regarded as matter of high importance. This could be conducted by following a two steps survey procedures, which is designed to collect relevant data required for planning structure maintenance annually. The approach taken to the assessment of structure condition is basically the same as for road condition. The first step assessment of the external characteristic of the structure and is undertaken by the Sub-Assistant Engineer of respective Upazilas. Structure condition survey should preferably be conducted just after the rainy season, when water level receded sufficiently to allow inspection of deck soffit and river bed. This should be done through visual inspection in Form -3.5 (a) and the data will be used in preparing annual structure maintenance need.

70. The second step is a more detailed survey of the structural elements of the bridges requiring precise engineering judgement. Closer inspection of underside of bridge deck and girders, bearing shelves, seats, etc. is required at this level of inspection. From- 3.5 (b) would be used to estimate the maintenance/ rehabilitation requirements and to prepare the annual maintenance program of bridges/ culverts with prioritizations.

71. Well experienced engineers (XEN, AE, UE) should undertake the full structural inspection of bridges rated as major elemental/ structural damage. The purpose of this inspection is to determine whether the bridge is to be repaired/ rehabilitated or replaced, and then to identify and quantify precisely what works are required in order to prepare a detailed cost estimate. The Bridge Unit at LGED HQ should be involved in such type of inspection.

72. Frequency of survey/ inspection of bridges are generally related to the physical condition of the structure. It is essential that the field engineers adopt a systematic approach to the survey/ inspection program and it is important that uniform criteria are applied consistently. All structures must be surveyed/ inspected at least on an annual frequency and may also have additional discretionary visits which may be called for either by Executive Engineer of the

district or by the Superintending Engineer of the region.

73. The Upazila Engineers will be responsible for preparing the survey/ inspection program of bridges/ culverts within his jurisdiction and for ensuring that the program is implemented on time. The Sub-Assistant Engineer (SAE) will be responsible for step-1 survey in Form-3.5 (a) of all the bridges and culverts once in a year. The Upazila Engineer (UE) will be responsible for checking all inspection reports prepared by SAE and to conduct step-2 survey where it is necessary. In addition, the Bridge Expert Team from LGED HQ should inspect major elemental/ structural damaged bridges as per request from district Executive Engineer after being reported by Upazila Engineer.

74. The Bridge Unit at LGED HQ should closely monitor the condition of bridges more than 100m in length through out the country, similarly the Regional Superintending Engineer should monitor the condition of bridges between 50-100m length within the region and the rest (up to 50m length) by the Executive Engineer of the district within their respective jurisdiction, so that defects/ damages are detected at an early stage and appropriate measure could be taken at right time. The Upazila Engineer will provide necessary cooperation at various stages of the work.

75. Instructions and guidance notes are furnished in the "Road Maintenance Management" training manual which can be considered as useful reference. Bridge/ Culvert Inspection Form -3.5(a) and Form -3.5(b) respectively are given in Annex-3 of this document. All relevant data are to be entered into RSDMS for subsequent analysis and shall have to be sent to the district XEN's office from Upazila Engineer's office. After necessary checking and validation, the district XEN will sent the database (softcopy) to RIMMU at LGED HQ within the specified time mentioned in article-26 of this document.

7.4 Roughness Survey

76. The roughness of road surface is an important measure of road condition and a key factor in determining vehicle operation cost and riding quality. The longitudinal unevenness of road surface is normally termed as roughness and is expressed as International Roughness Index (IRI). Now a days roughness survey is widely used for assessing the overall condition of the road network within a short time. A small instrument "Bump Integrator" fitted with jeep or Pick-up van measures the cumulative amount of bumps on the road surface, which in tern gives the roughness number indicating condition of road surface. To assess condition of roads the following rating with respect to roughness (IRI range) are used in LGED:

IRI Range	Condition Rating
6 ≥ IRI	Good
6 < IRI ≤ 8	Fair
8 < IRI ≤ 10	Poor
IRI > 10	Bad

77. Type of maintenance to be applied of road surface dependent on several factors, the most important one is the condition of the pavement surface. The IRI at different stretches of road section gives a clear indication of the present condition of the pavement which can be used in road maintenance planning and management. Roughness of the road in terms of IRI has great influence in HDM analysis. Recently roughness survey has been introduced in LGED to assess

condition of LGED roads. Necessary training has also been imparted to Assistant Engineers, Upazila Engineers and Sub Assistant Engineers of district/ Upazila level. This survey has to be conducted under the guidance of Assistant Engineer. Data from this survey has to be recorded in Form-3.2, which is given in Appendix-3 of this document and have to be entered in the particular window of the RSDMS-VI and to be sent to RIMMU at LGED HQ within specified time (mentioned in article-26). The roughness data shall have to be checked with the visual road condition data in order to ensure the quality and reliability of the survey. Detail procedure of conducting roughness survey has been described in the "Road Maintenance Management" training manual which can be considered as useful reference.

7.5 Deflection Test

78. The purpose of deflection test is to determine the pavement strengths in order to decide the type of maintenance/ rehabilitation needed to be undertaken and how strong they need to be. Pavement strength normally deteriorates with time due to the effect of traffic, axle load, construction standard and weather action. Accurate information on pavement strength is a critically important input for use in Road maintenance Management system. It determines the load bearing capacity of the pavement. In selecting a particular treatment under periodic maintenance, the value of pavement deflection has direct influence. If pavement strength is lost, in that case it helps to determine how much thickness is required to be added in the pavement to obtain adequate strength. Correct measurement of pavement strength is a prerequisite for HDM analysis. To add strength in weak pavement, deflection must be measured and the result has to be co-related with the standard pavement design to prescribe additional thickness of layer for taking rehabilitation work. There are various procedures to determine pavement strength, of which following are mentioned;

- Benkelman Beam Test
- Falling Weight Deflectometer
- Dynamic Cone Penetrometer (DCP) Test
- CBR Test

79. From the above procedures, Benkelman Beam Test is widely used, since it is comparatively easier and gives direct result within a short time. In order to carry out this test, necessary training has been imparted to Assistant Engineer and Laboratory Technician of the Executive Engineer's office at district level. This survey has to be conducted at locations where necessary under the guidance of Assistant Engineer of the district within specified time (mentioned in article-26). Data from this survey has to be recorded in Form- 3.10 which is given in Appendix-3 of this document and have to be entered in the particular window of the RSDMS-VI. Detail procedure of conducting Benkelman Beam Test has been described in the "Road Maintenance Management" training manual which can be considered as useful reference.

7.6 Traffic Count on Road

80. Traffic counts are very important exercise needed to find out how many and what types of vehicles are using the road. Categorized traffic flow data provide the current level of use of roads by different type of vehicles and thereby forms an essential input in the maintenance planning of

the road. This information is particularly very important to set priorities between two or more roads and to find out those roads carrying a larger number of motorized transports.

81. The traffic count should be conducted at least once in a year. The counting station should remain same for each count in different years. Location of the counting station should be marked in the road inventory and road map, so that the station can easily be identified.

82. Duration of count should be at least two days, 12 hours in each day starting from 8:00 am to 8:00 pm. One count will take place in hat day and the other on a non-hat day during the same week. Traffic passing in both directions of the counting station should be considered in the count. The counting will be done using the tally count method in the form-3.6 generated from RSDMS-VI has been given in appendix-3. Attention must be provided, so that the annual average of the total traffic on the road is properly reflected in determining the Annaul Average Daily Traffic (AADT). If necessary, duration of count could be extended (up to 3 days or more) in order to obtain the representative AADT. Information at the top of the form shall have to be filled up carefully. Name of the counter, designation, related road data, counting station, weather prevailing, date, etc. shall have to be entered into RSDMS System along with other data. The road-wise traffic data will be preserved in the office of the Upazila Engineer using RSDMS-VI and he will send softcopy of the database to the Executive Engineer of the concerned district, who will send the full updated database of the district to RIMMU at LGED HQ within specified time (mentioned in article-26). The Upazila Engineer will be held responsible for conducting traffic survey every year on a regular basis.

8.0 Pavement Evaluation and Selection of Appropriate Maintenance Option

83. Evaluation of existing bituminous pavement condition is very important before selecting appropriate maintenance treatment to be applied. The strategy for selecting appropriate option should be based on a number of considerations. Firstly, the causes of damages in the existing pavement must be correctly identified. For instance, the deterioration may result from some deep seated structural insufficiencies or construction defects, for which correction of the deficiencies should be done by rehabilitating the damaged portion of the pavement. Secondly, attention should be given to determine the nature, extent and severity of damages to check the effects that will have on the treatment, which is going to be considered. Finally, the strategy must be economically viable and technically sound. The following information are important in choosing appropriate option.

a) First of all, collection of data on the design, construction and maintenance of the proposed BC length considered for maintenance;
b) Surface condition, roughness, traffic data are to be collected;
c) Measurement of Deflection/ DCP to determine strength, if the pavement appears to fail. Where necessary, the existing pavement materials should also be tested to check quality (size, FM, LAA, gradation, etc);
d) Cause of defects should be precisely defined;
e) Based on the above data, the appropriate treatment (maintenance/ rehabilitation) has to be selected

84. Information gathered from detailed road condition survey shall have to be analysed carefully to ascertain the type of maintenance work required for the particular section of the road. Whenever, rutting, structural cracks, deep-potholes, depressions or wavy surface appeared on the surface, some additional tests are to be carried out to evaluate the pavement condition. For example, if the depth of damages is extended beyond the base or sub-base layers, in such case pavement strength has to be measured. It is well recognised that the structural damage caused by vehicular movement depends on the axle load it imposes on the road. The thickness of various pavement layers should be established using the DCP and trial pits and the in situ strength of the pavement layers and the sub grade are determined by deflection and DCP tests.

85. Traffic and Axle load are crucially important. The annual average of commercial vehicles plying on the road has to be calculated from traffic survey. The cumulative standard axle has to be determined from annual average daily traffic for the design life of the road and projected growth rate. Then the design cumulative standard axle has to be classified according to specified traffic range. The subgrade strength (CBR) has to be measured and classified into specified sub-grade class. Knowing the design cumulative standard axle and CBR value of sub-grade the pavement thickness can be selected from the design catalogue. TRL, Overseas Road note 31 could be used in determining the layer thickness and thereby additional thickness can be find out to resume appropriate strength of the pavement (example is given in the attachment 3.12 of appendix-3). Through this method it would be possible to determine whether overlay type of treatment or rehabilitation would be appropriate for proposed road section in question. Scheme preparation including preparation of cost estimates should follow the above requirement.

86. It is to mention that if there is no sign of structural failure on the pavement and the damages are mostly localised, in such case repair of patches should be done properly and re-surfacing could be applied as per necessity to improve the riding quality. For evaluation of existing pavement condition and selection of appropriate treatment, the procedure laid down in the “Road Maintenance Management” training manual could be considered as useful reference.

9.0 Maintenance Need Assessment and Preparation of Priority Scheme List

87. The first step of maintenance need assessment and preparation of annual road maintenance program of the district is to ascertain the condition of the road network including the structures within the district. In order to find out damages/ defects on the roads and structures, the surveys/ investigations mentioned in the previous sections shall have to be completed by following proper procedure (mentioned in article-7). The data captured from various surveys has to be entered into the respective windows of RSDMS-VI for necessary updating of the database. The primary responsibility of organizing the above surveys will lie upon the XEN of the respective districts. He will engage the Assistant Engineer of the district along with the concerned Upazila technical staff in performing the survey works. The Upazila technical staff under the guidance of Upazila Engineer will perform various surveys in the field, collect data in the specified form and enter them into RSDMS-VI. The district XEN will ensure completion of all survey works on time (mentioned in article-26) in LGED road network under his jurisdiction by taking appropriate measures. It has to be kept in mind that negligence in field data collection will result inaccurate assessment of maintenance need of LGED roads and

there by the annual maintenance program drawn up from the defective data will not meet the actual maintenance requirements of the road network within the district.

88. The survey data received from the respective Upazila Engineers within the district will be checked and validated by the district XEN office and then imported (extracted) into the district's road database through RSDMS-VI. The Assistant Engineer of district will be held responsible for compilation of all these data and update the district's road database annually. If any anomalies/ ambiguities are observed at the time of checking, the Assistant Engineer will request the concerned Upazila Engineer for clarification, if necessary, redo the survey and resubmit the correct data. After compilation of data from all the Upazilas under the district, the annual maintenance need of the district will be estimated taking the present road and structure condition into account through the RSDMS-VI software. The road maintenance need generated by the software will present the preliminary scheme list, priority rank, probable cost of schemes under various maintenance categories by Upazila.

89. Based on the preliminary needs, priorities, and allocation of road maintenance fund for the district for the current financial year, the district will propose list of schemes for inclusion in the annual maintenance program by optimizing budget allocation for the district. In ranking priorities of schemes in the list, the criteria set in the table-3.3 of appendix-3 will be applied (e.g. road class, surface type, traffic volume, connectivity, etc.) to obtain a score for each candidate scheme, so that, the reason for getting high/ low priority would be self explanatory. The XEN will then sent the concerned part of the list to the respective Upazila Engineers for further checking and verification in the field and then present them to the District Maintenance Committee meeting.

10.0 Finalization of District Annual Road Maintenance Program

90. The Upazila Engineer will check and verify the proposed schemes of the primary scheme list within the stipulated time (mentioned in section 26) and send all relevant papers including his comments to the Executive Engineer of the district for onward necessary action. The Executive Engineer will then invite District Maintenance Committee meeting to review the submissions of the Upazila Engineers and to formulate the District Annual Road Maintenance Program within the specified time-frame (mentioned in section 26). The list of schemes will be finalized considering the priority, importance, probable cost, etc taking district's allocation into account, and thereby the primary road maintenance program of the current fiscal year will be prepared for the concerned district.

91. The Executive Engineer of the district will then send the updated road database along with proposed scheme list in the prescribed form (Appendix-2, Form2.2a) to the Regional Superintending Engineer for approval of district's annual maintenance program within the stipulated time. The Regional Superintending Engineer will invite meeting participated by the Executive Engineers to finalize district's program within the region. The process would be completed in presence of the representative from RIMMU, LGED-HQ participating the meeting and thereby approve district's annual road maintenance program of the year. Detailed preparation will then be started for the schemes included under approved annual maintenance program. The Executive Engineer of the district will conduct necessary tests/investigations/

surveys and complete scheme-wise estimate preparation taking assistance from the Upazila Engineer within the stipulated time (mentioned in section 26).

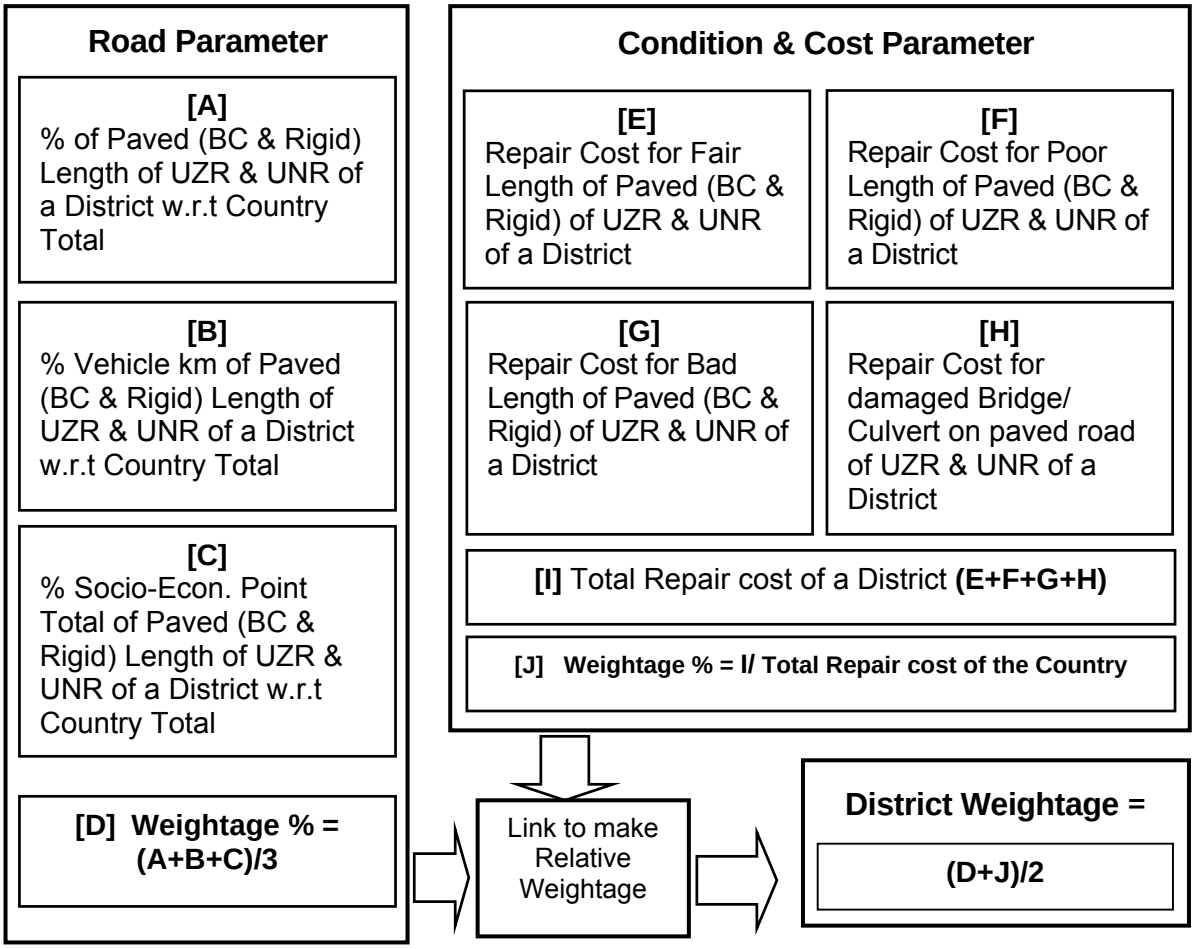
92. It is to mention that due importance has been given to Upazila Road and Union Road while selecting schemes under annual road maintenance program. Because, the Government has re-classified and defined the existing road system of the country on 12th May 2003 through gazette notification and assigned responsibilities to the concerned department. Subsequently, the Government on June 12, 2006 and on July 05, 2006 has published the detailed list of Union Roads and Upazila Roads respectively of the country through gazette in favour of LGED. Accordingly LGED has been made responsible for construction/development, maintenance and management of Upazila Roads and Union Roads through out the country; and the Government has been allocating funds from its national revenue budget to maintain the above classes of roads by LGED. On the other hand, concerned Local Government Institutions (Union Parishads) have been made responsible for construction/development and maintenance of Village Roads through gazette on June 12, 2006 and detailed list of those roads was also published.

11.0 District-wise Allocation of Maintenance Fund

93. Allocation of road maintenance fund to each district from GoB revenue budget will be given on the basis of certain criteria from the LGED HQ for maintenance of important road network of the respective districts. It can be mentioned that the district's allocation will principally depend upon the maintenance need and priorities. In order to assess such maintenance need, the updated road and structure inventory of the district and their condition will be considered as basic data. The following parameters will be taken into account while allocating road maintenance fund district-wise.

- Total lengths of roads under various categories (Upazila road and Union road), paved road length and vehicle-kilometres in each district;
- Existing condition of the road network within the district;
- Total number, span of structures (bridges/ culverts) and their present condition.

94. Based on the above criteria, an uniform weightage will be determined for allocating road maintenance fund among the districts of the country. The RSDMS-VII software has been designed to accommodate the above features and will be applied for this purpose. District wise allocation of road maintenance fund will be need based and will never be distributed evenly among the Upazilas of the district. Weightage calculation by district and accordingly the fund allocation to the district is shown by a Flow-Chart below:



95. The paved Upazila roads and paved Union roads of each district including the structures on these roads will be brought under the annual maintenance programme to apply required treatments under routine and periodic maintenance. Among them highest priority shall be given to those Upazila roads constructed under foreign aided development project.

96. Routine Off-pavement maintenance shall have to be continued through out the year by LCS, so that off-pavement maintenance can be ensured right from the beginning to the end of the financial year, necessary fund will be provided for this purpose. Fund will also be provided to carry out routine on-pavement maintenance over bituminous roads by mobile maintenance team to repair small pavement defects as and when it necessitate. Installation of traffic-sign, kilometer-post, etc. at appropriate locations and their maintenance is important from the road safety point of view, so, necessary fund for this purpose may be spent from routine maintenance allocation of the district.

97. The roads, which have not being included under tree plantation program by any LGED project, roadside plantation can only be taken up for those roads under off-pavement maintenance. Off-pavement routine maintenance fund of the district could be used for this purpose without exceeding the expenditure under the same allocation head. Preparation of such plantation scheme shall comply with LGED's "Tree plantation manual" published in April

2003. After completion of plantation, care taking of those trees will be the task of the maintenance workers under regular routine maintenance work. Where trees of the previous plantation are not survived, new saplings have to be re-planted in the appropriate place and care taking has to be ensured.

98. GoB has issued circular on "Repair and Maintenance of Physical Infrastructures in the country owned by the Government", where the ministry of finance has instructed to address the unpredicted emergency maintenance works caused by natural calamities (like, flooding, cyclone, etc.) and asked to keep a reserve of 10% of the allocated fund for this purpose. The schemes under emergency maintenance shall have to be sent to LGED HQ for necessary approval.

99. It is to mentioned that implementation of the maintenance program will jointly be monitored by the finance division and the concerned administrative ministry with respect to fund allocation and audit the expenditure.

12.0 District Maintenance Committee

100. In order to ensure proper maintenance and management of LGED roads, there will be a District Maintenance Committee in each district. The committee will be comprised of:

1.	Executive Engineer	Chairman
2.	Sr Assistant Engineer of XEN's office	Member- Secretary
3.	All Upazila Engineers of the District	Member
4.	Assistant Engineer of XEN's office	Member

101. Terms of Reference of the Committee

a) Proper maintenance of roads and road infrastructures of the district to attain design life and to ensure best use of allocated maintenance fund;

b) Selection of maintenance schemes from the important road network in accordance with the priority within the allocated fund for the district;

c) Conduct meeting in each month to review progress of scheme implementation and ensure quality control measures during implementation;

d) Conduct necessary tests and surveys in order to assess road maintenance need and ensure data entry in the prescribed software and its preservation;

e) Coordinate routine maintenance works undertaken on various roads under different Upazilas of the district. Look into the road selection, planning, management and ensure proper implementation of routine maintenance activities. Monitor payment to the workers, daily wage, date of payment, etc to safeguard worker's interest;

f) Ensure care-taking of road side plantation, negligence from any quarter to be dealt strictly;

g) Ensure inspection of bridges and culverts at regular interval by the staff and officials

from the district and upazila level and updating the RSDMS database. Follow-up the erection of road signs where necessary to facilitate traffic movement;

h) Emphasise on road safety to reduce accident rate on the road network of the district, identify the black-spots and take necessary measure to rectify them;

i) Perform duties and responsibilities assigned by HQ from time to time.

13.0 Scheme Preparation and Cost Estimation

102. Scheme preparation shall be progressed under the supervision of Upazila Engineer on the basis of actual measurements of defects and damages determined through road condition survey. The Upazila Engineer should make the fullest use of the plan books, inventories and maps, condition survey and detailed inspection report and finally compile a maintenance program using the forms that are attached under Appendix-3. Detailed about the quantity and cost estimate shall be prepared using LGED schedule of rate and standard specification. Any item of work beyond the LGED schedule of rate shall have to be defined precisely with justification and that must be sent to LGED HQ for approval. Best use of salvage materials will have to be ensured by physical inspections on the site while preparing cost estimate of schemes. Salvage materials recovered from the proposed scheme will have to be taken into account and recorded in the scheme estimate. It is to mention that all estimates shall have to be prepared by using Rate Schedule and Estimate Preparation (RSEP) software. The Upazila Engineer will take care of all preparatory works of the yearly maintenance programme at Upazila level and submit the same to the district XEN within the stipulated date (article 26) for taking further necessary actions on these.

13.1 Off-Pavement Routine Maintenance by Length-Person System

103. Estimate for off-pavement routine maintenance should be prepared on the basis of 7 (seven) working day per week, normally, 365 days for a year and 366 days for lip-year. In preparing estimate the rate approved in LGED schedule of rate; Tk 90/- (Taka Ninety) only per day per person for a length of 1 (one) Km shall have to be applied. In order to ensure proper supervision of off-pavement routine maintenance, maintenance supervisor will be engaged to supervise a group of 15-20 labourers. The supervisor will also work like the maintenance labourer and they will be paid Tk 100/- (Taka One hundred) only per day on master role basis. Purchase of tools and equipment will be included in the estimate which should not be more than 5% of the yearly labour cost. The contract for off-pavement maintenance will be started from 1 July and continue upto 30 June of each Financial Year. So, that maintenance activity will be on going throughout the year. This contract can be extended up to 3 (three) years maximum, subjected to satisfactory performance of the labour group. The roads, which have not being included under, tree plantation program by any other project, road side plantation shall be taken-up under off-pavement routine maintenance. Preparation of such plantation scheme shall comply with LGED's "Tree plantation manual" published in April 2003 and the Upazila Engineer will complete all preparatory works in time. The plan, section, specification of road side tree plantation is given in the attachment-3.8 of appendix-3. After completion of plantation, care taking of those trees will be the task of the maintenance workers under regular routine maintenance. All Upazila roads and Paved Union roads should be covered by off-pavement maintenance programme. List of each road taken up under routine maintenance

shall have to be submitted in Form-2.2 (b) of appendix-2 to the HQ within the stipulated date. In selecting scheme/ female labour duplication with any other project/ program must be avoided. The Upazila Engineer and the District Executive Engineer will have to certify jointly that the schemes submitted under this program have no duplication with any other project.

13.2 On-Pavement Routine Maintenance by Mobile Maintenance Team (MMT)

104. Small pavement damages must be repaired as quickly as possible. If not, further deteriorate will take place and will subsequently require expensive maintenance operation on it. In order to overcome such situation, Mobile Maintenance Team (MMT) has been introduced in every district under the supervision of XEN to repairs small patches on bituminous surfaced roads at the very early stage of defect. For prompt repair of defects, pre-mixed soft and cold mixture using bitumen emulsion will be used (detailed of the procedure described in section 21.4).

105. A mobile maintenance team will consist of 3-5 skilled/ semi-skilled labours headed by a foreman. The formation of such mobile team along with other related arrangements are described in section-20.0 of this document. The following points shall have to be taken into account while preparing estimate for small pavement repairs works by mobile maintenance team:

a) Determine the extent and severity of damages by using visual Road Condition Survey, the estimate will be based on the above survey. The concerned Assistant Engineer of XEN office in the district will be responsible for preparation of necessary estimate of schemes of such kind;

b) Compute the total damages of same nature from different schemes within the district and combine all repair works, which will constitute a single scheme for the district;

c) Estimate of the work will be prepared to carryout small patch repair works on bituminous road network throughout the year. The probable expenditure on such type of work could be analysed in two major head; (a) purchase of materials (b) expenditure on labour, equipment and fuel. By following LGED standard specification, analysis of materials-labours- equipment shall have to be done and included in the estimate;

d) Considering the over all damages on the road pavement, the labour-days and materials should be calculated following standard procedure of LGED rate analysis. Detailed analysis of labour, materials and equipment shall have to be done for the work in order to find out the quantity and cost of different elements (labour, material, equipment, etc.) involved in it. This will indicate the expenditure on various elements constituting the item of work;

e) For each Mobile Maintenance Team, provision of purchasing small equipment/ hand tools should be kept in the estimate as per necessity;

f) For transportation of material, equipment and team member from one spot to another within the district necessary fuel cost should be include in the estimate;

g) Cost of installation of kilometre post, road identification post, traffic sign including their maintenance should be included in the seperate estimate where it is necessary to provide safety of road. This will also be the task of mobile maintenance team. Sample

estimate for installation of traffic signs, kilometre-post and road identification post is given in attachment-1.2 of Appendix-1.

13.3 Periodic Maintenance

106. In preparation of periodic maintenance/ rehabilitation schemes, re-usable materials (brick, sand, etc) of good quality should be taken into consideration at the time of estimating the cost. Quality of salvaged materials shall have to be ensured through laboratory test. In case of repairing AS/WBM/BC all salvaged bricks shall have be converted into brick chips for AS & WBM layer preparation. It is to mention that value of salvaged materials shall have to be mentioned in tender schedule, which will remain unchanged. The quantity and unit cost of the materials will be mentioned in the estimate and that will be deducted from contractor's bill. If the salvaged materials are fund unacceptable with respect to quality and standard through lab test, in that case the concerned Regional Superintending Engineer will be informed by the XEN in writing. In response, the Regional Superintending Engineer will physically verify the quality of salvaged materials at site and give necessary instructions in writing. The following measures could be taken depending upon the local situation:

a) The unusable salvaged materials could be preserved at a suitable place for future use, for example- to meet emergency resulting from natural calamity. The place for storing such materials and time allowed for this purpose shall be mentioned in the tender document. Necessary cost for picking up and transportation of salvaged materials from the site to stockyard will be taken into account while preparing contract document;

b) If the idea of preserving the salvaged materials is not feasible, the contractor will receive the materials in exchange of cost. While fixing cost, it should not be less than 50% of the cost of standard materials of same kind mentioned in LGED schedule of rate for the district. Adjustment of cost could be made from contractor's running bill. The above provision will have to be mentioned in the contract document at the preparation stage;

c) The contractor will remove the unusable materials from the site before taking layout/ starting physical works. Necessary terms and conditions including time limit shall have to be mentioned in the tender document during preparation of contract.

107. VAT & IT will be deducted from Gross amount (including salvaged materials) of the contractor's bill as per standard procedure. Then the cost of salvaged materials will be deducted from the bill as stated in the tender schedule. Payment to the contractors shall be made after necessary deduction from the gross amount.

108. Where overlay is necessary on the damaged BC pavement, dense carpeting item should be used in the estimate. If the seal coat is necessary as a single item, this may be applied on whole/ partial length of the road to make it waterproof. The Upazila Engineer will be responsible for preparation of all kinds of periodic maintenance/ rehabilitation schemes on the basis of actual field measurement.

109. Protection Works: In general, palisading should not be used for protection of road, but under special case it may be used at the toe level with 1.5m interval wooden bullah with

maximum height 1 m from GL. As because, palisading is not a stable solution, that is why, the durability of road can be achieved by providing adequate cross-fall on shoulder and adequate side slope with earthwork. Beside, retaining wall/ toe wall/ RCC palisading, etc. may be provided under special circumstances, in such case, prior approval has to be taken from HQ.

110. Earth Works: In case of earthwork in damaged road shoulder/bridge Approach, pre-work survey will have to be taken by level instrument and, than calculation of required earth has to be made by earth work calculation software supplied by LGED HQ. Payment for earthwork shall be made by deducting pre-work measurement from post work measurement, no running bill will be allowed for earth work. If estimated cost for earthwork is more than 50 (Fifty) thousand, in such case it should be include under FFW project. The contractor shall have to maintain the earthwork till the warranty period after completion of his contract. Besides a clause will be include in the tender notice- in case of earth work, no lead/lift will be include in the estimate as the contractor is liable to collect earth. If it is necessity to collect earth from a distance place, lead/lift may be proposed reasonably and invite tender accordingly. Under no circumstances lead/lift or carted earth should be include in the estimate after inviting tender. Carted earth rate cannot be allowed in the estimate, except municipal area. Under special cases if it is necessity, prior approval will have to be taken from HQ. Further it may be mentioned that approved specification will not be changed without prior permission from HQ. If earthwork schemes are submitted without presenting the calculations using Earthwork software, in such case approvals of those schemes should not be given.

111. Scheme Submission: The Identification Number (ID) of each road and structure shall have to be given for every scheme on the list. This ID must be the same as it is recorded in the Road and Structure Inventory prepared and maintained by the Upazila Engineer. Funds will not be allotted against those schemes without ID Number.

112. All schemes must be supported with relevant documents. Necessary forms/ table/ papers in this regard have to be prepared/ filled up by the Upazila Engineer. Strict adherence to the specified deadlines is essential and the following documents shall have to be submitted to the Executive Engineer of the concerned district for necessary checking and perusal:

- Location of the scheme on the Upazila Road Map including the Road ID. No.;
- Road Line Diagram showing the present road condition (Form-3.11)/ structure condition survey Report (Form-3.5 b);
- Point value priority ranking of the scheme in Form- 3.3;
- Technical Report in prescribed Form- 3.7 (where applicable);
- Detailed quantity and cost estimate of maintenance scheme using RSEPS software;
- Estimate of salvaged material recovered from existing scheme using RSEPS software;
- Still picture/ Video of damaged road/ structure (where applicable);
- Any other pertinent information.

14.0 Approval of Scheme

113. The Executive Engineer must carefully examine the schemes submitted by the Upazila Engineer. The XEN will physically inspect at least 25% of those schemes that are of high priority and relatively costlier to check the appropriateness of selected treatment, physical measurement of damages, quantity, cost, etc. On the basis of field verification the XEN will make required revisions where necessary and certify that the proposed treatments for the schemes are adequate with respect to field condition and estimation of quantities and costs are realistic in the prescribed Form-2.3 of Appendix 2. The proposal will then be placed before the District Maintenance Committee (DMC). After careful and thorough review in the meeting, the priority of schemes in the district annual maintenance program will be determined with respect to the fund made available for the district.

114. The following procedures shall have to be observed in the process of approval of scheme under rural roads and culvert maintenance programme:

(a) Routine Maintenance: All schemes fall under routine maintenance category including tree plantation and care taking shall be eligible for approval within the allocated fund (for routine maintenance) of the district after taking concurrence of the District Maintenance Committee (DMC). This is to mention that routine off-pavement maintenance by LCS and On-pavement maintenance by MMT will have to be started right from the beginning of the year. If those activities do not start timely, the periodic maintenance activities will not be approved for the concerned district. The following points will have to be taken into account in the approval process:

- Priority ranking of schemes has to be followed
- All routine maintenance schemes (On-pavement and Off-pavement) will be approved by the Regional Superintending Engineer upon due recommendation from the concerned district XEN. Detailed list of schemes approved by the Regional Superintending Engineer will have to be sent to RIMMU, LGED HQ in the prescribed form (form-2.2)
- The Upazila Engineer and the District Executive Engineer will be held jointly responsible for duplication in appointing female labourers with any other similar project/program, or in any other financial irregularity for off-pavement routine maintenance activities in the district. If any deviation is observed in scheme selection and approval process, allotment against the scheme will be cancelled from LGED HQ

(b) Periodic maintenance: Following procedure will have to be observed in the approval of periodic maintenance works

- Schemes will be submitted by the district XEN to the respective Regional Superintending Engineer after taking concurrence of DMC;
- The Regional Superintending Engineer will examine the submission and physically inspect at least 10% of those schemes on random sample basis;
- The Regional Superintending Engineer will approve scheme estimate up to Tk 10 (ten)

lakh. In doing so, he must not exceed the allocation made under various periodic maintenance works against the concerned district. The Regional Superintending Engineer will send schemes to RIMMU, LGED HQ when the estimated cost exceed Tk 10 (ten) lakh after necessary revision (if required) based on field checking and certify the submission (in the prescribed Form-2.4) for approval. List of schemes approved by Regional Superintending Engineer along with detailed estimate will have to be sent to RIMMU, LGED HQ;

- The Regional Superintending Engineer must ensure that the road length has not been split to keep the estimated cost with in Tk 10 (ten) to obtain approval from a certain level while approving or recommending periodic maintenance schemes. This means, there will not be multiple periodic maintenance scheme on the same road;
- The schemes received by RIMMU at LGED HQ will be checked and scrutinised in accordance with the maintenance guidelines and also with the central database preserved at HQ and approval will be issued upon satisfying all requirements;
- Instructions regarding any scheme from RIMMU, LGED HQ must be complied with.

The XEN will invite tender according to the item of works mentioned in the approved cost estimate and issue work order to the contractor upon due approval of the scheme from the HQ.

(c) Rehabilitation: Under the "Rural Roads and Culverts Maintenance Programme", new construction/ re-construction will have to be avoided totally. In that case-

- Earthen roads, good HBB roads will not be allowed to upgrade to BC standard;
- Rehabilitation of damaged BC road can only be taken following the road standards;
- Damaged bridges and culverts appeared to be risky for traffic can be replaced by rehabilitation or reconstruction following appropriate design.

To obtain approval of rehabilitation, the XEN will submit the scheme along with cost estimate to RIMMU through the concerned Regional Superintending Engineer, who will physically inspect at least 25% of the submitted schemes on sample basis and certify the district proposal (in the prescribed Form-2.4) if that is found correct. This is to mentioned, all these works have to be completed within the specified time limit. Contract cannot be awarded without obtaining scheme approval from HQ.

(d) Revision of Approved Estimate: During implementation of maintenance/ rehabilitation work at field, any alteration/ revision/ inclusion of new items in the approved estimate and revising estimate should be avoided. In such case-

- Generally, revision of any estimate will not be approved;
- Under special circumstance, if revision become inevitable (estimated cost more than Tk 10 lakh or less than Tk 10 lakh) permission must be seek to the Regional Superintending Engineer in writing explaining justifications;
- After receiving written permission, revised estimate may be prepared jointly with the representative of Regional Superintending Engineer following the terms and conditions of PPR 2008.

The revised estimate will be sent to RIMMU, LGED HQ after necessary checking by the Regional Superintending Engineer with due recommendations. Authority of approving revised estimate (estimated cost more than Tk 10 lakh or less than Tk 10 lakh) has been kept at LGED HQ (not with the field offices. Any revision without having approval will be considered as irregular. For such irregular scheme, allotment will be withdrawn and the concerned XEN and the Upazila Engineer will be held responsible personally.

(e) Carry Over: Under special circumstances, if any approved scheme(s) of the preceding year has not been completed in due time and the remaining works need to be carried over to the next year, in that case, requirement of fund to complete the remaining works shall have to be incorporated in the next year's scheme list with necessary details and approval has to be obtained from LGED HQ before paying any bills against the carried over scheme.

(f) Duplication of Scheme: No duplication of scheme with any other project/ program must be ensured. The concerned Upazila Engineer and the District Executive Engineer will be held jointly responsible for any duplication of scheme

115. After completing various steps in the process of scheme approval at district level, all schemes of the district under different categories shall have to be listed in the prescribed From-2.2(b) of appendix- 2 with necessary details. All maintenance schemes of the year must be presented in that list. This will give a comprehensive picture of road maintenance of the district for a particular year and will be known as Annual Maintenance Plan of the district. The annual maintenance plan from each district must be submitted to the HQ and copy of the same shall have to be forwarded to the concerned Regional Superintending Engineer so that all concerned are well aware about the annual plan in their respective jurisdiction and can monitor execution of the programme accordingly.

116. The responsibilities of maintenance activities at different level is summarised in Table 14.1 and is shown in the form of a Flow Chart under Diagram 14.2

Table 14.1 Responsibilities of Maintenance Activities

Activity	Responsibility
1. Perform surveys on road condition, structure condition, roughness, traffic, etc on the Upazila roads and Union roads (as described in section 7) under each Upazila and updating the Upazila Road Database through RSDMS-VI and sent it to respective district XEN	Respective Upazila Engineers and the Sub-Assistant Engineers
2. Collect updated road database from the respective Upazilas, validation of data and compilation to create updated road database of the district	Executive Engineer and Sr. Assigned Assistant Engineer of the district
3. Receive updated road database from the districts, validation of data and compilation to central road database and thereby finalize annual updating of road database at HQ level	RIMMU, LGED HQ
4. Assess maintenance need, ranking priority on the basis of updated road data preserved at HQ through software run (RSDMS-VI), take print out and send the primary scheme list to respective Regional Superintending Engineer and Executive Engineer offices	RIMMU, LGED HQ
5. Send the primary scheme list (concerned part) to the respective Upazila Engineers	Executive Engineer and Senior Assistant Engineer/ Assistant Engineer of the district
6. Verification of schemes at field, preparation of preliminary cost estimates and submission to district XEN	Upazila Engineer
7. Check detailed schemes including their initial cost estimates received from the concerned Upazilas and review the submission in the DMC meeting. Finalize the annual maintenance program in accordance with the fund allocated for the district and send necessary papers to regional SE	Executive Engineer and the District Maintenance Committee
8. Approval of district's annual maintenance program in presence of RIMMU representative in the meeting invited by Regional Superintending Engineer	Regional Superintending Engineer and RIMMU representatives

Activity	Responsibility
9. Prepare of detailed cost estimate and procurement plan after conducting necessary survey/test for the schemes listed in the approved annual maintenance program of the district and send to Regional Superintending Engineer by XEN	Executive Engineer and Senior Assistant Engineer/ Assistant Engineer of the district and concerned Upazila Engineers
10. Approval of all routine maintenance schemes and periodic maintenance schemes up to estimated cost of Tk 10 (ten) lakh after necessary checking and forward all periodic and rehabilitation schemes (estimated cost above Tk 10 lakh) to RIMMU, LGED HQ	Regional Superintending Engineer and Assistant Engineer of his office
11. Approval of all periodic and rehabilitation schemes having estimated cost above Tk 10 (ten) lakh forwarded by Regional Superintending Engineer in the light of district allocation. Approval of Procurement plan sent by XEN from districts	RIMMU, LGED HQ
12. Tenders invitation, tenders receive and contracts award for the approved schemes.	Executive Engineer of the district
13. Implementation of annual maintenance program with close supervision and quality control.	Executive Engineer, Sr Assistant / Assistant Engineer, Upazila Engineer, Sub-Assistant Engineer and Monitoring Engineer
14. Submission of monthly progress report to RIMMU at LGED-HQ, Regional Superintending Engineer and Upazila Chairman's office	Executive Enginee and Upazila Engineer
15. Monitor implementation of road maintenance program and proper supervision for quality and standard. Take remedial action for any un-specified/ sub-standard works	Regional Superintending Engineer
16. Complete implementation of annual road maintenance program by spending the allocated fund to the district	Executive Engineer of the district and the Upazila Engineer
17. Submission of closure report to LGED-HQ	Executive Engineer through DMC

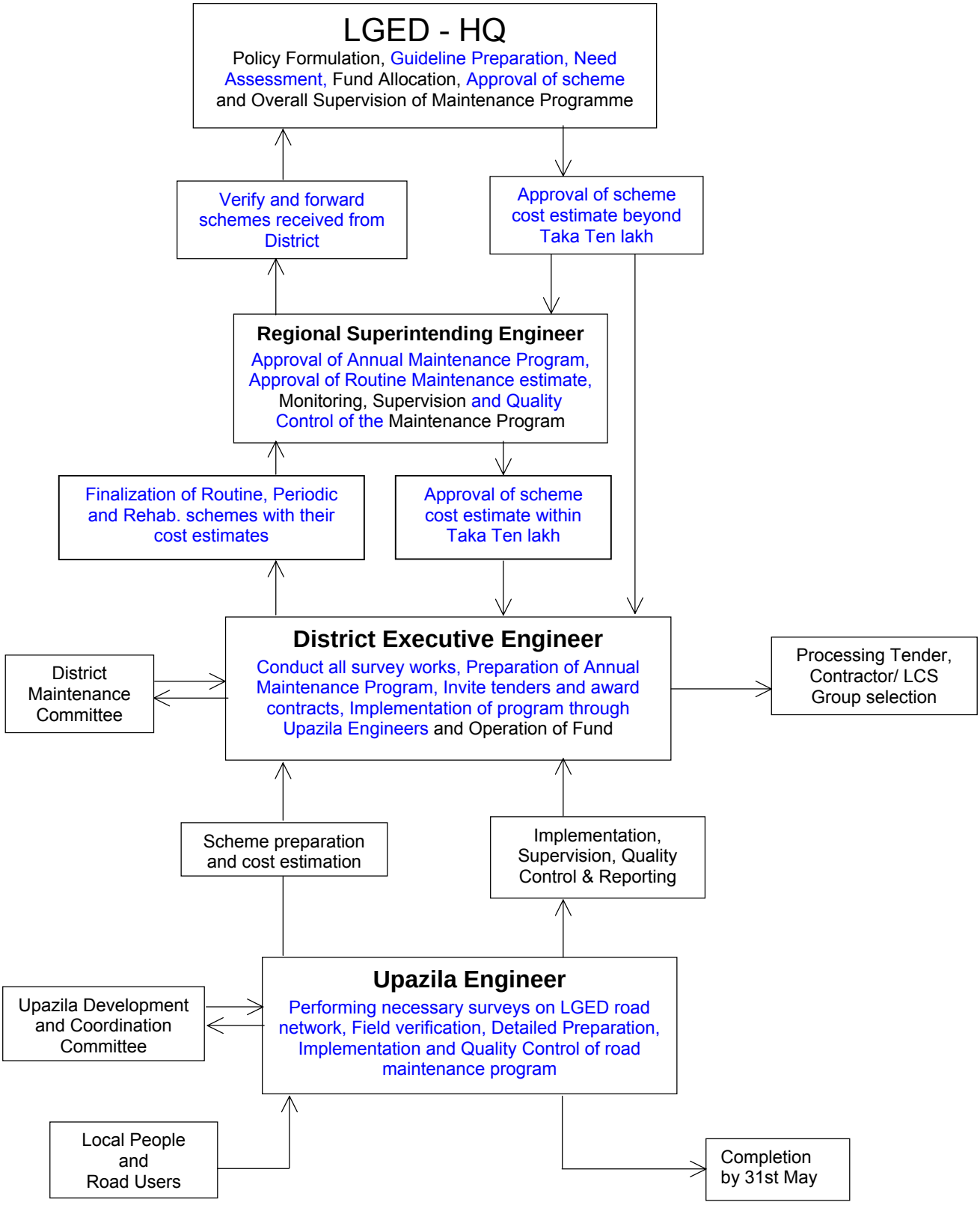


Fig 14.2: Flow Chart Showing Planning and Implementation of Maintenance Program

15.0 Procurement Management

15.1 Procurement Procedures

117. All kinds of procurements have to done following "Public Procurement Rules 2008" circulated by the government. This should be applied strictly to ensure transparency and accountability in the procurement process.

118. The mode of implementation of maintenance works will depend mainly upon the degree of technical skill that the work demands and the size and type of mechanical equipment that is required to carry out the work. The day-to-day routine maintenance of shoulders, slopes, small culverts and care-taking of roadside tree plantations will normally be carried out by destitute women labourers formed into Labour Contracting Societies (LCS). The formation and management of such LCS will be guided by "The LCS Management Guidelines" published by LGED. Under special circumstances, urgent repair of off-pavement (earthen part) could be done by engaging additional labourers so that the work can be accomplished within a shortest possible time to safeguard the road infrastructure from further damage. Repair of small wear and tear on pavement surface can be done by Mobile maintenance Team to arrest further deterioration of the road pavement as an immediate measure. The LCS system is consistent with "The Public Procurement Rules 2008" where the system has been treated as a mode under direct procurement under article 76(3) contributing towards poverty reduction of the rural poor.

119. In general terms, procurement of maintenance works (periodic, rehabilitation, emergency) should be done by following National Open Tendering Method, under special situation, recommendation may be made to the head of procuring entity for allowing other suitable method with proper justifications. For routine on-pavement maintenance by MMT, materials should be procured by following open tendering method and the article 82 should be applied for engaging labourers to get the work done. It is to mention that all documents related to procurement of works and goods should follow the standard format already circulated by LGED in the light of Public Procurement Rules 2008.

15.2 Annual Procurement Plan

120. A realistic procurement plan under the purview of "The Public Procurement Rules 2008" is very important for managing necessary procurement on time with efficiency. This will help to monitor various activities related to procurement and by which any deficiencies in the process can be identified and appropriate measure can be taken to overcome the problem. To this effect all procuring entities shall have to prepare an annual procurement plan of each item of procurement for submission to the Chief Engineer for taking necessary approval. In preparation of procurement plan, package can be made combining number of smaller contracts, so that the value of each package should be more than Tk 5.00 (five) lakh. The terms and conditions laid down in "The Public Procurement Rules 2008" for different procurement methods shall have to be followed strictly by all procuring entities.

16.0 Supervision and Monitoring of Maintenance Works

121. Day to day supervision and monitoring of all maintenance activities within each Upazila will be the responsibility of the concerned Upazila technical staff. The Upazila Engineer will have the responsibility for implementation of all maintenance activities according to the program and he will physically inspect works on a regular basis. The Upazila Engineer will present the progress of implementation of the annual maintenance program to the meeting of the Upazila Development and Coordination Committee from time to time and receive necessary advice from the committee. The Upazila Engineer will be held responsible for achieving satisfactory progress with respect to time and quality control at Upazila level.

122. Besides, the Senior Assistant Engineer of XEN's office at district level will have a very important role in the implementation of rural roads and culverts maintenance program of the entire district, major responsibilities in this regard are summarised below:

- To act as Member Secretary of the District Maintenance Committee;
- To inspect all important road network of the district and also co-operate with the Upazila Engineers to carry out Road Condition Survey (RCS) of the paved road network under each district. Collect data from Upazila and preserve them properly for necessary analysis;
- To support XEN in determining the district priorities of schemes and present the ranking of schemes in the District Maintenance Committee;
- To assist XEN to send necessary papers and documents to LGED HQ, Dhaka through the regional Superintending Engineer in accordance with the maintenance guidelines for necessary approval;
- To check estimate of schemes as sample on the spot at random basis submitted by Upazila Engineer;
- To monitor the progress and supervision of all types of maintenance works within the district and carry out spot checking to ensure quality of works and the accuracy of measurements;
- To preparing physical and financial progress report of all schemes under the district's maintenance programme;
- To operate routine on-pavement maintenance works by Mobile Maintenance Team (MMT);
- To update and the road database of the district (by compiling data from the concerned Upazila) using the Road and Structure Database Management System (RSDMS) and send it to regional SE and RIMMU, LGED HQ within the cut off date;
- To collect hard and soft copies of digital road map of the concerned district/ region from GIS unit of HQ. and preserve them in his computer for using planning/ programming annual maintenance activities;
- Prepare and collect necessary report/ information related to rural infrastructure maintenance as per instruction from RIMMU at HQ. and sent them accordingly to appropriate places.

123. The Sub-Assistant Engineer (Maintenance) of Upazila Engineer's office will have important role in various maintenance activities of the concerned Upazila, major responsibilities in this regard are follows:

- Monitor all maintenance-related activities of the entire Upazila as instructed by the Upazila Engineer.
- Collect detailed information of Upazila road network through Road Condition Survey as instructed in the maintenance guidelines.
- Update road and structure inventory including the road map of the concerned Upazila and maintain history of road construction and maintenance. Conduct traffic survey on paved LGED road at least once in a year.
- Prepare cost estimates of maintenance scheme using LGED's standard specifications and schedule of rate in accordance with data obtained from road condition survey and detailed visual inspection.
- Supervise implementation of maintenance works as per approved estimates, design and specifications.
- Report progress of on going maintenance works with respect to the work program.
- Monitoring and supervision off-pavement routine maintenance by LCS including care taking of planted trees on those roads.
- Monitoring and supervision on-pavement maintenance by mobile maintenance team at Upazila level.
- Prepare physical and financial progress report of maintenance works and submit them to UE for necessary action.

124. The XEN will also pay regular visits to the field and be responsible for proper execution of maintenance programme of the district. There will be a District Maintenance Committee (DMC) under the chairmanship of XEN in each district, where Sr Assistant Engineer of the XEN office will act as member secretary and all the Upazila Engineers within the district will act as member. The committee must meet at least once in a month to review the progress of implementation of maintenance programme. A hard copy of progress report including the proceedings of monthly DMC meeting shall have to be sent to RIMMU at LGED HQ and to regional SE by the XEN of the district within first week of each calendar month in the prescribed Form- 5.1 and 5.2 attached in Appendix-5. The said report must contain all relevant information of approved schemes category wise (routine, periodic, emergency, etc) in the specific rows and columns generated through RSDMS-VII. The Regional Superintending Engineers will regularly monitor the maintenance works being implemented by the districts within the region through inspections/ field visits and give necessary advice at field and report to RIMMU, LGED HQ for taking necessary action.

16.1 Quality Control

125. Particular attention shall have to be given to Quality Control, which is the most important aspect for ensuring the satisfactory cost-effectiveness maintenance operation. In maintaining the quality of works, if any lapse or negligence is observed from any quarter, the concerned officer or staff member will be held responsible.

126. Compliance with specified compaction requirements must be checked in particular by carrying out regular testing, both on site and in the LGED district laboratories, all materials should also be tested on a regular basis. In case of road work, the underlying subsequent layers shall be placed after obtained necessary clearance from the XEN/ UE after conducting laboratory test. The Contractor will be required to pay for any required testing that has been specified in the tender documents and no payment will be made against the bill unless the quality of the work is found to be satisfactory after laboratory testing. The test frequency for different type of tests should be determined by using standard and specification set by the Central Quality Control unit of LGED, HQ Dhaka. Required tests with their frequencies shall have to be mentioned in the tender schedule, so that the bidders are well aware about the lab test while participating in the bidding process. The Regional Superintending Engineer will regularly monitor and supervise the quality control aspect of implementation of road maintenance works.

16.2 Erection of signboard at work site

127. Signboard should be erected at the work site giving the following information:

- name of the implementing agency;
- name of the programme;
- description of the work;
- name of the contractor;
- estimated cost of the scheme;
- contract sum;
- main work component;
- date of commencement;
- completion date.

128. For road, the signboard should be erected at the starting and ending point and for culvert/ bridge scheme it should be erected at the work site. The cost of the sign should be included in the estimate.

129. To inform local people about the maintenance responsibility of the contractor at site, there should be a notification issued by the XEN specifying the name of a person assigned by the contractor as being responsible for the rectification of faults or defects within the warranty period. This person must reside close to the project vicinity.

130. In performing emergency maintenance, adequate advance warning signs should be set out ahead of the works to warn approaching traffic, especially on busy routes or where the visibility is restricted.

17.0 Measurement, Bill Preparation and Payment

131. Measurement of work must be carried out periodically and preferably simultaneously by the Contractor's representative and the Upazila SAE. Separate measurements books should be

provided for each scheme and all work should be recorded in this book for payment. If the SAE decides that the work is in accordance with the specification, he should then prepare the bill. All approved work will be subject to monitoring on a spot check basis by the UE or XEN and payment for any unsatisfactory or incorrectly measured work will be withheld.

132. The Upazila Engineer must certify each payment against the measurement as being correct before submitting it to the XEN who is responsible for the correct and proper expenditure of all the district maintenance funds. The measurement book, copy of the bill and all other relevant documents should be retained in the office of the Upazila Engineer. The original bill will be preserved in the office of the district Executive Engineer. The Executive Engineer of the district will ensure proper expenditure of the entire allocated fund timely following the rules and procedures issued by the government from time to time. The concerned Executive Engineer will be held responsible personally for unspent balance of the district (if any).

133. Running bills can be paid to contractors against specific items of works which have been accomplished satisfactorily in accordance with required quality standards, but under no circumstances can advance payments be made. The XEN submit details of all payments made to LGED HQ, where the Maintenance Cell may carry out further spot checks to monitor the correctness of these payments and the quality of the work that has been carried out.

134. At the time of paying the running or final bill against work that has been satisfactorily carried out, Income Tax (IT), VAT and Security Money shall be deducted as per the contract conditions and deposited under the respective account heading, otherwise the drawing and disbursing officers will be held responsible. For those schemes where construction materials recovered from the work site have been re-used, departmental issue rates for materials will be used to calculate their values, which will be included in the gross amount. IT and VAT will then be deducted from this gross sum in order that the value of these re-used materials is accounted for properly.

135. Rate of hire charge of equipment and machinery per unit quantity of work done (LGED schedule of rate, Appendix-1) shall have to be attached with the tender document. Side by side, daily hire charges of LGED equipment and machinery (LGED schedule of rate, Appendix-2) also have to be attached with the tender document. While preparing bill against the acceptable work, the equipment charge whichever is higher (calculated both ways by quantity of work done and daily hire charge of equipment) shall be deducted from contractor's bill. The contractor must agree on the above terms and that has to be mentioned in the tender document.

18.0 Additional Schemes from Savings

136. Any savings that may result from bids offered at a lower rate cannot be used for increasing the volume of the work within that scheme. It may be possible however to add other schemes from the priority list of the district, subject to approval at a co-ordination meeting of the District Maintenance Committee. The standard procedure shall have to be followed when selecting a contractor to carry out these additional works and complete by 31 May.

19.0 Action against Defaulting Contractors

137. The work order shall be cancelled for those contractors who fail to start work as per their submitted Work Plan or fail to submit performance security; the tender security of the defaulting contractor will also be forfeited. A replacement contractor shall be selected from the others that participated in the original bidding. The regulations laid down in "The Public Procurement Rules 2008" shall be applied in taking necessary action against the defaulting contractor and selecting new contractor for the work.

20.0 Off-pavement Routine Maintenance by LCS

20.1 General

138. The routine maintenance of off-pavement including shoulders, slopes, roadside tree plantations, surface water drainage channels and culverts is suited to labour intensive methods of working, requiring only a few basic hand-tools and limited technical expertise. These day to day routine maintenance activities will generally be carried out by destitute women labourers formed into Labour Contracting Society (LCS) on a yearly contract basis. Roadside tree plantation and care taking of the planted trees will be considered as an integrated part of routine maintenance. In order to prevent deterioration and to ensure durability of the road, as well as to increase the forest resources for maintaining ecological balance tree plantation and care taking shall have to be implemented simultaneously. Preparation and implementation of such program should follow the tree plantation manual of LGED published in April 2003. After completion of first part of the plantation program, normal care-taking of the road side trees will come under off-pavement routine maintenance carried out by maintenance workers as usual.

139. Destitute women labourers living in the vicinity of the road to be maintained should be made aware of the maintenance work through wide local publicity and applications invited, addressed to the Upazila Engineer. The age limit should be 18-40 years and they should be mentally and physically sound to take the responsibility. Landless, unemployed women having no earning member in the family will get priority in selection. The Upazila Engineer will make a primary list of female labourer (20 persons more or less) from the applicants and select required number of labourers on the basis of verbal interview from primary list of suitable candidate. The applicants must furnish correct information about themselves in their application; misleading information will cause termination from the job. For any reason, if new labourers are required to be engaged in future that should be done from the primary list prepared earlier. The female labourers will be appointed purely on a temporary yearly contract basis for a period of maximum three years.

140. The labourers to be working on the road shall form themselves into a group and elect one chairperson and a secretary to represent them and sign the contract for one year on their behalf on the standard form of contract using Form 4.1 under Appendix-4. The contract could be extended for a maximum period of three years subjected to satisfactory performance of individual labourers and the group. The chairperson and secretary will act as working labour and maintain their respective stretches of road on the same basis as the other workers.

141. A small gang of 4-7 labourers will work on a particular stretch of road to repair the damages as per direction of the Upazila technical staff and maintenance supervisor. More than one group may be engaged on those roads that are more than 7 Km in length. The labourers will work eight hours per day. Care taking of planted trees must be ensured by the individual labourer for their respective assigned length.

142. The UE will prepare road-wise estimate considering the length of road, nos. of labourers required and the labour wage for seven days a week. The estimate should be based on one labourer for each kilometer of road length, the wage rate will be as per approved LGED schedule of rate; TK 90.00 (Taka Ninety) only per day. Appropriate tools will be procured by the Upazila Engineer and distributed amongst the workers. To maintain earthen shoulder to its appropriate slope (5% cross-fall) wooden shoulder board shall have to be used. A sample of a shoulder board including its drawing and estimate is given in attachment 4.2 of appendix-4. The UE will procure this wooden shoulder board and distribute one for each group of labours. Cost of small hand tools like- spade, durmus, bucket, basket, etc. should be included in the estimate where necessary. Cost of signboards at both ends of the road may also be included in the estimate.

143. To supervise day to day works in off-pavement maintenance in the field, one Supervisor can be engaged for every 15-20 maintenance labourers in general on purely master-role basis. The supervisor will be either male or female member from the locality engaged by the Upazila Engineer, he/ she will be mobile, able to follow instruction from the Upazila technical staff and issue instruction to the workers. It is to mention that in one Union, only one supervisor can be appointed, if the number of maintenance worker is less than 15 (fifteen) in one Union, there will be no supervisor in that Union, in such situation the supervisor of the adjacent Union will be held responsible to supervise the neighbour Union. Like the maintenance labourer, the Supervisor should be selected from the vicinity of the road and they should be from low income group, having basic knowledge in earthwork in road (literate and numerate), qualified SSC, having their own bicycle and able to riding bicycle. The supervisor will be paid Tk 100.00 (Taka One hundred) only per day as wage. The responsibility of supervisor will be road-wise as per direction of the Upazila Engineer. They will look after the off-pavement maintenance work closely and will distribute day to day works to the labour group and take account accordingly from the group, so that the appropriate work is done at right time in the right place with adequate amount and quality. There should be a formal agreement between the Upazila Engineer and the Supervisor on non-judicial stamp before engagement with the work. It should be a purely temporary arrangement for a period of one year. Upon satisfactory performance of the supervisor the contract may be renewed on yearly basis. If the performance of the Supervisor is found not satisfactory, the Upazila Engineer will issue two warning letters and on the third time the UE will terminate the inefficient Supervisor from the job and engage new supervisor in that place. The supervisor will submit monthly report of works performed by the groups under him at the end of each month in the prescribed form - 4.5 and at the same time will submit Work Plan for the coming month in the form-4.5(a) to the UE through Community Organizer. The UE will arrange necessary training for the Supervisors to acquaint them with their tasks and responsibilities.

20.2 Description of Works

144. The following activities are required to be done by the LCS workers engaged in Off-pavement routine maintenance:

i. maintain shoulders to its proper width as per design standard with respect to road type (UZR/UNR) including maintenance of 5% cross-fall with the help of wooden shoulder board to facilitate drainage;

ii. cut high shoulder to maintain 5% cross-fall at road shoulders to avoid ponding at pavement edge or shoulder;

iii. fill low/ depressed shoulders at proper grade including filling small ditches on the shoulder with proper compaction to facilitate drainage;

iv. repair rain cuts, rat-hole on shoulders and slopes;

v. removal of weeds from abutment and wing walls and cleaning weep-holes, rain water pipes of the road structures (bridges/ culverts);

vi. removal of debris at the in-let/ out-let/ inside of culverts and keep them clean for easy passage of water;

vii. re-placing turf on the side slopes of road;

viii. care taking roadside tree plantations and cleaning jungles/ bushes;

ix. cut back overhanging branches or other vegetation; and

x. stockpile suitable materials on shoulder for use in monsoon season.

145. The LCS workers performing routine off-pavement maintenance on site should carry flag with LGED symbol, so that they can be identified easily while they are at work.

20.3 Work Planning and Distribution of Work to LCS Group

146. The Upazila Engineer will ensure routine off-pavement maintenance of all the roads taken under annual maintenance program in his Upazila round the year by engaging LCS with the close involvement of maintenance Supervisor. The Upazila technical staff will monitor the performance of Supervisors at least every fortnightly (two weeks interval) in the field and take account of work done and fix up the target for next fortnight during their visit. The Upazila Engineer will supply required number of register to each maintenance group, where the supervisor will record the tasks performed by the group date-wise. The group leader will be the custodian of the work register and maintenance supervisor will ensure availability of this register at all time in the work site. Each group will be responsible for maintenance of 4-7 Km road shoulders/ slopes including caretaking of the planted trees on the same stretch. The Community Organizer and the Supervisor will play an important role in the off-pavement routine maintenance work by checking the most necessary work is done all the time. The Supervisor will prepare monthly work plan for each LCS group in the prescribed form (Form-4.5 a) showing the location of work, type of works, length, etc. He will submit the work plan to the Upazila Engineer on the first day of each month through the Community Organiser, so that

the Upazila technical staff can monitor the progress with the monthly plan and provide necessary instructions for proper execution of routine off-pavement maintenance on the roads. The following aspects should be taken into consideration while preparing the work plan for routine off-pavement maintenance by the group;

- type of works with quantities in the light of condition of the shoulders of the road,
- availability of earth from the road side land,
- weather condition (monsoon, rain, etc.)

147. Quantity of work may vary depending on the above condition; as for example, if the condition of the shoulder is very bad (shoulder width reduced substantially), in such case the assigned length to the group will be lower compared to good condition road. During rainy season, earth become scared as a result the nature of works and target would be changed.

20.4 Supervision and Monitoring at Field Level

148. Monitoring and supervision is very important at field level to implement road maintenance program effectively and efficiently. It is necessary to ensure that the most necessary work is being done properly with adequate quantity and acceptable standard. In order to establish an effective monitoring system, necessary forms are to be used to collect information on different aspects and these data should be transmitted to different level of authority. The maintenance supervisor and technical staffs at Upazila level will play a vital role in the monitoring process. Upazila Engineer will collect and preserve all relevant information in his office and he will send the monthly summary report to the district XEN office in the prescribed form (Form-4.5). The following system should be followed to monitor off-pavement routine maintenance activities in terms of setting target, standard, quality, progress, etc.

1) In order to monitor the routine off-pavement maintenance activities closely, a field monitoring register for each group shall have to be supplied by the Upazila Engineer through the respective supervisor. The group leader will preserve the register at the work site. The supervisor will record the relevant information on it, like; location of work, work type, amount of work performed, etc by the group day-wise on the basis of task assigned to them (Form-4.4 of appendix-4).
2) The group leader will take daily attendance of the labourers on the standard master-roll form and the supervisor will counter sign to certify the attendance of the workers.
3) The supervisor will visit all the roads under his responsibility everyday. During his visit he will spent considerable time (preferably two hours or more) with each group and take account of all works assigned to the group in the previous day and record in the register, at the same time, he will fix up the target for the current day and also take necessary step to resolve the local problems if any.
4) The concerned Sub-Assistant-Engineer (SAE)/ Community Organiser (CO) will visit the roads fortnightly to check the tasks performed by the group in terms of quantity and quality and give his comments on the monitoring register. He will also assign the task of

the next fortnight to the supervisor. If negligence is found with supervisor in performing his/her duty, the SAE/ CO will report to UE for taking necessary action

5) The Supervisor will prepare the monthly summary report containing different types of works done at various locations of each road using Form- 4.5 and submit to SAE through the CO. In preparing the report, he should extract necessary information from the monitoring register, where day-to-day performances are recorded.
6) The SAE will check and verify the report submitted by the supervisor from the field and forward it to Upazila Engineer for on ward necessary action
7) Upazila Engineer will review the monthly reports; he will randomly check the work at site and give his comments and forward it to the district XEN for paying monthly bill in full or part according to his observation. The UE will forward his report to XEN within 1st week of every month.
8) The Executive Engineer will take necessary action for paying monthly bill on the basis of the reports received from the Upazila Engineer and give necessary advice to him for smooth implementation of the work.
9) The XEN and the regional SE will also visit field to check the quality and progress of off-pavement maintenance work and provide necessary advice to the field staff.

149. In executing routine off-pavement maintenance of LGED roads by LCS group, the responsibilities at various levels of LGED officials and staff are given below:

Responsibilities of Regional Superintending Engineer

- Approval of Annual Road Maintenance Program (ARMP) of the districts under the jurisdiction of the region through conducting regional meeting
- Approval of all routine maintenance scheme estimates of the districts under the jurisdiction of the region, except approval of revised estimates
- Look into the maintenance activities of the whole region and extend necessary technical assistance and co-operation to the concerned XENs within the region.
- To check and verify the planning, preparation and implementation of “Rural Roads and Culverts Maintenance Programme” of the districts within the region, so that, it follows the guidelines and instructions issued from LGED HQ.
- To attend the District Maintenance Committee (DMC) meetings of the concerned districts and provide necessary advice, and also invite XENs of the concerned districts in his office for meeting to review the annual maintenance program for proper co-ordination within the region.
- To extend necessary support to XENs and UEs of the concerned region in solving any problem with regard to maintenance of LGED roads
- Review the status of updated road database of the district with the concerned district XEN in the monthly coordination meeting invited by him.

Responsibilities of XEN

- To ensure payment of wage to LCS female worker in time.
- To supervise all type of maintenance work and maintain co-ordination with Upazila Engineers under him.
- To review the progress reports received from the Upazila Engineers and send necessary information to RIMMU at HQ.
- To extend cooperation to Upazila Engineers to resolve problem related to maintenance if any;
- To review progress and problems of off-pavement maintenance activities in district level coordination meeting and take the necessary action to resolve any problem.

Responsibilities of Upazila Engineer (UE)

- To select LCS labours and supply necessary tools and equipment to the LCS workers for routine off-pavement maintenance.
- To review off-pavement maintenance activity in the monthly meeting.
- To prioritize and select road for routine off-pavement maintenance
- To help the LCS for resolving any kind of problem related to off-pavement maintenance
- To provide technical support and guidance to LCS in road maintenance works
- To submit the monthly progress and monitoring report to the XEN of the district
- To supervise quantity and quality of work done by maintenance workers and take necessary action where applicable
- To take initiative for paying LCS workers and supervisors timely and regularly

Responsibilities of Sub-Assistant Engineer

- To assist UE in selecting and prioritizing LGED roads for taking under routine maintenance program as per maintenance guideline.
- To assist the Upazila Engineer for resolving any problem regarding execution of off-pavement maintenance works.
- To give technical support to LCS workers and supervisors in road maintenance.
- To assist the Upazila Engineer in imparting training to female workers in off-pavement maintenance work.
- To monitor off-pavement maintenance work of each road at least once in every fortnight.
- To prepare the monthly payment bill of LCS workers and maintain accounts of their wages.
- To monitor payment of wage of LCS members and inform the UE in this regard if necessary
- To submit monthly summary report for off-pavement maintenance in form-4.5 regularly
- To carryout the responsibilities as per instruction of the Upazila Engineer

Responsibilities of Community organizar (CO)

- To participate in the female LCS worker selection process and arrange training for selected female members under the guidance of UE.
- To impart training to female LCS worker on routine off-pavement maintenance activities and working by group
- To select new LCS worker if replacement is needed and provide training.
- To take account of works from the supervisors according to the work plan and submit report to the UE
- To give necessary advice to maintenance supervisor regarding off-pavement maintenance works.
- To help LCS female members in opening savings bank accounts and encourage them for saving.
- To collect road accident report from the supervisors in the prescribed form (Form-1.2a) and to submit the report to UE after necessary checking.
- To carryout instruction of Upazila Engineer in conducting maintenance works

Responsibilities of Work Assistant (WA)

- To evaluate maintenance work done by LCS during the current fortnight and assign activity for the next fortnight to the maintenance supervisor.
- To follow maintenance guideline in supervising off-pavement maintenance work of LCS.
- To help the supervisor for recording the work in monitoring register and to evaluate the quality and standard of works
- To check the monitoring register filled up by supervisor during visit and inform the LCS about their performance.
- To ensure that the monitoring register is under the custody of Group leader, so that SAE, UE and XEN might know the comments on it during their visit and also pass on their comments.

Responsibilities of Supervisor

- To receive instructions about the type of work to be done, location, work procedure, etc from SAE and CO for off-pavement maintenance works and act accordingly to accomplish the work by the assigned female LCS workers
- Preparation of monthly work plan in the prescribed form (form-4.5a) for submission to the Upazila Engineer on the first day of each month through the Community Organiser
- Assign work to the LCS groups for the current day and to take account of works performed during the previous day in relation to the work plan and recording in the daily work register preserved at site on daily basis

- Preparation of monthly report showing the work done in the prescribed form (form-4.5) and submission of the report to the Upazila Engineer through Community Organizer after the end of each month
- To certify daily attendance of the LCS workers
- To inform negligence of any LCS worker to the Community Organizer and give warning if necessary.
- To recommend salary deduction of LCS worker, if the worker does not rectify herself even after receiving warnings.
- To demonstrate tasks practically to the LCS workers
- In case of occurrence of road accident, the road accident reporting form (form-1.2a) has to be filled up and submitted to the Upazila Engineer through the CO.
- To monitor the payment distribution, and to ensure compulsory saving of wage of each individual LCS worker to their respective saving Bank Accounts as per prescribed rate.
- To deposit saving of wages of each supervisor to their respective saving Bank Accounts as per prescribed rate
- To represent as spokesmen on behalf of the LCS (when required)
- To resolve problems (if any) arise at site and inform the concerned CO/ SAE.

Responsibilities of Group Leader

- To identify the amount and type of work to be done as per direction of the maintenance supervisor and do the job with the group according to plan.
- To preserve the monitoring register at work site, so that the SAE, UE and XEN can check the register during their visit and provide necessary comments.
- To record daily attendance of LCS workers and obtain attestation of the supervisor
- To distribute monthly payment among the LCS workers in presence of supervisor and CO
- To inform supervisor, CO, SAE, UE if necessary regarding any problem in off-pavement maintenance work
- To maintain good relationship among the group members and maintain better working environment
- To receive instructions from maintenance supervisor, CO, SAE, UE from time to time and act accordingly

20.5 Payment

150. Payment to the LCS group will be made by the Upazila Engineer through account payee cheque to the group account in the joint name of LCS Chairperson and the Secretary in the near by schedule bank once in a month. The SAE of the respective Upazila will inspect the work

before preparing bill, he will check the monthly summary report (in Form- 4.5) submitted by the supervisor with the actual work done by the LCS in the field. Monthly bill will only be paid against the satisfactory performance of works assigned to the group. If the given tasks are not completed by any worker/ group, her/ their payment will remain withheld untill the work is done with acceptable quantity and quality. Despite of repeated instruction for completing the undone work to any group, if that still remain incomplete due to ignorance of any worker/ group, the UE should terminate the concerned worker/ group and appoint new worker/ group in that place.

151. Since care taking of the planted trees on roadside is a continuos task of each worker for a particular stretch, the concerned worker has to ensure that. But for any unavoidable reason, such as due to illness, there must be a replacement in place arranged by the absentee. If any worker remain absent from work without valid reason, her salary will be deducted first, even that she is rectified her employment will be terminated.

152. Payment to the individual worker will be made from LCS group account subjected to receiving bill from treasury against satisfactory work. Bill will be prepared by the concerned SAE supported with relevant documents- contract agreement, monthly summary report (in Form-4.5), attendance, etc and duly signed by the UE before forwarding this to the XEN of the district. The XEN will check the submission and sent the bill to treasury for payment. Upon receiving cheque issued by treasury the UE will issue advice to the concerned bank for transferring funds to respective LCS accounts. The LCS chairperson and secretary will draw money from the joint account and distribute wages among the workers in presence of supervisor and community organiser. Unnecessary delay has to be avoided in paying the workers. It is to mention that each LCS group has to open a joint bank account operated by their chairperson and secretary within seven day after signing the contract in nearby schedule bank. Utmost attention must be given to avoid duplication among the projects while selecting labourers for routine off-pavement maintenance, for any financial irregularities the concerned Upazila Engineer and the district XEN will be held responsible jointly.

153. In order to attain self-reliance through economic solvency, each LCS worker and the maintenance supervisor shall have to save a certain amount from their wage. All workers and supervisors will have to open an individual saving bank account in the near by bank with in 7 days of their appointment. The UE will extend necessary support to this effect. After receiving monthly payment, the LCS workers will deposit at the rate of Tk 36.00 (Taka thirty six) per day for each working day and the maintenance supervisors will deposit at the rate of Tk 40.00 (Taka forty) per day for each working day to their respective bank account. The UE will examine the bank deposit from time to time. Upon expiry of contract or termination from the job or in case of death, the concerned person/ authorised representative of the account holder will draw the money from that account. No one will be allowed to draw money from the said account before termination/ expiry of the contract.

154. The XEN from the district will monitor the monthly saving of LCS workers and supervisors on a regular basis. He will submit quarterly (in every three months) savings report to RIMMU at LGED HQ using the prescribed form-4.3 given in appendix-4.

20.6 Training

155. The Upazila Engineer will arrange training for all LCS workers including the Supervisor. The Community Organiser of the concerned Upazila will take an active part in organising such training courses. The UE should consult with XEN (Training) of the concerned district and take his advice in this regard. A suitable training vanue (UP Complex, LGED Godown) near by the work site should be selected for this purpose. The following topics will be covered in the training course;

- role and responsibilities of LCS workers, Supervisor, LGED staff, NGO, etc.
- description of work related to off-pavement routine maintenance
- work planning and distributing works among the LCS workers
- management of LCS group
- solving internal and external problems of LCS
- payment distribution and savings, etc.

156. Both supervisors and LCS workers must take part in such training courses as per instruction of the Upazila Engineer. Remaining absent from the training course without valid reason may even be a cause of terminated from the job.

21.0 On-Pavement Routine Maintenance by Mobile Maintenance Team

21.1 General

157. Repair of small defects timely and effectively on bituminous road pavement is very important. If these small damages are not addressed timely, the severity and extent of damage will aggravate over time; and at one stage it will go beyond the scope of maintenance and a costly rehabilitation or re-construction operation will be necessary to bring back the road to its original condition. It may be mentioned that if these repair works are to be carried out by contractors, a considerable time would be spent in the process of selection of contractor and by that time the degree of damages will aggravate to such an extent that routine maintenance treatment would not be enough to tackle the problem. In order address such problem promptly, there would be at least one team at district level comprising skilled and semi-skilled labourers called - Mobile Maintenance Team (MMT). This team will repair small but important pavement defects in a planned manner on the BC road network of each district. All activities of the team concerning routine On-pavement maintenance will be regulated from district XEN office.

21.2 Surface Condition Monitoring and Work Planning

158. Monitoring the condition of the road network to evaluate the condition and to assess the effectiveness and efficiency of routine maintenance is an important task to be performed. The entire bituminous paved Upazila and Union road network of the district will come under the coverage of routine on-pavement maintenance operation through out the year. The Sub Assistant Engineers of the Upazila Technical setup under the guidance of Upazila Engineer will play a vital role in monitoring the surface condition of BC roads within the boundary of each

Upazila. The responsibility of monitoring the surface condition of BC roads within the Upazila will be distributed among the SAEs of the Upazila. They will inspect the network every month under their responsibility and submit report of visible defects on the road surface to the Upazila Engineer (UE) in the prescribed form (form-1.3.1) on the first day of each month. The UE will examine the inspection reports and prepare a summary of defects road-wise in the prescribed form (form-1.3.2) and send the need for undertaking necessary repair work by MMT to the district XEN within third day of each month.

159. The XEN of the district will assign one of his Assistant Engineer (AE) with the responsibilities of planning, operation and management of MMT for on-pavement routine maintenance activities within the district. The assigned AE will receive all the condition monitoring reports from XEN and analyze the observed surface defects to assess the need and priority of patching works on the district road network. Considering the nature, extent and severity of defects from the reports, the AE will prepare a week-wise work plan over the month for the MMT in the prescribed form (form-1.3.3) so that the MMT can be operated according to that plan. The SAE of the district will be involved closely in preparing this work plan and operating MMT activities. Such planning should be completed within the first week of each month. Activities of MMT will be controlled from the district offices under the guidance of the XEN and under the management of assigned AE according to the work plan mentioned above. While MMT will be working in a particular Upazila for repairing pavement damages, the concerned UE will be informed about the task by providing the work plan in advance, so that his representative (SAE/ WA) can attend at site to certify the repair work performed by MMT in the Upazila.

160. The aim of introducing MMT is to keep the rood network in good usable condition throughout the year by not allowing major distresses on the pavement surface. Care should be taken for not growing potholes more than 25 mm deep in maintainable BC road network. Besides, MMT will also be responsible for the task of maintaining the traffic sign, kilometre post, road identification post, etc. as per actual need. Painting/ marking the speed breaker/ hump on the road should be treated as important task of MMT to provide safety and convenience to the road users.

21.3 Formation of MMT

161. In order to form MMT at district level, application shall have to be invited by the XEN from among the skill/semi skill labours having experiences in construction and maintenance of bituminous pavement. The applicants will have to appear before interview for selection. After conducting interview, a panel of skilled and semi-skilled labours has to be prepared, from that panel a team consisting 3-5 members (skilled/ semi-skilled) will be formed named as Mobile Maintenance Team (MMT). One of the skilled labour of the team will act as foreman and will guide the team as per instruction of Sub-Assistant Engineer (SAE) of the district. Before starting the works, all selected labours (skilled, semi skilled) will have to undergo for a short on-the-job training related to the repair works. The working hour for the labours will be 8 hours/day and payment will be made on master-role basis, i.e. no work no pay. Under no circumstances, payment can be made without work. The quality and standard of work performed by MMT must satisfy the standard specification of LGED. The SAE from XEN's office will be directly responsible to supervise all MMT activities and maintain all books of accounts.

21.4 Use of Soft and Cold Asphalt Mixture in MMT Works

162. Small damages and defects on bituminous road surface, like – pothole, edge break, etc will have to be repaired as soon as those appear on the surface using soft and cold asphalt mixture. Bitumen available in the local market remains at solid or semi-solid state under normal temperature, so it requires heating to bring them to liquid state for using road construction and repair works. Use of bitumen is difficult to some extent in patch repair works because of the need for heating. To get rid from this situation, bitumen emulsion can be used. Many countries of the world including Japan using bitumen emulsion extensively in road maintenance as well as road construction works. Among many other advantages, it does not require heating and thereby no need of any kind of fuel, it is environment friendly and the road works can be continued round the year including rainy season (monsoon). Considering the above facts, it has been decided to use bitumen emulsion in road repair works from the current financial year and this has been made compulsory for the repair works being carried out by MMT.

163. The procedure for repairing pothole and edge breaking using bitumen emulsion is described below:

Pothole Repair Procedure

- Remove all damaged and loose materials (Asphalt Pavement Materials) from the pothole including dusts
- The side and bottom of the pothole should be cut to provide a firm coherent surface, so that the filled soft and cold asphalt materials can not get out from the repaired area
- Where the base is damaged that has to be repaired with proper compaction
- Then the required amount of soft and cold asphalt mixture will be laid into the pothole and spread properly
- Compact the layer properly with Plat Compactor, ensure that the final layer is flush by 1 cm from the surrounding pavement surface
- Spread a light layer of sand over repaired surface
- Clean the site

Edge Break Repair Procedure

- Remove all damaged and loose materials (Asphalt Pavement Materials) and clean salvages and dust
- Cut the broken edge of the pavement vertically with hammer and chisel to a firm base, replace the bricks on end edging if edging is damaged and make-up shoulder with proper compact
- Where the base is damaged that has to be repaired with proper compaction
- Then the required amount of soft and cold asphalt mixture has to be laid on to the damaged spot and spread properly
- Compact the layer properly with Plat Compactor, ensure that the final layer is flush by 1 cm from the surrounding pavement surface

- Spread a light layer of sand over repaired surface
- Clean the site

21.5 Materials

164. In order to carry out on-pavement maintenance through out the year, stock of following materials shall have to be maintained by the district XEN's as per necessity:

- Sand
- Brick
- Brick/Stone aggregate
- Bitumen
- Bitumen Emulsion, Kerosene, etc

165. The quantity of the above materials will depend on total estimated amount of works of the district. The materials must be of good quality and satisfy the requirements of standard specification of LGED and quality control test.

21.6 Procurement of Materials

166. The required materials shall be procured by following standard procurement procedures at the beginning of the financial year. Small hand tools required for the team should be procured from local market in similar way. A mini-truck (1.5 ton) of XEN office may be used for transporting materials, labours and equipment from one spot to another. Provision of daily fuel cost should be kept in the estimate.

21.7 Labour Wages and Hire Charges

167. Payment of wages to the labourers of MMT engaged in maintenance work will be made monthly on the basis of working days from XEN office. The working hour for the labour shall be 8 hours/day and they will be paid on work charge basis. The daily payment rate to the skilled/ semi-skilled labourers will follow LGED rate schedule of the concerned district. Hire charge of equipment (where necessary) will be paid as per LGED rate, for which necessary provision has to be kept in the work estimate.

21.8 Tools and Equipment

168. The district, XEN office will supply the following hand tools/ equipment to Mobil Maintenance Team:

- Basket – 6 nos.
- Shovel – 4 nos.
- Pick axe –2 nos.
- Hand rammer – 3 nos.
- Steel brush – 5 nos.
- Ordinary brush – 5 nos.

- Jerry can of 20 liters capacity – 5 nos.
- Siphon – 1 no
- Watering can – 2 nos.
- Measuring jar – 2 nos.
- Ordinary hammer – 2 nos.
- Large hammer – 2 nos.
- Steel chisel – 4 nos.
- Wheel Barrow – 1 no
- Flat squeegees – 2 nos.
- Jute bag – 4 nos.
- Mechanical tamper – 1 no
- Plate compactor – 1 no
- Cutter – 1 set
- Bitumen heater – 1 no

For the workers:

- Apron – 5 nos.
- Hand gloves and socks – 5 sets
- Safety mat – 5 nos.
- Safety shoes – 5 pairs

For safety and precaution:

- Cones – 8 nos.
- Warning signs – 2 nos.
- Red flag – 2 nos.

169. Besides, the XEN office will also provide a mini-truck (1.5 ton capacity) for transportation of materials, labourers, equipment, etc. to various repair spots.

21.9 Record Keeping of MMT Activities

170. The quantity of repair work performed by MMT and the amount of materials consumed will be recorded road-wise systematically on daily basis, so that it would be possible to calculate the cost of materials, equipment, labour-days against each individual road-scheme precisely. All these records shall have to be preserved in the XEN office for necessary reference in future. The Forms shall have to be used for recording the aforesaid information/ data are presented in Appendix- 1

a) Daily work record of MMT, Form - 1.3.4
b) Daily transport, man power and equipment use record, Form - 1.3.5

171. The above forms will be filled up by the Sub Assistant Engineer (SAE) on the basis of actual work done and activities performed date-wise. The Assistant Engineer in the district will

check and certify the daily records taken by SAE. Works performed by MMT shall have to be discussed in monthly district coordination meeting in presence of all UEs of the district and relevant issues should be recorded in the minutes.

172. It is difficult to ascertain the quantity of repair work to be done per day by MMT in advance, because the rate of progress depend on various factors, like; number of working labours, their efficiency, distance from one spot to another spot, severity and extent of damages, and local condition. Even though, in order to get some ideas about the requirement of labour and materials in small patch repair works, approximate accounts from the experiences are as follows:

- Production of one MMT per day is about 15- 25 m2
- Consumption of stone chips is about 0.8- 1.5 m3
- Consumption of bitumen emulsion is about 110- 150 litres
- Consumption of sand is about 0.3- 0.8 m3
- Consumption of bricks for edging is about 50- 80 nos.
- Consumption of crushed bricks (Khoa) is about 0.25- 0.50 m3

173. Before starting the physical work, check the following :

- Presence of necessary man-power
- Necessary materials are in-hand
- Necessary items of equipment, transportation and tools are available at site.

22.0 Completion of Works

174. Every effort must be made to complete all works before the onset of the annual monsoons. The execution of all major maintenance schemes including additional ones taken up out of savings have to be completed by the 31st May and the scheme completion report has to be submitted to RIMMU before 12th June through RSDMS –VI software. For any special reason, if it is not possible to complete any scheme within the cut off date, the remaining work could be carried out to the next financial year upon taking approval from LGED HQ and must be completed within the shortest possible time. In such case, the physical and financial progress of the carried over scheme has to be reported in the monthly progress report and the scheme completion report must be submitted to LGED HQ in due course.

23.0 Expenditure, Accounts and Audit

175. The Executive Engineer of the district shall be the drawing and disbursing officer of the fund and will remain responsible for every payment, strictly following the procedures and regulations regarding maintaining books of accounts and facing subsequent audit.

176. Original bills, vouchers, cash books and other relevant documents shall be retained in the office of the XEN and the work ledger shall be kept by the Upazila Engineer. Copies of similar

documents should be held in both district and upazila offices for audit purposes. All relevant papers of this nature must be readily available for examination by the internal and external auditors who should be given the fullest co-operation.

177. It is to mention that according to the circular from Ministry of Finance (10 December 2002) implementation of the "Rural Roads and Culverts Maintenance" program will jointly be monitored by the finance division and the concerned administrative ministry in terms of fund allocation and audit the expenditure.

24.0 Reporting Progress and Special Instructions

178. The Forms and Tables referred in this guideline must be used carefully in preparation of schemes including their estimates. In the process of scrutinizing/ checking schemes at Head Quarter, if it is found that the relevant forms are not used properly, funds will not be released to the concerned district and side-by-side disciplinary action will be taken against the concerned officer/staff. The material testing laboratories at districts shall have to be used properly in order to ensure the quality of works. Payment can not made for any work before obtaining satisfactory test results, failing to ensure quality; departmental action will be taken against the concerned person. The hard copy of monthly progress report of all approved schemes (category wise) must be reached to the Head Quarter and to the Regional Superintending Engineer's office from each district within the first week of each month in the prescribed Form-5.1 and Form-5.2 of the Appendix-5, generated from RSDMS-VI software. The soft copy of the report should be transmitted through FTP server (directly transferring report file to http://ww.lgedmis.gov.bd) or through E-mail addressed to rimmu@yahoo.com or CD/Removable disk to RIMMU, LGED HQ. The progress report submitted by the districts without using RSDMS-VI will not be accepted. Fund will not be released for the subsequent installments if regular monthly progress report of district's annual maintenance program is not received. Beside, Program Summary Status Report (given in Appendix-6) covering all categories of works in the district will have to be sent within 15 days to RIMMU, LGED HQ

25.0 Coordination of Maintenance Works

179. Maintenance programs are also taken up by LGED Projects each year in addition to implementation of Rural Roads and Culverts Maintenance Program under GoB revenue budget supervised by RIMMU, LGED. All maintenance activities under LGED programs/projects must be well coordinated. To this effect, there should be coordination meeting invited in every month by the Additional Chief Engineer (Maintenance) to maintain over all coordination among LGED's maintenance works.

26. Annual Work Schedule of Maintenance Program

180. The annual work schedule for implementation of "Rural Roads and Culverts Maintenance Program" is presented in the table below. Concerned officials at different levels of LGED will ensue the following time-table for proper implementation of the said program

(A) Maintenance Need Assessment for Next Financial Year		
Sl	**Activities**	**Time-table**
1.	Perform surveys on road condition, structure condition, roughness, traffic, etc under supervision of district XEN and participation of concerned Upazila Engineers on the Upazila roads and Union roads under each Upazila and updating the Upazila Road Database through RSDMS-VI and sent it to respective district XEN	From 1st July to 30th September
2.	Update road database of the district on the basis of data received from the respective Upazilas and send it to Regional Superintending Engineer and RIMMU, LGED HQ	Within 15th October
3.	Receive updated road database from the districts, validation of data and compilation to central road database and thereby finalize annual updating of road database at HQ level	Within 31st October
4.	Assess annual maintenance need district-wise on the basis of updated road data preserved at HQ through software run (RSDMS-VI)	Within 30th November
5.	Prepare consolidated maintenance need for the country on the basis of district-wise need assessment and send them Local Government Division to receive budgetary allocation from Finance Ministry	Within 15th December
(B) Maintenance Program Implementation for the Current Financial Year		
6.	Take print out and send primary scheme list of the district following priority order along with the district's allocation and the implementation guidelines to the Regional Superintending Engineer and to district XEN	Within 30th June
7.	Send relevant part of the district's primary scheme list to the concerned Upazila Engineer by district XEN	Within 7th July
8.	(a) Approval of all routine off-pavement and on-pavement maintenance from the beginning of the financial year (b) Field checking the primary schemes (periodic and other) received from the district by Upazila Engineer and send the proposed scheme list to district XEN	Within 31st July

Sl	Activities	Time-table
9.	Check detailed schemes including their initial cost estimates received from the concerned Upazilas and review the submission in the DMC meeting. Finalize the annual maintenance program in accordance with the fund allocated for the district and send necessary papers to Regional Superintending Engineer	Within 15th August
10.	Approval of district's annual maintenance program in the meeting invited by Regional Superintending Engineer in presence of RIMMU representatives from LGED HQ	Within 30th August
11.	Prepare of detailed cost estimate and procurement plan after conducting necessary survey/test for the schemes listed in the approved annual maintenance program through the Upazila Engineers and then send to Regional Superintending Engineer by XEN	Within 30th September
12.	Approval of all periodic maintenance schemes up to estimated cost of Tk 10 (ten) lakh after necessary checking and forward all periodic and rehabilitation schemes above the estimated cost of Tk 10 lakh to RIMMU, LGED HQ after necessary field verification and certification	Within 15th October
13.	Approval of all periodic and rehabilitation schemes (having estimated cost above Tk 10) forwarded by Regional Superintending Engineer in accordance with district's allocation. Approval of Procurement plan sent by XEN from districts (made little change)	Within 15th November
14.	Tenders invitation, tenders receive and contracts award for the approved schemes	Within 1st January
15.	Complete implementation of annual road maintenance program by spending the allocated fund to the district	Within 31st May
16.	Submission of closure report using the RSDMS-VI to LGED-HQ	Within 30th June

Appendix

1.1 Routine Maintenance

Routine maintenance operations are primarily labour-intensive as well as being extremely cost-effective and should be given more attention than they are currently receiving in connection with the maintenance of roads. They should receive higher priority for fund allocation purposes over periodic and other maintenance categories.

The important road network in each district must be maintained all the year round for vehicular traffic. All paved Upazila Roads connecting Growth Centres, and paved Union roads must be given priority in regular off-pavement maintenance program

Drainage is of paramount importance when considering road maintenance priorities and is of particular significance here in Bangladesh which experiences exceptionally heavy annual rainfall and consequently has vast areas of flooding that create problems and hardship for such a high proportion of the rural population every year. Surface water drainage is therefore the first of the routine maintenance tasks to be addressed, with the cleaning of culvert inlets and outlets needing particular attention.

The next section deals with the routine maintenance of shoulders and slopes which are other important elements to receive attention in order to protect the investments made in providing reasonable transportation facilities in rural areas.

For these purposes local labour should be engaged on length-person basis, with destitute women being given priority for carrying out this work as members of Labour Contracting Societies.

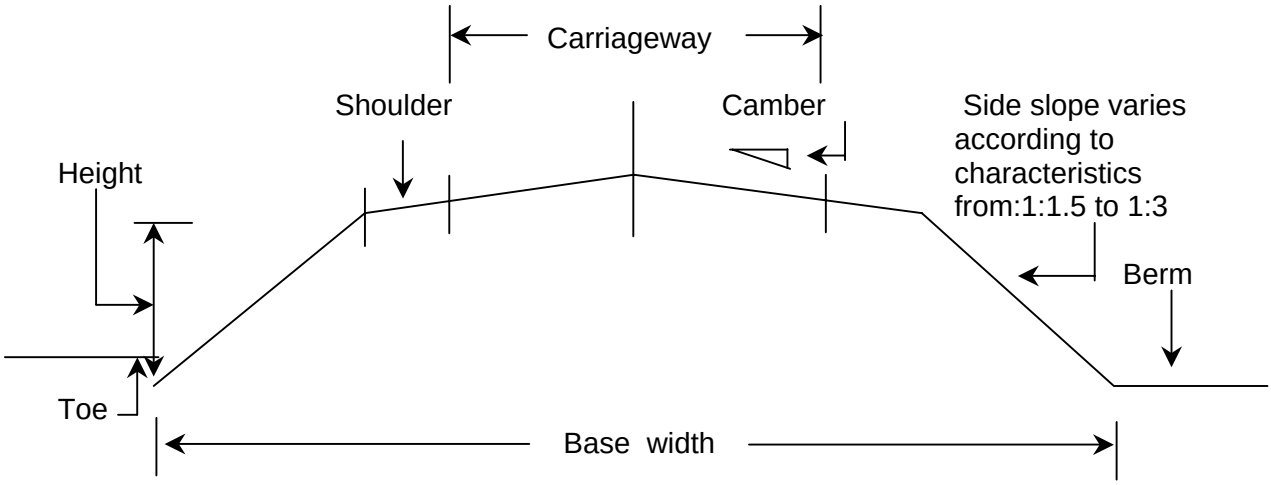


Diagram 1.1 :Typical Road Cross Section

1.2 Surface Water Drainage

Water is a major cause of serious erosion and deterioration of road surfaces, shoulders and slopes, therefore proper drainage of surface water is of the highest importance, particularly in Bangladesh where such heavy monsoon rain experience every year. The topography is also very flat for the most part, which results in annual widespread flooding but at least reduces the erosive effect of fast flowing waterways as experienced in some hilly, mountainous regions.

A high proportion of the roads are constructed on embankments and a typical cross-section has been illustrated in Diagram 1.1. Attention is particularly drawn to the camber of the road crest which ensures that surface water falling on the road flows quickly away to the sides. The objective is to remove any water from the road surface as quickly as possible, otherwise it will penetrate through cracks or other surface defects into the structural layers of the road and contribute significantly to their deterioration. This can also occur if the carriageway is pot-holed or has other depressed areas and the shoulders are rutted, flat or sloping inwards.

A prime objective of routine maintenance workers is therefore to ensure that surface water flows away quickly from the carriageway and shoulders, and to keep the road as dry as possible. Grassed side slopes and tree plantations should also be diligently maintained in order to keep the embankments stabilized and to reduce the erosive effect of surface water flowing over them, particularly during the period of heavy monsoon rainfall.

Unfortunately in many cases the water only flows as far as the road shoulder where it lays in low spots caused by the subsidence and erosion of the shoulder by the encroaching wheels of passing vehicles or because of an adverse sloping of the verge and shoulder as indicated in Diagram 1.2 which is sometimes referred to as a “reverse slope.” An immediate but temporary solution to this problem is to cut a narrow outlet through the high section in order to let the water flow away laterally through this channel. The permanent solution is to re-grade the verge, using labour-intensive methods.

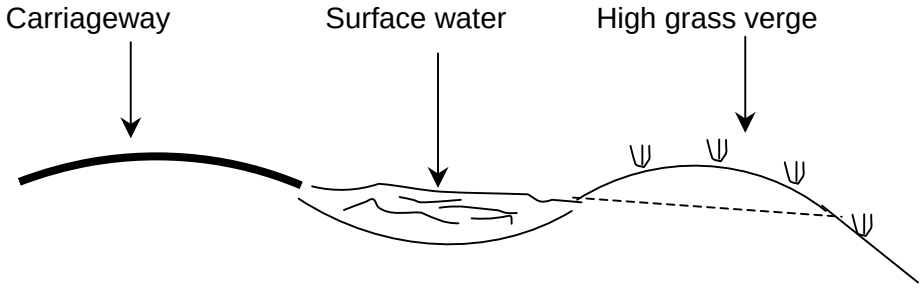


Diagram 1.2 : Surface water retained by high grass verge

1.3 Shoulders and Slopes

The main functions of road shoulders are to provide safe and convenient access for the passage of pedestrians and animals, also lateral support and protection to the edges of the paved carriageway. All maintenance work-loads are largely determined at the construction stage and if construction standards are to approve specification standards, using suitable and adequately compacted materials, the future maintenance work-load is obviously reduced. Shoulders constructed by depositing non-compacted clods of earth from adjacent fields will be weak and unstable, susceptible to erosion, settlement and subsidence under occasional traffic loading heavy rainfall. Inadequate shoulder maintenance will also result in progressive damage to unprotected road edges.

Rain-cuts represent another common hazard encountered usually during and after the annual monsoon rains. When carrying out repairs, the damaged sections must be excavated in stepped fashion and the defective material carted away. The berm of the excavated area must be level and well compacted with a vibrating plate compactor or durmus. It must also not be less than one metre wide. Suitable material should then be brought in, broken up, placed and thoroughly compacted in layers not exceeding 6" in thickness, up to finished levels. See Diagrams 1.3 and 1.4.

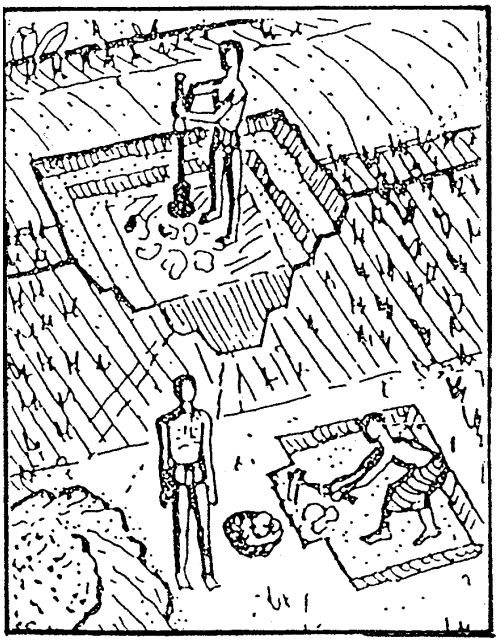
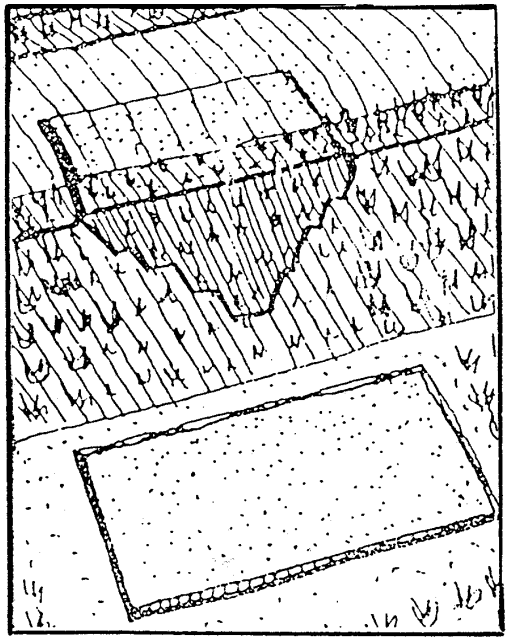


Diagram 1.3



Repairing Rain-Cuts **Diagram 1.4**

Additional stabilization of slopes can be achieved by turfing them and Durba grass is recommended for this purpose. Seeds of Pigeon Pea and Dhanche will also germinate quickly and assist in the stabilization process.

1.4 Bitumen Surfaced Roads

The majority of Upazila Roads (UZR) in the rural areas are bitumen surfaced roads and their routine and periodic maintenance is of high priority because they represent the most important routes that come within the maintenance responsibilities of the LGED.

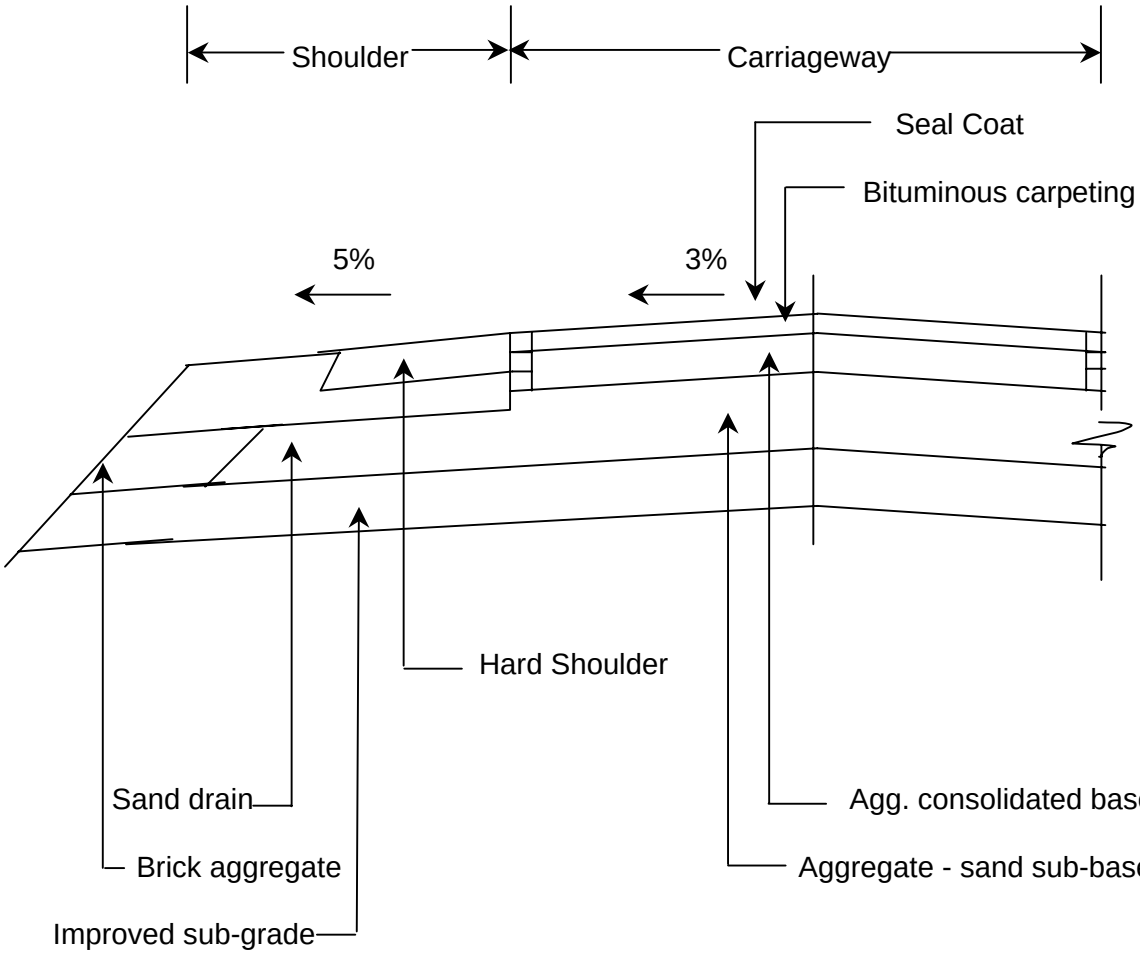


Diagram 1.5: Typical cross-section through Bitumen Surfaced Road.

The maintenance of the carriageways of Bitumen Surfaced roads requires a higher level of technical competence and expertise than for the lower classes of road and it is particularly important that small cracks, potholes and other surface defects are dealt with promptly, otherwise the cost of remedial work quickly escalates and swiftly uses up the limited funds available for maintenance operations.

“Hair cracks” will quickly develop as more extensive “chicken-wire” or “alligator” cracking unless cleaned by blowing or brushing and sealed with hot bitumen, “blinded” with sand.

Potholes are the most common type of surface defect on bituminous carpeted roads and should be promptly dealt with in a responsible, professional and cost-effective manner as described below and illustrated in Diagram 1.6.

The area to be repaired should be clearly marked out using paint and a straight-edge. It does not have to be square in shape but, it is essential that the edges are cut vertically when the defective material is cut out. It is probable that it can be used to make up low areas and other irregularities in the road shoulders not too far away, which represents a useful and convenient way of disposing of surplus material.

The floor of the area to be patched should be clean, level and well-compacted before suitable base material is brought in and thoroughly compacted in layers not exceeding 4" thick using the durmus or preferably a mechanical vibrating plate compactor.

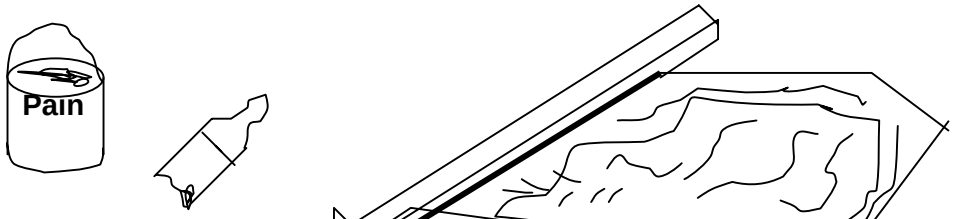
The edges of the patch should be painted with bitumen or emulsion and the base material tack-coated before the wearing course is laid up to or very slightly above, but never below the existing road level and the finished surface is well rolled before finally being dusted with sand or fine gravel.

Serious rutting or deep depressions in the carriageway surface should be dealt with in similar fashion, cutting out the defective areas with vertical sides in order to positively retain the material to be laid and thoroughly compacted within the confined limits of the excavated area. If this is not done, proper compaction is not possible and the new material will simply spread sideways, either under the weight of the compacting equipment or passing heavy vehicles.

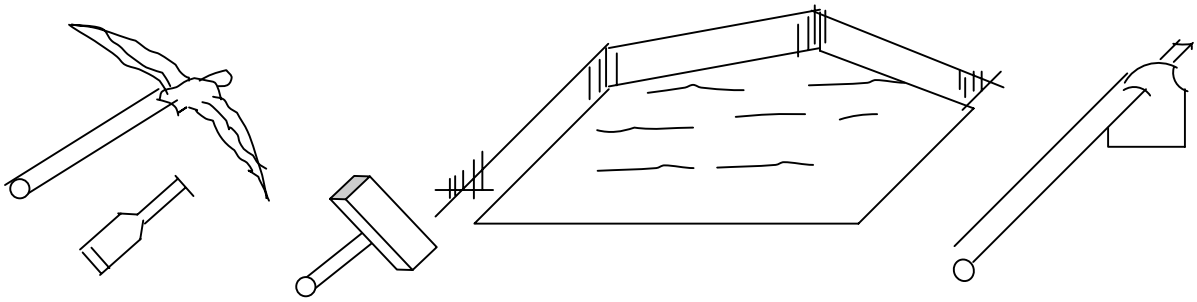
Serious damage to the edges of paved road surfaces is a very common problem and is usually as a result of insufficient attention being given to the maintenance of the shoulders by keeping them well compacted and up to the same level as the carriageway. If this is not done and the edges are left exposed and without proper lateral support and protection, passing traffic will soon cause the edge of the road to erode and break away to an increasing extent until sometimes this severe deterioration will extends far as, and beyond, the middle of the road.

This will naturally represent a very dangerous hazard for all types of vehicles and remedial works should be put in in hand as soon as possible in accordance with the recommendations given under Diagram 1.7

REPAIRING POTHOLES AND SIMILAR SURFACE DEFECTS

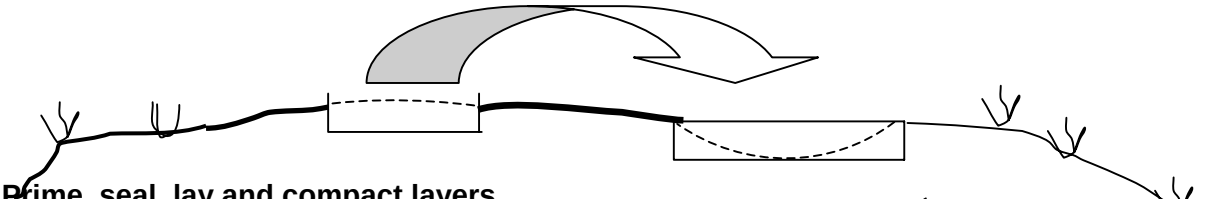


Mark the area to be repaired
Using straight-edge and paint

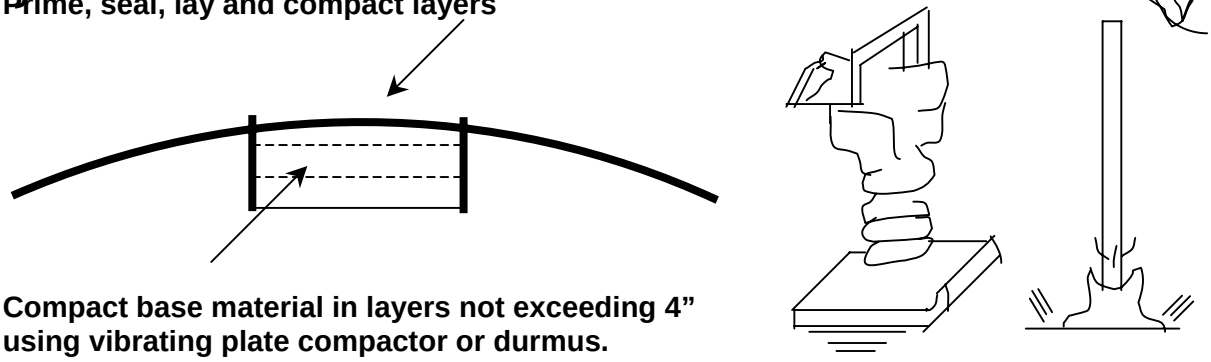


Excavate using cold chisel, pick-axe
and durmus, keeping the sides vertical

Use surplus excavated material to make up low spots in shoulder



Prime, seal, lay and compact layers

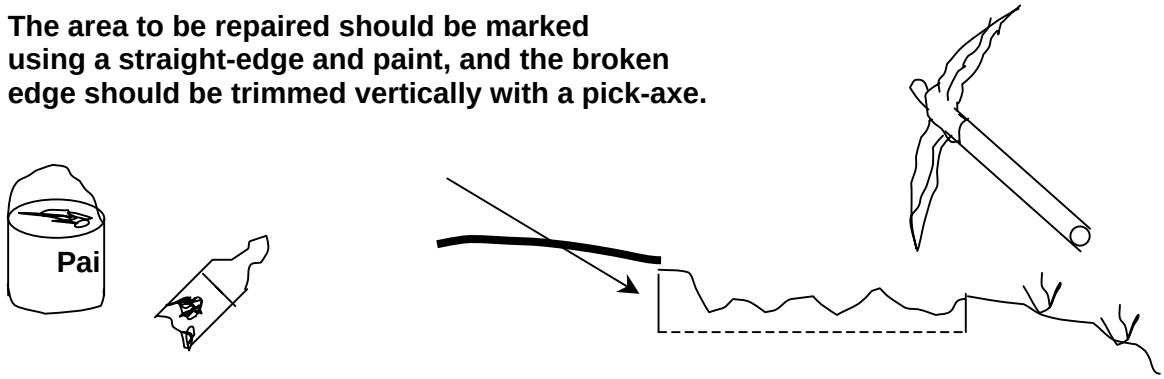


Compact base material in layers not exceeding 4”
using vibrating plate compactor or durmus.

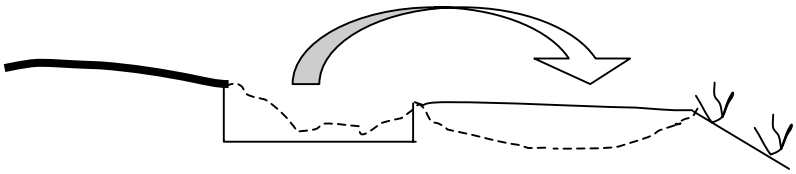
Diagram :1.6

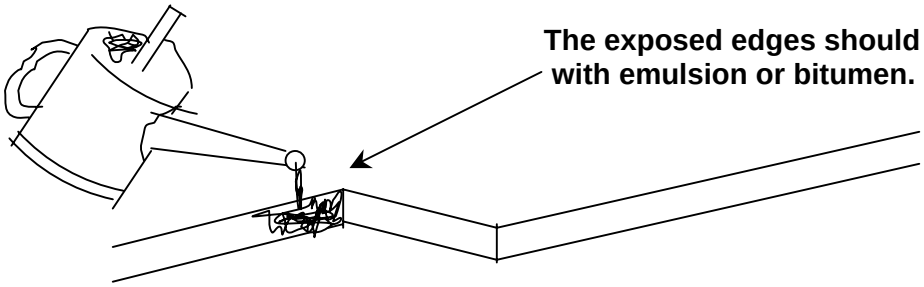
REPAIR OF EDGE DAMAGE TO PAVED ROAD SURFACE

The area to be repaired should be marked using a straight-edge and paint, and the broken edge should be trimmed vertically with a pick-axe.



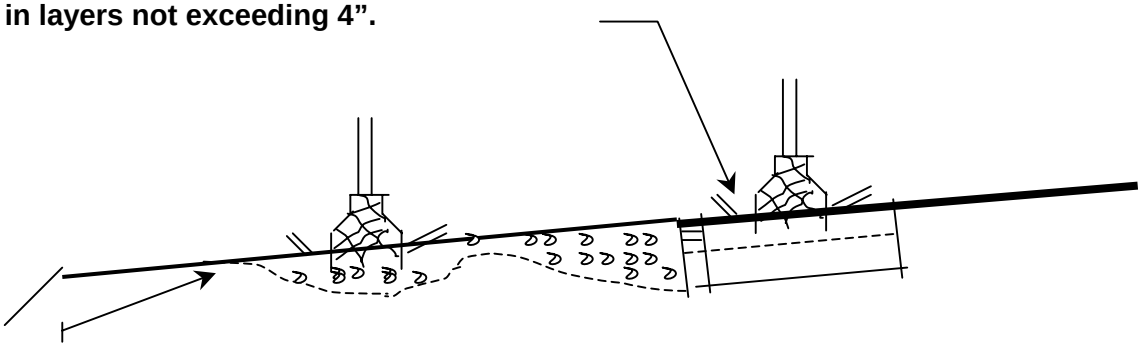
Surplus material should be used to stabilize or make up low areas in the adjacent shoulder.





The exposed edges should be painted with emulsion or bitumen.

Suitable material, preferably pre-mixed coated stone, should be placed and compacted in layers not exceeding 4".



The adjacent verge should be made up and well compacted to provide protection and lateral support to the edge of the carriageway

Diagram :1.7

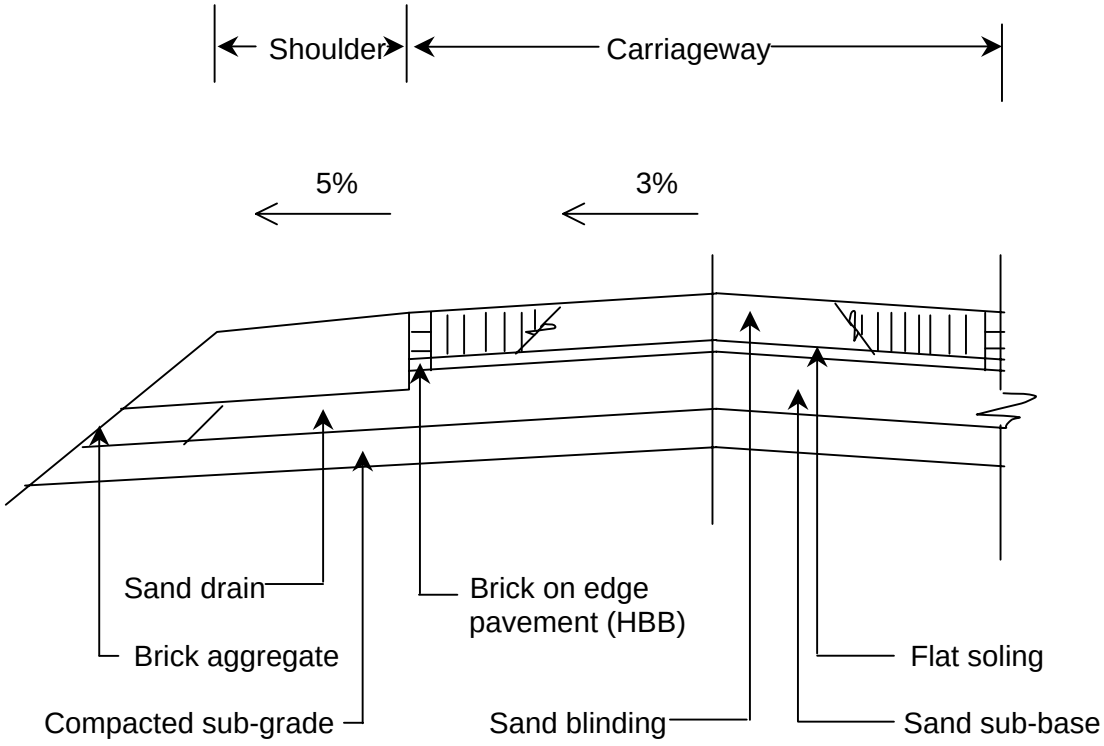
1.5 Herringbone Bond Brick Roads (HBB)

The number of HBB roads in rural areas is rapidly diminishing. Some have indeed recently been constructed to very high standards but generally speaking HBB is no longer generally regarded as being a viable and reliable form of construction.

They are susceptible to various types of damage and deterioration, frequently due to the inadequate compaction and consequently low load-bearing capacity of the structural layers and sub-base on which the bricks were originally laid.

Consequently rutting and other serious forms of surface deformation are all too common, not only because of the reasons referred to above but frequently because of the poor quality of the bricks and the absence of regular routine maintenance attention to remove vegetation growing between the bricks, to quickly repair small areas where bricks have been damaged or removed or to keep the road surfaces and shoulders well-drained and free from standing surface water.

When defective areas are to be made good by replacing damaged or missing bricks, it is most important that they are laid on a sound, well-compacted base.



Typical cross-section through HBB road

Diagram :1.8

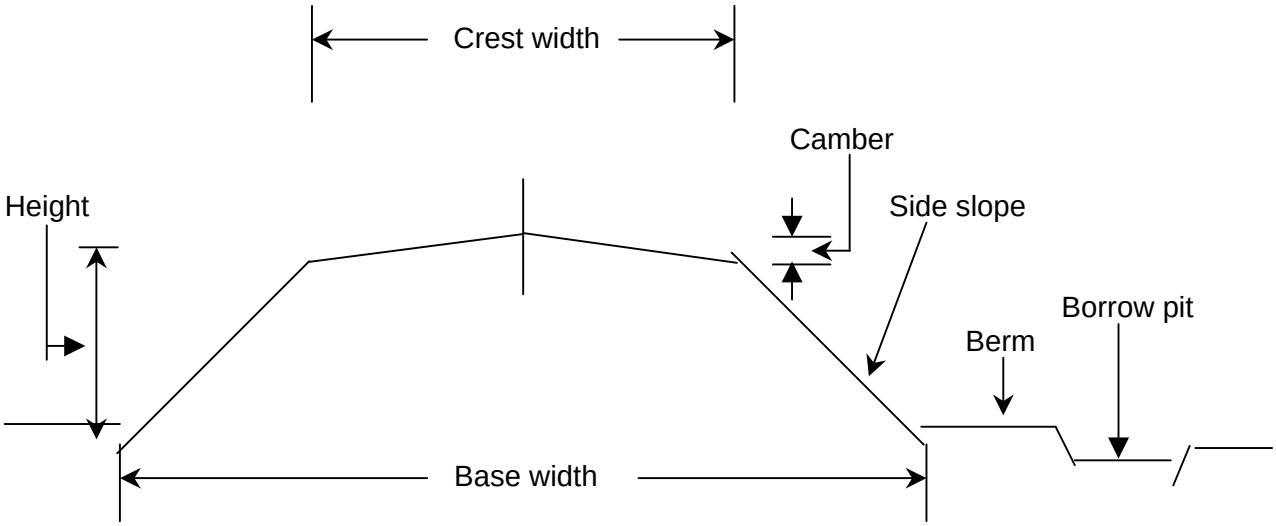
1.6 Earth Roads

The vast majority of the Rural Roads are earth roads. Routine maintenance activities require a low level of technical expertise and are particularly well suited to labour-intensive methods of working, with minimal mechanical equipment support and very low material costs.

Potholes and rutting are the most common defects suffered by earth roads and the most suitable hand-tools needed to carry out minor repairs are the kudal, durmus, baskets, etc.

Earth roads and side slopes are especially susceptible to damage caused by heavy rainfall; therefore the diligent maintenance of surface water drainage components is of particular importance. Potholes, ruts and other depressions that will retain water should be quickly repaired as described earlier and the entire road crest kept as dry as possible.

The reinstatement of damaged slopes and embankments has been dealt with earlier, and the importance of carrying out this work in stepped fashion with proper compaction has been strongly emphasized.



Typical cross-section through earth road

Diagram : 1.9

1.7 Maintenance of Bridges and Culverts

The regular inspection and proper maintenance of bridges and culverts should be regarded as matters of the highest importance and should be carried out at intervals of not greater than a year or immediately after periods of flooding or other natural disasters.

A long length of well-maintained road in immaculate condition is rendered useless if a major structure mid-way along it suddenly collapses, inevitably resulting in long periods of delay, inconvenience and frustration for road users, also unfortunately and all too frequently, in loss of life.

All structures, large and small, should come within regular routine maintenance schedules and the implementation of a positive program of regular inspection is essential in all districts and Upazilas. The form for use in this connection is to be seen under Form 3.5 (a) and 3.5 (b) in appendix 3 and it should be appreciated that even routine maintenance activities associated with these structures requires some special training and technical skills.

The most common problems associated with bridges and culverts are obstructions to inlets, outlets and channels caused by floating debris, and erosion around piers, abutments and wing-walls. The basic visual symptoms of potentially serious distress in a concrete structure are cracking, spalling and disintegration.

The main causes of deterioration include shrinkage, temperature stresses, moisture absorption, corrosion, chemical reaction, weathering, erosion, poor design and poor quality control during construction.

Whenever the overall condition of a bridge/ culvert, or of any component thereof, is described as “major structural defect”, it should immediately receive the personal attention of the Upazila Engineer/ XEN who should make a prompt decision as to whether it should immediately be closed or make restricted use in the interests of public safety and will invite the Bridge Unit of LGED HQ for further inspection and necessary advise. The planning and implementation of remedial works should then be put in hand as quickly as possible.

Table: 1.1

TYPICAL ROUTINE AND PERIODIC MAINTENANCE ACTIVITIES

ROUTINE MAINTENANCE	PERIODIC MAINTENANCE
Bitumen Surfaced Roads:	
Seal cracks	Reseal or surface dress
Repair potholes and edges	Repair larger defective areas and reseal
Repair raveling, depression, rutting, etc.	Restore damaged area and overlay thin bituminious carpeting layer or in-lay
Make up and repair shoulders	Restore damaged shoulders
Repair rain-cuts	Restore damaged slopes
Maintain side slopes	
Care-taking roadside tree plantations and replacement of dead trees	
WBM Roads:	
Repair potholes and small defects	Repair larger defective areas
Restore camber and profiles	Restore longitudinal profile
Maintain shoulders and side slopes	Restore shoulders and slopes
Care-taking roadside tree plantations and replacement of dead trees	
HBB Roads:	
Replace damaged or missing bricks in small areas	Restore defective base course and large areas of damaged HBB
Repair lengths of damaged edging less than 2 metres	Replace longer lengths of damaged edging
Remove vegetation between bricks	
Maintain shoulders and side slopes	Restore shoulders and slopes
Care-taking roadside tree plantations and replacement of dead trees	
Earth Roads:	
Repair of potholes and minor defects	Repair larger surface defects
Restore camber and profiles	Restore longitudinal profile
Make up and repair shoulders	Restore damaged shoulders
Repair rain-cuts and ghogs	Repair larger defective areas
Maintain side slopes	
Care-taking roadside tree plantations and replacement of dead trees	
Bridges and Culverts:	
Remove vegetation	Replace wearing course
Clear culvert inlets and outlets	Replace damaged sections of culvert
Clean bridge drainage outlets	Rebuild wing-walls as necessary
Clean out weep-holes	Replace defective bridge members
Repair minor defects	Replace and/or re-point brickwork

TRAFFIC SIGNS

1 General Principles of Traffic Signs

Clear and efficient signing is an essential part of the road system, and a road with poor signing or with badly maintained signs is not functioning well. Road authorities depend on signing for traffic control and regulation, and for road safety. The key requirements for each traffic sign should:

- ✓ Meet a need
- ✓ Command attention
- ✓ Be legible
- ✓ Convey a simple, clear meaning at a glance
- ✓ Be placed so as to give road users time to respond
- ✓ Command respect

Signs must only be used where there is a clear need for them. Using standard signs assists in their quick recognition, as does uniformity of shape, colour and lettering for each type. Traffic signs should be constructed and erected so that they will last for many years without any attention apart from occasional cleaning and painting.

2 Types of Signs

The three main functions of traffic signs are to regulate, warn and inform. There is a different group of signs for each function, and the signs in each group have a uniform shape to help drivers recognize them quickly. The three groups are:

Regulatory Signs: These signs give orders. They tell drivers what they must not do (prohibitory), or what they must do (mandatory). Most of them take the form of a circular disk, although two signs, the Stop sign and the Give Way sign, have distinctive individual shapes.

Warning Signs: These warn drivers of some danger or difficulties on the road ahead. Most of them take the form of an equilateral triangle with point upwards.

Information Signs: Most of these signs give drivers information to enable them to find their way to their destination or to a service provided. It is a varied group of signs, but they are all either square or rectangular in shape.

3 Regulatory Signs

Most regulatory signs are the means of putting into practical effect the regulation or control of traffic. For example, they may impose restriction on speed, on the turning of traffic at a junction, or on waiting. Regulatory signs are normally sited at or near the point where the instruction applies. Drivers must be able to see the sign from at least 75 meters away so that they have time to read the message and act on it. Regulatory signs are placed at the left-hand side of the road, but a second sign on the right-hand side may be used where extra emphasis is needed. The choice of size depends on the type of site where the sign is going to be installed. Size of regulatory signs are given in the Table 1

Table 1 Size of Regulatory Signs

Site Type	Diameter of Sign (mm)
Signs attached to traffic signal ahead	300
Sites where space is limited (e.g., on narrow traffic islands)	450
Traffic speed up to 50 km/h – such as single carriageway town and rural roads	600
Traffic speed between 50 km/h and 80 km/h	750
Sites where additional emphasis is required – because of very high speeds and/ or a bad accident record	900

Stop signs, Go signs and Give way signs are normally 750 mm

Example of regulatory signs is given below:

The colour of each sign (background, border, and diagram/ symbol) should match with the color of respective sign given above

4 Warning Signs

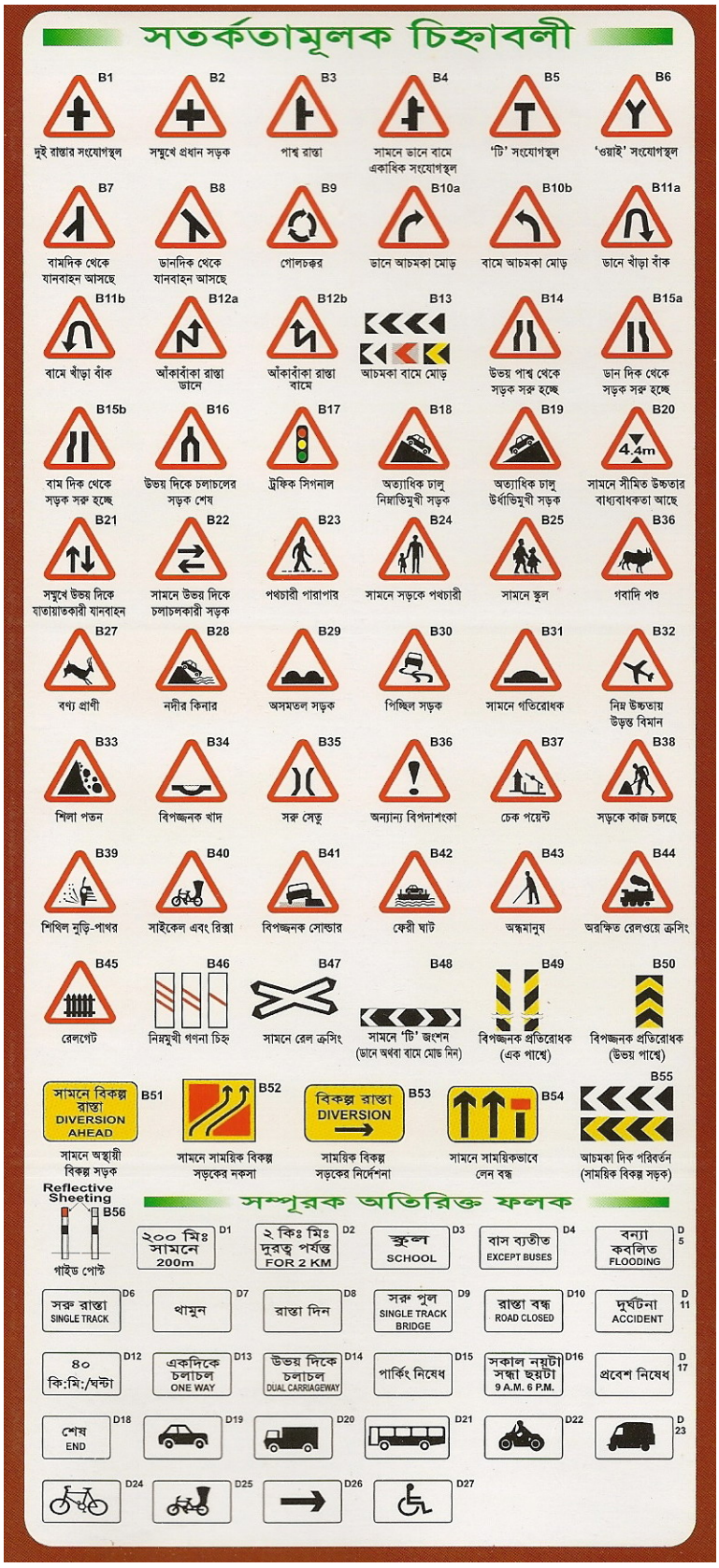
Warning Signs are used to alert drivers to danger or potential danger ahead. They indicate a need for extra caution by road users and may require a reduction in speed or other manoeuvre. Adequate warning signs can greatly assist road safety. Warning signs are very important in roadworks.

Most warning signs are triangular in shape with a red border encompassing a black symbol on a white background. The black symbol represents the hazard. Sometimes additional information is put onto a supplementary plate below the main sign. Drivers must be able to see the sign from at least 75 meter away so that they have time to read the message and act on it. Warning signs are placed at the left-hand side of the road. Signs must also be large enough to be read clearly by drivers traveling at above average speeds. The size and siting distance is given in Table 2

Table 2 Size and Siting of Warning Signs

Site Type	Height of triangle (mm)	Distance of sign from hazard (m)
Traffic speed up to 50 km/h – such as single carriageway town and rural roads	600	45
Traffic speed between 50 km/h and 70 km/h	750	90
Traffic speed between 70 km/h and 80 km/h	900	150
Sites where additional emphasis is required – because of very high speeds and/ or a bad accident record	1200	150-200

Example of warning signs is given below:



The colour of each sign (background, border, and diagram/ symbol) should match with the colour of respective sign given above

5 Information Signs

Route signs are the most important of the Information Signs. They give drivers information to enable them to find their way to their destination. Good route signing helps:

- To reduce delay and frustration
- To keep traffic flowing smoothly and safely through junctions
- To promote commerce and tourism

Destinations on route signs must be given in Bangla and English, and the Bangla word will generally appear above the English word. It is important that signing is consistent along the route.

Route signs are not standard sizes. Never try to squeeze route information onto a sign plate of a specific size. First, determine the size of the lettering to be used, which has to be large enough for drivers to read at a distance. The lettering sizes are set out in Table 3.

Table 3 Lettering Sizes for Route Signs

Site Type	Capital Letter Height (mm)
Traffic speed up to 50 km/h	100
Traffic speed between 50 km/h and 70 km/h	150
Traffic speed between 70 km/h and 80 km/h. Road with more than two lanes in the direction of travel. Signs mounted overhead	175

Once the lettering size has been chosen, the design should proceed accordingly.

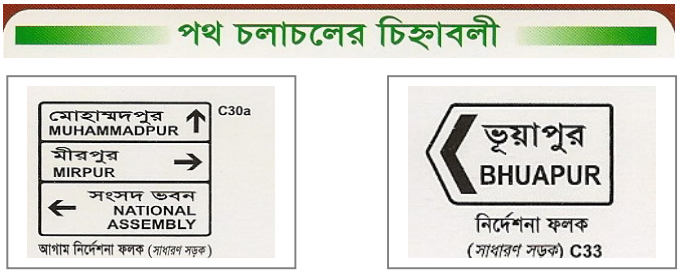
Drivers must be able to see the sign from at least 75 m away so that they have time to read the massage and act on it. Direction signs are placed at the junction and point along the route shown on the sign. Advance direction sign should be sited as shown in Table 4.

Table 4 Siting of Advance Direction Signs

Site Type	Distance of sign from Junction (m)
Traffic speed up to 50 km/h	45
Traffic speed between 50 km/h and 70 km/h	90
Traffic speed between 70 km/h and 80 km/h	150

Example of Information signs is given below:

The colour of each sign (background, border, and diagram/ symbol) should match with the colour of respective sign given above.



কিলোমিটার পোষ্টের নমুনা চিত্র

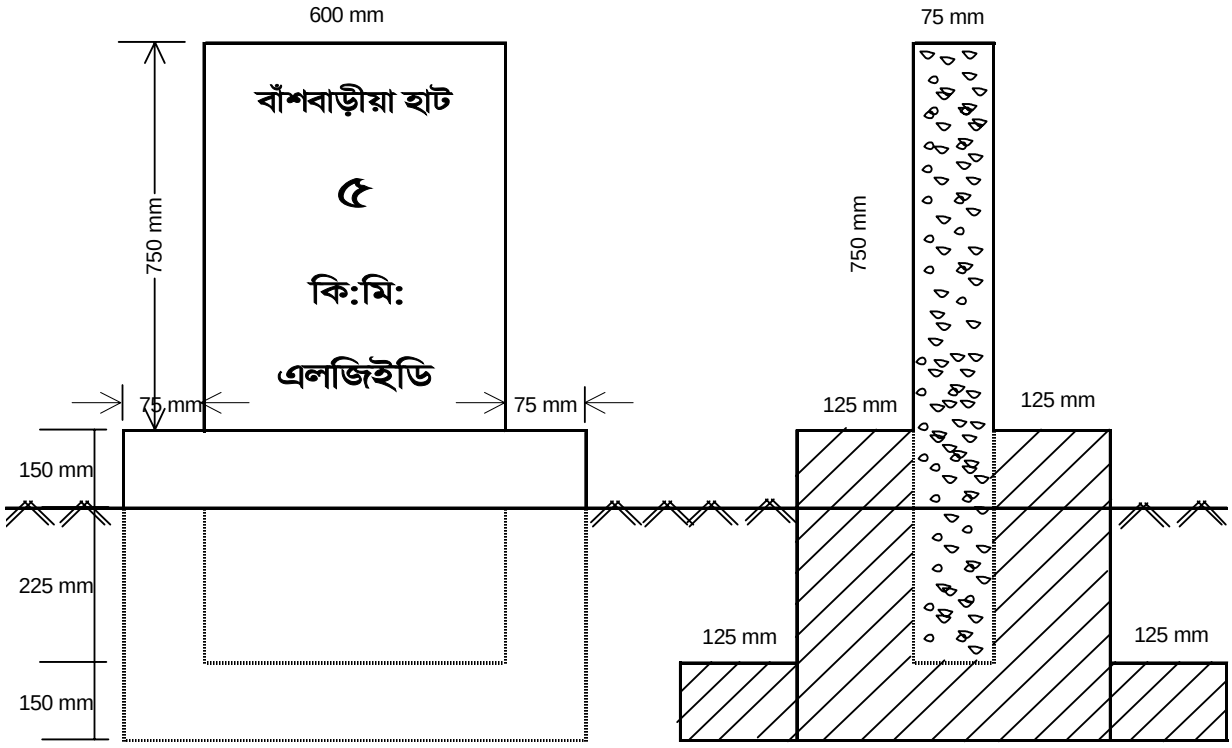


Fig : Elevation

Fig : X-Section

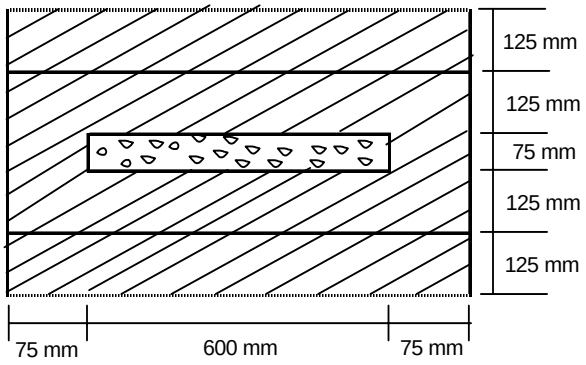


Fig : Plan

বিশেষ দ্রষ্টব্য ঃ পোষ্টে হলুদ রংয়ের জমিনের (Background) উপর কালো রংয়ের বর্ডারসহ কালো অক্ষরে তথ্যাদি উভয় পৃষ্ঠে লিখতে হবে। কিলোমিটার পোষ্টগুলো Stagger ভাবে সড়কের উভয় পার্শ্বে স্থাপন করতে হবে।

নাম ফলকের নমুনা চিত্র

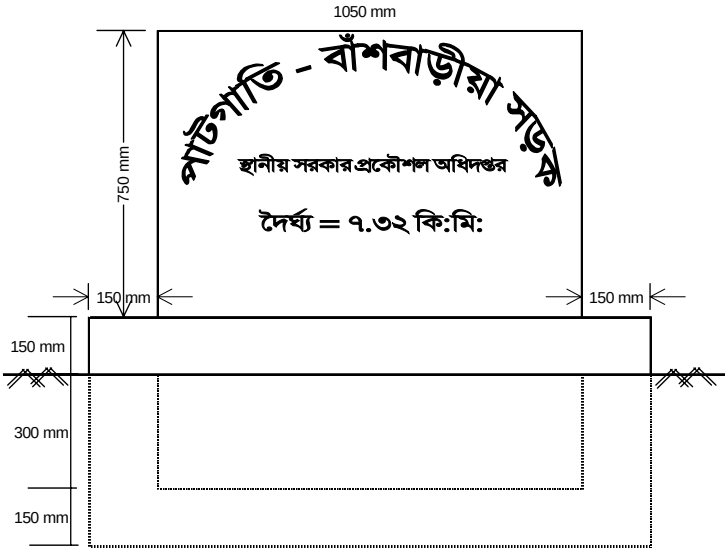


Fig : Elevation

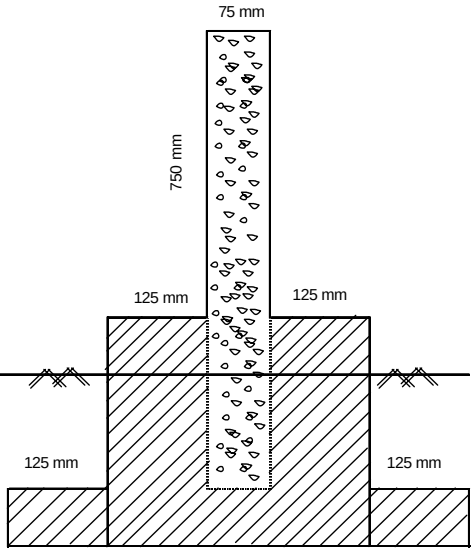


Fig : X-Section

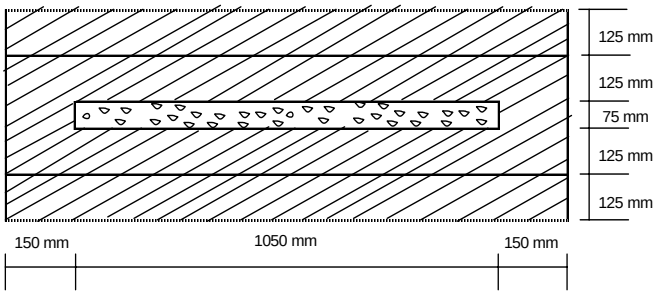


Fig : Plan

বিশেষ দ্রষ্টব্য ঃ ফলকে হলুদ রংয়ের জমিনের (Background) উপর কালো রংয়ের বর্ডারসহ কালো অক্ষরে তথ্যাদি লিখতে হবে।

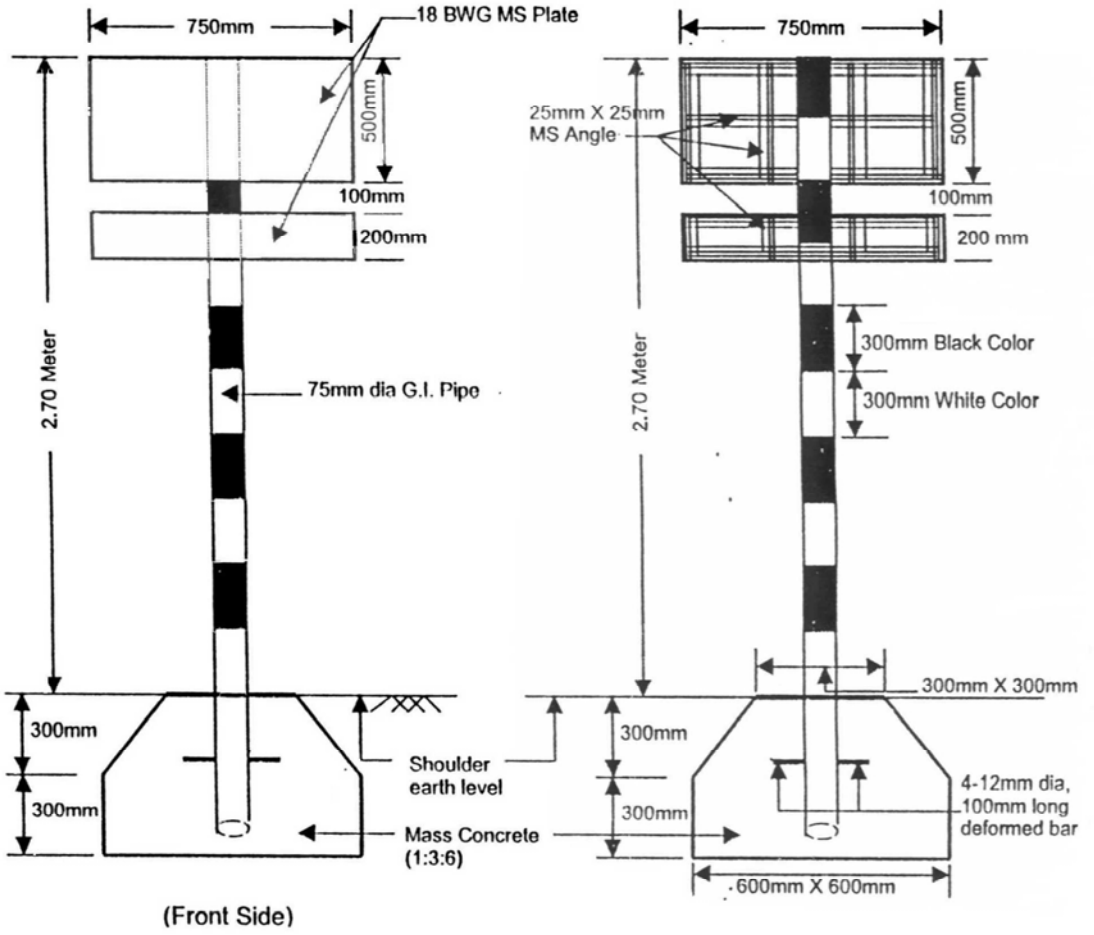
SAMPLE ESTIMATE OF KILOMETER POST

Item Code	Brief Description of Item	Quantity	Unit	Rate (Tk)	Amount (Tk)
01. [2.2.01]	E/W in excavation	0.20	m^3	61.31	12.26
02. [2.1.05.01]	E/W in filling	0.07	m^3	20.85	1.46
03. [5.007.01]	Sand filling (75mm)	0.03	m^3	598.40	17.95
04. [5.010.02]	1st class Brick work (1:4)	0.16	m^3	3763.67	602.19
05. [5.031.01]	RCC with Brick chips (1:2:4)	0.05	m^3	8191.47	409.57
06. [5.048.02]	Reinforcement	6	Kg	78.63	471.78
07. [5.102.03.01]	6mm Plaster (1:4)	1.87	m^2	94.54	176.79
08.	Painting & writing (Enamel Paint)	-	-	LS	200.00
				Total :	**1892.00**

SAMPLE ESTIMATE OF NAME PLATE

Item Code	Brief Description of Item	Quantity	Unit	Rate (Tk)	Amount (Tk)
01. [2.2.01]	E/W in excavation	0.40	m^3	61.31	24.52
02. [2.1.05.01]	E/W in filling	0.13	m^3	20.85	2.71
03. [5.007.01]	Sand filling (75mm)	0.06	m^3	598.40	35.9
04. [5.010.02]	1st class Brick work (1:4)	0.28	m^3	3763.67	1053.83
05. [5.031.01]	RCC with Brick chips (1:2:4)	0.09	m^3	8191.47	737.23
06. [5.048.02]	Reinforcement	10.50	Kg	78.63	825.62
07. [5.102.03.01]	6mm Plaster (1:4)	2.97	m^2	94.54	280.78
08.	Painting & writing (Enamel Paint)	-	-	LS	200.00
				Total :	**3160.59**

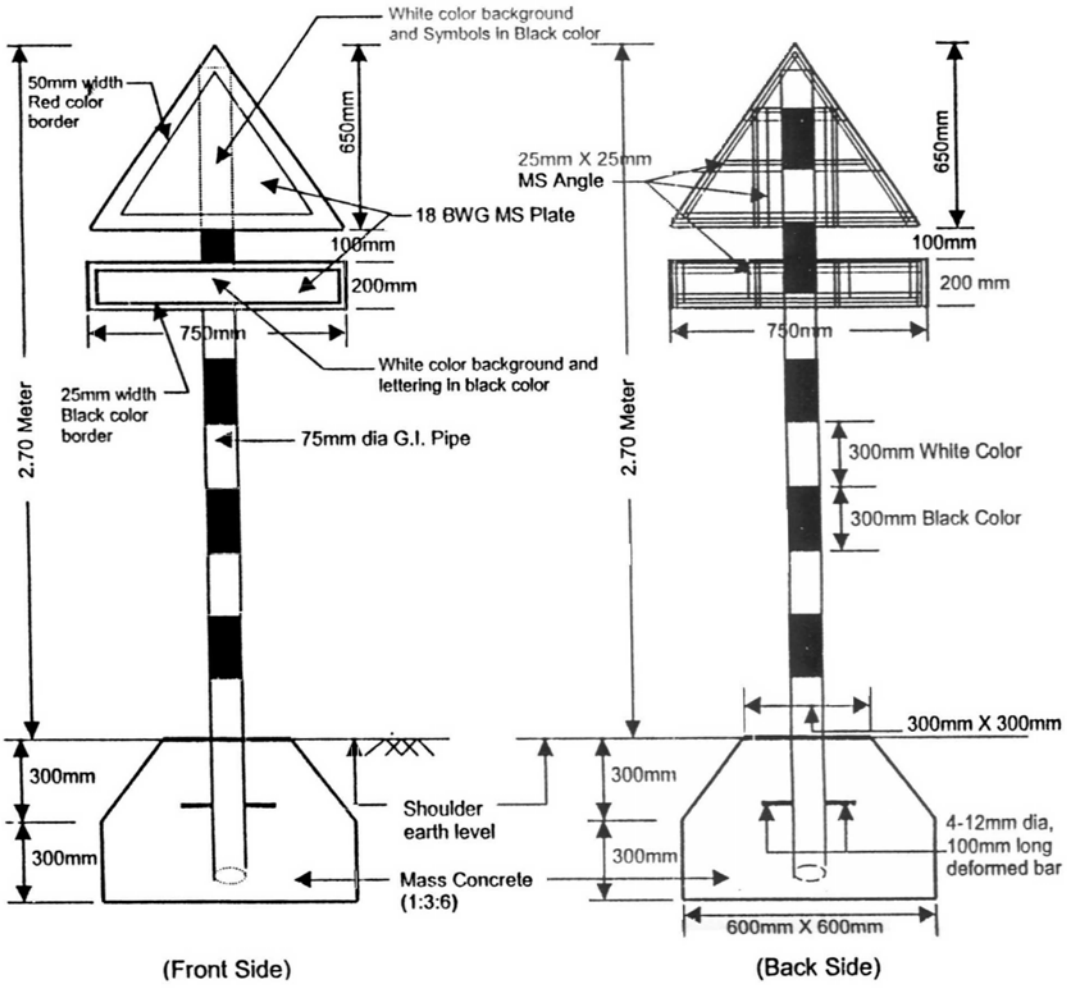
A) Informative:



◎ All Color using by Synthetic enamel paint.

● Section of Traffic Sign (Informative) ●

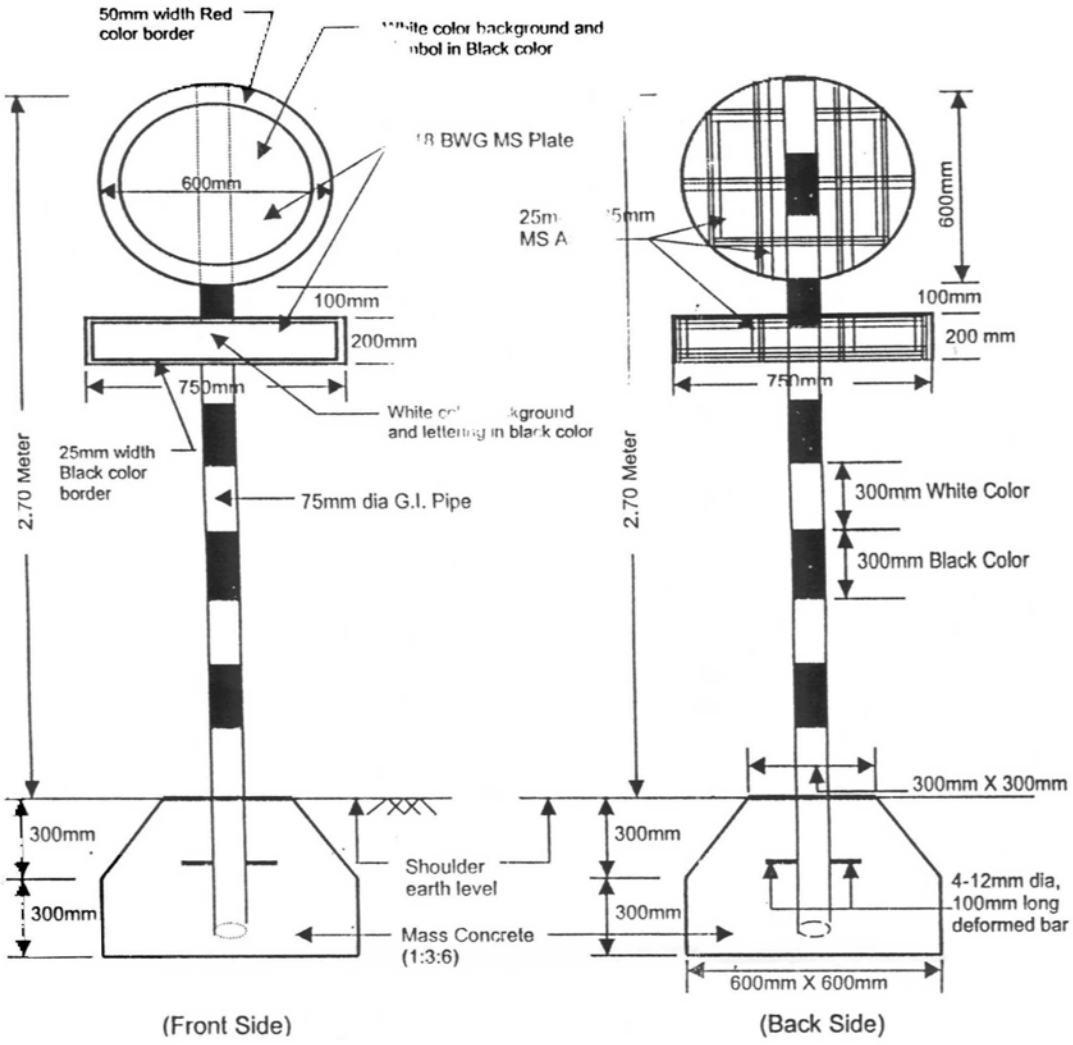
B) Precautionary:



◎ All Color using by Synthetic enamel paint.

● Section of Traffic Sign (Precautionary) ●

C) Compulsory:

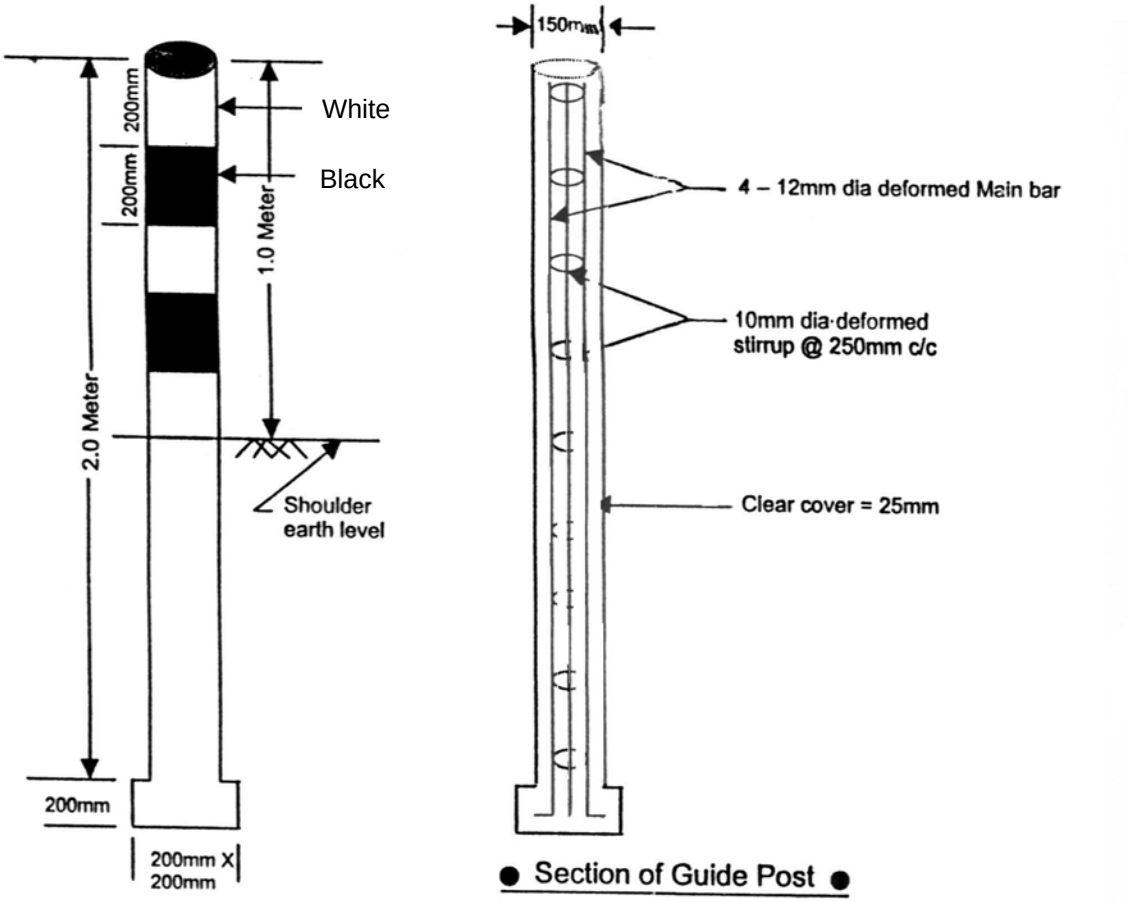


◎ All Color using by Synthetic enamel paint.

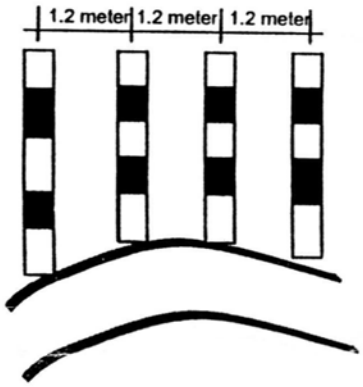
● Section of Traffic Sign (Compulsory) ●

D) Guide Post

RCC Guide Post of 2.20 meter height with 150mm diameter each to be posted 1.20 meter c/c embedded 1.20 meter of its length into the compacted shoulder by digging and refilling the hole. The portion of Guide Post above ground level to be painted using yellow and red colors by synthetic enamel paint alternatively for 200mm height of each color.



● Section of Guide Post ●



SAMPLE ESTIMATE OF ROAD SIGN

(A) Informative

Item Code	Brief Description of Item	Quantity	Unit	Rate (Tk)	Amount (Tk)
01. [2.2.01]	E/W in excavation	0.25	m^3	61.31	15.33
02. [4.1.10.01.1]	CC with Brick chips (1:3:6)	0.168	m^3	4432.31	744.63
03. [2.1.05.01]	E/W in filling	0.155	m^3	20.85	3.23
04. [5.048.02]	Reinforcement	0.40	Kg	78.63	31.45
05. [4.3.21.01]	Welding	40	No.	1.81	72.40
06. [Analysis]	75mm GI Pipe *	3.30	m	998.15	3293.9
07. [6.29]	18 BWG MS Plate	0.525	Kg	94.09	49.4
08. [6.29]	25x25 mm MS Angle	9.50	Kg	94.09	893.86
09.	Painting & writing (Enamel Paint)	-	-	LS	200.00
				Total :	**5304.2**

(B) Precautionary

Item Code	Brief Description of Item	Quantity	Unit	Rate (Tk)	Amount (Tk)
01. [2.2.01]	E/W in excavation	0.25	m^3	61.31	15.33
02. [4.1.10.01.1]	CC with Brick chips (1:3:6)	0.168	m^3	4432.31	744.63
03. [2.1.05.01]	E/W in filling	0.155	m^3	20.85	3.23
04. [5.048.02]	Reinforcement	0.40	Kg	78.63	31.45
05. [4.3.21.01]	Welding	30	No.	1.81	54.30
06. [Analysis]	75mm GI Pipe *	3.30	m	998.15	3293.9
07. [6.29]	18 BWG MS Plate	0.24	Kg	94.09	22.58
08. [6.29]	25x25 mm MS Angle	8.60	Kg	94.09	809.17
09.	Painting & writing (Enamel Paint)	-	-	LS	200.00
				Total :	**5174.59**

(C) Compulsory

Item Code	Brief Description of Item	Quantity	Unit	Rate (Tk)	Amount (Tk)
01. [2.2.01]	E/W in excavation	0.25	m^3	61.31	15.33
02. [4.1.10.01.1]	CC with Brick chips (1:3:6)	0.168	m^3	4432.31	744.63
03. [2.1.05.01]	E/W in filling	0.155	m^3	20.85	3.23
04. [5.048.02]	Reinforcement	0.40	Kg	78.63	31.45
05. [4.3.21.01]	Welding	36	No.	1.81	65.16
06. [Analysis]	75mm GI Pipe *	3.30	m	998.15	3293.9
07. [6.29]	18 BWG MS Plate	1.88	Kg	94.09	176.89
08. [6.29]	25x25 mm MS Angle	8	Kg	94.09	752.72
09.	Painting & writing (Enamel Paint)	-	-	LS	200.00
				Total :	**5283.31**

(D) Guide Post

Item Code	Brief Description of Item	Quantity	Unit	Rate (Tk)	Amount (Tk)
01. [2.2.01]	E/W in excavation	0.05	m^3	61.31	3.07
02. [2.1.05.01]	E/W in filling	0.03	m^3	20.85	0.63
03. [5.031.01]	RCC with Brick chips (1:2:4)	0.043	m^3	8191.47	352.23
04. [5.048.02]	Reinforcement	8.75	Kg	78.63	688.01
05.	Painting & writing (Enamel Paint)	-	-	LS	100.00
				Total :	**1143.94**

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

স্থানীয় সরকার প্রকৌশল অধিদপ্তর
আগারগাঁও, শেরে বাংলা নগর
ঢাকা-১২০৭ ।

স্মারক bxit এলজিইডি/পিডি/আরটিআইপি/Avi-13/03/4885 তারিখ ঃ ০৭-০২-২০০৫ Bs|

প্রতি

১। প্রকল্প পরিচালক (সকল)
.....
স্থানীয় সরকার প্রকৌশল অধিদপ্তর
সদর দপ্তর, ঢাকা ।

২। নির্বাহী প্রকৌশলী (সকল)
স্থানীয় সরকার প্রকৌশল অধিদপ্তর

জেলা ঃ ..... ।

৩। উপজেলা প্রকৌশলী (সকল)
স্থানীয় সরকার প্রকৌশল অধিদপ্তর

উপজেলা ঃ .....

জেলা ঃ ..... ।

বিষয় ঃ স্থানীয় সরকার প্রকৌশল অধিদপ্তরের আওতাধীন বাস্তবায়নাধীন/বাস্তবায়িত/বাস্তবায়িতব্য বিভিন্ন সড়কসমূহের "সড়ক নিরাপত্তা (Road Safety)" নিশ্চিত করার লক্ষ্যে কার্যক্রম গ্রহণ প্রসঙ্গে।

উপরোক্ত বিষয়ের প্রেক্ষিতে জানানো যাচ্ছে যে, সড়ক নিরাপত্তা নিশ্চিতকরণের লক্ষ্যে স্থানীয় সরকার প্রকৌশল অধিদপ্তর ইতোমধ্যেই বিভিন্ন প্রকল্পের আওতায় কারিগরী দিক ছাড়াও জনসাধারণের সচেতনতা বৃদ্ধির লক্ষ্যে এতদ্‌বিষয়ক বিভিন্ন কার্যক্রম গ্রহণ করেছে। সদর দপ্তর পর্যায়ে অতিরিক্ত প্রধান প্রকৌশলী (বাস্তবায়ন)কে ইউনিট প্রধান করে একটি সড়ক নিরাপত্তা ইউনিট গঠন করা হয়েছে। উন্নয়নের জন্য গৃহীত/গৃহীতব্য প্রতিটি সড়কের সাথে আবশ্যিক বিষয় হিসাবে সড়কের নিরাপত্তা নিশ্চিত করার লক্ষ্যে নিম্নলিখিত কার্যক্রম বিবেচনা করতে হবে। এছাড়া যে সমস্ত সড়ক ইতোমধ্যে বাস্তবায়িত হয়েছে সেগুলোকেও রক্ষণাবেক্ষণের আওতায় এনে উক্ত কার্যক্রম গ্রহণ করতে হবে।

১। সড়কের পরিকল্পনা ও বাস্তবায়নকালীন সময়ে বিবেচ্য বিষয়সমূহ ঃ

সড়কের পরিকল্পনা ও বাস্তবায়নকালীন সময়ে সড়ক নিরাপত্তার নিমিত্তে নিম্নোক্ত কারিগরী বিষয়সমূহ বিশেষভাবে বিবেচনা করতে হবে।

(ক) কোন Sharp Curve থাকলে সেটাকে যথাসম্ভব সোজা করে Easy Curve প্রদান করতে হবে।

(খ) যেখানে এলজিইডি সড়ক, জাতীয় ও আঞ্চলিক মহাসড়কসমূহের সাথে মিলিত হবে সেই মিলনস্থলের Level এবং Grade একই হতে হবে। প্রয়োজনে Traffic Channelize করার জন্য Divider/Round about (গোলচক্কর) ইত্যাদি স্থাপন করা যেতে পারে।

(গ) Curvature অনুযায়ী Super Elevation প্রদান করতে হবে।

(ঘ) সড়কের উভয়পার্শ্বে কমপক্ষে ৪ (চার) ফুট Shoulder থাকতে হবে।

(ঙ) "Safe Sight Distance" Clear রাখার প্রয়োজনীয় পদক্ষেপ গ্রহণ করতে হবে।

(চ) সড়ককে অবৈধ স্থাপনা মুক্ত করতে হবে, এ ব্যাপারে সড়কের উপরে অবস্থিত হাট-বাজার/বিলবোর্ড/বিভিন্ন ইউটিলিটিজ-এর লাইনস যেমন ঃ টেলিফোন লাইন, বৈদ্যুতিক খুঁটি, গ্যাসের সংযোগ লাইন ইত্যাদি অপসারণ করতে হবে।

(ছ) এলজিইডি সড়কে দূর্ঘটনা হওয়া মাত্রই অত্রসাথ সংযোজিত ''সড়ক দূর্ঘটনা ফরম'' পূরণ পূর্বক ছষতধ জতপনঢ়ঁ Unit-এ প্রেরণ করতে হবে। প্রাপ্ত তথ্য বিশ্লেষণের মাধ্যমে দূর্ঘটনা প্রতিরোধের ব্যবস্থা গ্রহণ করতে হবে।

(জ) সড়কে অযাচিতভাবে কোন এয়লস থাকলে তা অপসারণ করতে হবে। যদি একান্তই Speed Control এর প্রয়োজন হয় তবে Hump এর পরিবর্তে Rumble Strips প্রদান করতে হবে।

(ঝ) প্রতিটি সড়ক নির্মাণ/রক্ষণাবেক্ষণের পরে ঘাস লাগানো (বিশেষতঃ ব্রীজ এ্যাপ্রোচে) এবং বৃক্ষরোপণ কর্মসূচী গ্রহণ করতে হবে। এক্ষেত্রে খেয়াল রাখতে হবে যেন কোনভাবেই Sight Distance বাধাগ্রস্ত না হয়। Curve এর Inner Side এ কোন বৃক্ষ রোপণ করা যাবে না।

(ঞ) সড়কে যাতে কোনভাবেই পানি জমতে না পারে সেদিকে খেয়াল রাখতে হবে। প্রয়োজনে Built-up Area সমূহের পানি Drain out করার ব্যবস্থাদি গ্রহণ করতে হবে।

(ট) সড়ক সংলগ্ন স্কুল/কলেজ/মাদ্রাসা সহ অন্যান্য শিক্ষা প্রতিষ্ঠানের ছাত্র-ছাত্রীগণের নিরাপত্তা নিশ্চিত করার স্বার্থে বরাদ্দ প্রাপ্তির নিশ্চয়তা সাপেক্ষে যথাযথ ব্যবস্থা গ্রহণ, যেমন- Pedestrian Crossings/Boundary Wall ইত্যাদি নির্মাণ করা যেতে পারে।

(ঠ) প্রতিটি ব্রীজের Railing/Rail Post Painting করতে হবে। এছাড়া Alternate Rail-এ Retro Reflecting Markings দিতে হবে।

(ড) সড়কের বাঁকের উল্টো দিকে/ব্রীজ এ্যাপ্রোচে/মার্কেট এরিয়াতে Guide Post দিতে হবে। প্রতিটি Alternate Guide Post-এ Retro Reflecting Markings দিতে হবে।

(ঢ) প্রতিটি সড়কে অনুমোদিত ডিজাইন, ড্রইং এবং স্পেশিফিকেশন মোতাবেক কিলোমিটার পোষ্ট বসাতে হবে। এছাড়া প্রতিটি সড়কের জরষসন এর শেষে Boundary Post বসাতে হবে।

(ন) **এছাড়া আবশ্যিকভাবে নিম্নবর্ণিত Signs ও Markings স্থাপন করতে হবে।**

i) প্রতিটি সড়কের Intersection-এ Regulatory *'Stop'* Signs স্থাপন করতে হবে।

ii) Retro Reflecting Markings সম্বলিত *'Give way'* Signs Intersection-এ বসাতে হবে।

iii) Major Intersection/Built-in Area/Market এলাকায় Retro Reflecting Markings এর Regulatory Speed Limit Signs এবং Markings বসাতে হবে।

iv) Intersection/বড় ব্রীজ (৩০ মিটারের উর্দ্ধে)/Narrow Bridge/Built-in Area/Permanent Hazard Obstructions- এ Warning এবং Guide Signs বসাতে হবে।

v) সম্ভব হলে Intersection/Narrow Bridge/Built-in Area/Railway Intersection Rumble Strips (A series of rough textured surface patches) বসাতে হবে।

vi) স্কুল/কলেজ/মাদ্রাসা/ধর্মীয় প্রতিষ্ঠান ইত্যাদির পূর্বে অবশ্যই Retro Reflecting Markings এর Regulatory Speed Limit Signs এবং Markings বসাতে হবে।

vii) ভাঙ্গা ব্রীজ/সরু ব্রীজ/পরস্পর বাঁক ইত্যাদির পূর্বে অবশ্যই Retro Reflecting Markings এর Regulatory Speed Limit Signs এবং Markings বসাতে হবে।

ix) রিক্সা/রিক্সা ভ্যান/বাই সাইকেল ইত্যাদি অযান্ত্রিক যানবাহনের সাথে Retro Reflecting Material এর Sticker ব্যবহার করতে হবে।

উপরোক্ত বিষয়াদি বিশেষ করে কারিগরী কারণে গৃহীত কার্যক্রমের ব্যয় নির্বাহের জন্য BOQ এর Line Item হিসাবে Safety Item সমূহ সংযোজন করতে হবে।

২। সড়ক ব্যবহারকালে বিবেচ্য বিষয়সমূহ ঃ

এ পর্যায়ে সড়ক ব্যবহারকালে স্থানীয় জনগণকে সড়ক নিরাপত্তার ব্যাপারে উদ্বুদ্ধ করতে হবে। নির্মিত/নির্মিতব্য সকল সড়ক যেন যথাযথভাবে চলাচল উপযোগী হয় সে লক্ষ্যে প্রয়োজনীয় ব্যবস্থা গ্রহণের জন্য Upazila Road Safety Committee সহ

জনপ্রতিনিধি বিশেষতঃ ইউপি চেয়ারম্যান/ মেম্বার/স্কুলের শিক্ষক-শিক্ষিকা/গার্লস গাইড/বয়-স্কাউট/যানবাহনের মালিক ও পরিচালনা পর্ষদের প্রতিনিধিবৃন্দকে সঙ্গে নিয়ে Safety Campaign এবং প্রতি ৩ মাসে একবার Community Road Safety Patrolling- এর ব্যবস্থা গ্রহণ করতে হবে। Safety Campaign-এ প্রধানতঃ সড়ক নিরাপত্তা বিষয়ক র‍্যালী, সভা, সেমিনার, ডকুমেন্টারী প্রদর্শন ইত্যাদির ব্যবস্থা করতে হবে। অন্যদিকে Community Road Safety Patrolling-এর সময় সড়কের উপরে নতুন স্থাপিত কোন অবৈধ স্থাপনা/বিলবোর্ড ইত্যাদি যা যানবাহন চলাচলে বিঘ্ন সৃষ্টি করবে তা অপসারণের ব্যবস্থা গ্রহণ করতে হবে এবং তার ব্যয়ভার রক্ষণাবেক্ষণ (Maintenance) খাত হতে নির্বাহের ব্যবস্থা করতে হবে। এছাড়া নিম্নলিখিত কার্যক্রম আবশ্যিকভাবে গ্রহণ করতে হবে ঃ

(ক) সড়কে দূর্ঘটনা প্রবল অংশসমূহ কিংবা যে স্থানে এ যাবৎ সবচাইতে বেশী দূর্ঘটনা ঘটেছে এমন অংশসমূহ (Black Spots) চিহ্নিত করতে হবে।

(খ) কোন অবস্থাতেই সর্বসাধারণ সড়কের উপর খড় যেন জড়ো করতে না পারে সেদিকে সতত দৃষ্টি দিতে হবে। সড়কের উপর কাঠের টুকরা/খড়/ধান/গোবর শুকানো বর্জন করার জন্য স্থানীয় জনসাধারণকে উদ্বুদ্ধ করতে হবে। এর ক্ষতিকারক প্রভাবগুলো তাদেরকে বুঝাতে হবে।

(গ) সড়কের বার্ম ও সোল্ডার থেকে যেন কেউ মাটি কেটে নিতে না পারে সেদিকে দৃষ্টি রাখতে হবে। এছাড়া সড়কের বার্ম ও সোল্ডার ক্ষতিগ্রস্থ হয় এমন কোন কার্যক্রম যেন গৃহীত না হয় সেদিকেও সজাগ দৃষ্টি রাখতে হবে।

(ঘ) সড়কের ধারে যেসব ঘাস লাগানো হয় তা সড়কের মাটিকে ধরে রাখার জন্য বিশেষ উপযোগী। কোন ক্রমেই এই ঘাস কেটে অন্য কাজে ব্যবহার না করার জন্য জনসাধারণকে উদ্বুদ্ধ করতে হবে। এছাড়া সড়কের গাছপালাগুলোকে যথাযথভাবে সংরক্ষণ করতে হবে। গবাদিপশুর হাত থেকে সড়কের সংলগ্ন গাছপালাগুলোকে নিরাপদে রাখতে হবে।

(ঙ) ট্রাক্টরের লোহার চাকা/কাঠের চাকার গরু বা মহিষের গাড়ি ব্যবহার পুরোপুরিভাবে বন্ধ করা এবং কাঠের বা লোহার চাকার পরিবর্তে রাবারের চাকা ব্যবহার করার ব্যাপারে জনসাধারণকে উদ্বুদ্ধ করতে হবে।

(চ) ট্রাক, বাস এবং অন্যান্য যানবাহন বিকল হলে সড়কের উপর থেকে যথাসম্ভব দূরে সরানোর ব্যবস্থা করতে হবে।

(ছ) জনগণকে অতিরিক্ত যাত্রী হয়ে বাসে চলাচল না করার জন্য উদ্বুদ্ধ করতে হবে। এছাড়া ট্রাক/ট্রাক্টর যাতে অতিরিক্ত মালামাল পরিবহন করতে নিরুৎসাহিত হয় সে ব্যাপারে এতদ্‌সংক্রান্ত ক্ষতিকর দিকগুলো সম্পর্কে তাদের অবহিত করতে হবে।

(জ) জনসাধারণ যেন সড়কের গায়ে অথবা সোল্ডারে বা ঢালে সেচের নালা তৈরী কিংবা চাষ করতে না পারে সেদিকে দৃষ্টি দিতে হবে।

(ঝ) ঝড়/বন্যা অথবা যে কোন প্রাকৃতিক দূর্যোগের পরে সড়ক পরিদর্শন করতে হবে। এরূপ দূর্যোগ বিশেষত ঝড়ের পরে বৃক্ষ সড়কে পরে থাকলে তাৎক্ষণিকভাবে তা অপসারণ করতে হবে।

এ ব্যাপারে কোন পরামর্শ কিংবা সহযোগিতার প্রয়োজন হলে এলজিইডির সড়ক নিরাপত্তা ইউনিটের সাথে যোগাযোগ করা যেতে পারে।

¯v¶wiZ/-
(মোঃ শহীদুল হাসান)
প্রধান প্রকৌশলী

অনুলিপি ঃ

১। অতিরিক্ত প্রধান প্রকৌশলী (সকল), এলজিইডি, ঢাকা ।
২। তত্ত্বাবধায়ক প্রকৌশলী (সকল), এলজিইডি, ঢাকা ।
৩। তত্ত্বাবধায়ক প্রকৌশলী, অঞ্চল (সকল), এলজিইডি ।
৪। জনাব .....
৫। Mr./Ms. .....

MYcRvZšx evsjv‡`k miKvi
¯vbxq miKvi c‡KŠkj Awa`ßi
AvMvgxMvI, †k‡i evsjv bMi
XvKv-1207 |

¯§viK b¤it GjwRBwW/wmB/B-02/2002 (Ask-1)/4251 ZwiL t 24-05-2006 Bs|

Awdm Av‡`k

GZØviv ¯vbxq miKvi c‡KŠkj Awa`ß‡ii AvIZvaxb ev¯evwqZ/ev¯evqbvaxb/ev¯evwqZe¨ wewfb mo‡K ÒmoK wbivcËvÓ welqK Kvhµg AwaKZi mô I mPvi“i‡c m¤úb Kivi Rb¨ AvÂwjK chv‡q wb‡gv³ KgKZvM‡Yi mgš‡q I ewYZ Kgcwiwai Av‡jv‡K ÒAvÂwjK moK wbivcËv BDwbUÓ MVb Kiv n‡jv|

1| ZËveavqK c‡KŠkjx, (mKj AÂj), GjwRBwW | - BDwbU cavb

2| wbevnx c‡KŠkjx (cwk¶Y), GjwRBwW, mKj AÂj | - m`m¨

3| mnKvix c‡KŠkjx (hwšK), GjwRBwW, †Rjv t AvÂwjK `ßi †h †Rjvq Aew¯Z †mB †Rjv| - m`m¨

4| mnKvix c‡KŠkjx, ZËveavqK c‡KŠkjxi `ßi, (mKj AÂj), GjwRBwW| - m`m¨

5| ‡mwmI‡jwRó/†mwmI-B‡Kv‡bwgó (wbevnx c‡KŠkjx KZK g‡bvbxZ), GjwRBwW, †Rjv t AvÂwjK `ßi †h †Rjvq Aew¯Z †mB †Rjv| - m`m¨

6| mnKvix c‡KŠkjx (mswkó wbevnx c‡KŠkjx KZK g‡bvbxZ), GjwRBwW, †Rjv t AvÂwjK `ßi †h †Rjvq Aew¯Z †mB †Rjv| - BDwbU mwPe

AvÂwjK moK wbivcËv BDwb‡Ui Kgcwiwa t

(1) RvZxq moK wbivcËv KvDwÝ‡ji Kg cwiKíbvq GjwRBwWi Dci AwcZ `wqZ cvj‡b †K›`xq moK wbivcËv BDwbU‡K mn‡hvwMZv c`vb |
(2) GjwRBwW KZK ev¯evwqZ/ev¯evqbvaxb/ev¯evwqZe¨ wewfb mo‡K e¨vK ¯úU/SwKcY Ask wPwýZ Kiv Ges GZ`msµvš wbivcËvgjK Kvhµg MnY wbwðZ Kiv |
(3) ÒDc‡Rjv moK wbivcËv KwgwUÓ MV‡b Dc‡Rjv c‡KŠkjx‡K mnvqZv c`vb Ges †h mg¯ Dc‡Rjvq B‡Zvg‡a¨ G KwgwU MwVZ n‡q‡Q †m mg¯ ‡¶‡Î MwVZ KwgwU‡K Zv‡`i `wqZ-KZe¨ m¤ú‡K m‡PZb Kiv Z_v mwPeK moK wbivcËv KgmPx ev¯evq‡b DØ× Kiv|
(4) GjwRBwWi moK †bIqv‡K msNwUZ moK `NUbvi Z_¨w` msMn, msi¶Y, we‡klb, weZib Ges moK `NUbv cwZ‡iv‡a c‡qvRbxq Kvhµg Mnb I ev¯evq‡bi e¨e¯v Kiv |
(5) moK wbivcËv msµvš wel‡q gvV-chv‡qi wewfb `ßi †hgb weAviwUG, cwjk wefvM, ckvmb I ¯vbxq miKvi cwZôvbmg‡ni mv‡_ †hvMv‡hvM i¶v I c‡qvRb †gvZv‡eK KwiMix mnvqZv c`v‡bi e¨e¯v Kiv|
(6) moK wbivcËv Dbq‡b GjwRBwWi KgKZv/KgPvix‡`i cwk¶Y I `¶Zv ew×i Rb¨ c‡qvRbxq cwk¶Y Kvhµg Mnb I ev¯evq‡bi e¨e¯v Kiv|
(7) moK `NUbv wel‡q MYm‡PZbZv mwói j‡¶¨ c‡qvRbxq Kvhµg Mnb I ev¯evq‡bi e¨e¯v Kiv|

(8) GjwRBwW KZK ev¯evwqZ/ev¯evqbvaxb/ev¯evwqZe¨ wewfb mo‡K wbivcËv AwW‡Ui e¨e¯v Kiv|

(9) GjwRBwW KZK cYxZ wbivcËv msµvš Kvhw` môfv‡e m¤úb Kivi Rb¨ c‡qvRbxq g¨vb‡qj, MvBWjvBbm BZ¨w` cbq‡b mnvqZv I gZvgZ c`vb Kiv | GQvov G¸‡jv msi¶‡bi c‡qvRbxq e¨e¯v MnY Kiv|

(10) moK `NUbvq nZvnZ‡`i weeiY msi¶‡Y ¯vbxq miKvi cwZôvbmgn‡K mnvqZv c`v‡bi e¨e¯v Kiv|

(11) moK wbivcËv msµvš Kvhµ‡gi mgšq mvab, gwbUwis I gj¨vq‡bi e¨e¯v Kiv|

(12) ewlK moK wbivcËv KgmPx cYq‡b †Rjv¸wj‡K mnvqZv c`vb|

(13) ‡K›`xq moK wbivcËv BDwb‡U gwmK cwZ‡e`b †ciY |

(14) KZc¶ KZK †`q Ab¨vb¨ `wqZvejx |

GB Av‡`k Rb¯v‡_ Rvix Kiv n‡jv Ges Awej‡¤ KvhKi Kiv n‡e |

¯v¶wiZ/-
(†gvt knx`j nvmvb)
cavb c‡KŠkjx

¯§viK b¤it GjwRBwW/wmB/B-02/2002 (Ask-1)/4251/1(750) ZwiL t 24-05-2006 Bs|

Abwjwc t

1| AwZwi³ cavb c‡KŠkjx (cwiKíbv/ev¯evqb/i¶Yv‡e¶Y), GjwRBwW, XvKv |
2| ZËveavqK c‡KŠkjx (mKj), GjwRBwW, XvKv |
3| ZËveavqK c‡KŠkjx (mKj AÂj), GjwRBwW, ‡Rjv t ..... |
4| cKí cwiPvjK (mKj), GjwRBwW, m`i `ßi, XvKv|
5| wbevnx c‡KŠkjx (mKj), GjwRBwW, ‡Rjv t ..... |
6| wbevnx c‡KŠkjx (cwk¶Y), GjwRBwW, ‡Rjv t ..... |
7| Dc‡Rjv c‡KŠkjx (mKj), GjwRBwW, Dc‡Rjv t ....., †Rjv t ..... |
8| mnKvix c‡KŠkjx, GjwRBwW, mKj |
9| ‡mwmI‡jwRó/†mwmI-B‡Kv‡bwgó, GjwRBwW, mKj |

¯v¶wiZ/-
(মোঃ আব্দুর রউফ)
mnKvix c‡KŠkjx

MYcRvZšx evsjv‡`k miKvi
¯vbxq miKvi c‡KŠkj Awa`ßi
AvMviMvl, †k‡i evsjv bMi
XvKv-1207 |

¯§viK b¤it GjwRBwW/wmB/B-02/2002 (Ask-1)/4252 ZwiL t 24-05-2006 Bs|

Awdm Av‡`k

GZØviv ¯vbxq miKvi c‡KŠkj Awa`ß‡ii AvIZvaxb ev¯evwqZ/ev¯evqbvaxb/ev¯evwqZe¨ wewfb mo‡K ÒmoK wbivcËvÓ welqK Kvhµg AwaKZi mô I mPvi“i¡c m¤úb Kivi Rb¨ ‡Rjv chv‡q mnKvix c‡KŠkjx, GjwRBwWi Dci `wqZ Acb Kiv n‡jv| mswkó wbevnx c‡KŠkjx KZK g‡bvbxZ D³ mnKvix c‡KŠkjx, GjwRBwW wbgewYZ Kg m¤úv`b Ki‡eb t

(1) ‡Rjvi ev¯evwqZ/ev¯evqbvaxb/ev¯evwqZe¨ mKj mo‡Ki cv°j‡b Ges ‡¯úwkd‡Kk‡b moK wbivcËv m¤úwKZ welqw` Ašf³ K‡i Z`vbhvqx ev¯evqb Kiv Ges cwZwU mo‡Ki Rb¨ "Road Safety Compliance Monitoring Format" AvÂwjK moK wbivcËv BDwb‡Ui gva¨‡g †K›`xq moK wbivcËv BDwb‡U †ciY Kiv|
(2) ‡Rjvi Rb¨ ewlK moK wbivcËv KgmPx cYqb Kiv|
(3) GjwRBwW KZK ev¯evwqZ/ev¯evqbvaxb/ev¯evwqZe¨ wewfb mo‡K e¨vK ¯úU/SwKcY Ask wPwýZ Kiv Ges GZ`msµvš wbivcËvgjK Kvhµg MnY wbwðZ Kiv |
(4) moK wbivcËv welqK Kvhµ‡g Routine Maintenance Group (RMG) ‡K Kv‡R jvMv‡bv | G e¨vcv‡i Length-Person Supervisor Gi gva¨‡g RMG Gi Kvhµg Z`viKx‡Z mswkó Dc‡Rjv c‡KŠkjx‡K mnvqZv c`vb |
(5| Ò‡Rjv moK wbivcËv KwgwUÓ KZK wbevnx c‡KŠkjx, GjwRBwW‡K †`q `wqZ-KZe¨ cvj‡b mnvqZv c`vb|
(6) ÒDc‡Rjv moK wbivcËv KwgwUÓ MV‡b Dc‡Rjv c‡KŠkjx‡K mnvqZv c`vb Ges †h mg¯ Dc‡Rjvq B‡Zvg‡a¨ G KwgwU MwVZ n‡q‡Q †m mg¯ ‡¶‡Î MwVZ KwgwU‡K Zv‡`i `wqZ-KZe¨ m¤ú‡K m‡PZb Kiv Z_v mweK moK wbivcËv KgmPx ev¯evq‡b DØ× Kiv|
(7) GjwRBwWi moK †bUIqv‡K msNwUZ moK `NUbvi Z_¨w` msMn, msi¶Y, we‡klb, weZib Ges moK `NUbv cwZ‡iv‡a c‡qvRbxq Kvhµg Mnb I ev¯evq‡bi e¨e¯v Kiv |
(8) wewfb `ßi †hgb weAviwUG, cwjk wefvM, ckvmb I ¯vbxq miKvi cwZôvbmg‡ni mv‡_ †hvMv‡hvM i¶v I c‡qvRb †gvZv‡eK KwiMix mnvqZv c`v‡bi e¨vcv‡i wbevnx c‡KŠkjx‡K mn‡hvwMZv Kiv|
(9) moK wbivcËv Dbq‡b GjwRBwWi KgKZv/KgPvix‡`i cwk¶Y I `¶Zv ew×i Rb¨ c‡qvRbxq cwk¶Y Kvhµg Mnb I ev¯evq‡bi e¨e¯v Kiv|
(10) moK `NUbv wel‡q MYm‡PZbZv mwói j‡¶¨ ¯vbxq mvs¯wZK ‡Mvôx, wewfb msev` gva¨‡gi Kgx, MYgvb¨ e¨w³, hvbevn‡bi gwjK I PvjK mwgwZmgn‡K m¤ú³ K‡i c‡qvRbxq Kvhµg Mn‡Y I ev¯evq‡b Dc‡Rjv c‡KŠkjx‡K mnvqZv c`vb|
(11) GjwRBwW KZK ev¯evwqZ/ev¯evqbvaxb/ev¯evwqZe¨ wewfb mo‡K wbivcËv AwW‡Ui e¨e¯v Kiv|
(12) GjwRBwW KZK cYxZ wbivcËv msµvš Kvhw` môfv‡e m¤úb Kivi Rb¨ c‡qvRbxq g¨vb‡qj, MvBWjvBbm BZ¨w` cbq‡b mnvqZv I gZvgZ c`vb Kiv | GQvov G¸‡jv msi¶‡bi I c‡qvRbxq e¨e¯v MnY Kiv|
(13) moK `NUbvq nZvnZ‡`i weeiY msi¶‡Y ¯vbxq miKvi cwZôvbmgn‡K mnvqZv c`v‡bi e¨e¯v Kiv|
(14) moK wbivcËv msµvš Kvhµ‡gi mgšq mvab, gwbUwis I gj¨vq‡bi e¨e¯v Kiv|
(15) ‡K›`xq moK wbivcËv BDwb‡U AvÂwjK moK wbivcËv BDwb‡Ui gva¨‡g gwmK cwZ‡e`b †ciY Kiv|
(16) KZc¶ KZK †`q Ab¨vb¨ `wqZvejx |

GB Av‡`k Rb¯v‡_ Rvix Kiv n‡jv Ges Awej‡¤ KvhKi Kiv n‡e|

¯v¶wiZ/-
(†gvt knx`j nvmvb)
cavb c‡KŠkjx

¯§viK b¤it GjwRBWW/wmB/B-02/2002 (Ask-1)/4252/1(750) ZwiL t 24-05-2006 Bs|

Abwjwc t

1| AwZwi³ cavb c‡KŠkjx (cwiKíbv/ev¯evqb/i¶Yv‡e¶Y), GjwRBWW, XvKv |
2| ZËveavqK c‡KŠkjx (mKj), GjwRBWW, XvKv |
3| ZËveavqK c‡KŠkjx (mKj AÂj), GjwRBWW, ‡Rjv t ..... |
4| cKí cwiPvjK (mKj), GjwRBWW, m`i `ßi, XvKv|
5| wbevnx c‡KŠkjx (mKj), GjwRBWW, ‡Rjv t ..... |
6| wbevnx c‡KŠkjx (cwk¶Y), GjwRBWW, ‡Rjv t ..... |
7| Dc‡Rjv c‡KŠkjx (mKj), GjwRBWW, Dc‡Rjv t ....., †Rjv t ..... |
8| mnKvix c‡KŠkjx, GjwRBWW, mKj |
9| ‡mwmI‡jwRó/†mwmI-B‡Kv‡bwgó, GjwRBWW, mKj |

¯v¶wiZ/-
(মোঃ আব্দুর রউফ)
mnKvix c‡KŠkjx

Local Government Engineering Department

Accident Report Form

District: Upazila: Union: Time of Accident:

Name of Road: Road ID: Date of Accident:

Reference of the Accident in the Police Station: Location of Accident Spot:

Road Type		Environmental Features		Vehicle Details		Casualty Details		Accident Particulars (Vehicles)	
Road width		**Road side activities**		**Vehicle Type**		**Victims**	**Nos.**	**Nature of the damage of the vehicle**	
Single Lane	☐	Hat Day	☐	Bus	☐	Male		Slightly damaged	☐
Double Lane	☐	Non-hat Day	☐	Truck/Lorry	☐	Female		Partly damaged	☐
Road Shoulder		**Weather**		Utility	☐			Severely damaged	☐
Hard	☐	Cloudy/Rainy	☐	Pickup	☐	**According to type of Injures**	**Nos.**	**Type of Collision**	
Earthen	☐	Dry/Sunny	☐	Auto Rickshaw	☐	Simple		Head on collision	☐
Road Pavement		**Location of Accident Spot**		Bicycle	☐	Grievous		Rear Hit	☐
Earthen	☐	Bridge Approach	☐	Rickshaw/Van	☐	Fatal		Side collision during overtaking	☐
HBB	☐	Junction	☐	Bullock Cart	☐	**According to Categories of Victim**	**Nos.**	Hit on roadside structures	☐
Bituminous	☐	Curvature	☐	Pedestrian	☐	Pedestrian		Skidding	☐
Geometry		Straight	☐			Passenger		**Nature of damage to roadside object**	
Straight and level	☐	**Road Safety Precautions**		**Vehicle loading (in case of Truck/Utility)**		Animal		Simple	☐
Bendy & level	☐	Sign & Signal	☐	Heavy	☐	**Age of Victim**	**Nos.**	Medium	☐
Straight & undulating	☐	Zebra Crossing	☐	Medium	☐	Below 6		Severe	☐
Bendy & undulating	☐	Speed Breaker	☐	Light	☐	6-12			
Traffic		**Comments, if any:**				12-18		**Category of the Accident (Overall)**	
Low	☐					18-45		Simple	☐
Medium	☐					45-60		Medium	☐
High	☐					Above 60		Severe	☐

Community Organizer:
Upazila:

Upazila Engineer:
Upazila:

Executive Engineer:

Repair Procedure of Small Defects on BC Road by Bitumen Emulsion

Repair works on BC Roads can be carried out by using Bitumen Emulsion. The procedures are as follows:

(a) Cold Premix Method

The aggregates will be prepared with at least two fractured faces complying with the gradation shown in the Table-1.3.1 below to repair surface damages on BC pavement.

Table: 1.3.1

Sieve size (mm)	% Passing by Weight
6.3	100
4.8	75-85
2.4	40-75
0.3	8-40
0.075	2-8

The aggregate must be hard and sound. No crashed brick chips should be used.

Crushed brick aggregates will be prepared to comply with the gradation given in Table 1.3.2 for Base Course repair

Table : 1.3.2

Sieve size (mm)	% Passing by Weight
50	100
38	50-100
20	60-90
10	40-70
4.8	30-55
2.4	20-45
0.6	10-30
0.3	10-25

Before using a drum of emulsion, the drum should be rolled on a distance covering 50m back and forth to mix the emulsion properly with water in the drum. (Ratio of Emulsion and water in the drum is 60:40). To ease the handling of the emulsion, this may be transferred from the drum to smaller Jerrycan of about 20 liter capacity. For this purpose, a pipe may be fixed to the drum or a siphon device may be used to pour the emulsion into the Jerrycan.

Prepare the spot to be repaired following the procedure described in section 21.4. Mix 200 kg bitumen emulsion for each cubic meter of aggregate (maximum size 6.3mm) and place them into the mixture machine in order to get the soft and cold asphalt mixture. The premix will then be preserved in polythene bag properly and this will subsequently be used in repairing surface defects. This can be used up to seven days from the date of preparing the premix. Sand (FM 0.8) will be spread over the repaired surface immediately after the operation.

(b) Layer by Layer Method

The stone chips should be prepared in sufficient quantities to fill the damaged spots in layers. The stone chips of the gradation given in Table-1.3.3 shall have to be used in the first layer.

Table: 1.3.3

Sieve Size (mm)	% Passing by weight
16.0	100
12.5	80
10.0	60
6.3	40
4.8	25
2.4	20
1.18	10
0.3	4
0.025	2-8

Stone chips of the gradation in Table-1.3.4 below shall have to be used in second and subsequent layers.

Table: 1.3.4

Sieve Size (mm)	% Passing by weight
12.5	100
10.0	80
6.3	60
4.8	40
2.4	25

The repair spot shall have to be prepared following the standard procedure. Bitumen emulsion will then be sprayed at the rate of 1 liter per square meter, and immediately after that, stone chips will have to be spread at the rate of 16 kg per square meter uniformly according to the gradation mentioned in Table-1.3.3. In the second layer bitumen emulsion will be sprayed at the rate of 1.2 liter per square meter and then stone chips will have to be spread at the same rate with gradation mentioned in Table-1.3.4. On the top of the stone chips, bitumen emulsion will be sprayed again at the rate of 1.4 liter per square meter. Then the surface will be rolled lightly by hand roller and finally sand (FM 0.8) will be spread over the repaired surface.

¯vbxq miKvi c‡KŠkj Awa`ßi
Dc‡Rjv c‡KŠkjxi Kvhvjq
Dc‡Rjv: .....

weUwgb moK c‡ô cwijw¶Z Î"wU-wePÞwZi weeiY
(**MMT** Øviv ‡c f‡g‡›Ui i"wUb †gB‡›U‡b‡Ýi Rb¨ c‡hvR¨)

Dc‡Rjv : iv¯vi bvg : iv¯vi ^`N¨ :

‡Rjv : iv¯vi cKvi‡f` : ZvwiL :

¶q-¶wZi aiY	¶q-¶wZi ZxeZv	‡PB‡bR														†gvU	gše¨
		+500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000		
Pot holes (eM wgUvi)	¯ígvÎv																
	AwaK gvÎv																
Depressions (eM wgUvi)	¯ígvÎv																
	AwaK gvÎv																
Edge Distress (‰`N¨)	¯ígvÎv																
	AwaK gvÎv																
Cracks (eM wgUvi)																	
Any Other Defect																	

- ¯ígvÎv : GK layer c‡qvM K‡i †h wePÞwZ †givgZ m¤e
- AwaK gvÎv : †h wePÞwZ †givgZ Ki‡Z GKwaK layer c‡qv‡Mi c‡qvRb

¯v¶i
DcmnKvix c‡KŠkjxi bvg

¯v¶i
Dc‡Rjv c‡KŠkjx

¯vbxq miKvi c‡KŠkj Awa`ßi
Dc‡Rjv c‡KŠkjxi Kvhvjq
Dc‡Rjv: .....

‡gvevBj †gB‡›U‡bÝ Ux‡gi Øviv †cf‡g‡›Ui wbqwgZ †givg‡Zi Pwn`v cÎ

Dc‡Rjv : gv‡mi bvg :
‡Rjv : Zvwi L :

µwgK bs	iv¯vi bvg	iv¯vi aiY	iv¯vi ^`N¨	¶wZM‡¯i cwigvY							gše¨ (AMwaKvi µg)
				Pot holes		Depression		Edge Distress		Cracks	
				¯ígvÎv	AwaK gvÎv	¯ígvÎv	AwaK gvÎv	¯ígvÎv	AwaK gvÎv	e:wg:	
			wK:wg:	e:wg:	e:wg:	e:wg:	e:wg:	e:wg:	e:wg:		

- ¯ígvÎv : GK layer c‡qvM K‡i †h weP¨wZ †givgZ m¤e
- AwaK gvÎv : †h weP¨wZ †givgZ Ki‡Z GKwaK layer c‡qv‡Mi c‡qvRb

¯v¶i ¯v¶i

DcmnKvix c‡KŠkjxi bvg Dc‡Rjv c‡KŠkjx

¯vbxq miKvi c‡KŠkj Awa`ßi
wbevnx c‡KŠkjxi Kvhvjq
‡Rjv.....

‡gvevBj †gB‡›U‡bÝ Ux‡gi Øviv ‡givgZ cwiKíbv dig

gvm: mßvn: | 1g | 2q | 3q | 4_ | Zvwi L: nB‡Z chš

µwgK bs	Dc‡Rjvi bvg	iv¯vi bvg	‰`N¨ (km)	†givgZ				gvjvgv‡ji weeiY						AMwaKvi µg	MMT †ci‡Yi m¤ve¨ ZwiL	g š e¨
				Sand sealing	MvDwUs	Kv‡cwUs	WBM	B‡Ui ‡Lvqv	Stone Chips	Sylhet Sand	Emulsion	Bitumen	Abvb¨			
				e:wg:	e:wg:	e:wg:	N:wg:	N:wg:	N:wg:	N:wg:	Kg	Kg				

Ab‡gw`Z

¯v¶i.
wbevnx c‡KŠkjx

¯v¶i
mnKvix c‡KŠkjxi bvg

Abwjwc Kvhv‡_ †cwiZ nj
1. Dc‡Rjv c‡KŠkjx, Dc‡Rjv: .....
2. DcmnKvix c‡KŠkjx, wbevnx c‡KŠkjxi `ßi

Local Government Engineering Department
Daily Work Record of MMT
District:_____

Date	Upazila	Road name	Chainage		Work description	Ave. Length (m)	Ave. Width (m)	Ave. Depth (mm)	Measured Area (m^2)	Measured Volume (m^3)	Remarks (Materials consumed)
			From (m)	To (m)							

The average value will be calculated on the basis of several measurements on the site and will not always coincide with the average of the minimum and maximum values.

Signature (Supervised by)
Sub-Assistant Engineer
XEN office, LGED, _____

Signature (Checked and Certified by)
Assistant Engineer
XEN office, LGED, _____

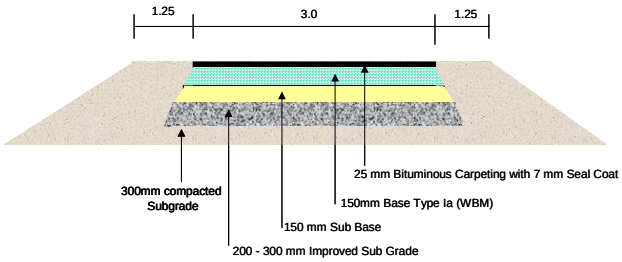
Local Government Engineering Department
Daily Transport, Man Power and Equipment requirement
District:_____

Date	Transport					Man Power					Mechanical Equipment		Remarks
	Vehicle Used	Km Start	Km Arrival	Km Total	Fuel used Lirter	Skilled (No)	Sem-skilled (No)	Ordinary (No)	Driver (No)	Supervisor (No)	Name	No.	

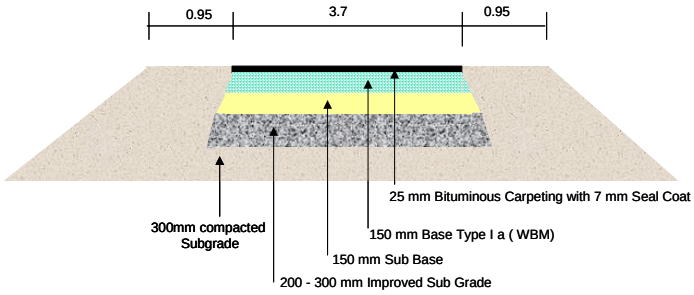
Signature (Supervised by)
Sub-Assistant Engineer
XEN office, LGED, _____

Signature (Checked and Certified by)
Assistant Engineer
XEN office, LGED, _____

Figure- 1: Approved Pavement Designs for Union Roads



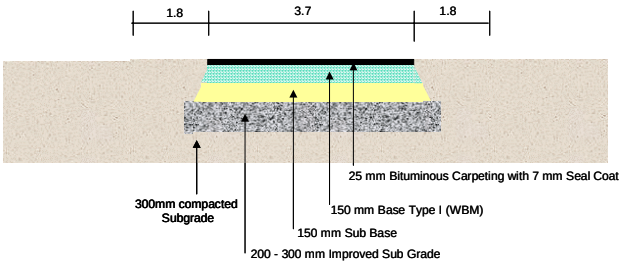
Design Type 8



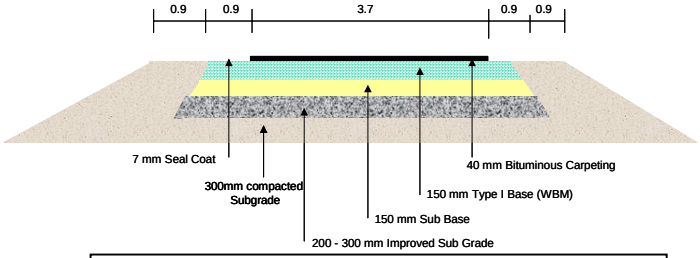
Design Type 7

Rural Road defined in 1996, Union Road defined in 2003

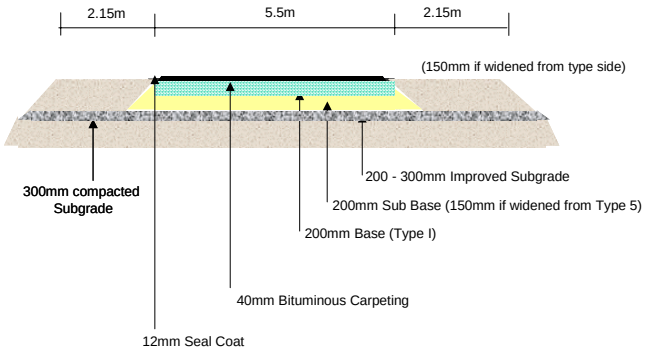
Figure- 2: Approved Pavement Designs for Upazila Roads



Design Type 6



Design Type 5



Design Type 4

Feeder Road B defined in 1996, Upazila Road defined in 2003

LOCAL GOVERNMENT ENGINEERING DEPARTMENT
Annual Maintenance Need based on Road Condition (District-wise)
Fin-Year : _____

DISTRICT :

Routine Maintenance (Off-Pavement)

SL	Road Code	Road Name (Upazila)	Total Length (km)	Total Priority Score	Traffic Volume (Nos.)		Connectivity (Nos.)			Maintainable Length (km)	Tentative Cost (LT)
					CVD	AADT	GC	RM	Others		
1	2	3	4	5	6	7	8	9	10	11	12

Periodic Maintenance (Road)

SL	Road Code	Road Name (Upazila)	Total Length (km)	Total Priority Score	Traffic Volume (Nos.)		Connectivity (Nos.)			Construc-tion Period	Proposed Maintenance Program				Last Maintenance Operation on Proposed Segment			
					CVD	AADT	GC	RM	Others		Segment	Effective Length (km)	Treat-ment Type	Tentative Cost (LT)	Year	Segment	Treat-ment Type	Actual Cost (LT)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Periodic Maintenance (Structure)

SL	Road Code	Road Name (Upazila)	Total Length (km)	Total Priority Score	Traffic Volume (Nos.)		Connectivity (Nos.)			Proposed Maintenance Program				Last Maintenance Operation on Proposed Chainage		
					CVD	AADT	GC	RM	Others	Chainage	Struct. Type	Span (m)	Tentative Cost (LT)	Year	Treatment Type	Actual Cost (LT)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

LOCAL GOVERNMENT ENGINEERING DEPARTMENT
Annual Maintenance Plan (District-wise)
Fin-Year : _____

DISTRICT :

Routine Maintenance (Off-Pavement)

SL	Road Code	Road Name (Upazila)	Total Length (km)	Total Priority Score	Traffic Volume (Nos.)		Connectivity (Nos.)			Maintainable Length (km)	Tentative Cost (LT)
					CVD	AADT	GC	RM	Others		
1	2	3	4	5	6	7	8	9	10	11	12

Periodic Maintenance (Road)

SL	Road Code	Road Name (Upazila)	Total Length (km)	Total Priority Score	Traffic Volume (Nos.)		Connectivity (Nos.)			Construc-tion Period	Proposed Maintenance Program				Last Maintenance Operation on Proposed Segment			
					CVD	AADT	GC	RM	Others		Segment	Effective Length (km)	Treat-ment Type	Tentative Cost (LT)	Year	Segment	Treat-ment Type	Actual Cost (LT)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Periodic Maintenance (Structure)

SL	Road Code	Road Name (Upazila)	Total Length (km)	Total Priority Score	Traffic Volume (Nos.)		Connectivity (Nos.)			Proposed Maintenance Program				Last Maintenance Operation on Proposed Chainage		
					CVD	AADT	GC	RM	Others	Chainage	Struct. Type	Span (m)	Tentative Cost (LT)	Year	Treatment Type	Actual Cost (LT)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

LOCAL GOVERNMENT ENGINEERING DEPARTMENT
Annual Maintenance Plan (Upazila-wise)
Fin-Year : _____

DISTRICT :

UPAZILA :

Routine Maintenance (Off-Pavement)

SL	Road Code	Road Name	Total Length (km)	Total Priority Score	Traffic Volume (Nos.)		Connectivity (Nos.)			Maintainable Length (km)	Tentative Cost (LT)
					CVD	AADT	GC	RM	Others		
1	2	3	4	5	6	7	8	9	10	11	12

Periodic Maintenance (Road)

SL	Road Code	Road Name	Total Length (km)	Total Priority Score	Traffic Volume (Nos.)		Connectivity (Nos.)			Construc-tion Period	Proposed Maintenance Program				Last Maintenance Operation on Proposed Segment			
					CVD	AADT	GC	RM	Others		Segment	Effective Length (km)	Treat-ment Type	Tentative Cost (LT)	Year	Segment	Treat-ment Type	Actual Cost (LT)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Periodic Maintenance (Structure)

SL	Road Code	Road Name	Total Length (km)	Total Priority Score	Traffic Volume (Nos.)		Connectivity (Nos.)			Proposed Maintenance Program				Last Maintenance Operation on Proposed Chainage		
					CVD	AADT	GC	RM	Others	Chainage	Struct. Type	Span (m)	Tentative Cost (LT)	Year	Treatment Type	Actual Cost (LT)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

cZ¨qb cÎ

GB g‡g cZ¨qb Kiv hv‡"Q †h, *2007-08* A_ erm‡i ivR¯ ev‡RUf³ Òcjx moK I Kvjfv‡U †givgZ KgmPxÛÛ/ Òcjx moKmg‡ni i¶bv‡e¶Y KgmPxi (Japan Debt Cancellation Fund) A_vq‡b ev¯evq‡bi Rb¨ *PqvWv½v* †Rjvq c¯ZKZ wcwiqwWK i¶Yv‡e¶Y/ win¨vewj‡Ukb ¯«gmg‡ni g‡a¨ wb‡g ewbZ ¯«gmgn m‡iRwg‡b cwi`kb Kiv n‡q‡Q |

cwi`wkZ ¯«‡gi weeiY t

µwgK bs	Dc‡Rjvi bvg	cwi`wkZ Scheme mg‡ni msL¨v/(Road Code)					gše¨
		Re-Seal	Over lay	Re-hab.	Structure	Emergency	
1	PqvWv½v (m`i)	1/(2005)	2/(2002, 2005, 2014)	2/(2004 & 2005)	1/(2006)	-	
2	Avjgv½v	2/(2009, 2014)	2/(2009, 2014)	1/(2009)	2/(3075, 3005)	-	
3	`vgoû`v	1/(2005)	2/(2005, 2011)	1/(2005)	1/(3014)	-	
4	RxebbMi	-	1/(2002)	1/(2002)	2/(4004, 3023)	-	
cwi`wkZ Scheme Gi msL¨v		04	08	05	06	-	
Ab‡gv`‡bi Rb¨ c¯ZKZ Scheme Gi msL¨v		11	18	08	23	-	
cwi`wkZ Scheme Gi kZKiv nvi		36%	44%	62%	26%	-	

Ab‡gv`‡bi Rb¨ AÎmv_ †cwiZ LvZIqvix ¯«‡gi weeib t

†gvU eivÏ (j¶ UvKv)	Carried Over msL¨v/(UvKv)	Routine Maintenance No./(Tk.)		Periodic Maintenance No./(Tk.)			Rehabilita-tion No./(Tk.)	Emergen-cy No./(Tk.)	†gvU msL¨v/(UvKv)	Over/Under Pprogram-ming (%)	gše¨
		On-Pavement	Off-Pavement	Re-Sealing	Overlay	Structure					
550 (wRIwe)	5 (21.78)	1 (7.00)	85 (91.12)	11 (90.85)	18 (197.98)	23 (67.17)	8 (211.27)	-	151 (687.17)	+24.94 %	
LvZIqvix eivÏ		7.00	76.00	60.00	135.00	47.00	170.00	55.00	550.00		
Salvage Material Gi gj¨				-	-	-	23.38	-	23.38		

AÎ †Rjv n‡Z *2007-08* A_ eQ‡i ev¯evq‡bi Rb¨ wcwiqwWK i¶Yv‡e¶‡Yi/ win¨vewj‡Ukb Gi AvIZvq c¯ZKZ †gvU *88wU* ¯«‡gi g‡a¨ *23wU* ¯«g wbæ ¯v¶iKvix KZK m‡iRwg‡b cwi`kb Kiv n‡q‡Q| cwi`kbv‡š MnxZ i¶bv‡e¶Y e¨e¯vw`, ¯«g cv°j‡b D‡jwLZ gvc, cwigvY I e¨q hvPvB-evQvB K‡i c‡qvRb g‡Z ms‡kvab ceK c¯vebv mwVKfv‡e Dc¯vcb Kiv n‡q‡Q| Aewkó ¯«gmgn AÎ Kvhvjq n‡Z cix¶v-wbix¶v ceK c‡qvRbxq ms‡kvab Kiv n‡q‡Q| GgZve¯vq AÎmv_ msh³ ¯«gmgn Ab‡gv`‡bi Rb¨ cieZx e¨e¯v Mn‡bi mcwik Kiv n‡jv|

¯v¶i

wbevnx c‡KŠkjx
GjwRBwW, †Rjv t

cZ¨qb cÎ

GB g‡g cZ¨qb Kiv hv‡"Q †h, *2007-08* A_ erm‡i ivR¯ ev‡RUf³ Òcjx moK I Kvjfvu †givgZ KgmPxÛÛ/ Òcjx moKmg‡ni i¶bv‡e¶Y KgmPxi (Japan Debt Cancellation Fund) A_vq‡b ev¯evq‡bi Rb¨ *PqvWv½v* †Rjvq c¯ZKZ wcwiqwWK i¶Yv‡e¶Y/ win¨wewj‡Ukb ¯«gmg‡ni g‡a¨ wb‡g ewbZ ¯«gmgn m‡iRwg‡b cwi`kb Kiv n‡q‡Q|

cwi`wkZ ¯«‡gi weeiY t

µwgK bs	Dc‡Rjvi bvg	cwi`wkZ Scheme mg‡ni msL¨v/(Road Code)					gše¨
		Re-Seal	Over lay	Re-hab.	Structure	Emergency	
1	PqvWv½v (m`i)	1/(2005)	-	-	1/(2006)	-	
2	AvjgWv½v	-	2/(2009, 2014)	-	1/(3075)	-	
3	`vgoû`v	1/(2007)	-	1/(2005)	1/(3014)	-	
4	RxebbMi	-	1/(2002)	1/(2002)	-	-	
cwi`wkZ Scheme Gi msL¨v		02	03	02	03	-	
Ab‡gv`‡bi Rb¨ c¯ZKZ Scheme Gi msL¨v		11	18	08	23	-	
cwi`wkZ Scheme Gi kZKiv nvi		18%	16%	25%	13%	-	

PqvWv½v †Rjv n‡Z *2007-08* A_ eQ‡i ev¯evq‡bi Rb¨ wcwiqwWK i¶Yv‡e¶‡Yi/ win¨wewj‡Ukb Gi AvIZvq c¯ZKZ †gvU *88wU* ¯«gi g‡a¨ *10wU* ¯«g m‡iRwg‡b cwi`kb Kiv n†q‡Q| cwi`kbKv‡j MnxZ i¶Yv‡e¶Y e¨e¯'v ev¯e m¤§Z e‡j cwZqgvb nq| ¯«g cv°j‡b D‡jwLZ gvc, cwigvY I e¨q ev¯e Ae¯vi mv‡_ msMwZcb| D³ bgbv (Sample) cix¶vi wfwË‡Z wbevnx c‡KŠkjxi c¯vebvi mv‡_ GKgZ n‡q AÎmv_ msh³ *88wU* ¯«g Ab‡gv`‡bi Rb¨ mcwik Kiv n‡jv|

¯v¶i

ZËveavqK c‡KŠkjx
GjwRBwW, AÂj t

Rapid Road Condition Survey

Name of District: Name of Road : Total Road Length**:** Surveyed By:

Name of Upazila: Road ID No. & Type : Average Width of Road: Date:

Road Element	Damage Type	Severity		Length (km) +250	+500	Total Extent	+750	+000	km Total Extent	+250	+500	Total Extent	+750	+000	km Total Extent	Remarks
Carriage Way	Pothole Area (sqm)	Depth	Low													
			High													
	Crack Area (sqm)	Width	Low													
			High													
	Depression Area (sqm)	Depth	Low													
			High													
	Edge Failure Area (sqm)	Depth	Low													
			High													
	Ravelled/ Delamination Area (sqm)	Depth	Low													
			High													
	Rutting Area (sqm)	Depth	Low													
			High													
Road Side	Hard Shoulder, loss of materials Volume (cum)	Depth	Low													
			High													
	Low Earth Shoulder Volume (cum)	Depth	Low													
			High													
	Protection Work Linear meter (m)	Depth	Low													
			High													

Low : Repair normally possible with a single layer

High : Repair normally done with multiple layers

LOCAL GOVERNMENT ENGINEERING DEPARTMENT
Roughness Data Collection Form

DISTRICT: _____ **UPAZILA:** _____

Road Code : Road Type : Total Length :

Road Name:

Survey Date :	Surveyed By :	Designation	Vehicle Reg. No:

Seg. SL No	Chainage		Segment Length (m)	Segment Surface Type	Bump Count	Remarks
	From	To				
1	0	500	500	BC		
2	500	1000	500	BC		
3	1000	1500	500	BC		
4	1500	2000	500	BC		
5	2000	2500	500	BC		
6	2500	3000	500	BC		
7	3000	3500	500	BC		
8	3500	4000	500	BC		
9	4000	4500	500	BC		
10	4500	5000	500	BC		
11	5000	5500	500	BC		
12	5500	5900	400	BC		

Road Code : Road Type : Total Length :

Road Name:

Survey Date :	Surveyed By :	Designation	Vehicle Reg. No:

Seg. SL No	Chainage		Segment Length (m)	Segment Surface Type	Bump Count	Remarks
	From	To				
1	0	500	500	BC		
2	500	1000	500	BC		
3	1000	1500	500	BC		
4	1500	2000	500	BC		
5	2000	2500	500	BC		
6	2500	3000	500	BC		
7	3000	3500	500	BC		
8	3500	3750	250	BC		
9	3750	5570	1820	Earthen		
10	5570	6000	430	BC		

LOCAL GOVERNMENT ENGINEERING DEPARTMENT
POINTS VALUE FOR PRIORITY RANKING

District: Upazila:

Road Code: Road Name:

Group	Description	Rating	Score
Classification	Upazila Road	12	
	Union Road	6	
	Village Road	3	
Surface Type	Fully BC	12	
	BC + HBB/Other Pavement (Fully Paved)	10	
	Fully HBB/Other Pavement	6	
	BC + HBB/Other Pavement + Earthen	3	
Gaps	Nil Gaps	12	
	Minor Gaps (upto 50m total)	6	
	Major Gaps	3	
Traffic Volume (CVD)	CVD 0-50	0	
	CVD 51-100	30	
	CVD 101-200	40	
	CVD 201-300	50	
	CVD 300+	100	
Fund Source	Donor Funded	12	
Markets (Per No.)	Growth Center	12	
	Rural Market	6	
Hospitals (Per No.)	Upazila/Union Health Complex	6	
	Private Clinic/Community Clinic/Non-Govt. Hospitals	3	
Social Centers (Per No.)	Union Parishad Office	9	
	Other Public Center	3	
Educational (Per No.)	College	9	
	Secondary School	6	
	Primary School/Madrasha	3	
Industry (Per No.)	Large Industry	9	
	Medium Industry	6	
	Small Industry	3	
		Total Points Scored:	

Signature
Sub-Asstt. Engineer
Date:

Signature (Checked by)
Upazila Engineer
Date:

LOCAL GOVERNMENT ENGINEERING DEPARTMENT

Detailed Road Condition Survey (DRCS)

Road Name and Category :

Ref. to Starting Point :

Road ID No:

Tot Length :

Surface Type :

Ave. Width:

Surveyed By:

Date:

Chainage		Potholes		Cracks		Depression		Edge Failure		Ravel/ Delamination		Rutting		Hard Shoulder- Low		Earth Shoulder- Low		Protection Work		Remarks
From (m)	To (m)	Depth (mm)	Length (m) X Breadth (m)	Width (mm)	Length (m) X Breadth (m)	Depth (mm)	Length (m) X Breadth (m)	Depth (mm)	Length (m) X Breadth (m)	Depth (mm)	Length (m) X Breadth (m)	Depth (mm)	Linear (m)	Depth (mm)	Length (m) X Breadth (m)	Depth (mm)	Length (m) X Breadth (m)	Type	Linear (m)	

LGED **BRIDGE / CULVERT INSPECTION REPORT FORM** | **Form :** | **SCS-1**

1 Location

Division		District		Upazila	
Road ID		Road Name			
Structure ID				Chainage (km)	

2 Structure Type (√ x)

Box Culvert		RCC Bridge		Bailey with Steel Deck	
Slab Culvert		RCC Girder Bridge		Truss with Steel Deck	
Arch Masonry		PC Girder Bridge		Truss with RCC Slab	
Pipe Culvert		Steel Beam & RCC Slab			

3 Superstructure Details (Specify)

No. of Span/Boxes		Span Length (m)					Total Length (m)				
No. of Beams		Year of Construction		E	A	Load Restriction (Tons)					
Width (m)		Carriageway		Sidewalk							
Wearing Surface (√ x)		Bitumen		Concrete		Nil					
Railing Type (√ x)		RCC Post & Rail		RCC Solid		Masonry		Steel		Nil	

4 Substructure Details

	Material (√ x)				Type (√ x)							Weep Holes
	RCC	Steel	Earth	Masonry	Solid	Spill through	Column	Trestle	Pipe	Free	Fixed	
Abutment												
Pier/Box wall												
Wing Wall												

5 Foundation Type (√ x)

Abutment	Open		Piled		Well		Not Known	
Pier	Open		Piled		Well		Not Known	

6 Abutment Protection Existing (√ x) | **Approach Drainage Existing** (√ x)

7

Observation (√ x)		Element: Road Approaches	Channel	Railing	Truss	Deck Slab	RCC Girder	Abutment	Piers/ Box Walls	Wing Walls
Scouring	Major									
	Minor									
Leaning/ Tilting	Major									
	Minor									
Settlement	Major									
	Minor									
Obstruction	Major									
	Minor									
Cracks	Major									
	Minor									
Concrete Spilling	Major									
	Minor									
Damaged or Missing Sections	Major									
	Minor									
Missing Bolts	Major									
	Minor									

Note: All tick boxes to be completed as indicated with √ (yes) or x (no)

All specify boxes to be completed with required details or dimentions in metres

Additional Information and / or Sketch to be placed on back of the page if required | Yes | No

Inspected by _____ Date _____

Full name / designation

LGED BRIDGE/ CULVERT MAINTENANCE AND REHABILITATION ASSESSMENT	Form :	SCS-2

1 LOCATION

Division		District		Upazila	
Road ID		Road Name			
Structure ID				Chainage (km)	

2 SUMMARY OF PROPOSED MAINTENANCE/ REHABILITATION WORKS

Element	Repair			Replace / New			Remarks
	No.	m	m^2	No.	m	m^2	
Approaches							
Guide Posts							
Slope Protection							
Toe Wall							
Railing							
Sidewalk							
Deck							
Concrete Beam							
Steel Beam							
Truss							
Bailey							
Abutment							
Pier							
Wing Wall							
Pier Cap							
Bearing Seat							
Bearing							
Expansion Joint							
Pile Cap							
Foundation Protection							

3 SUMMARY OF OVERALL BRIDGE CONDITION

Category	Condition	Recommended by Name & Signature	Accepted by Name & Signature
1	Structure is satisfactory		
2	Structure requires repair of some members		
3	Structure requires replacement of some members		
4	Structure requires total replacement		
5	Structure is in danger of imminent collapse		

Additional Information and / or Sketch to be placed on back of this page if required	Yes	No

Local Government Engineering Department
DAILY TRAFFIC COUNT (12 Hours From 8am to 8pm)

DISTRICT: **UPAZILA:**

Road Code		Road Type		Road Name		Surveyed By	
Survey Date		Hat Day (Y/N)		Non-Hat Day (Y/N)		Designation	

Vehicle Name	Description	Time							TOTAL
		8 am	10 am	12 pm	2 pm	4 pm	6 pm	8 pm	
Vehicle Type: Motorised									
Truck Medium	Two or Three Axle Rigid (>3.5 ton payload)								
Truck Light	Two Axle Rigid (<3.5 ton payload)								
Bus Heavy	>40 Seats and >36 Feet Chassis								
Bus Mini	16-39 Seats and <36 Feet Chassis								
Bus Light	<16 Seats								
Utility	Landrover/Jeep type Vehicle								
Delivery Vehicle	Panel Van, Pickup Truck								
Car	All Saloon Cars and Taxis								
Auto Rickshaw	All Three Wheeled Motorised Vehicles								
Tempo	All Three Wheeled Motorised Vehicles								
Motorcycle	All Two Wheeled Motorised Vehicles								
Vehicle Type: Non-Motorised									
Bicycle	All Two Wheeled Non-Motorised Vehicles								
Rickshaw	Three Wheeled Passenger Non-Motorised Vehicles								
Rickshaw Van	Three Wheeled Cargo Non-Motorised Vehicles								
Animal Cart	All Animal Carts and Human Drawn/Push Carts								

LOCAL GOVERNMENT ENGINEERING DEPARTMENT
RURAL ROAD AND CULVERT MAINTENANCE PROGRAMME

TECHNICAL REPORT

DISTRICT: _____; UPAZILA: _____; Road ID No: _____
NAME OF SCHEME/ ROAD: _____

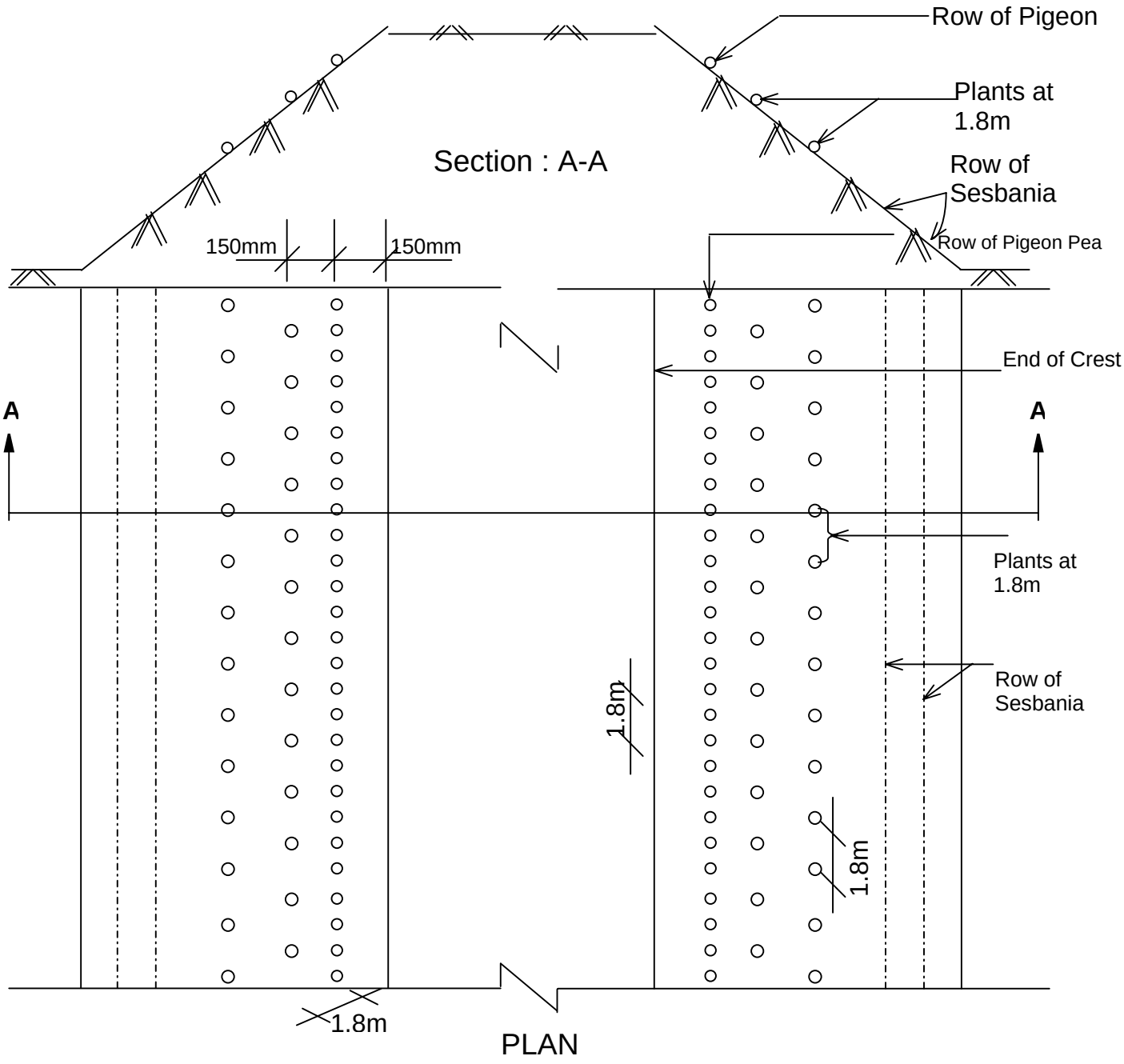
LOCATION OF WORK: ch. _____to ch. _____; LENGTH: _____Km/ SPAN: _____m

---

1. Description of the scheme (road/structur) :
   _____
   _____
2. Importance of the scheme (in terms of socio-economic benefit) :
   _____
   _____
3. Priority Rank (score according to Form 3.3) : _____
4. Year of Construction :_____ Source of Fund :_____
5. Previous Maintenance Operations with Years (if there were any) :
   _____
   _____
5. Details of the Condition (according to surface type in case of road) :
   _____
   _____
   _____
6. Proposed Maintenance Action :
   _____
   _____
   _____
7. Justifications for the Incidental work if any (Earth work/Carted Earth work/Palisading):
   (Attach photograph, diagram, additional description, etc. as per requirement)
   _____
   _____
   _____
8. Clarification about Salvaged Materials from the Scheme (if any):
   _____
   _____
   _____

Singnature	Singnature	Singnature
Upazila Engineer	Assistant Engineer (Maint.)	Executive Engineer
Date : _____	Date : _____	Date : _____

STRIP PLANTATION MODEL



Specification
Supplying specified seedlings of min^{m} 1 meter height from different nursery including carrying the same to the work site and preparing plants bed by digging earth etc. all complete including supplying of 1.5 meter long bamboo split, sharpening one end of the same and placing it into the ground upto 500mm depth and also tying the plants with jute rope etc. all complete including supplying and applying fertilizer @50gm NPK and 2kg manure (decomposed cow dung) for each plants as per direction of the E-in-C.

THE PROCEDURES FOR IMPLEMENTATION OF THE PPR, 2003

Appendix C: Formats and Guidance Notes on Preparations of Procurement Plan.

Procurement Planning for Development Projects / Programmes

This part identifies the packages for goods, works and services that are required under the development project. It identifies each procurement item, giving it a unique code and considers the expected cost of the item (as per the PP/TAPP) and the anticipated dates when the key elements of the procurement item will be supplied.

A separate Schedule, completed as shown below, should be provided for Goods, Works and Services.

Sl No	Activity	Note
1	Serial Number	In ascending numerical order. (e.g. G1, G2, G3, etc)
2	Package Number	Unique identifier for the procurement item. This could be confined with a project number if so wished. e.g. Q876/G1: would be project number Q876, item G1 (Goods)
3	Description of Contract	Brief description of the procurement items required in quantifiable terms.
4/5	Unit/ Quantity	The unit of supply. (e.g. 1, set, group, etc) The quantity of the unit required (e.g. 1,2,3 etc)
6/7	Procurement Method & Source of Funds	Procurement Method (e.g. Open tendering OTM; Restricted tendering RTM, Direct Procurement DP, etc. Source of Funds (e.g. Government (GoB) of Development Partner (IDA, ADB, EU etc)
8	Procuring Entity	Name here the actual procuring entity (under the HOPE) responsible for procuring the items.
9	Estimated cost in Tk	Express the anticipated cost in Taka (Lakh) as per the PP/TAPP. e.g. 50 Lakh would be "50", 1 crore 50 lakh would be "150"
—	Indicative Dates :	These are the three key dates of any procurement activity, the date at which the Procuring Entity invites Tenders, the date at which a Contract is actually signed and the date of completion of the Contract.
10	Invitation for Tender	State the anticipated date when the Advertisement will be placed and when the Tender Document will be ready for issue.
11	Signing of Contract	State the anticipated date when the Contract will be signed.
12	Completion of Contract	State the anticipated date when the Contract will be completed, excluding any warranty period or defects liability period.

PROCUREMENT PLAN FOR DEVELOPMENT PROJECTS / PROGRAMMES
(FOR FULL PROJECT PERIOD)

(a) **Name of Project:**
(b) **Project Cost (in Tk. Lakh)** Total:
GoB:
PA:
(c) **Ministry / Division**
(d) **Head of Procuring Entity / or Implementing Agency**

GOODS PROCUREMENT

NO THRESHOLD LEVELS

Sl. No.	Package No.	Description of Procurement Item (as per PP / TAPP)	Unit	Quantity	Procurement Method & (NCT/ICT))	Source of Funds	Procuring Entity	Estd. Cost in Tk. (Lakh)	Indicative dates		
									Invitation for Tender	Signing of Contract	Completion of Contract
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
		Total Value of Goods Procurement									

PROCUREMENT PLAN FOR DEVELOPMENT PROJECTS / PROGRAMMES
(FOR FULL PROJECT PERIOD)

(a) Name of Project:
(b) Project Cost (in Tk. Lakh) **Total:**
GoB:
PA:
(c) Ministry / Division
(d) Head of Procuring Entity / or Implementing Agency

WORKS PROCUREMENT

NO THRESHOLD LEVELS

Sl. No.	Package No.	Description of Procurement Item (as per PP / TAPP)	Unit	Quantity	Procurement Method & (NCT/ICT))	Source of Funds	Procuring Entity	Estd. Cost in Tk. (Lakh)	Indicative dates		
									Invitation for Tender	Signing of Contract	Completion of Contract
	2	3	4	5	6	7	8	9	10	11	12
		Total Value of Works Procurement									

LOCAL GOVERNMENT ENGINEERING DEPARTMENT
Deflection Data Collection Form

District: Upazila:

Road Code: Road Type: Total Length:

Road Name:

Survey Period: Surveyed By: Designation:

Chainage	Reading		Remarks
	Initial (0.01mm)	Final (0.01mm)	

Chainage	Reading		Remarks
	Initial (0.01mm)	Final (0.01mm)	

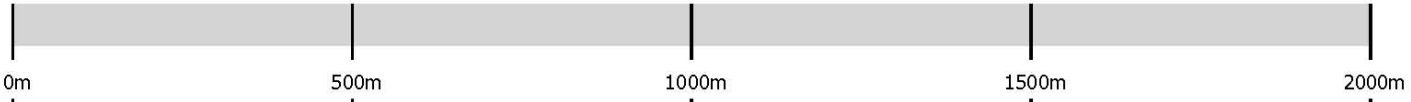
LOCAL GOVERNMENT ENGINEERING DEPARTMENT

Road Line Diagram (Example)

1. District	:	JESSORE	2. Upazila	:	JESSORE-S	3. AADT	:	3678	4. Road Code	:	241472002
5. Road Name	:	Jessore-Potengali-Kayemkhola GC Rd.							6. Total Length (km)	:	14.38

7. Surface Type Line Diagram:

8. Present Condition Line Diagram:



IRI	:	7.2	IRI	:	5.7	IRI	:	5.9	IRI	:	5.5
Pothole (sqm)	:	0.0	Pothole (sqm)	:	0.0	Pothole (sqm)	:	3.0	Pothole (sqm)	:	4.0
Depression (sqm)	:	0.0	Depression (sqm)	:	0.0	Depression (sqm)	:	0.0	Depression (sqm)	:	50.0
Cracks (sqm)	:	0.0	Cracks (sqm)	:	0.0	Cracks (sqm)	:	0.0	Cracks (sqm)	:	0.0
Ravelling (sqm)	:	0.0	Ravelling (sqm)	:	0.0	Ravelling (sqm)	:	0.0	Ravelling (sqm)	:	375.0
Rutting Area (sqm)	:	0.0	Rutting Area (sqm)	:	0.0	Rutting Area (sqm)	:	0.0	Rutting Area (sqm)	:	0.0
Edge Failure (sqm)	:	0.0	Edge Failure (sqm)	:	0.0	Edge Failure (sqm)	:	20.0	Edge Failure (sqm)	:	12.0
Total (sqm)	**:**	**0.0**	**Total (sqm)**	**:**	**0.0**	**Total (sqm)**	**:**	**23.0**	**Total (sqm)**	**:**	**441.0**

9. Technical Specification of Existing Pavement [Only for the portion where Maintenance (Overlay Rehabilitation) Required]:

Chainage (m)	Layer			
	Base (mm)	Sub-Base (mm)	ISG (mm)	Subgrade CBR (%)
200	140	150	150	8.00
1000	150	150	150	8.00

10. Last Maintenance History:

Year	Chainage (m)		Maintenance Type	Source of Fund
	From	To		
1998-99	1000	2000	PM (Re-Seal)	RDP-18
2002-03	1000	2000	PM (Overlay)	Greater Jessore
2003-04	1402	2000	PM (Overlay)	GoB Maint.

Traffic Analysis and Pavement Design

Traffic analysis and pavement design have been made on the basis of ROAD NOTE-31 (TRL, U.K., 1993 version), reports on ROAD MATERIALS & STANDARD STUDY BANGLADESH (June, 1994), and literature from INDIAN ROAD CONGRESS (IRC).

Cumulative Standard Axle Determination:
In the design method ROAD NOTE-31 (TRL, UK, 1993), the traffic is defined in terms of the cumulative number of standard axles (8160 kg) to be carried during the design life of the road. It is well recognized that the structural damage caused by a vehicle depends on the axle load it imposes on the road, and the equivalent axle loads actually applied to a pavement. For the purpose of structural design of road pavement, cars and similar sized vehicles can be ignored and only the total number and the axle loadings of the heavy vehicle that use the road during its design life need to be considered. In this context, heavy vehicles are defined as those having a unladen weight of 3000 kg or more.

NOTE: Equivalent Factor, EF = $\left(\frac{\text{Axle Load, in Kg}}{8160}\right)^{4.5}$, used for converting axle load of different vehicles to a common unit.

According to Axle Load Survey of Bangladesh (RMSS Report), only Truck, Bus and Minibus to be considered for road design purpose. On the basis of the analysis of axisting data and further data collected by RMSS, the following recommendations are made for Equivalent Standard Axles (ESA) for Upazila Roads (Feeder) :

EF of Axle load for Truck for All Upazila Roads of Bangladesh – 1.0
EF of Axle load for Bus for All Upazila Roads of Bangladesh – 0.5
EF of Axle load for Minibus for All Upazila Roads of Bangladesh – 0.2

} From RMSS, Vol IX B, Axle Load Survey Results

Growth Rate: An estimate of likely growth rate can be obtained by studying the past trends in traffic growth. According to Indian Road Congress (IRC-37-1984), if adequate data is not available, then an average value of 7.5 percent may be adopted for rural routes. However according to Road Design Standard of Rural Road, 2005, 5% growth rate per annum has been considered.

Design Life: It is considered appropriate that roads in rural areas should be designed for a life of 10 to 15 years but provision must be made in the design for progressive strengthening of the road. Arterial roads should normally be designed for 15 years life and other for 10 years. Urban roads may, however, be designed for a longer life based on judgment and depending on the rate of growth of the traffic expected.
According LGED's Road Design Standard of Rural Road, Pavement Design Life has been considered as 10 years for all rural roads.

Cumulative Standard Axle for different category of Traffic (Trucks, Bus, Minibus)

This is calculated using the following formula for the design period and assumed annual growth rate, as shown below:

$$\text{ESA} = 365 \times \text{AADT} \times \text{EF} \times \frac{\left(1+\frac{r}{100}\right)^{n}-1}{\frac{r}{100}}$$

$$\text{CSA} = \sum \text{ESA (for all heavy vehicle types)}$$

Where, ESA = Cumulative Standard Axles, for each type of vehicle (Truck, Bus, Minibus), in one direction, in design life
AADT = Average Annual Daily Traffic for Vehicle Type at year of opening
EF = Equivalent Factor of Average Equivalent Standard Axle for Vehicle Type (from axle-load- survey of the particular country/area)
r = Growth Rate, in percentage
n = Design Period, in year
CSA = Cumulative Standard Axles for All Heavy Vehicle

NOTE: Total No. of Cumulative Standard Axles is expressed in Million Standard Axles or MSA (dividing the Total by 10^6).

Design Cumulative Standard Axle Determination:

For a single-Lane road (3.7 m wide), Traffic tends to be more channelised on single lane roads than on a two lane road. To allow this concentration of wheel load repetitions, the Design Cumulative Standard Axle should be based on the highest total number of commercial vehicles per day from either of two directions multiplied by 2 (two).

In case of a Double Lane road, the Design Cumulative Standard Axle is based on the total number of commercial vehicles per day in both directions.

Traffic Analysis & Flexible Pavement Design Format

Road Type: UPAZILA ROAD Road Code: 333302001
Road Name: Joydebpur – Pubali Road
Survey Date [Hat Day]: 06-Mar-2006 Survey Date [Non-Hat Day]: 07-Mar-2006
Counting Station: Pubali Basugaon Rail Crossing
Surveyed By: A F M Faridur Rahman Designation: SAE CVD: 167 AADT: 1096

Motorized Vehicle							
Name of Vehicle	Traffic Count		WADT [(2x2)+(3x5)]/7	Hourly Multiplier (HM)	Monthly Multiplier (MM)	AADT (4x5x6)	Composition %
	Hat Day	Non-Hat Day					
1	2	3	4	5	6	7	8
Truck Medium	25	20	21	1.15	1.09	26	4.52
Truck Light	50	35	39	1.15	1.09	49	8.52
Bus Heavy	30	25	11	1.1	1.16	33	5.74
Bus Mini	60	40	46	1.1	1.16	59	10.26
Bus Light	50	30	36	1.1	1.16	46	8.00
Utility	15	3	6	1.1	1	7	1.22
Delivery Vehicle	59	48	51	1.1	1.16	65	11.30
Car	15	3	6	1.1	1	7	1.22
Auto Rickshaw	0	0	0	1.1	1.03	0	0
Tempo	160	80	103	1.1	1.03	117	20.35
Motor Cycle	185	115	135	1.15	1.07	166	28.87
Total	634	384	454			575	100

Non-Motorized Vehicle							
Name of Vehicle	Traffic Count		WADT [(2x2)+(3x5)]/7	Hourly Multiplier (HM)	Monthly Multiplier (MM)	AADT (4x5x6)	Composition %
	Hat Day	Non-Hat Day					
1	2	3	4	5	6	7	8
Bicycle	115	110	111	1.15	1.04	133	25.53
Rickshaw	180	172	174	1.15	1.35	270	51.82
Rickshaw Van	92	85	87	1.15	1.18	118	22.65
Animal Cart	0	0	0	1.1	1.31	0	0
Total	387	367	372			521	100

Cumulative Traffic Analysis (oneway)

Vehicle Type (Only Truck, Bus, MiniBus)	Av. Annual Daily Traffic (AADT), oneway	Equivalent Factor of Equivalent Standard Axle (Upazila Road) EF	Growth Rate r	Design Life n	Cumulative Standard Axle (each type vehicle) 365 x AADT x ESA x $\frac{\left(1+\frac{r}{100}\right)^{n}-1}{\frac{r}{100}}$
Truck Medium	26	1	5% Assumed	10 Year Assumed	119364
Truck Light	49	0.5			112477
Bus Heavy	33	0.5			75750
Bus Mini	59	0.2			54172
Other Vehicle	Negligible				Negligible
					361763

Equivalent Standard Axles are as per RMSS Recommendation (Vol IXB, Axle Load Survey Results, June-1994) for Upazila Roads (former Feeder Road). Accordingly only four types of vehicles are to be considered.

NOTE: For Sinle-Lane Roads, Traffic is more channelised than on two lane roads. To allow for this concentration of wheel load repetition the design should be based on the Total No. of cumulative ESA in both directions multiplied by Two (according to ROAD NOTE-31 & IRC).

Therefore, for single-lane road, Design Cumulative Standard Axle = 0.36 x 2 = 0.72 million
Hence, Traffic Class = T_3 (as per ROAD NOTE-31, of TRL/UK, 1993)

If Sub-grade CBR (found from Lab Test) is 3.2%, so Type S_2 (as per ROAD NOTE-31, of TRL/UK, 1993)

Pavement Structure Recommended (from chart-1 & 3 of ROAD NOTE-31, of TRL/UK, 1993)
for Granular Road base & T_3/S_2 Category are:

175mm Sub-Base + 200mm Base + Surface Dressing

or 175mm Sub-Base + 175mm Base + 25mm Carpeting + 7mm Seal Coat

KEY TO STRUCTURAL CATALOGUE

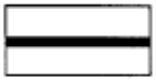
Traffic classes
(10^6 esa)

T1 = < 0.3
T2 = 0.3 - 0.7
T3 = 0.7 - 1.5
T4 = 1.5 - 3.0
T5 = 3.0 - 6.0
T6 = 6.0 - 10
T7 = 10 - 17
T8 = 17 - 30

Subgrade strength classes
(CBR%)

S1 = 2
S2 = 3 , 4
S3 = 5 - 7
S4 = 8 - 14
S5 = 15 - 29
S6 = 30+

Material Definitions

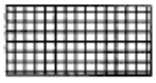

Double surface dressing


Flexible bituminous surface

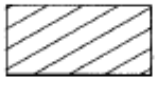

Bituminous surface
(Usually a wearing course, WC, and a basecourse, BC)

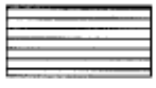

Bituminous roadbase, RB


Granular roadbase, GB1 - GB3


Granular sub-base, GS


Granular capping layer or selected subgrade fill, GC


Cement or lime-stabilised roadbase 1, CB1


Cement or lime-stabilised roadbase 2, CB2


Cement or lime-stabilised sub-base, CS

CHART 1 GRANULAR ROADBASE / SURFACE DRESSING

	T1	T2	T3	T4	T5	T6	T7	T8
S1	SD 150 175 300	SD 150 225* 300	SD 200 200 300	SD 200 250* 300	SD 200 300* 300	SD 225 325* 300		
S2	SD 150 150 200	SD 150 200 200	SD 200 175 200	SD 200 225* 200	SD 200 275* 200	SD 225 300* 200		
S3	SD 150 200	SD 150 250	SD 200 225	SD 200 275*	SD 200 325*	SD 225 350*		
S4	SD 150 125	SD 150 175	SD 200 150	SD 200 200	SD 200 250	SD 225 275		
S5	SD 150 100	SD 150 100	SD 175 100	SD 200 125	SD 225 150	SD 250 175		
S6	SD 150	SD 150	SD 175	SD 200	SD 225	SD 250		

Note: 1 * Up to 100mm of sub-base may be substituted with selected fill provided the sub-base is not reduced to less than the roadbase thickness or 200mm whichever is the greater. The substitution ratio of sub-base to selected fill is 25mm : 32mm.

2 A cement or lime-stabilised sub-base may also be used.

CHART 2 GRANULAR ROADBASE / SEMI-STRUCTURAL SURFACE

	T1	T2	T3	T4	T5	T6	T7	T8
S1			50 175 200 300	50 175 250* 300	50 175 300* 300	50 200 325* 300		
S2			50 175 175 200	50 175 225* 200	50 175 275* 200	50 200 300* 200		
S3			50 175 225	50 175 275*	50 175 325*	50 200 350*		
S4			50 175 150	50 175 200	50 175 250	50 200 275*		
S5			50 150 100	50 175 125	50 175 150	50 200 175		
S6			50 150	50 175	50 200	50 225		

Note: 1 * Up to 100mm of sub-base may be substituted with selected fill provided the sub-base is not reduced to less than the roadbase thickness or 200mm whichever is the greater. The substitution ratio of sub-base to selected fill is 25mm : 32mm.

2 A cement or lime-stabilised sub-base may also be used.

(This contract agreement must be completed in the Non-Judicial stamp)

Contract Agreement for Routine Off-pavement Maintenance by Labour Contracting Society (LCS) in LGED Roads

1st Party : Upazila Engineer, Local Government Engineering Department, _____ Upazila, _____District.
Hereinafter designated as the 1st Party represented by the Upazila Engineer.

2nd Party : Ms. _____, LCS Chairperson,
Ms. _____, LCS Secretary,
Address _____
Hereinafter designated as the 2nd Party.

This contract agreement is signed between above mentioned 1st & 2nd party on _____ for routine off-pavement maintenance work of the road mentioned below under the following terms and condition:

Schedule:

Name of Road :_____ I.D :_____

Total Length: _____ km. From: _____ km: To: _____ km

Estimated cost: Tk_____ Contract Period From: _____ To: _____

Upazila: _____ District: _____

Terms and Conditions:

1 The following activities shall have to be carried out by the second party as per schedule mentioned above under the guidance and instructions of the first party within the estimated cost and the entire amount shall be utilized for routine off-pavement maintenance activities and not for any other purpose:

a) maintain shoulders to its proper width with respect to road type (UZR/UNR) including maintenance of 5% cross-fall with the help of wooden shoulder board to facilitate drainage
b) repair rain cuts and ghogs in shoulders and slopes
c) maintain cambers and repair surface defects in case of earth roads
d) clear and keep clean all weep-holes, drainage outlets and road-side ditches
e) clear and keep clean all culverts, especially inlets and outlets
f) Re-placing turf on the side slopes of road
g) care taking roadside tree plantations
h) cut back overhanging branches or other vegetation
i) stockpile suitable materials on shoulder for use during rainy season.

2 The names of the Chairperson and the Secretary of the group with other relevant information must be written clearly on sign-boards displayed at the starting and finishing end of the road. The maintenance workers must also exhibit a flag showing the LGED symbol when they are at work so that they can be easily identified.

3 The LCS will open a bank account in the name of the group to be jointly operated by the chairman and the secretary. All payments to LCS shall be transferred in this bank account through account payee cheque and never in cash.

4 The Upazila Engineer will ensure monthly payments to the LCS within 7th of each month subject to satisfactory performance of routine maintenance tasks. The concerned SAE of each Upazila will prepare monthly bill after inspecting the physical condition of each section of the road. The monthly bill shall not exceed the wages for the total working days in the particular month.

5 If any damage/ defects are found unattended or unsatisfactory work due to negligence of workers, those particular labourers will not be paid until the tasks have been completed satisfactorily. If the labourers continue to show negligence and do not improve their performance after receiving repeated instructions from the supervising staff, then the Upazila Engineer will replace the workers/ group with the new labourers/ group.

6 Wages to the individual workers will be paid by the LCS Chairperson and the secretary in presence of Community Organiser and Supervisor and submit the adjustment of the same to the Upazila Engineer in each month.

7 We put our signature / left thumb impression (LTI) on this agreement in good faith and free will.

Signature and seal of Upazila Engineer .....

Date:.....

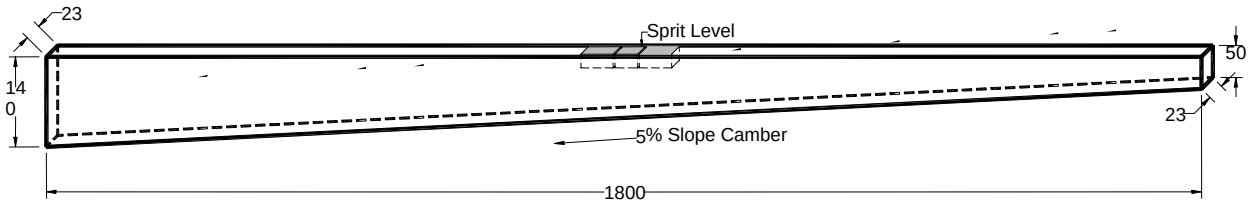
Signature / LTI of chairperson of LCS .....

Date:.....

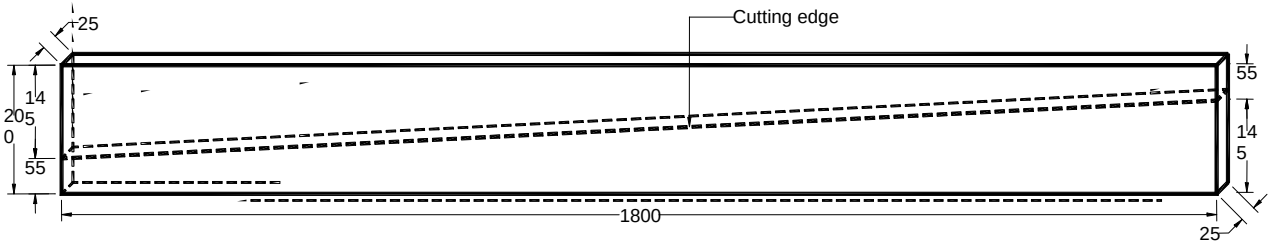
Signature / LTI of Secretary of LCS .....

Date:.....

WOODEN SHOULDER BOARD

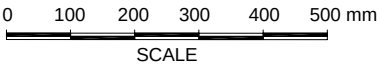


COMPLETED BOARD WITH FINAL



PRODUCTION OF TWO SHOULDER BOARDS
ONE STANDARD PLANK OF

All dimensions in



Approximate Cost of Wooden Shoulder Board (Each):

Item	Quantity	Unit	Rate	Total
Timber (Sundari/Garzan)	0.0045	cum	25000.00	112.50
Carpenter	0.25	day	150.00	37.50
Nails/Spikes etc.	0.25	kg	40.00	10.00
Paint	0.50	liter	140.00	70.00
Sprit level	1	each		
			Total :	

Local Government Engineering Department
Rural Road and Culvert Maintenance Program
Quarterly Savings Statement of LCS Workers engaged in Off-Pavement Routine Maintenance

District:_____ Period:_____ to _____

Sl No	Upazila	Road Code	Road Name	Length (Km)	Name of the Crew	Date of Contract	Name of Bank with SB A/C No	Savings upto last quarter	Savings under current quarter	Total Savings to date	Remarks
1	2	3	4	5	6	7	8	9	10	11=9+10	12

Note : 1st Quarter : January - March
2nd Quarter : April - June
3rd Quarter : July - September
4th Quarter : October - December

Prepared By

Checked By
Assistant Engineer
Date :

Executive Engineer
Date:

For Register

Daily Work Register of Routine Maintenance Work Carried out by Female Workers

District:.....Upazila:.....Month:.....

Road Name:.....Road Length:.....km

Total No. of workers:.....Group No.:.....No. of workers under this Group:.....

Date	Location of Work Chainage From.....to.....	work Code	Quantity of work done				Remarks
			Length (m)	Width (m)	Height/ Depth (m)	Quantity (m^2/m^3)	
1- -							
	Total=						

(1) Cutting shoulder at 5% slope **(2)** Filling low/ depressed shoulder at 5% slope **(3)** Cutting/ clearing drain **(4)** Ditch repair (Rat hole/ Rain-cut/ side slope)
(5) Removal of jungles at shoulder & Slope **(6)** Removal of weeds from abutment and wing walls **(7)** Removal of debris at the inlet/ outlet of bridge/culvert
(8) Caretaking of planted trees **(9)** Turfing **(10)** Stock Piling earth at road shoulder

Monthly Report Form

Monthly Statement of Routine Maintenance Work Carried out by Female Workers

District:.....Upazila:.....Month:.....

Road Name:.....Road Length:.....km

Total No. of workers:.....Group No.:.....No. of workers under this Group:.....

Date	Location of Work	Accomplished Length	Quantity of work done under respective work Code										Remarks
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
1- -													
2- -													
3- -													
4- -													
5- -													
6													
7- -													
8- -													
9- -													
10- -													
11- -													
12- -													
13- -													
14- -													
15- -													
16- -													
17- -													
18- -													
19- -													
20- -													
21- -													
22- -													
23- -													
24- -													
25- -													
26- -													
27- -													
28- -													
29- -													
30- -													
31- -													
	Total=												

(1) Cutting shoulder at 5% slope **(2)** Filling low/ depressed shoulder at 5% slope **(3)** Cutting/ clearing drain **(4)** Ditch repair (Rat hole/ Rain-cut/ side slope) **(5)** Removal of jungles at shoulder & Slope **(6)** Removal of weeds from abutment and wing walls **(7)** Removal of debris at the inlet/ outlet of bridge/culvert **(8)** Caretaking of planted trees **(9)** Turfing **(10)** Stock Piling earth at road shoulder

Signature
Supervisor

Signature
Community Organizer

Signature
SAE (Maint.)

Signature
Upazila Engineer

Monthly Work Plan

Routine Off-pavement Maintenance by LCS Workers

District: …….. Upazila: ……. Month: ……..
Road Name: ……... Road Length: …….km
Total No. of Workers: ……..Group No: …….

Date	Location of Work	Length	* Work Type (as per description below)	Remarks
1-				
2-				
3-				
4-				
5-				
6-				
7-				
8-				
9-				
10-				
11-				
12-				
13-				
14-				
15-				
16-				
17-				
18-				
19-				
20-				
21-				
22-				
23-				
24-				
25-				
26-				
27-				
28-				

* Work Type: Cutting shoulders at 5% slope (2) Filling low/ depressed shoulders (3) Cutting/ clearing drains (4) Ditch filling (rain cut, rat hole, etc) (5) Removal of jungles from shoulders (6) Removal of wide from abutment/ wing walls (7) Removal of debris from in-let/ out-let of bridges/ culverts (8) Caretaking of planted trees (9) Turfing (10) Stock piling of earth at road shoulders

Signature

Supervisor's Name: ……..
Upazila:……..

(This contract agreement must be completed in the Non-Judicial stamp)

Contract Agreement of Maintenance Supervisor of Labour Contracting Society for Routine Off-pavement Maintenance

1st Party : Upazila Engineer, Local Government Engineering Department, _____ Upazila, _____District.
Hereinafter designated as the 1st Party represented by the Upazila Engineer.

2nd Party : Mr./Mrs. _____, Maintenance Sardar/ Supervisor, Address _____
Hereinafter designated as the 2nd Party.

This contract agreement is signed between above mentioned 1st & 2nd party for supervision of off-pavement maintenance work of _____ _____ road at chainage _____ Km to _____ Km by length person system through labour contracting society according to following terms and condition :

1. 2nd party will be responsible to supervise labourers engaged in routine maintenance of aforesaid road. 2nd party shall ensure proper maintenance of following activities that should be included under routine maintenance.

   a) 2nd party shall identify the type of maintenance activity to be done on different segment of the road and get the job done accordingly.
   b) 2nd party shall maintain a register so that SAE(Maint), UE & XEN might have the scope of verifying the inscribed information while visiting the site.
   c) 2nd party shall inform the labourers of the weekly work schedule.
   d) If any problem arise regarding maintenance work, 2nd party shall inform it to Work Assistant or Sub Assistant Engineer(Maint) or if needed to the Upazila Engineer.
   e) 2nd party shall maintain a congenial atmosphere in the team and shall create a favourable condition to resolve any problem evolved.
   f) 2nd party shall always maintain coordination with 1st party and other officials/ staffs.

2. 2nd party shall ensure carrying LGED flags by the maintenance labourers wherever they will be working under him.
3. 2nd party shall not be paid any allowance except Tk. 60/= as consolidated daily wage.
4. If deviations are observed or progress of work is not found satisfactory due to negligence to duty of labourers, 2nd party shall notify 1st party in writing mentioning that the payment to workers of concern road length will not be made.
5. If any labourer remains absent due to illness, a replacement must be made temporarily so that work does not get hampered, since caretaking of trees is included under routine maintenance work. No worker should be allowed to remain absent from work without valid and acceptable reasons.
6. 1st party shall pay the last month's bill of maintenance labourers and sardar/ supervisor within 1st week of every month upon satisfactory performance. Amount of payment shall in no way be more than the total assigned workdays wages.
7. 2nd party shall be compelled to carryout the responsibilities assigned upon him as per above agreement and he shall also be compelled to abide by any action taken against him for violating rules and regulation without taking shelter to law.

This contract agreement is signed on the day of …….…….. in presence of the undersigned witnesses complying with the above terms and conditions.

1st Party	**2nd Party**
Signature & Seal Of Upazila Engineer Date : ____/____/_____	Signature/ thumb impression Of Maintenance Supervisor Date : ____/____/_____

Witnesses :

1. Name : Signature :
2. Name : Signature :
3. Name : Signature :

MONTHLY PROGRESS REPORT FOR ROUTINE MAINT. (OFF-PAVE)
Rural Road and Culvert Maintenance Programme
LOCAL GOVERNMENT ENGINEERING DEPARTMENT
Fin-Year :

Distirct :
Fund Allocation (Tk.) :
Estimated Cost (Tk.) :
Up-to-Date Expenditure (Tk.) :

Reporting Month :
Reporting Date :

SL No	Name of Scheme [Road Code]	Effective Road Length	Gross Estimated Cost (Tk.)	No of Length Person	Name of Supervisor	TOTAL No of Tree Planted	No of Tree Planted in Reporting Month	No of Tree Survived	TOTAL Employment (Person-Days)	Employment (Person-Days) in Reporting Month	Financial Progress		Remarks
											Upto Prv. Month (Tk.)	Upto Reporting Month (Tk.)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14

DISTRICT TOTAL :

PHYSICAL AND FINANCIAL MONTHLY PROGRESS REPORT (Other than OFF-PAVE)
Rural Road and Culvert Maintenance Programme
LOCAL GOVERNMENT ENGINEERING DEPARTMENT
Fin-Year :

Distirct :
Fund Allocation (Tk.) :
Estimated Cost (Tk.) :
Salvage Cost (Tk.) :
Contract Value (Tk.) :
Payable to Contractor (Tk.) :
Up-to-Date Expenditure (Tk.) :

Reporting Month :
Reporting Date :

SL No	Name of Scheme (Upazila) [Road Code]	Effec-tive Road Length	Structure		Gross Estimated Cost (Tk.)	Salvage Cost (Tk.)	Contract Amount (Tk.)	Amount Payable to Contractor (Tk.) [8-7]	Name of Contractor	Date of Signing of Contract	Date of Comple-tion of Contract	Actual Date of Comple-tion	Employ ment (Person -Days)	Phy. Progress		Financial Progress		Remarks
			No	Span (m)										Upto Prv. Month (%)	Upto Report-ing Month (%)	Upto Prv. Month (Tk.)	Upto Reporting Month (Tk.)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

DISTRICT TOTAL :

PHYSICAL AND FINANCIAL CLOSURE REPORT
Rural Road and Culvert Maintenance Programme
LOCAL GOVERNMENT ENGINEERING DEPARTMENT
Fin-Year :

Distirct :
Fund Allocation (Tk.) :
Estimated Cost (Tk.) :
Salvage Cost (Tk.) :
Contract Value (Tk.) :
Payable to Contractor (Tk.) :
Up-to-Date Expenditure (Tk.) :

Reporting Month :
Reporting Date :

SL No	Name of Scheme (Upazila) [Road Code]	Effec-tive Road Length	Structure		Gross Estimated Cost (Tk.)	Salvage Cost (Tk.)	Contract Amount (Tk.)	Amount Payable to Contractor (Tk.) [9-8]	Name of Contractor	Start Date as per WO	Date of Comple-tion as per WO	Revise Date of Comple-tion	Actual Date of Start	Actual Date of Completion	Phy. Prog. (%)	Final Bill Amount (Tk.)	Remarks
			No	Span (m)													
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
DISTRICT TOTAL :																	

LGED Maintenance Program FY 2009-2010: Summary Status Report

District : Rangpur

In Taka | **As on 31 May, 2010**

Component	No. of Schemes	Approved Estimated Cost	Appvd./Contract Amount	Av. Physical Progress (%)	Amount Spent	Amount Required	Remarks
GOB MAINT.							
A. CARRIED OVER [2008-2009]							
Road	5	3,623,134	3,623,134	100%	3,520,629	-	5=100%; 5= FBP
Structure	9	1,211,979	1,211,979	100%	1,203,841	-	9=100%; 9= FBP
Sub-Total	**14**	**4,835,113**	**4,835,113**		**4,724,470**	-	
B. ROUTINE MAINT. [2009-2010]							
Off-Pavement	33	9,313,699	9,313,699		7,653,059	1,637,240	Up to April 2010
On-Pavement	1	1,000,000	962,104	85%	823,499	138,605	Work in progress
Emergency Maint.	3	702,906	226,041	100%	226,041	476,865	1 scheme FBP; 2=RFQ
Sub-Total	**37**	**11,016,605**	**10,501,844**		**8,702,599**	**2,252,710**	
C. PERIODIC MAINT. [2009-2010]							
Re-seal	4	8,976,935	8,528,088	100%	8,525,755	-	4=100%; 4=FBP;
Overlay	19	40,757,803	39,307,688	86%	17,388,923	21,331,032	19=100%; 8=FBP;
Rehabilitation	-	-	-	0%	-	0	-
Other Structure	9	6,062,635	5,759,503	98%	2,052,644	3,706,859	9=100%; 1=FBP;
Sub-Total	**32**	**55,797,373**	**53,595,279**		**27,967,322**	**25,037,891**	
GoB Maint. Total:	**83**	**71,649,091**	**68,932,236**	**-**	**41,394,391**	**27,290,601**	
GoB Fund Released:		**60,250,000**		**Unspent:**	**18,855,609**	**8,434,992**	**Demand by 30 June**
JDCF							
A. CARRIED OVER [2008-2009]							
Road Rehab	9	31,629,875	31,629,875	100%	30,676,283	266,718	9=100%; 8=FBP;
Structure	0	-	-	0%		0	
Sub-Total	**9**	**31,629,875**	**31,629,875**		**30,676,283**	**266,718**	
B. Road/Structure [2009-2010]							
Road Rehab	3	11,256,492	10,693,668	73%	1,823,717	8,869,951	2=100%; 1=Ongoing;
Structure	0	-	-	0%	-	0	
Sub-Total	**3**	**11,256,492**	**10,693,668**		**1,823,717**	**8,869,951**	
JDCF Total:	**12**	**42,886,367**	**42,323,543**		**32,500,000**	**9,136,669**	
JDCF Fund Released:		**41,244,153**		**Unspent:**	**8,744,153**	**392,516**	**Demand by 30 June**

XEN LGED Rangpur Comments:

1.1 Carried Over (Road): All **5** schemes **100%** completed and Final Bill Paid;

1.2 Carried Over (Structure): All **9** schemes **100%** completed and Final Bill Paid;

2.1 Off-Pavement: LCS paid upto **April 2010**;

2.2 On-Pavement: Works on-going

2.3 Emergency Maintenance: 1S-100% completed and Final Bill Paid to Contractor; **2=RFQ under process;**

2.4 Re-seal: All **4S** Contract signed; **4=100%; 4=Final Bill Paid;**

2.5 Overlay: All **19S** Contract signed; **19=100%; 8=Final Bill Paid;**

2.6 Structure: All **9S** Contract signed; **9=100%; 1=Final Bill Paid;**

3.1 JDCF Carried Over (Road Rehab): All **9** schemes-**100%** completed, **8 schemes final bill paid; 1 schemes final bill not paid**

3.2 JDCF 2009-10 (Road Rehab): Out of 3 schemes 2=100%; 1=Ongoing;

GOB Fund Released: 07-09-2009: Tk.2,47,50,000/-; 11-02-2010: Tk.1,00,00,000/-; 04-04-2010: Tk.75,00,000/-; 24-05-2010: Tk.1,50,00,000/-; 31-05-2010: Tk.30,00,000/-; **Total Fund Released Tk. 6,02,50,000/-**

JDCF Fund Released: 07-10-2009: Tk.1,75,00,000/-; 11-02-2010: Tk.1,50,00,000/-; 31-05-2010: Tk.87,44,153/- **Total Fund Released Tk.4,12,44,153/-**